

End Semester Examination, May 2019

B. Tech. – First Semester

APPLIED PHYSICS-I(PH-101B)

Time: 3 hrs.

MaxMarks:**100**

No. of pages:**1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is population inversion in Laser? **2×10**
b) Discuss important applications of Laser.
c) Explain the terms: Numerical aperture and acceptance angle.
d) Elaborate Attennation in optical fibers.
e) Write inverse lorentz transformation equations.
f) Differentiate between Inertial and non-inertial frames of reference.
g) Write Poisson's and Laplace equations.
H) Define electric field intensity and electric potential.
i) Explain Piezoelectricity.
j) What is Sabine's formula?

PART-A

- Q.2 a) Discuss Einstein's coefficients. Derive the relations between them. **10**
b) Explain in detail the construction and reconstruction of image on a hologram. **10**
- Q.3 a) What is an optical fiber? Classify different types of fibers on the basis of modes of propagation and refractive index. **10**
b) Enumerate the merits of optical fiber. **5**
c) A light ray enters from air to fiber. The refractive index of air, core and cladding are 1, 1.5 and 1.48 respectively. Find the critical angle and numerical aperture. **5**
- Q.4 a) Derive Lorentz transformation equations for space and time. **10**
b) Explain and establish mass energy equivalence relation $E=mc^2$. **6**
c) What would be the mass of a particle, having rest mass 10^{-20} kg, when it moves with a speed of 2×10^8 m/s? **4**

PART-B

- Q.5 a) Derive an expression for curl of electrostatic field. Give its physical significance. **7**
b) Solve one dimension Laplace eq. to obtain the expression for capacitance of a parallel plate capacitor. **7**
c) Given a potential of the form $V = \frac{A}{r} + B$, where A and B are constants and r is position vector. Check, if the potential satisfies Laplace equation. **6**
- Q.6 a) Derive Clausius – Mossotti equation for dielectrics. **6**
b) What happens when a dielectric is placed in an alternating electric field? Explain. **6**
c) What is electric polarization? Explain different types of polarization. **8**
- Q.7 a) Discuss how piezoelectric generators are used to produce ultrasonic waves. **8**
b) What is absorption coefficient? Explain how to determine the absorption coefficient for a hall? **4**
c) Define the reverberation time? Discuss its importance for the design of an acoustically good hall. **8**

End Semester Examination, May 2019

B. Tech. – First Semester

APPLIED PHYSICS-I (PH-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Discuss LASER pumping.
- b) What is an optical fiber?
- c) Enumerate the advantages of an optical fiber.
- d) What do you understand by a black body?
- e) Write Fermi-Dirac distribution formula.
- f) State postulates of special theory of relativity.
- g) Define electric field strength
- h) Discuss Gauss' law in electrostatics
- i) What are dielectrics? Give examples.
- J) Write about pair-production.

2x10

PART-A

- Q.2** a) Discuss Einstein's coefficients. Derive the relation between them. **8**
 b) Explain different types of optical fiber on the basis of mode of propagation and index **8**
 c) Calculate the numerical aperture and acceptance angle of optical fiber having core and cladding refractive index 1.62 and 1.52 respectively. **4**
- Q.3** a) What is Compton Effect? Show that the change in wavelength of a photon is given by $\lambda' - \lambda = \frac{h}{m_0 c} (1 - \cos \phi)$ where ϕ is the angle at which photon is scattered. **12**
 b) Derive time independent Schrodinger wave equation. **8**
- Q.4** a) Write down Lorentz Transformation equations and hence explain length contraction and Time dilation. **10**
 b) Differentiate between Inertial and non inertial frames of reference. **5**
 c) What would be the mass of a particle, having rest mass 10^{-20} kg, when it moves with a speed of 2×10^8 m/s? **5**

PART-B

- Q.5** a) Define electric potential and show that electric field is negative gradient of electric potential. **5**
 b) Give the solution of one dimensional Laplace equation for the capacitance of a parallel plate capacitor. **10**
 c) Find the divergence and curl of vector $\vec{V} = yz^2 \hat{y} + xz \hat{z}$. **5**
- Q.6** a) Discuss the behavior of a dielectric in an alternating electric field. **6**
 b) Establish the relation between three electric vectors \vec{E} , \vec{P} and \vec{D} . **7**
 c) Explain different types of polarization in dielectrics. **7**
- Q.7** a) Discuss the interaction of light charged particles with matter. **8**
 b) Describe the principle construction and working of G.M counter. **12**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

FLIGHT DYNAMICS (AE-824A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- Define the ground axes system.
- Explain the term stick fixed neutral point and give its relation.
- What are the different modes of longitudinal motion with respect to dynamic stability?
- Write the equations of motion for lateral directional dynamic stability.
- Explain briefly how stability of an aircraft can be determined from roots of the characteristic equation of the system.
- Explain briefly the function of aircraft longitudinal autopilot.

4×5

PART-A

- Q.2** a) What are aerodynamic hinge moments? Derive the expression for hinges moment coefficient and explain floating and restoring tendencies. **15**
 b) Derive the expression for pitching moment due to horizontal tail. **5**
- Q.3** a) Explain the term stick free static stability, and derive the expression for stick free neutral point. **15**
 b) Compare and contrast directional and lateral static stability, give criterion for equilibrium for both. **5**
- Q.4** a) Compare and contrast long period and short period modes. **10**
 b) Explain small perturbation theory, and write the longitudinal equation of motion along with small perturbation form of equations. **10**

PART-B

- Q.5** a) What are the characteristics of the following modes of stability in an aircraft?
 i) Roll mode.
 ii) Dutch roll mode.
 iii) Spiral mode. **15**
 b) For the given characteristic equation:

$$\Delta s = s^4 + 1.326s^3 + 1.219s^2 + 1.096s - 0.015 = 0$$

 Check the stability of aircraft system based on Routh Hurwitz Criterion. **5**
- Q.6** For the dynamic system given below:
 Check the controllability and observability of the system. Also explain the terms by giving criterion for controllability and observability.

$$\dot{x} = Ax + B\eta$$

$$y = Cx + D\eta$$

 where $A = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, $C = [1 \ 0]$, **20**
- Q.7** Determine the feedback gains so that the airplane's short period characteristics are $\lambda_{sp} = -2.1 \pm 2.14i$. Assume that the original short period dynamics are given by

$$\begin{bmatrix} \Delta\dot{\alpha} \\ \Delta\dot{q} \end{bmatrix} = \begin{bmatrix} -0.334 & 1.0 \\ -2.52 & -0.387 \end{bmatrix} \begin{bmatrix} \Delta\alpha \\ \Delta q \end{bmatrix} + \begin{bmatrix} -0.027 \\ -2.6 \end{bmatrix} [\Delta\delta_e]$$

20

End Semester Examination, May 2019

B. Tech. – Eighth Semester

INTRODUCTION TO WIND ENERGY (AE-825A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- a) How wind, as a power source, is created and what factors affect the wind power?
- b) What do you understand by inter-connected systems and dispersed applications of wind turbines?
- c) Define capacity factor. What do you understand by economies of scale in respect of wind turbine design?
- d) What are the various wind energy storage options that are considered for providing uninterrupted power supply?
- e) What different methods are used for controlling the power output of wind turbines?
- f) How do you summarize the features of suitable sites for installing wind machines?
- g) If η_g and η_b are the generator efficiency and gear box efficiency respectively, and C_p is the power coefficient, write how is electrical power output from generator related to the power available in the wind.

4×5

PART-A

Q.2 a) Explain the working of a vortex tower design of a VAWT. Draw a neat sketch of a vortex tower. Explain how the size of the vortex tower contributes to increased output of the VAWT installed in the system. **10**

b) What are the characteristics of Darrieus wind turbine that make it a suitable choice as a wind turbine? **10**

Q.3 a) What are the essential concepts of momentum theory for studying the performance of wind turbines? **5**

b) What is Betz' limit? Derive the value of Betz limit by applying momentum theory treatment to the flow through a wind turbine rotor. **15**

Q.4 a) Explain the following plots:

- i) Torque-speed curve,
- ii) Power density variation with wind speed,
- iii) Wind frequency distribution plot and
- iv) Annual wind energy yield of a particular site,

8

b) What are 'active stall power control' and 'passive stall power control' methods of controlling power? **12**

PART-B

Q.5 a) Explain, with the help of sketches / block diagrams, the pumping applications of wind energy. **10**

b) Show with the help of plots, how the wind velocity is found to vary with height from the ground level, if the site has features like:

- i) Tall buildings,
- ii) Trees and houses, and
- iii) Water surface and plains.

10

- Q.6 a) What are the major impacts of the use of wind energy systems on the environment?
Explain how these can be controlled. **10**
- b) Explain the meaning of waste fraction as a market leverage factor. **10**
- Q.7 a) What are the various aspects of cost of wind energy that are considered in the design process? **10**
- b) Define:
i) Wind fraction.
ii) Water saver mode of operation.
iii) Fuel saver mode of operation. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

FLIGHT MECHANICS-II (AE-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following questions:

- a) Define the terms stick free static stability.
 - b) What is the function of frise aileron and tabs?
 - c) What do you understand by stick force gradients? Give the expression for the same.
 - d) Explain the term weather cock effect.
 - e) What is dihedral effect?
 - f) Differentiate between static and dynamic stability in terms of the parameters analysed to determine them.
- 4×5**

PART-A

- Q.2** a) Derive the expression for stick fixed neutral point and static margin. **15**
 b) Explain the process of in-flight measurement of stick fixed neutral point. **5**
- Q.3** a) Derive the expression for aerodynamic hinge moment. **10**
 b) What are floating and restoring tendencies? **10**
- Q.4** a) A airplane has the following characteristics. Obtain the movement of the neutral point on freeing the stick
 Wing : $S=39 \text{ m}^2$, $C_{L\alpha\omega} = 4.6 \text{ rad}^{-1}$
 Tail : $S_t = 4.6 \text{ m}^2$, $l_t = 7.6 \text{ m}$, $V_H = 0.55$
 $\frac{dC_{Lt}}{d\delta e} = 1.9 \text{ rad}^{-1}$, $\frac{d}{d\alpha} = 0.39$, $\eta = 0.98$
 $C_{hat} = -0.008 \text{ deg}^{-1}$, $C_{hoe} = -0.013 \text{ deg}^{-1}$. **15**
 b) Explain the method for in flight measurement of stick free neutral point. **5**

PART-B

- Q.5** a) What is asymmetric flight? Give the condition for minimum control speed. **10**
 b) What do you understand by directional stability and control? Explain rudder lock. **10**
- Q.6** a) Explain the contribution of vertical tail and wing to $C_{I\beta}$. **15**
 b) What is the criterion for stabilizing dihedral effect? **5**
- Q.7** a) What is the necessary condition for longitudinal dynamic stability? **5**
 b) Derive the expression for the spring mass damper system and discuss the condition for overdamped, underdamped and critically damped systems. **15**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

VIBRATION AND AERO ELASTICITY (AE-801)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Attempt the following questions:

- Explain flutter phenomenon.
- Define the following: Transmissibility, resonance, free vibration, force vibration, Natural frequency.
- Briefly explain various aeroelastic problems.
- What are the vibration measuring instruments?
- Write down formula to calculate logarithmic decrement.

4×5

PART-A

Q.2 a) What is divergence speed? Derive the expression for divergence speed in case of wing torsional divergence for two dimensional wings. 10

b) **What is aileron reversal speed? Derive the expression for aileron reversal speed in case of two-dimensional wing.** 10

Q.3 A damped vibrating system consisting of 100 kg mass executes 10 oscillations in 5 sec. The amplitude of vibration decreases to one-eighth of the initial value after 6 complete oscillations. Determine logarithmic decrement, damping factor, damping co-efficient and spring stiffness. 20

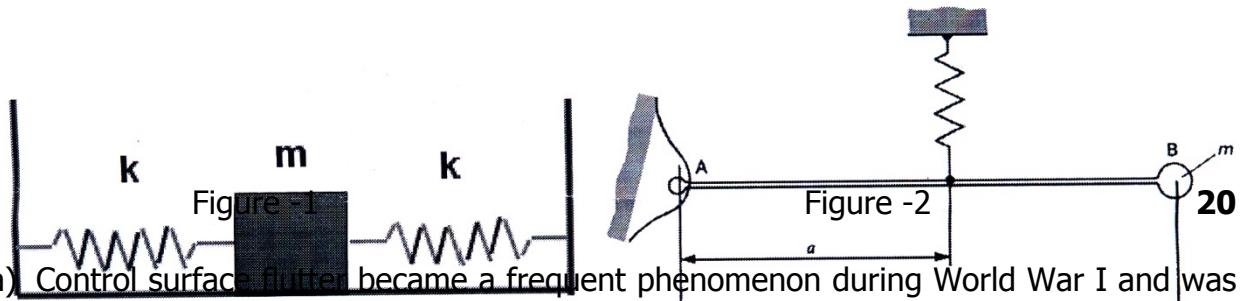
Q.4 a) **Derive the expression for response of a rotating and reciprocating unbalanced system.** 10

b) **Find the natural frequency of the system shown in figure -1. Given that K=10 N/m, m=100 kg.** 10

PART-B

Q.5 Derive an expression for transmissibility. Explain its importance and applications. 20

Q.6 A link AB in a mechanism is a rigid bar of uniform section 0.3 m long. It has a mass of 10 kg, and a concentrated mass of 7 kg is attached at B. The link is hinged at A and is supported in a horizontal position by a spring attached at the mid-point of the bar. The stiffness of the spring is 2 kN/m. Find the frequency of small free oscillations of the system. The system is shown in figure 2.



Q.7 a) Control surface flutter became a frequent phenomenon during World War I and was solved by placing a mass balance around the control surface hinge line. Critically analyze the problem of flutter and mechanics of remedies measures adopted. 10

b) With the help of plots of modal frequency v/s airspeed and modal damping v/s airspeed for bending and torsion loads, explain the stability regimes around flutter speed. 10

End Semester Examination, May 2019

B. Tech. — Third Semester

BASICS OF AERONAUTICAL ENGINEERING (AE-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Attempt the following questions:

- a) What do you mean by flight vehicle? List out the various kinds of flight vehicles.
- b) Sketch a plan view of an aircraft detailing all control surfaces.
- c) Define aerodynamic centre and static margin.
- d) What functions are performed by a localizer and glide slope in ILS?
- e) What do you understand by stressed skin and pressure bulkhead?

4×5

PART-A

Q.2 a) Classify various types of flight vehicles based on the operation domain, source of lifting force and the operator for flying. Discuss prominent features of each type. **14**
b) What are slat and slot? How do they help in increasing lift? **6**

Q.3 a) Discuss various types of trailing edge high lift devices that are normally used on modern aircraft. Draw suitable sketch of each type to explain their function. **10**
b) Define "Stability". Explain the concept of longitudinal, lateral and directional stability. **10**

Q.4 a) Classify various types of piston engines used in aircraft. **6**
b) What types of propulsion systems are used in space vehicles? **6**
c) What do you understand by staging of rockets? Why do we use staging of rockets? **20**

PART-B

Q.5 a) What are the traditional materials used in aircraft structures? What are the key material properties that are pertinent to maintenance cost and structural performance? **12**
b) Discuss the V-n diagram and explain its usefulness as a flight envelope. **8**

Q.6 Explain the basic fuel system requirements. What are the basic types of aviation fuels used? Draw a system diagram of basic fuel system used in an aircraft and explain its operation **20**

Q.7 a) With the help of a block diagram, explain how ADF provides information about the direction of location of a flying aircraft. **10**
b) What are the frequency band widths for operation of ADF, VOR, ILS and GPS? Write briefly the purpose served by these navigation aids. **10**

End Semester Examination, May 2019

B. Tech. (Aeronautical) — Fourth Semester

AIRCRAFT PROPULSION-I (AE-403)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following question:

- a) Write the expression for the advance ratio for a propeller.
- b) If incoming flow Mach number is greater than 1 and duct in which the flow is entering is convergent. Then will this duct act like diffuser or nozzle? If incoming flow Mach number is less than 1, how this duct will act like?
- c) In normal shock wave, oblique shock wave and flow with heat addition what happens to total temperature and total pressure (increase, decrease or constant)?
- d) Draw the valve timing diagram for four stroke SI engine.
- e) Write down area velocity relation.
- f) Draw p-v diagram for a diesel cycle.
- g) An aircraft is moving very near to sea level with speed of 300 Km/Hour. It is equipped with an air breathing engine which has inlet diameter 1 m. Calculate the mass flow rate of air moving through the engine.
- h) Explain the importance of air-intake (diffuser) in an air breathing propulsion system.
- i) Draw schematic diagram of supersonic wind-tunnel. Also show the variation of pressure across it.
- j) What is specific thrust and thrust specific fuel consumption of gas turbine engine?

2×10

PART-A

Q.2 a) Draw a schematic of a turbofan engine and explain its working. Draw the T-S and the P-V plots and explain the Brayton cycle for this engine. **10**

- b) Draw the Schematic diagram and T-S diagram of Ramjet engine and explain its working. Write down the advantages and disadvantages of the Ramjet engine. **10**

Q.3 In a diesel cycle, the compression ratio is 13. Compression begins at 0.2 MPa, 45°C. The heat added is 1.675 MJ/kg. Find out:

- a) The maximum temperature in the cycle.
- b) Work done per kg of air.
- c) The cycle efficiency.
- d) The temperature at the end of the isentropic expansion.
- e) The cut-off ratio.
- f) The mean effective pressure of the cycle.

20

Q.4 In a turbojet unit with forward facing ram intake, the jet velocity relative to the propelling nozzle at exit is twice the flight velocity. The unit develops the thrust of 25000N under the following conditions:

Ambient pressure and temperature: 0.7 bar; 1°C

Compression total head pressure ratio: 5:1

Flight speed: 800 km/h

CV of fuel: 42000 kJ/kg

Ram efficiency: 100%

Isentropic efficiency of compressor: 85%

Isentropic efficiency of turbine: 90%

Isentropic efficiency of nozzle: 95%

Combustion efficiency: 98%

Turbine pressure ratio: 2.23

Assume mass flow of fuel is small compared with the mass flow of air and that the working fluid throughout has properties of air at low temperature. Neglect the extraneous pressure drop. Assume $C_{pg} = C_{pa} = 1.005 \text{ KJ/kg K}$. Determine the following parameters:

- Turbine inlet temperature.
- Rate of fuel consumption in kg/s.
- Mass flow rate of air in kg/s.

20

PART-B

- Q.5 An aircraft cruises at 644 km/hr speed at sea level, is powered by a 3-bladed propeller rotates at 1300 rpm, and is supplied 1491.5 kW of power. The propeller is designed with blades of NACA blade sections. Compute the propeller diameter and the efficiency of the propeller at this operating condition. If the propeller is a variable pitch propeller what would be its efficiency at 161 km/hr. use design chart to find advance ratio, blade angle and propeller efficiency, (design chart is attached) 20
- Q.6 a) Air flowing in a duct has a velocity of 250 m/s, pressure of 1.0 bar and temperature 300 K. Taking $\gamma = 1.4$ and $R = 287 \text{ J/kg K}$ determine:
i) Stagnation pressure and temperature.
ii) Velocity of sound in the dynamic and stagnation conditions. 5x2
b) A normal shock wave is standing in the test section of a supersonic wind tunnel. Upstream of the wave, $M_1 = 2$, $p_1 = 0.5 \text{ atm}$, and $T_1 = 250 \text{ K}$. Find M_2 , p_2 , T_2 and u_2 (velocity) downstream of the wave. 10
- Q.7 An aircraft flies at 800 km/hr at an altitude of 10000 meters ($T=223.15 \text{ K}$, $p= 0.264 \text{ bar}$). The air is reversibly compressed in an inlet diffuser. If the Mach number at the exit of the diffuser is 0.36 determine:
a) Entry Mach number.
b) Velocity, pressure and temperature of air at the diffuser exit. 10x2

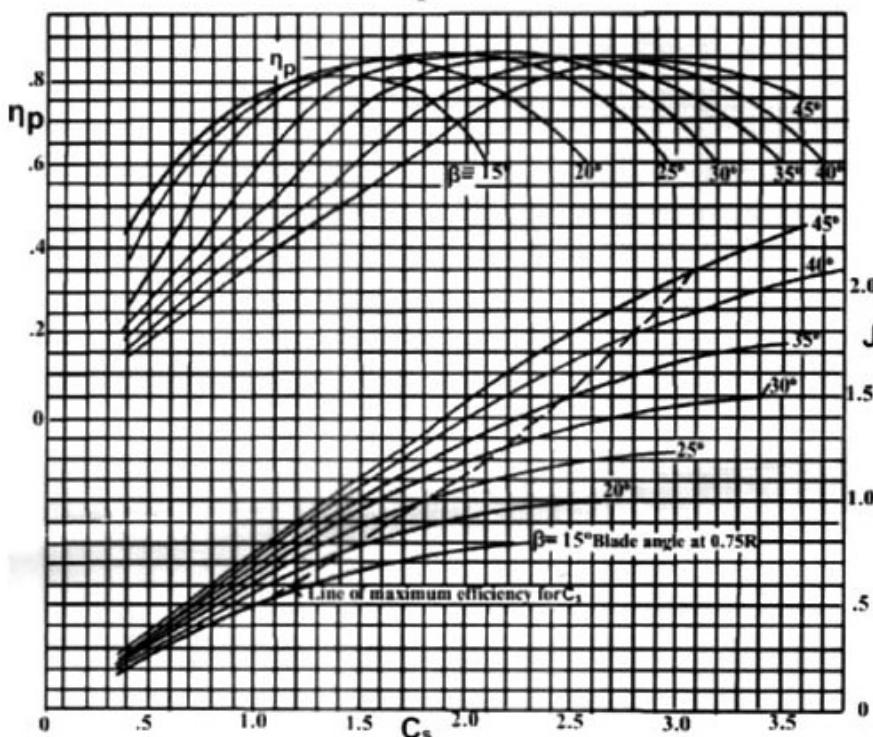


Fig 4.5c Design chart

End Semester Examination, May 2019

B. Tech. (Aeronautical) — Fourth Semester

AIRCRAFT STRUCTURES-I (AE-402A)

Time: 3 hrs.

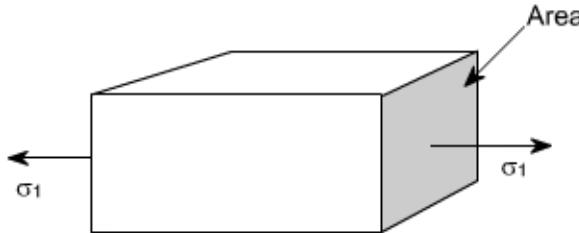
Max Marks: **100**

No. of pages: **3**

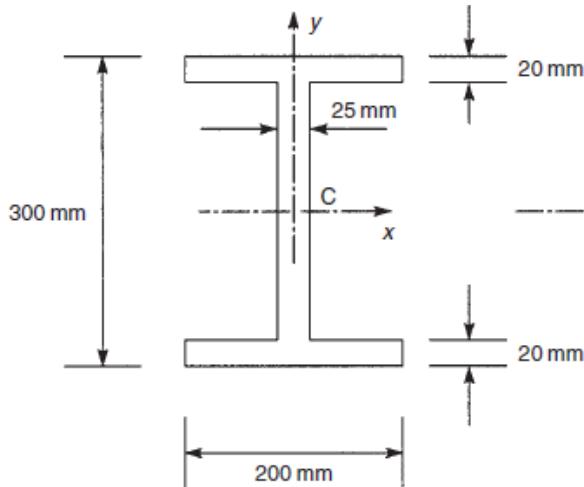
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following question:

- Write down expressions for internal virtual work:
 - Due to axial force F.
 - Due to bending moment M.
- Write down the zero and nonzero direct and shear strains with formulas for plain strain condition. What are the nonzero stresses for plane strain condition?
- Write down equilibrium equations for the case of plane stress? What are the unknowns in solving three-dimensional deformable body problem in aircraft structures?
- Draw Mohr's stress circle in two-dimensional plane for the state of stress given in figure.



- Define "Strain Energy".
- Write down the principle of virtual work.
- What is castigliano's first theorem?
- Find area moment of inertia of I section about X-X axis of figure.

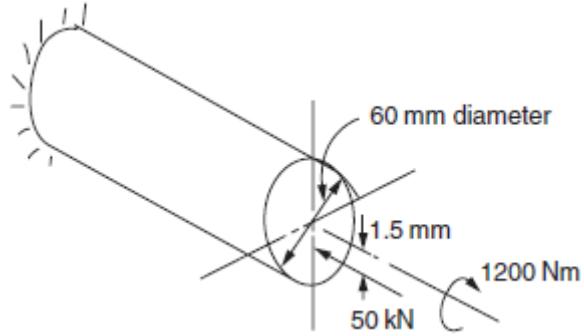


- What do you mean by limit load and Ultimate load of any structure?
- Write flexural and torsional formula.

2×10

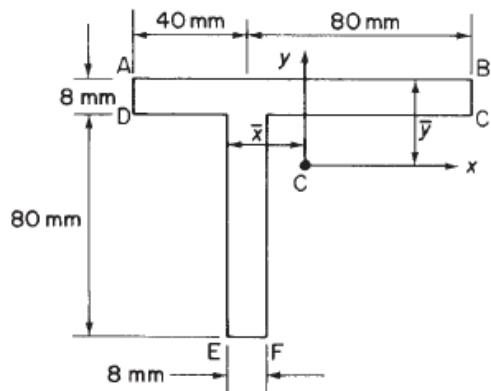
PART-A

- Q.2 What are principal stresses? A cantilever beam of solid, circular cross-section supports a compressive load of 50 kN applied to its free end at a point 1.5 mm below a horizontal diameter in the vertical plane of symmetry together with a torque of 1200 Nm shown in the figure. Calculate the direct and shear stresses on a plane inclined at 30 to the axis of the cantilever at a point on the lower edge of the vertical plane of symmetry.



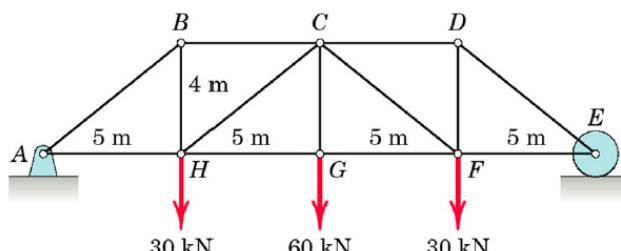
20

- Q.3 A beam having the cross-section shown in the figure is subjected to a bending moment of 1500Nm in a vertical plane. Calculate the maximum direct stress due to bending stating the point at which it acts.



20

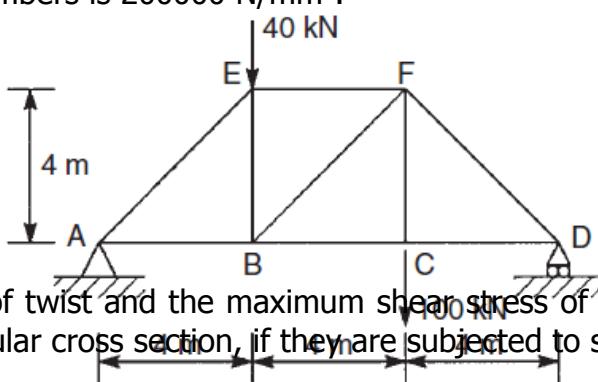
- Q.4 Determine the force in each member of the loaded truss by Method of Joints shown in the figure. Is the truss statically externally determinate? Is the truss statically internally determinate? Are there any zero force members in the truss?



20

PART-B

- Q.5 Calculate the vertical deflection of the joint B in the truss shown in the figure. The cross-sectional area of each member is 1800 mm² and Young's modulus, E for the material of the members is 200000 N/mm².

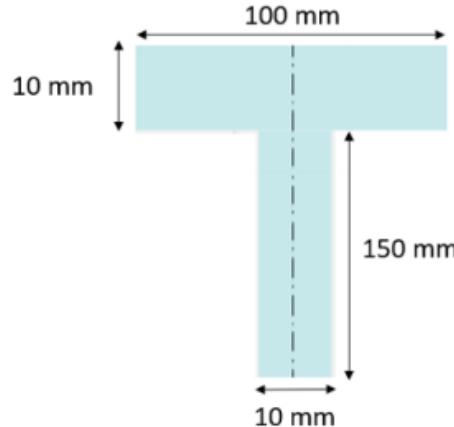


20

- Q.6 a) Compare rate of twist and the maximum shear stress of open circular cross section and closed circular cross section, if they are subjected to same torque.

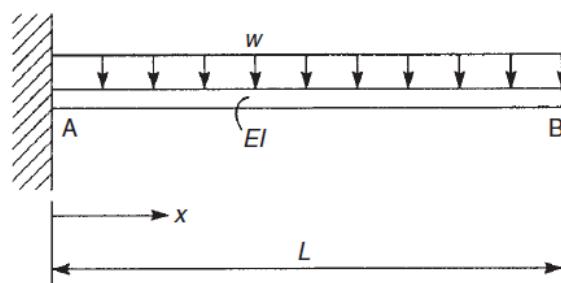
10

- b) A T section shown in the figure with flange 100×10 mm, Web 150×10 mm is subjected to a torque of 200Nm . Find the maximum shear stress. Given that modulus of rigidity, G is 82 Gpa .



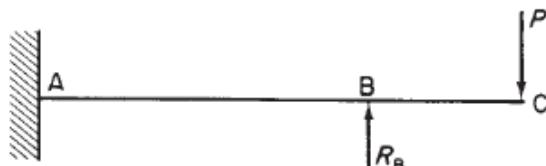
10

- Q.7 a) Determine the vertical deflection and slope of the free end of the cantilever beam shown in the figure using unit load method of virtual work.



10

- b) Find the value of support reaction R_B in propped cantilever shown in the figure by the method of complementary energy. The value of load p is 10 kN . Length of the cantilever is L and distance between point B and C is $L/4$.



10

End Semester Examination, May 2019

B. Tech. (Aeronautical) — Sixth Semester

AIRCRAFT DESIGN (AE-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions

- What is fineness ratio? What is its value for an aircraft with smaller empennages and lower tail drag?
- Analyze the difference between turboprop and turbofan engines in reference to airframe power plant integration.
- Explain the concept of rubber engine.
- List out FAR requirements in the calculation of landing gear loads.
- Briefly explain the stages of conceptual design for designing a new aircraft.

4×5

PART-A

Q.2 a) List out various factors required to be considered to finalize configuration of an aircraft. Briefly explain any two. **12**

- Briefly explain features of unmanned aerial vehicles. **8**

Q.3 a) With suitable examples, explain various design considerations to decide on the vertical location of the wing by analyzing mission requirements of the aircraft you are required to design. **10**

- Critically analyze the role of stall characteristics in airfoil selection explaining different types of stall required to be considered during aircraft design process. **10**

Q.4 Plot the combined Vn diagram for the following acrobatic ac:

Mass= 2300 kg Wing Area= 18 m² Max Lift Coefficients = +3 and -1.4

Cruise Speed = 320 KEAS at 3 Km AMSL Aspect Ratio = 6.8

Lift Curve Slope = 6.31 /rad **20**

PART-B

Q.5 a) Explain the concepts of fuselage stations, wing stations, butt lines and water lines to prepare the 3 - view drawing to decide the structural layout during aircraft design process. **12**

- Briefly analyze various primary and secondary loads required to be considered during the load and load path analysis of a structural layout. **8**

Q.6 a) What is the purpose of a landing gear system in an aircraft? List out its important components. **7**

- With the help of a diagram briefly explain the landing gear retraction system working on hydraulic power. **7**

- With suitable diagram, explain tow in- tow out and camber adjustments on an aircraft. **6**

Q.7 a) With the help of appropriate non-dimensional parameters briefly analyze the concept of tail volumes to size horizontal and vertical tails during the preliminary design process of a fixed wing aircraft. **8**

- During design of LCA Mk II aircraft by the Aircraft Development Agency (ADA), the General Electric engine F 414 (thrust 22000 lb) was planned with the following parameters:

Length 3.91 meters, Dia 35 inches, Weight 2445 pounds.

The aerodynamics and mission system groups of the design team have intimated a higher thrust requirement of 110 KN. In view of the difference in the required and

actual thrust of the nominal engine, estimate the aero engine parameters required to be considered during the airframe - engine integration of the LCA Mk II. **12**

End Semester Examination, May 2019

B. Tech. (Aeronautical) — Fourth Semester

AERODYNAMICS-I (AE-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (any five) of the following:

- a) Consider an airfoil in a flow with a free stream velocity of 150 ft/s. The velocity at a given point on the airfoil is 225 ft/s. Calculate the pressure coefficient at this point.
- b) Consider a thin flat plate at 5° angle of attack. Calculate the:
 - i) Lift coefficient.
 - ii) Moment coefficient about the leading edge.
 - iii) Moment coefficient about the quarter chord point.
- c) Define "Biot-Savart Law". Apply this law to obtain velocity induced at a point by an infinite straight vortex filament.
- d) Work out an expression for displacement thickness of a boundary layer. Discuss the concept of effective body?
- e) Name the combination of high lift systems which provides the maximum value of lift coefficient at a typical angle of attack and justify your answer.
- f) What is downwash? Explain its effect on the local flow over an airfoil section of a finite wing.

4×5

PART-A

Q.2 a) Explain how from the consideration of pressure distribution and shear stress distribution over an airfoil, we arrive at the lift and drag forces per unit span and pitching moment about the leading edge per unit span. **10**

b) Consider an airfoil in a flow at standard sea level conditions with a free stream velocity of 50 m/s. At a given point on the airfoil, the pressure is 0.9×10^5 N/m². Calculate the velocity at this point. **10**

Q.3 a) Derive the fundamental equation of thin airfoil theory. Show that for thin symmetrical airfoil, $c_l = 2\pi\alpha$ and $c_{m,le} = c_l / 4$. Define aerodynamic center and center of pressure. **5**

b) Consider the following data for the NACA 2412 airfoil: $c_l = 0.64$, $c_{m,c/4} = -0.036$. Calculate the lift and moment per unit span about the quarter chord for this airfoil when the free stream is at standard sea level conditions with a velocity of 20 m/s. The chord of the airfoil is 60 cm. **15**

Q.4 What is the elliptical distribution of circulation? Use the under mentioned equation of downwash velocity induced at y_0 by all the entire trailing vortex sheet as per Prandtl's lifting line theory $w(y_0) = -\frac{1}{4\pi} \int_{-b/2}^{b/2} \frac{(d\Gamma / dy)dy}{y_0 - y}$ to derive an expression for downwash angle $\alpha_i = \frac{C_L}{\pi AR}$. **20**

PART-B

Q.5 a) Consider a finite wing of simple plan form with different span wise airfoil sections whose experimental data are known. Write the steps of non-linear lifting-line method for finite wings for obtaining lift and induced drag coefficients based on the Prandtl's classical lifting-line theory. **12**

- b) Derive expressions for local skin friction coefficient and displacement thickness for incompressible, two-dimensional flow over a flat plate at 0° angle of attack in terms of local Reynolds number Re_x . Assume Blasius equation solutions $f''(0) = 0.332$ and $\eta_1 - f(\eta) = 1.72$. **8**

Q.6 Consider the incompressible, two-dimensional flow over a flat plate at 0° angle of attack. Derive the Blasius equation for incompressible flow over the flat plate using the transformation $\xi = x$, $\eta = y\sqrt{\frac{V_\infty}{vx}}$ and defining stream function as $\Psi = \sqrt{vxV_\infty} f(\eta)$. **20**

Q.7 a) Discuss the methods used for achieving the boundary layer control with emphasis on the physics of flow and relevant applications of such methods. **10**
b) What are the various types of drag? What factors affect the occurrence of drag? Plot a typical drag polar and discuss the terms that contribute towards the shape of the drag polar. **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

NUMERICAL METHODS AND OPTIMIZATION TECHNIQUES (MA-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- Find relative and percentage error of the number 8.6, if both the digit are correct.
- State intermediate value property. Write the interval in which the root of the following equation lies $x \log_{10} x - 1.2 = 0$.
- Write normal equation of the curve $y(x) = a + bx + cx^2$.
- Write Normal equation for Runge-Kutta method of 4th order for the equation $\frac{dy}{dx} = f(x, y); y(x_0) = y_0$.
- Write Newton's iterative formula to find \sqrt{N} .
- Using graphical method, maximize $Z = 2x_1 + 3x_2$ subject to the constraints:
 $x_1 + x_2 \leq 30$;
 $x_2^3 \leq 3; 0 \leq x_2 \leq 12$;
 $x_1 - x_2^3 \leq 0; 0 \leq x_1 \leq 20$
- Solve $x + y = 2$ and $2x - 3y = 5$ by Gauss-elimination method.
- Prove that $dE^{\frac{1}{2}} = D$.

2½×8

PART-A

Q.2 a) Using Lagrange's interpolation formula, find $y(5)$ for the following table:

$x :$	1	2	3	4	7
$y :$	2	4	8	16	128

10

b) Fit a straight line by using the principle of least squares to the following data:

$x :$	1	2	3	4	5
$F(x) :$	0.5	2.0	4.5	8.0	12.5

10

Q.3 a) Find a root of $x^3 - x - 11 = 0$ correct to 4 decimal place using bisection method. **10**
b) Find the fourth root of a positive no. N, hence find $\sqrt[4]{32}$. **10**

Q.4 a) Solve the following equations by Gauss Seidal method correct to 3 decimal places:

$$-x + 6y + 27z = 85$$

$$-2x + 15y + 6z = 72$$

$$54x + y + z = 110$$

10

b) Using power method, determine the largest Eigen value and the corresponding Eigen vector of the matrix:

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

10

PART-B

- Q.5 b) Evaluate the integral $\int_1^8 \frac{e^x + e^{-x}}{2} dx$ by Simpson's 1/3rd rule taking $h = 0.2$. **10**

- a) Find $f'(10)$ from the following data:

$x :$	3	5	11	27	34
$f(x) :$	-13	23	899	17315	35606

10

- Q.6 a) Using RK-method of 4th order find $y(0.2)$ given that $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$, taking $h = 0.1$. **10**

- b) Compute $y(0.2)$ correct to 4 decimal places from the Taylor's series solution of the equation $yy' = y^2 - 2x$; $y(0) = 1$. **10**

- Q.7 Solve the following L.P.P.:

$$\text{Minimize } Z = 2x + 3y$$

Subject to the constraints:

$$-2x + 3y \leq 2$$

$$3x + 2y \leq 5$$

$$x, y \geq 0$$

20

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ROCKETS AND MISSILES (AE-804)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- a) Explain briefly the difference between solid rocket motors and liquid rocket engines.
- b) What forces act on a missile while it is passing through the atmosphere?
- c) How is the injector pressure related to the propellant volumetric flow rate? Give expression for oxidizer and fuel mass flow rate in terms of O/F ratio.
- d) What do you understand by vertical trajectory?
- e) Explain SITVC method for thrust vector control.
- f) Why is multistaging of rockets done?

4×5

PART-A

Q.2 a) With the help of a schematic diagram explain the working of a liquid propellant rocket engine. **10**

- b) How are electric propulsion systems classified? Explain the working principle of any one electric propulsion system. **10**

Q.3 a) How do the lateral damping moment and longitudinal moment affect the performance of a rocket? **10**

- b) With the help of a diagram explain the components of a missile. **10**

Q.4 a) What are the merits and demerits of pressure fed and turbo pump feed systems in liquid propellant rockets? **10**

- b) Explain the effects of propellant slosh in liquid rocket engine. **10**

PART-B

Q.5 a) Derive the equation of motion for rocket motion in a homogeneous gravitational field. **10**

- b) How are the range and altitude of a rocket determined? Give expression for range and altitude. **10**

Q.6 a) What are the techniques used in stage separation in rockets? **10**

- b) What are the thrust termination methods used in liquid rocket engines? **10**

Q.7 a) Derive the rocket equation and write the important assumptions used for deriving the same. **10**

- b) Write a note on generalized 2D trajectory of a rocket. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

APPLIED MATHEMATICS - I (FOR BIOTECHNOLOGY) (MA-103)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Find the determinant of the Matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$.
- b) Verify the Cayley Hamilton theorem of the Matrix $A = \begin{bmatrix} 3 & 3 \\ 2 & 4 \end{bmatrix}$.
- c) Express the $z = 1 - i$ in polar form.
- d) Find the modulus and amplitude of $z = \sin \alpha - i$.
- e) Write the necessary condition for a series to be convergent.
- f) Expand $\tan^{-1}(x)$ in powers of x .
- g) If $y = (2x + 3)^{10}$, find y_{10} .
- h) Find the differentiation of $f(x) = x^2 \tan^{-1} x$.
- i) Find limit of the $\lim_{(x, y) \rightarrow (0, 0)} \frac{(1+x^2)\sin y}{y}$.
- j) Evaluate $\int x^2 \cos x \, dx$. **2×10**

PART-A

- Q.2 a) Find the rank of the matrix $A = \begin{bmatrix} 1 & -1 & 2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 0 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$. **10**
- b) Find the Eigen values and the corresponding Eigen vectors of the matrix $A = \begin{bmatrix} 3 & 2 & -1 \\ 4 & 2 & 6 \\ 7 & 4 & 5 \end{bmatrix}$. **10**

- Q.3 a) Separate into real and imaginary parts: $\cos(x+iy)$. **10**
- b) Find the general value of $\log(-i)$. **10**

- Q.4 a) Discuss the convergence of the following series:

$$x + \frac{2^2 x^2}{2!} + \frac{3^3 x^3}{3!} + \frac{4^4 x^4}{4!} + \frac{5^5 x^5}{5!} + \dots \dots \dots \dots \dots \infty$$
 10
- b) Prove that the series $\frac{\sin x}{1^3} - \frac{\sin 2x}{2^3} + \frac{\sin 3x}{3^3} \dots \dots \dots$ converges absolutely. **10**

PART-B

Q.5 a) If $y = e^{m \cos^{-1}(x)}$, calculate $y_n(0)$ by using Leibnitz theorem. **10**

b) Use Taylor's theorem to express the polynomial $3x^3 + 2x^2 + x - 5$ in terms of $(x-1)$. **10**

Q.6 a) If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$, prove that $x = \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$. **10**

b) If $F = xu + v - w$, $G = ux + vy + w$ and $H = zu - v + vw$, compute $\frac{\partial(F, G, H)}{\partial(u, v, w)}$. **10**

Q.7 a) Evaluate $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy dx$. **10**

b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} dx dy dz$. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ROCKET PROPULSION (AE-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- a) What are the different ballistic properties of a solid rocket motor?
- b) Differentiate between electric and chemical propulsion system.
- c) Explain briefly stratification and geysering in cryogenic stage.
- d) Differentiate between impinging and non-impinging type injectors used in liquid propellant rocket engines.
- e) Define mass ratio of a vehicle. What is the resultant velocity increment in a multistage rocket?
- f) Define specific impulse and characteristic velocity.

4×5

PART-A

- Q.2** a) Derive the rocket equation and write the important assumptions used in deriving it. **10**
b) What do you understand by multistaging of rockets? Explain why it is done and give the expression for the resultant velocity increment in this case? **10**
- Q.3** a) What are the types of solid propellants and what are the desired properties of solid propellants? **15**
b) What are the thrust vector control methods used in solid rocket motors? **5**
- Q.4** a) Compare and contrast the pyrotechnic and pyrogen igniter. **10**
b) Explain the regression rate phenomena in a hybrid rocket motor and write the relation for regression rate in terms of oxidizer mass flux, G_{ox} . **10**

PART-B

- Q.5** a) Explain with the help of a schematic diagram the main components of a liquid propellant rocket. **10**
b) How is injection pressure drop related to mass flow rate of liquid propellant? Express oxidizer and fuel mass flow rates in terms of O/F ratio? **10**
- Q.6** a) What are cryogenic propellants? Why are they used in liquid propellant rocket engines? **10**
b) What are the merits and demerits of pump-feed and pressure-feed systems? **10**
- Q.7** a) What are the distinctive features of electric propulsion systems? **10**
b) Explain the principle and working of electron bombarded ion thruster with diagram. **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

NUMERICAL METHODS AND OPTIMIZATION TECHNIQUES (MA-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- If $\pi = \frac{22}{7}$ is approximated as 3.14, find the absolute error, relative error and percentage error.
- Perform three iteration of bisection method to obtain root of equation $x^3 - 5x + 1 = 0$.
- Derive Newton's Iterative formula for $N^{\frac{1}{3}}$.
- Write normal equations to fit a Parabola.
- Write the fourth order R-K method formula.
- Differentiate between "Interpolation" and "Extrapolation".
- Find value of $\int_0^2 f(x)dx$ by Simpson's 1/3rd rule from the following data:

x	0	0.5	1	1.5	2
y	0	0.25	1	2.25	4

- h) Write the following LPP into standard form:

Max $z = 2x_1 + x_2$ subject to the constraints; $-x_1 + 2x_2 \leq 2$; $x_1 + x_2 \leq 4$; $x_1, x_2 \geq 0$. **2½×8**

PART-A

Q.2 a) By the method of Least squares fit a straight line to the following data:

x	1	2	3	4	5
y	14	27	40	35	68

10

- b) Find $f(30)$ from following data:

x	3	5	11	27	34
y	-13	23	899	17315	35606

10

Q.3 a) Find the real root of the equation $e^{-x} = \sin x$ using Newton-Raphson method. **10**

b) Find the real root of the equation $xe^x = \cos x$ by Secant method. **10**

Q.4 a) Solve the system of linear equation by Gauss-Seidel method correct to three decimal places:

$$x + y + 54z = 110$$

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

10

- b) Calculate five iterations of the power method with scaling to approximate a dominant

eigenvector of the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & 1 & 2 \\ 1 & 3 & 1 \end{bmatrix}$ Use $x_0 = (1, 1, 1)$ as the initial approximation. **10**

PART-B

Q.5 a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule. 10

b) Find $f'(10)$ from following data:

x	3	5	11	27	34
y	-13	23	899	17315	35606

10

Q.6 a) Using Modified Euler's method obtains a solution of equation $\frac{dy}{dx} = x + \sqrt{y} = f(x, y)$ with initial condition $y(0) = 1$ for range $0 \leq x \leq 0.6$ in steps of 0.2. 10

b) Using Runge Kutta Method of order 4, find y for $x = 0.1, 0.2, 0.3$ given that $\frac{dy}{dx} = xy + y^3, y(0) = 1$ 10

Q.7 Solve the following LPP by Simplex method:

$$\text{Max } U = 2x + y + z$$

Subject to constraints

$$x + y \leq 1$$

$$x - 2y - z \geq -2$$

$$x \geq 0, y \geq 0, z \geq 0$$

20

End Semester Examination, May 2019

B. Tech. — Fifth Semester

AERODYNAMICS-II (AE-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer **any five** of the following questions:

a) Differentiate between the terms characteristic Mach number and critical Mach number.

b) When is a flow considered compressible? What is isentropic compressibility?

c) How does Rankine-Hugoniot equation differ from an isentropic relation?

$\frac{p_2}{p_1} = \left(\frac{\rho_2}{\rho_1} \right)^{\gamma}$ Explain the difference through suitable plots of both.

d) What do you understand by supersonic compression by turning?

e) Explain briefly the intersection of right and left running shock waves.

4×5

PART-A

Q.2 a) Why do we need to study high angle of attack aerodynamics? **5**

b) Transformation a circle into a cambered airfoil profile using the Kutta-Zhukovsky transformation and obtain lift for the same. **15**

Q.3 Explain why delta configuration is adopted in high speed military aircrafts? Also discuss the subsonic flow characteristics over a delta wing and state the assumptions and theory given by Polhamous to calculate lift over delta wing. **20**

Q.4 a) Consider a flow with a pressure and temperature of 1 atm and 288 K. A Pitot tube is inserted into this flow and measures a pressure of 3.645 atm. What is the velocity of the flow? **10**

b) Consider a normal shock wave in air. The upstream conditions are given by $M_1=2.2$, $p_1=1\text{ atm}$, $\rho_1=1.23 \text{ kg/m}^3$. Calculate the downstream values M_2 , P_2 , ρ_2 , T_2 , T_{02} and P_{02} . Also calculate the change in entropy across the shock wave. **10**

PART-B

Q.5 A flat plate is kept at 5° angle of attack to free-stream flow having Mach number 2 and pressure 1 atm. With the help of a diagram, explain compressible flow phenomenon (shock or expansion) happening over the plate. Use "Shock Expansion theory" to calculate coefficients of lift and drag and compare it with coefficients obtained from the "Thin Airfoil Theory". **20**

Q.6 Obtain $\theta\rho M$ relation for flow across oblique shock wave. Also explain various situations when detached shock wave will be formed over a wedge with a finite apex angle. **20**

Q.7 a) What do you understand by the compatibility equations along the characteristic lines? **5**

b) Considering the compatibility relations along C- and C+ characteristics and starting from points where flow properties are known, discuss the steps of the method of

characteristics used to obtain the flow properties at downstream points for a two-dimensional, inviscid, steady flow.

15

End Semester Examination, May 2019

B. Tech. — Fifth Semester

AERODYNAMICS-II (AE-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer **any five** of the following questions:

a) Differentiate between the terms characteristic Mach number and critical Mach number.

b) When is a flow considered compressible? What is isentropic compressibility?

c) How does Rankine-Hugoniot equation differ from an isentropic relation?

$\frac{p_2}{p_1} = \left(\frac{\rho_2}{\rho_1} \right)^{\gamma}$ Explain the difference through suitable plots of both.

d) What do you understand by supersonic compression by turning?

e) Explain briefly the intersection of right and left running shock waves.

4×5

PART-A

Q.2 a) Why do we need to study high angle of attack aerodynamics? **5**

b) Transformation a circle into a cambered airfoil profile using the Kutta-Zhukovsky transformation and obtain lift for the same. **15**

Q.3 Explain why delta configuration is adopted in high speed military aircrafts? Also discuss the subsonic flow characteristics over a delta wing and state the assumptions and theory given by Polhamous to calculate lift over delta wing. **20**

Q.4 a) Consider a flow with a pressure and temperature of 1 atm and 288 K. A Pitot tube is inserted into this flow and measures a pressure of 3.645 atm. What is the velocity of the flow? **10**

b) Consider a normal shock wave in air. The upstream conditions are given by $M_1=2.2$, $p_1=1\text{ atm}$, $\rho_1=1.23 \text{ kg/m}^3$. Calculate the downstream values M_2 , P_2 , ρ_2 , T_2 , T_{02} and P_{02} . Also calculate the change in entropy across the shock wave. **10**

PART-B

Q.5 A flat plate is kept at 5° angle of attack to free-stream flow having Mach number 2 and pressure 1 atm. With the help of a diagram, explain compressible flow phenomenon (shock or expansion) happening over the plate. Use "Shock Expansion theory" to calculate coefficients of lift and drag and compare it with coefficients obtained from the "Thin Airfoil Theory". **20**

Q.6 Obtain $\theta\rho M$ relation for flow across oblique shock wave. Also explain various situations when detached shock wave will be formed over a wedge with a finite apex angle. **20**

Q.7 a) What do you understand by the compatibility equations along the characteristic lines? **5**

b) Considering the compatibility relations along C- and C+ characteristics and starting from points where flow properties are known, discuss the steps of the method of

characteristics used to obtain the flow properties at downstream points for a two-dimensional, inviscid, steady flow.

15

End Semester Examination, May 2019

B. Tech. – Fifth Semester
AIRCRAFT PROPULSION-II (AE-502)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

(Take: For air as working medium, use $\gamma = 1.4$, $c_p = 1005 \text{ J/kg K}$ and $R = 287 \text{ J/kg K}$

For hot gas as working medium, use $\gamma = 1.33$, $c_p = 1148 \text{ J/kg K}$ and $R = 287 \text{ J/kg K}$).

Q.1 Answer the following questions:

- Define the propulsion efficiency of a propulsive duct. What happens to the value of propulsive efficiency when velocity entering the inlet (C_i) is equal to velocity coming out of the nozzle of the engine (C_j) ?
- Briefly explain fundamental and cold loss.
- Draw h-s diagram of Rayleigh flow highlighting the direction of heating and cooling with Mach number approaching unity.
- What are the advantages of a turbofan over a pure turbojet engine?
- Briefly explain various types of combustion chambers used in turbojet engines. **4x5**

PART-A

Q.2 Determination of the specific thrust and SFC for a simple turbojet engine, having the following component performance at the design point at which the cruise speed and altitude are M 0.8 and 10000m.

Compressor pressure ratio:	8.0
Turbine inlet temperature:	1200 K
Isentropic efficiency	
Of compressor, η_c :	0.87
Of turbine, η_t :	0.90
Of intake, η_i :	0.93
Of propelling nozzle, η_j :	0.95
Mechanical transmission efficiency η_m :	0.99
Combustion efficiency η_b :	0.98
Combustion pressure loss Δp_b :	4%

20

Q.3 a) Discuss the following factors in assessing combustion chamber performance:

- Pressure loss,
- Combustion efficiency,
- Stability limits and
- Combustion intensity.

10

b) Draw schematic diagram of gas turbine combustor and discuss all the components of it. Explain various zones of combustion chamber. **10**

Q.4 Draw stage velocity triangles at inlet and outlet of the rotor for axial flow compressor at mean radius of rotor blade. Derive the expression for:

- Work input to the compressor in terms of flow angles, and
- Degree of reaction in terms of flow angles.

20

PART-B

- Q.5 a) What is Gas Generator? Draw schematic diagram of turbojet engine and explain working of each component. **10**
- b) Draw h-s diagram of Fanno flow. Write the application of Fanno flow in gas turbine engine. What is effect of friction on flow properties (static pressure, velocity, static temperature, total pressure) and Mach number for the following regimes of Fanno flow:
- Supersonic inlet flow.
 - Subsonic inlet flow.
- Q.6 Air at 1.0132 bar and 288 K enters an axial flow compressor stage with an axial velocity 150 m/s. There are no inlet guide vanes. The rotor stage has a tip diameter of 60 cm and hub diameter of 50 cm and rotates at 100 rps. The air enters the rotor and leaves the stator in the axial direction with no change in velocity or radius. The air is turned through 30.2° as it passes through rotor. Assume a stage pressure ratio of 1.2. Assuming the constant specific heats and that the air enters and leaves the blade at the blade angles.
- Construct the velocity diagram at mean dia for this stage.
 - Mass flow rate.
 - Power required, and.
 - Degree of reaction.
- Q.7 A gas turbine having single stage rotates at 10000 rpm. At entry to the nozzles the total head temperature and pressure of the gas are 700°C and 4.5 bar respectively and at outlet from the nozzle, the static pressure is 2.6 bar. At the turbine outlet annulus, the static pressure is 1.5 bar. Mach number at outlet is limited to 0.5 and gas leaves in an axial direction. Gas leaves the nozzle with an absolute velocity of 524.9 m/s. The outlet nozzle angle is 70° to the axial direction. Calculate
- The gas angles at the entry and outlet of the rotor showing them on velocity diagrams for mean blade section.
 - Output power developed by the turbine shaft.
- Assume the mean blade diameter as 64cm, gas mass flow rate as 22.54 kg/s, turbine mechanical efficiency = 99%, $C_p = 1.147 \text{ kJ/kgK}$, $\gamma = 1.33$ **20**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

BASICS OF COMPUTATIONAL FLUID DYNAMICS (AE-827)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- a) Explain the physical meaning of substantial derivative and describe its components.
- b) Explain graphically the concept of time marching and space marching.
- c) Define:
 - i) Stability criteria based on the round off error and
 - ii) Courant number
- d) Define Peclet number and transportiveness.
- e) Why are adaptive grids used?
- f) What do you understand by eddy viscosity and mixing length?

4×5

PART-A

Q.2 a) What is the essential difference between Navier-Stokes and Euler equations? Write the Euler equations for conservation of mass, momentum and energy considering x -direction. **10**

b) What are the different models of flow? Derive continuity equation using any one model of flow. **10**

Q.3 a) Explain the explicit and implicit approaches for simple one dimensional heat conduction equation for writing a finite difference equation. **15**

b) What are the relative advantages and disadvantages of explicit and implicit approaches used for CFD solutions? **5**

Q.4 Explain the transformations used for the generation of:

- a) Stretched grids in case of boundary layer flow over a flat surface **10**
- b) Elliptic grid for flow around airfoil. **10**

PART-B

Q.5 Explain the salient steps of Lax-Wenderoff technique. Specify the flow conditions assumed. Write about the difficulty in using this technique which makes Mc Cormack's technique more suitable. **20**

Q.6 a) What is central differencing scheme? Explain with equations. **10**

b) What steps are used for solving one-dimensional steady state diffusion problem? Also write the discretization equation for the same. **10**

Q.7 a) What are the salient features of LES? Explain where LES technique can be used. **10**

b) What are the equations used in $k-\omega$ turbulence model? Explain the various terms and coefficients associated with this model. **10**

End Semester Examination, May 2019
B. Tech. — First Semester
APPLIED MATHEMATICS-I (MA-101A)

Time: 3 hrs.

Max Marks: **100**
 No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Test the convergence of $\sum_{n=1}^{\infty} \frac{1}{n+1}$.
- b) State Leibnitz's test for alternating series.
- c) Expand a^x in powers of x .
- d) Find the degree of $f(x, y) = \sin^{-1} \frac{ax}{y} + \tan^{-1} \frac{ay}{x}$.
- e) If $x = u(1-v); y = uv$, prove that $JJ' = 1$.
- f) Evaluate $\iint_{\substack{1 \\ 0}} (xy) dx dy$.
- g) Prove that $\int_0^1 \sqrt{1-x^2} dx = \frac{\pi}{4}$.
- h) Prove that $\int_0^{\pi} r^n \sin^{n-2} \theta d\theta = n \int_0^{\pi} r^{n-2} \sin^{n-2} \theta d\theta$.
- i) Solve $(x^2 - ay)dx = (ax - y^2)dy$.
- j) Find Wronskian "w" of $y'' + 4y = 0$.

2×10

PART-A

- Q.2**
- a) Test the convergence of the series $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{\sqrt{n^2+1}} x^n$ ($x > 0$).
 - b) Test for absolute/conditional convergence of the series $\sum_{n=1}^{\infty} (-1)^n \left\{ \sqrt{n+1} - \sqrt{n} \right\}$.

- Q.3**
- a) Compute $\cos 32^\circ$ upto 4 decimal places correction.
 - b) By forming a differential equation expand $e^{m \cos^{-1} x}$ upto x^5 terms.

- Q.4**
- a) If $u = \frac{1}{\sqrt{t}} e^{-x^2/4a^2t}$; prove that $u_t = a^2 u_{xx}$.
 - b) Find the maximum and minimum distance of the point (3, 4, 12) from the unit sphere.

PART-B

- Q.5**
- a) Prove that $\iint_{\substack{1-x^2 \\ 0 \\ 0}} \frac{dxdydz}{\sqrt{x^2+y^2+z^2}}$.
 - b) Prove that $B(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.

- Q.6**
- a) Find the angle between the tangent planes to surfaces $x \log z = y^2 - 1, x^2y = 2 - z$ at the point (1, 1, 1).

b) If $\frac{dF}{dR} = \frac{\partial F}{\partial x} - \frac{\partial F}{\partial y} + \frac{\partial F}{\partial z}$, evaluate $\oint dR$ along a curve $x = \cos t, y = \sin t, z = 2\cos t$
 cost from $t = 0$ to $t = \frac{\pi}{2}$. 10

Q.7 a) Solve $y'' + 2y = x^2 e^{3x} + e^x \cos 2x$. 10

b) Solve: $\frac{dx}{dt} + 2x - 3y = 5t$;
 $\frac{dy}{dt} - 3x + 2y = 2e^{2t}$ 10

End Semester Examination, May 2019

B. Tech. — First Semester

APPLIED MATHEMATICS-I (MA-101B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

a) Test the convergence of $\sum_{n=1}^{\infty} \frac{1}{n+1}$.

b) State Leibnitz's test for alternating series.

c) Expand a^x in powers of x .

d) Find the degree of $f(x, y) = \sin^{-1} \frac{x}{y} + \tan^{-1} \frac{x}{y}$.

e) If $x = u(1-v); y = uv$, prove that $JJ' = 1$.

f) Evaluate $\iint_{\Delta} (xy) dx dy$.

g) Prove that $\int_0^1 1 dx = 1$.

h) Prove that $\int r^n dr = n r^{n-1} \Big|_0^1$.

i) Solve $(x^2 - ay)dx = (ax - y^2)dy$.

j) Find Wronskian "w" of $y'' + 4y = 0$.

2×10

PART-A

Q.2 a) Find eigen values and eigen vectors of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$. **10**

b) Investigate for λ and μ so that the system

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$$x + 2y + \lambda z = \mu$$

has i) no solution.

ii) infinite solution.

iii) unique solution. **10**

Q.3 a) Compute $\cos 32^\circ$ upto 4 decimal places correction. **10**

b) By forming a differential equation expand $e^{m \cos^{-1} x}$ upto x^5 terms. **10**

Q.4 a) If $u = \frac{1}{\sqrt{t}} e^{-x^2/4a^2 t}$; prove that $u_t = a^2 u_{xx}$. **10**

b) Find the maximum and minimum distance of the point (3, 4, 12) from the unit sphere. **10**

PART-B

Q.5 a) Prove that $\oint_{\gamma} \frac{dx dy dz}{\sqrt{x^2 + y^2 + z^2}}.$ 10

b) Prove that $B(m, n) = \frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}.$ 10

Q.6 a) Find the angle between the tangent planes to surfaces $x \log z = y^2 - 1, x^2 y = 2 - z$ at the point $(1, 1, 1).$ 10

b) If $\frac{dF}{dR} = 2y \hat{i} - Z \hat{j} + x \hat{k},$ evaluate $\oint_C \frac{dF}{dR}$ along a curve $x = \cos t, y = \sin t, z = 2 \cos t$ cost from $t = 0$ to $t = \frac{\pi}{2}.$ 10

Q.7 a) Test the convergence of the series $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{\sqrt{n^2 + 1}} x^n$ ($x > 0$). 10

b) Test for absolute/conditional convergence of the series $\sum (-1)^n \left\{ \sqrt{n+1} - \sqrt{n} \right\}.$ 10

End Semester Examination, May 2019

B. Tech. – Fifth Semester

AIRCRAFT STRUCTURES-II (AE-503A)

Time: 3 hrs.

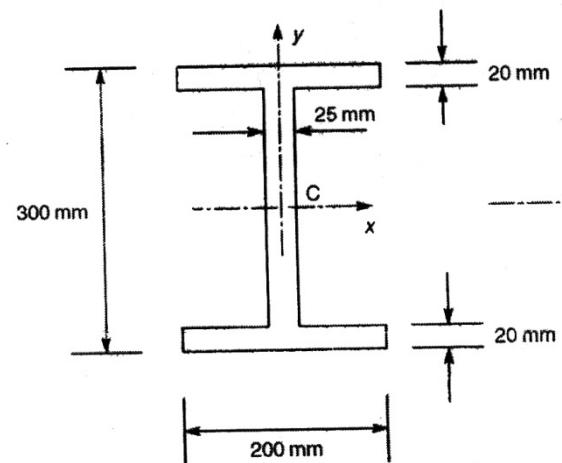
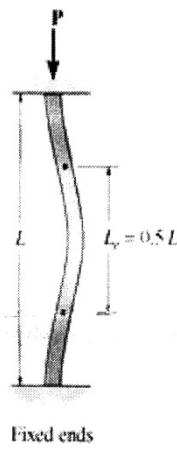
Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- A fixed-ended column of length L , modulus of elasticity E and second moment of the cross-sectional area I shown in fig. 1 is loaded centrally by a compressive load P . Write down the boundary conditions and Euler's buckling load formula for this column. Take bottom end as $x=0$ and top end as $x=L$.
- Find out Area moment of inertia about x axis shown in fig. 2
- Define shear Centre. Locate the shear Centers of thin walled T and L sections.
- What is Aeroelasticity? Briefly explain various Aeroelastic problems.
- Draw the shape of a thin walled circular cylinder loaded in compression parallel to its axis. What is the formula of compression buckling stress for this column?

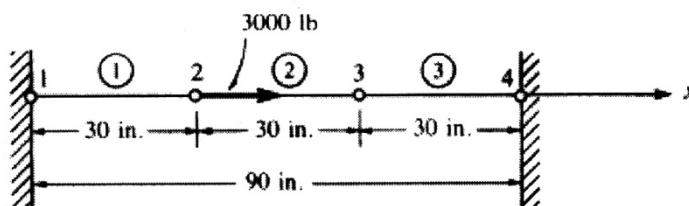


4x5

PART-A

- Q.2** a) A cast iron hollow cylindrical column 2m in length hinged at both ends has a critical buckling load of P kN. When the column is fixed at both the ends, its critical buckling load is raised by 200 kN more. If ratio of external diameter to internal diameter is 1.25 and $E = 100$ GPa. Determine the external diameter of column. **10**
 b) Derive Rankine's empirical formula for the collapse load which covers all types of columns. **10**

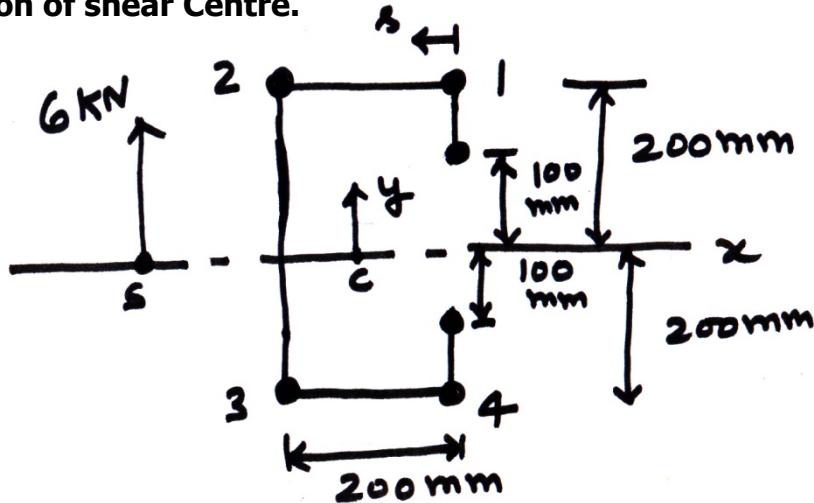
- Q.3** For the three-bar assemblage shown in the figure, determine (a) the global stiffness matrix, (b) the displacements of nodes 2 and 3, and (c) the reactions at nodes 1 and 4. A force of 3000 lb is applied in the x direction at node 2. The length of each element is 30 in. Let $E = 30 \times 10^6$ psi and $A = 1$ in 2 for elements 1 and 2, and let $E = 15 \times 10^6$ psi and $A = 2$ in 2 for element 3. Nodes 1 and 4 are fixed.



20

38/5

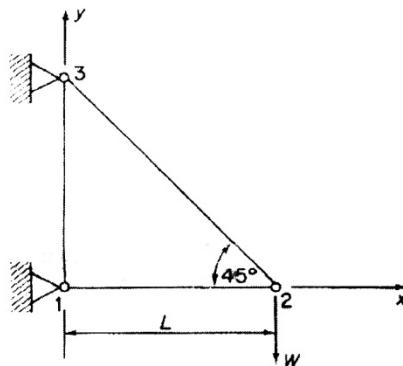
- Q.4 Calculate the shear flow distribution in the channel section shown in the figure produced by a vertical shear load of 6kN acting through its shear Centre. Assume that the walls of the section are only effective in resisting shear stresses while the booms, each of area 300 mm^2 , carry all the direct stresses. Also find the location of shear Centre.



20

PART-B

- Q.5 Determine the horizontal and vertical components of the deflection of node 2 and the forces in the members of the pin-jointed framework shown in the figure. The product AE is constant for all members.

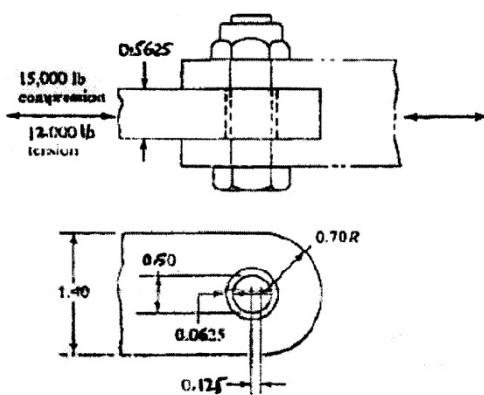


20

- Q.6 Derive the expression for divergence speed in case of wing torsional divergence for finite wing.

20

- Q.7 The fitting shown in the figure is made of a 2014 aluminum forging, for which $\sigma_{at} = 65000 \text{ lb/in}^2$, $\tau_a = 39000 \text{ lb/in}^2$ and $\sigma_{abr} = 98000 \text{ lb/in}^2$. The bolt and bushing are made of steel for which $\sigma_{at} = 125000 \text{ lb/in}^2$, $\tau_a = 75000 \text{ lb/in}^2$ and $\sigma_{abr} = 175000 \text{ lb/in}^2$. The fitting resists limit or applied loads of 15,000 lb compression and 12,000 lb tension. The fitting factor of 1.2 and a bearing factor of 2.0 are used. Find the margins of safety for the fitting for various types of failure.



20

End Semester Examination, May 2019

B. Tech. – Third Semester

APPLIED MATHEMATICS-III (MA-341A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) If $y = \tan x + e^x \cos x$ find $\frac{dy}{dx}$. **2**
 b) If $y = \frac{x-y}{x^2+y^2}$ find $\frac{dy}{dx}$. **3**
 c) Evaluate $\int \frac{1-\cos^2 x}{1+\cos x} dx$. **2**
 d) Evaluate $\int_1^4 \frac{dx}{\sqrt{x}}$. **2**
 e) Prove that : $\left| \left(\frac{1}{2} \right) \right| = \sqrt{\pi}$. **2**
 f) Find curl \vec{v} , $\vec{v} = (xyz)\hat{i} + (3x^2y)\hat{j} + (xz^2 - y^2z)\hat{k}$ at $(2, -1, 1)$. **3**
 g) Expand $\log(x+h)$. **3**
 h) Evaluate $\int_0^1 \int_{y^2}^y (1+xy^2) dx dy$. **3**

PART-A

- Q.2 a) Find $\frac{d^2y}{dx^2}$, if $y = \frac{xe^{-x}+1}{\cos x}$. **7**
 b) Find $\frac{dy}{dx}$, if $y = e^{2x} \tan x + \tan^{-1}\left(\frac{2}{x}\right)$. **6**
 c) Find $\frac{dy}{dx}$ if $y = \log x + \sec^2 x - 1$. **7**

- Q.3 a) Evaluate : $\int_0^{\frac{\pi}{4}} \log(1+\tan x) dx$. **6**
 b) Prove that $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\sqrt{\cot x}} = \frac{\pi}{4}$. **7**
 c) Evaluate $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \sqrt{1-\sin 2x} dx$. **7**

- Q.4 a) If $x = r \cos \theta$, $y = r \sin \theta$, evaluate

$$\frac{\partial(x,y)}{\partial(r,\theta)} \text{ and } \frac{\partial(r,\theta)}{\partial(x,y)}$$

10

b) Find $\frac{\partial u}{\partial \theta}$, $u = e^{r \cos \theta} \cdot \cos(r \sin \theta)$.

5

c) Verify Euler's theorem for $u = \sin^{-1} \frac{x}{y} + \tan^{-1} \frac{y}{x}$.

5

PART-B

Q.5 a) Expand $\sin x$ in powers of $x - \frac{\pi}{2}$ and hence find $\sin 91^\circ$.

10

b) Examine $f(x, y) = x^3 + y^3 - 3axy$ for maxima and minimum values.

10

Q.6 a) Evaluate $\iint r^3 dr d\theta$ over the area bounded between the circles $r = 2 \cos \theta$ and $r = 4 \cos \theta$.

10

b) Change the order of integration

$$I = \int_0^1 \int_{x^2}^{2-x} xy \, dx \, dy \text{ and hence evaluate.}$$

10

Q.7 a) If $\vec{F} = 2y\hat{i} - z\hat{j} - x\hat{k}$, evaluate $\int_c \vec{F} \times d\vec{r}$ along the curve $x = \cos t$, $y = \sin t$,

$$z = 2 \cos t \text{ from } t = 0 \text{ to } t = \frac{\pi}{2}.$$

10

b) Discuss the physical interpretation of curl.

5

c) Find angle between $x^2 + y^2 + z^2 = 16$ and $z = x^2 + y^2 - 2$ at $(2, -1, 1)$.

5

End Semester Examination, May 2019

B. Tech. – Third Semester

APPLIED MATHEMATICS-III (MA-302)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Separate real and imaginary parts: $\ln(6+8i)$. **2**
- b) Evaluate: $\lim_{z \rightarrow (1+i)} \frac{z^3 - 1}{z^2 - 1}$. **2**
- c) Expand $f(z) = \sin z$ in Taylor's series about $z = \frac{\pi}{4}$. **2**
- d) Find Fourier cosine transform of $f(x) = e^{-ax}$, $x > 0$. **2**
- e) What is the probability that a leap year contains 53 Sundays? **2**
- f) If we reject the null hypothesis, which type of error may occur? **2**
- g) What is the range of correlation coefficient? **2**
- h) Write the value of regression coefficient of 'y' on 'x' for the following lines: $5x = 22 + y$ and $64x = 24 + 45y$. **3**
- i) Write the poles and residue at each pole of $f(z)$:

$$f(z) = \frac{1}{(z-2)^3} \quad \text{3}$$

PART-A

- Q.2 a) Prove that $\tan^{-1} x = \frac{1}{2i} \log \left(\frac{1+ix}{1-ix} \right)$. **6**
- b) Determine the analytic function $f(z) = u + iv$, where $v = e^x (x \cos y + y \sin y)$. **7**
- c) Evaluate $\oint \frac{1-\cos 2(z-3)}{(z-3)^3} dz$, where $c : |z-3| = 1$. **7**

- Q.3 a) Expand the function in Laurent's series:

$$f(z) = \frac{1}{z^2 - 4z + 3} \text{ for } |z| < 3 \quad \text{6}$$

- b) Evaluate the following integral by Cauchy's residue theorem $\oint_c \frac{12z-7}{(z-1)^2(2z+3)} dz$ where $c : |z| = 2$. **7**

- c) Evaluate the following real integral:

$$\int_{-\infty}^{\infty} \frac{dx}{1+x^4} \quad \text{7}$$

- Q.4 a) State and prove Parseval's Identity for Fourier transform. **10**
- b) Find the finite Fourier sine transform of $f(x) = \cos x, 0 \leq x \leq \pi$. **10**

PART-B

- Q.5 a) A random variable x has the following probability distribution:

x	0	1	2	3	4	5	6	7	8
$p(x)$	a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$

i) Determine value of ' a '.

ii) Find $p(x < 3)$, $p(x \geq 3)$, $p(2 \leq x < 5)$.

iii) What is the smallest value of x for which $p(X < x) > 0.5$? **10**

- b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. Given: values of z corresponding to area 0.19 and 0.42 are 0.5 and 1.4 respectively. **10**

- Q.6 a) In a Hospital 475 female and 525 male babies were born in a week. Do these figures confirm the hypothesis that males and female are born in equal numbers. **10**
- b) A random sample of size 16 has 53 mean. The sum of the squares of the deviation from mean is 135. Can this sample be regarded as taken from the population having 56 as mean? **10**

- Q.7 a) Find the regression equation of x on y and coefficient of correlation from the given data $\sum x = 60$, $\sum x^2 = 4160$, $\sum y = 40$, $\sum y^2 = 1720$, $\sum xy = 1150$ $N = 10$. **10**
- b) Calculate the coefficient of correlation between x and y for the following data:

$x:$	1	2	4	5	7	8	10
$y:$	2	6	8	10	14	16	20

End Semester Examination, May 2019

B. Tech. – Third Semester

AIRCRAFT MATERIALS (AE-404)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the process of fatigue failure.
- b) Differentiate among the mechanical properties of ferrite and cementite.
- c) What are superalloys?
- d) What is the difference between silicate and silica?
- e) Explain the advantages of composite materials.
- f) Explain the need for surface hardening of steels.
- g) Describe the precipitation heat treatment of aluminum alloys.
- h) Explain the causes of corrosion in metals.
- i) Mention the various materials used for construction of fuselage and engine controls.
- j) Describe uses of k-Monel in aircraft applications.

2×10

PART-A

- Q.2** a) Explain various factors governing the choice of materials for various parts of aeroplane. **10**
- b) Describe mechanical properties of metal used in aircraft structure. **10**
- Q.3** a) Explain the carbon equilibrium diagram. **10**
- b) Describe the heat treatment of corrosion resistant steel. **10**
- Q.4** a) Bring out the effect of following metallic elements on the plain carbon steel?
 - i) Carbon
 - ii) Manganese
 - iii) Sulphur
 - iv) Silicon
 - v) Phosphorus**2×5**
- b) Describe the desired properties of corrosion resisting steel for the following aircraft components.
 - i) Exhaust collector.
 - ii) Hydraulic systems.
 - iii) Structural Members.**3**
3
4

PART-B

- Q.5** a) What are various types of magnesium alloys and describe their mechanical properties? **10**
- b) Bring out various properties of aluminum alloys which make them suitable for aerospace industry. **10**
- Q.6** a) Name some of the prominent nickel alloys. Describe in detail mechanical properties of Inconel and its application in aerospace industry. **10**
- b) Describe important properties of titanium alloys. **10**
- Q.7** List out various constituents of composite material and bring out their application in manufacture of modern aircraft. **20**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

FLIGHT MECHANICS-I (AE-504)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- LCA Mk 1A (Tejas) and Mig 23 Bn are flying at the same Mach number at 1000 m and 5000 m respectively. Are these fighters of the IAF flying at the same speed? If not, which is flying faster?
- Analyze consequences of a wing (three dimensional) instead of an airfoil (two dimensional) from the flight mechanics perspective.
- Compare and contrast the shear stresses in the laminar and the turbulent flows with due justification.
- With appropriate diagram, explain the kind of span-wise lift distribution having minimum induced drag.
- Analyze various conditions (in terms of C_L and C_D) for maximum endurance of a propeller driven aircraft.

4×5

PART-A

Q.2 a) The atmosphere of Jupiter is essentially made up of hydrogen. For hydrogen, the specific gas constant is 4157 J/kgK. The acceleration due to gravity at Jupiter is 24.9 m/s². Assuming an isothermal atmosphere with a temperature of 150 K, calculate the altitude above the surface where pressure is one half of the surface pressure. Calculate the standard values of T, P, and r at a geopotential altitude of 14 km **10**
b) On Mars, the atmosphere is composed mainly of carbon dioxide. The value of the gas constant for the Martian atmosphere is 192 J/kg K, and the acceleration of gravity there is 3.72 m/s². At the average of the Martian surface, the average temperature is 228 km, the pressure is 774 Pa, and the density is 0.0178 kg/m³. At an altitude of 1 km above the surface, the average temperature is 225 K. What are pressure and density at this altitude? **10**

Q.3 a) Explain the functioning of an altimeter and an airspeed indicator with neat sketches. **10**
b) What do you understand by head wind, tail wind and cross wind? Suppose it takes a small airplane flying with a head wind 16 hours to travel 1800 Kilometres. However, when flying with a tail wind, the airplane can travel the same distance in only 12 hours. Find the wind speed and the air speed of the airplane. **10**

Q.4 a) What is the total drag of an airfoil? Explain the variation of drag coefficient with Mach number for subsonic and supersonic speeds. **6**
b) Explain induced drag with the help of proper illustration and derive a relation for calculation of induced drag coefficient for finite wing. **8**
c) The Cessna aircraft has a wing area of 16.2 m² and an aspect ratio of 7.31. Assume the span efficiency factor of 0.62. If this aircraft is weighing 9800 N and is flying at standard sea-level conditions with a velocity of 251 km/h, what is the induced drag? **6**

PART-B

- Q.5 a) Explain various high lift devices. Draw the lift-and-drag-coefficient curves for wings with flaps, lift coefficient curves for wings alone and for wings with strakes. Briefly illustrate the effect of leading-edge flaps and boundary layer control on lift coefficient. **14**
- b) Critically analyze the effect of wing sweep on stream wise thickness-to-chord ratio and free stream Mach number. **6**
- Q.6 a) Derive the expression for power required in terms of aircraft design parameters and characteristics, what is the aerodynamic condition for the power required to be minimum? **8**
- b) A twin jet aircraft has a wing area of 47 m^2 , aspect ratio of 6.5, Oswald efficiency factor of 0.87 and weighs 10300 Kg and its zero lift drag coefficient is 0.032. It is equipped with two jet engines with 40 KN of static thrust each at sea-level. Given the atmospheric density at 5 km as 0.73643 kg/m^3 .
- i) Calculate and plot the power required curve for S/L and 5 km altitude.
 - ii) Calculate the maximum velocity at sea-level and 5 km altitude. **12**
- Q.7 a) With usual notations and stated assumptions, derive expressions for turn radius and turn rate for aircraft during a horizontal turn, pull-up and pull-down maneuver. **10**
- b) Estimate the landing distance for a jet aircraft weighing 54966 N, at sea level. It has a wing area= 29.54 sq m , parasite drag co-efficient = 0.022, coefficient of rolling friction = 0.02. No thrust reversal is used. However, spoilers are employed such that $L = 0$? The maximum lift coefficient, with flaps fully deployed at touchdown, is 2.5. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

ELEMENTS OF AERONAUTICAL ENGINEERING (AE-301)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer (**any five**) of the following:

- a) How do we achieve short take-off and landing of an aircraft? How do the gliders and the powered gliders take off?
- b) What are slat and slot? How do they help in increasing lift?
- c) What do you understand by Frise ailerons, horn balance and mass balance that are used on control surfaces?
- d) Draw c_1 and α curves for a cambered airfoil and a symmetrical airfoil.
- e) What is the simplest jet engine that has been used to power a flight vehicle? What is the basis of its simplicity?
- f) What do you understand about loop antenna and sense antenna?
- g) What frequencies are allocated to different navigation and communication systems?
- h) Define load factor. What are the implications of load factor?
- i) What do you understand by staging of rockets? Why do we need it?

4x5

PART-A

Q.2 a) Explain the features of a transport aircraft, a fighter aircraft, a helicopter and a spacecraft. **10**

b) Explain how turning of a helicopter to left or right is achieved. How do we achieve take-off of a glider aircraft? What is a powered glider? **10**

Q.3 a) What are main sources of drag? What is induced drag? How do finite wings generate induced drag? **12**

b) What is difference between static stability and dynamic stability? **4**

c) What are conditions of static lateral and directional stability? Draw typical pitching moment vs α plots in case of a statically stable and unstable airplane. **4**

Q.4 a) Describe the function of a propeller. What is pitch of a propeller? What are fixed pitch and variable pitch propellers? **10**

b) Describe the features and functions of ramjet engine, pulse jet engine and rocket engines of solid propellant and liquid propellant type. **10**

PART-B

Q.5 a) What is the importance of strength / weight ratio in the design of aircraft and its components? **5**

b) Explain the type of loads that are resisted by the following structural components of an aircraft during flying: i) fuselage ii) wings, and iii) tailplane. **15**

Q.6 a) With the help of suitable block diagrams, describe a basic radio system that is used for communication in an aircraft. **10**

b) Explain the features of an Instrument Landing System. **10**

Q.7 a) Why do we need an auto-pilot system? Explain the essential features and operation of an auto-pilot system used in an aircraft. **15**

b) What is the difference between a single action and a double action hand pump? **5**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

BOUNDARY LAYER THEORY (AE-802)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Attempt the following questions:

- a) What do you understand by the concept of an effective body?
- b) Explain the concept of boundary layer thickness.
- c) Define and explain the point of separation with diagram.
- d) What do you understand by energy thickness, explain briefly?
- e) Explain Reynolds stresses with an example.

4×5

PART-A

Q.2 Derive the expression for displacement thickness with the help of appropriate diagrams? List out and explain the assumptions made. **20**

Q.3 Using Approximate methods for steady equations show that momentum thickness for the flow past a flat plate at zero incidence is given by $\theta = 2 \frac{\tau_0}{\rho U_\infty^2} x$. **20**

Q.4 Using Approximate methods for steady equations explain the rotation near the ground with the help of an appropriate diagram? **20**

PART-B

Q.5 With usual notations and diagrams, Derive expressions of approximate solutions for a flat plate with uniform suction. **20**

Q.6 a) Briefly explain the theory of stability of laminar flows. **10**
b) Critically analyze the factors affecting transition of laminar flow into the turbulent region. **10**

Q.7 a) With appropriate diagram, explain the Prandtl mixing length theory. **14**
b) What is Von Karman's similarity hypothesis? **6**

End Semester Examination, May 2019

B. Tech. – First Semester

APPLIED PHYSICS-I (PH-101B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the phenomenon of population inversion in LASER.
- b) Give the principle of holography.
- c) Explain the principle of propagation of light in optical fibre.
- d) Is earth an inertial frame of reference? Give reason.
- e) State postulates of special theory of relativity.
- f) Write Poisson's equation and Laplace equation.
- g) What are equipotential surfaces?
- h) Differentiate between polar and non-polar dielectrics.
- i) What is Sabine's formula?
- j) What do you mean by reverberation?

2×10

PART-A

- Q.2** a) What is Laser pumping? Explain different pumping mechanisms. **10**
 b) Discuss the construction and reconstruction of image on a hologram. **10**
- Q.3** a) Derive the expression for the numerical aperture of an optical fibre, giving neat diagram. **10**
 b) Give the reasons of attenuation and distortion of light through the optical fibre. **6**
 c) How optical fibres can be used in medical and communication fields? **4**
- Q.4** a) Deduce the expression of length contraction and time dilation from Lorentz transformation equations. **10**
 b) Explain and establish mass energy equivalence relation $E = mc^2$. **10**

PART-B

- Q.5** a) Determine the electric potential between two parallel plates of a capacitor using Laplace equation. **10**
 b) Given a potential of the form $V = \frac{A}{r} + B$, where A and B are constants and r is position vector. Check if the potential satisfies Laplace equation. **10**
- Q.6** a) Derive Clausius - Mossotti relation for non-polar dielectrics. **10**
 b) What is Gauss's law? Explain the changes in Gauss's law in presence of dielectrics. **6**
 c) A crystal when placed in an electric field of strength 1 kV/m, shows polarization $4.3 \times 10^{-8} \text{ C/m}^2$. Determine the relative permittivity of the crystal. **4**
- Q.7** a) Explain the various factors affecting the acoustics of building and give their remedies. **10**
 b) Explain how ultrasonic waves are produced using magnetostriction method? **10**

End Semester Examination, May 2019

B. Tech. – First Semester

APPLIED PHYSICS-I (PH-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Expand the term LASER.
- b) Discuss the phenomena of population inversion.
- c) Give the principle of an optical fibre.
- d) Write a note on Planck's constant.
- e) Write Fermi Dirac distribution formula.
- f) What do you mean by an inertial frame of reference?
- g) What are equipotential surfaces?
- h) Give physical significance of divergence and curl of a vector.
- i) What is electric polarization in dielectrics?
- j) Write short notes on fluorescence.

2×10

PART-A

- Q.2** a) Explain Einstein's coefficients. Derive the relations between them. **10**
 b) Discuss different types of optical fibre on the basis of mode of propagation and index. **10**
- Q.3** a) Derive the expression for Schrodinger time independent wave equation. **10**
 b) What are matter waves? Derive an expression for de-Broglie wavelength. **7**
 c) De-Broglie wavelength of an electron is 73 Å. What is its velocity? **3**
- Q.4** a) Derive Lorentz transformation equations for space and time. **10**
 b) Explain and establish mass energy equivalence relation $E = mc^2$. **6**
 c) Calculate the rest energy of electron and proton in MeV.
 Given $m_e = 9.1 \times 10^{-31}$ kg, $m_p = 1.67 \times 10^{-27}$ kg **4**

PART-B

- Q.5** a) Determine the electric potential between two parallel plates of a capacitor using Laplace equation. **10**
 b) Given a potential of the form $V = m(x^2 + y^2 + z^2)^{1/2}$, check whether the potential satisfies Laplace equation **10**
- Q.6** a) Define electric polarization and establish the relation between three electric vectors E, P and D. **10**
 b) What happens when a dielectric is placed in an alternating electric field? Explain. **6**
 c) A crystal when placed in an electric field of strength 1 kV/m, shows polarization 4.3×10^{-8} C/m². Determine the relative permittivity of the crystal. **4**
- Q.7** a) Describe the principal and working of G.M. counter. **12**
 b) Discuss different mechanisms which are responsible for the interaction of γ -rays with matter. **8**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

AIRCRAFT SYSTEMS (AE-505)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the primary and secondary controls? Give examples.
- b) Explain briefly the function of a frise aileron and a fowler flap.
- c) List out the checks carried out on hydraulic fluid prior to its use in the aircraft to ensure its fitness for use on the aircraft.
- d) Explain the need for and operation of in-flight refueling.
- e) Name the typical zones on aircraft that require a fixed fire detection and/or fire extinguisher system.

4×5

PART-A

Q.2 a) Describe with the help of a schematic diagram, a typical fly-by-wire control system used in an aircraft. **8**

b) What is the basic difference between cable control system and push-pull rod control system? Describe a typical cable control type flying control system used in an aircraft. **12**

Q.3 a) Explain the difference between a power-assisted and a power-operated control system. **10**

b) Explain the hydraulic operation of shimmy damper and anti-skid unit. **10**

Q.4 a) Draw a schematic diagram of fuel system suitable for a piston engine aircraft having minimum two fuel tanks, EDP, engine primer line and all other basic system components. Discuss the operation. **10**

b) Explain the purpose and function of different types of fuel feed systems and tank vent system used in aircraft fuel system. **10**

PART-B

Q.5 a) Explain, with the help of a suitable system diagram, the function of air cycle air conditioning system used in aircraft. **12**

b) What are the various air supply sources used for pressurization system in an aircraft? **8**

Q.6 a) Describe a demand type oxygen system that is used in aircraft. How is the availability of oxygen percentage increased in the aircraft passenger cabin with increase in altitude? **12**

b) What are the various cautionary steps observed while carrying out leak test and oxygen charging of gaseous oxygen? **8**

Q.7 a) Describe briefly different types of smoke, flame and carbon monoxide detectors which are used in transport aircraft. **10**

b) Explain the phenomenon of ice formation on aircraft. Discuss typical anti-icing and de-icing systems used in an aircraft. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

QUANTITATIVE APTITUDE (MA-301 / MA-201A)

Time: 2 hrs.

Max Marks: **50**

No. of pages: **5**

Note: All questions are **compulsory**. Each question has **FOUR options**. Fill the right option in the answer table given below. Each question carries **ONE mark**. **No negative marking**. Options filled in the answer table will be considered.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
41.	42.	43.	44.	45.	46.	47.	48.	49.	50.

- Q.1 From his house, Lokesh went 15 kms to the North. Then he turned West and covered 10 kms. Then he turned South and covered 5 kms. Finally, turning to East, he covered 10 kms. In which direction is he from his house?
a) East b) North
c) West d) South
- Q.2 If P \$ Q means P is the brother of Q; P # Q means P is the mother of Q; P * Q means P is the daughter of Q. In A # B \$ C * D, who is the father?
a) D
b) B
c) C
d) Data is inadequate
- Q.3 A horse is facing north. It turns 90 degrees in the clockwise direction, then 180 degrees in the anti-clockwise and then another 90 degrees in the same direction. Which direction is the horse facing now?
a) East b) South
c) Southeast d) Southwest
- Q.4 A boy rode his bicycle Northward, then turned left and rode 1 km and again turned left and rode 2 km. He found himself 1 km west of his starting point. How far did he ride northward initially?
a) 1 Km b) 2 Km
c) 5 Km d) 4 Km
- Q.5 Gaurav walks 20 metres towards North. He then turns left and walks 40 metres. He again turns left and walks 20 metres. Further, he moves 20 metres after turning to the right. How far is he from his original position?
a) 40m b) 50m
c) 60m d) 70m
- Q.6 A's son b is married with c whose sister d is married to e the brother of B. How D is related to A?
a) Sister
b) Daughter's-in-law
c) Sister-in-law
d) Cousin
- Q.7 Rahul put his timepiece on the table in such a way that at 6 p.m. hour-hand points to North. In which direction the minute-hand will point at 9.15 p.m.?
a) South-East b) South
c) North d) West
- Q.8 If A is the brother of B; B is the sister of C; and C is the father of D, how D is related to A?
a) Brother
b) Sister
c) Nephew
d) Can't be determined
- Q.9 Identify the next word in the series: QAR, RAS, SAT, TAU, _____
a) UAV b) UAT
c) TAS d) TAT

Q.10 Pointing towards a girl, Abhisek says, "This girl is the daughter of only a child of my father." What is the relation of Abhisek's wife to that girl?
a) Daughter b) Mother
c) Aunt d) Sister

Q.11 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.: _____ babbba ___ a _____
a) ababb b) baaab
c) bbaba c) babbb

Q.12 In a code, CORNER is written as GSVRIV. How can CENTRAL be written in that code?
a) DFOUSBM b) GIRXVEP
c) GNFJKER d) None of these

Q.13 In a group of 100 persons, 72 people can speak English and 43 can speak French. How many can speak English only? How many can speak French only and how many can speak both English and French?
a) 28,15 b) 27,15
c) 30,16 d) 28,18

Q.14 If person is coded as PLPOEE, how is trend coded?
a) TNERD b) DNERT
c) NDETR d) TRDNE

Q.15 Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both, a two-wheeler and a credit card, 30 had both, a credit card and a mobile phone and 60 had both, a two wheeler and mobile phone and 10 had all three. How many candidates had none of the three?
a) 0 b) 20
c) 10 d) 18

Q.16 If \times stands for 'subtraction', \div stands for 'addition', $+$ stands for 'division' and $-$ stands for 'multiplication', then $20 \times 8 \div 8 - 4 + 2 = ?$
a) 18 b) -12
c) 40 d) -4

Q.17 The number of boys in a class is three times the number of girls. Which one of the following numbers cannot represent the total number of children in the class?
a) 48 b) 44
c) 42 d) 40

Directions for questions 18 to 22: Which one will replace the question mark in the following figures?

Q.18

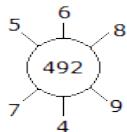
a) 5 b) 6
c) 7 d) 9

Q.19

2	4	0
1	2	4
3	1	3
36	?	91

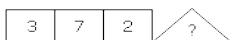
- a) 73 b) 173
 c) 70 d) 130

Q.20



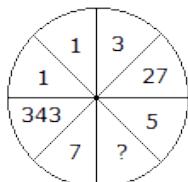
- a) 115 b) 130
 c) 135 d) 140

Q.21



- a) 1 b) 4
 c) 3 d) 6

Q.22



- a) 125 b) 165
 c) 600 d) 625

- Q.23 In a garden, there are 10 rows and 12 columns of mango trees. The distance between the two trees is 2 meters and a distance of one meter is left from all sides of the boundary of the garden. The length of the garden is
 a) 20 m b) 22 m
 c) 24 m d) 26 m

- Q.24 In a class, 18 boys are over 160 cm tall. If these constitute three-fourths of the boys and the total number of boys is two-thirds of the total number of students in the class, what is the number of girls in the class?
 a) 6 b) 12
 c) 18 d) 24

- Q.25 If A is to the south of B and C is to the east of B, in what direction is A with respect to C?
 a) South-East b) North
 c) None of these d) South-West

- Q.26 A man is facing north-west. He turns 90 degree in the clockwise direction and then 135 degree in the anticlockwise direction. Which direction is he facing now?
 a) East b) West
 c) North d) South

- Q.27 Shreyas walks northwards. After a while, he turns to his right and a little further to his

left. Finally, after walking a distance of one kilometer, he turns to his left again. In which direction is he moving now?

- a) North b) South
- c) West d) East

Q.28 Pointing to a photograph, a man said, "I have no brother or sister but that man's father is my father's son." Whose photograph was it?

- a) His own b) His son
- c) His Father d) His Grandfather

Directions for questions Q. 29 to

Q. 33: A cube painted red on two adjacent faces and black on the faces opposite to the red faces and green on the remaining faces, is cut into 64 smaller cubes of equal size.

Q.29 How many cubes are there which have no face painted?

- a) 0 b) 4
- c) 8 d) 16

Q.30 How many cubes have only one face painted?

- a) 8 b) 4
- c) 24 d) 32

Q.31 How many cubes have less than three faces painted?

- a) 44 b) 24
- c) 48 d) 36

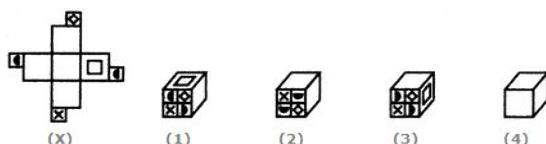
Q.32 How many cubes are there with three faces painted?

- a) 4 b) 8
- c) 16 d) 24

Q.33 How many cubes have one face green and one of the adjacent faces black or red?

- a) 8 b) 16
- c) 24 d) 28

Q.34 Choose the box that is similar to the box formed from the given sheet of paper (X).



- a) 1, 2 and 3 only
- b) 2 and 3 only
- c) 1, 3 and 4 only
- d) 2, 3 and 4 only

Q.35 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

- _ _ aba _ _ ba _ ab
- a) abbba b) abbab
 - c) baabb b) bbaba

Q.36 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

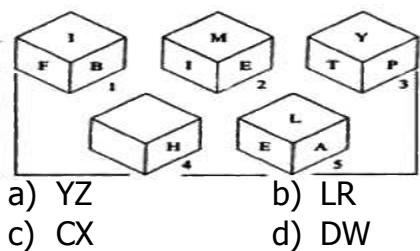
- _ bcdbc _ dcabd _ bcdbc _ dc _ bd
 a) aaaaaa b) ccccc
 c) bbbbb d) dddddd

- Q.37 In the AMS club, all the members participate either in the Tambola or the Fete. 420 participate in the Fete, 350 participate in the Tambola and 220 participate in both. How many members does the club have?
 a) 410 b) 550
 c) 440 d) 140

Directions for Questions Q. 38 —

Q. 39: Refer to the data below and answer the questions that follow. In a test in which 120 students appeared, 90 passed in History, 65 passed in Sociology and 75 passed in Political Science. 30 students passed in only one subject and 55 students in only two. Five students passed in no subject.

- Q.38 How many students passed in all the three subjects?
 a) 25 b) 30
 c) 35 d) Data Insufficient
- Q.39 Find the number of students who passed in at least two subjects.
 a) 85 b) 95
 c) 90 d) Data Insufficient
- Q.40 Debashish walks towards East then towards North and turning 45° right walks for a while and lastly turns towards left. In which direction is he walking now?
 a) North b) East
 c) South-East d) North-West
- Q.41 What letters are missing from cube 4?



- Q.42 Rahul told Anand, 'Yesterday I defeated the only brother of the daughter of my grandmother.' Whom did Rahul defeat?
 a) Son b) Father
 c) Mother d) Daughter

Directions for questions Q. 43 to

Q. 46: In a family of six, C is the sister of F, B is the brother of E's husband; D is the father of A and grandfather of F. There are two father's and three brothers in the family:-

- Q.43 How is D related to B?
 a) Father b) Mother
 c) Brother d) Grandfather
- Q.44 Who is C's mother?
 a) E b) B
 c) F d) D

- Q.45 Which of the following are not siblings?
a) A & B, A & C b) B & A, C & F
c) C & F d) A & C
- Q.46 If F is married to an outsider G, how is B related to G?
a) Uncle b) Aunt
c) Sister in law d) None of these
- Q.47 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.
ab _ aa _ bbb _ aaa _ bbba
a) abba b) baab
c) aaab d) abab
- Q.48 Sandeep is 40 metres South-West of Ananya, Prashant is 40 meters South-East of Ananya, Prashant is in which direction of Sandeep?
a) South b) West
c) East d) North-East
- Q.49 Vaibhavi who is the sister-in-law of Arpit is the daughter-in-law of Kiran. Divyansh is the father of Shrey who is the only brother of Arpit. How Kiran is related to Arpit?
a) Mother-in-law b) Aunt
c) Wife d) Mother
- Q.50 A man said to a lady, "Your mother's husband's sister is my aunt". How is that lady related to that man?
a) Daughter b) Sister
c) Grand-daughter d) Mother

End Semester Examination, May 2019

B. Tech. – Third Semester

QUANTITATIVE APTITUDE (MA-301 / MA-301A)

Time: 2 hrs.

Max Marks: **50**

No. of pages: **5**

Note: All questions are **compulsory**. Each question has **FOUR options**. Fill the right option in the answer table given below. Each question carries **ONE mark**. **No negative marking**. Options filled in the answer table will be considered.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
41.	42.	43.	44.	45.	46.	47.	48.	49.	50.

- Q.1 From his house, Lokesh went 15 kms to the North. Then he turned West and covered 10 kms. Then he turned South and covered 5 kms. Finally, turning to East, he covered 10 kms. In which direction is he from his house?
a) East b) North
c) West d) South
- Q.2 If P \$ Q means P is the brother of Q; P # Q means P is the mother of Q; P * Q means P is the daughter of Q. In A # B \$ C * D, who is the father?
a) D
b) B
c) C
d) Data is inadequate
- Q.3 A horse is facing north. It turns 90 degrees in the clockwise direction, then 180 degrees in the anti-clockwise and then another 90 degrees in the same direction. Which direction is the horse facing now?
a) East b) South
c) Southeast d) Southwest
- Q.4 A boy rode his bicycle Northward, then turned left and rode 1 km and again turned left and rode 2 km. He found himself 1 km west of his starting point. How far did he ride northward initially?
a) 1 Km b) 2 Km
c) 5 Km d) 4 Km
- Q.5 Gaurav walks 20 metres towards North. He then turns left and walks 40 metres. He again turns left and walks 20 metres. Further, he moves 20 metres after turning to the right. How far is he from his original position?
a) 40m b) 50m
c) 60m d) 70m
- Q.6 A's son b is married with c whose sister d is married to e the brother of B. How D is related to A?
a) Sister
b) Daughter's-in-law
c) Sister-in-law
d) Cousin
- Q.7 Rahul put his timepiece on the table in such a way that at 6 p.m. hour-hand points to North. In which direction the minute-hand will point at 9.15 p.m.?
a) South-East b) South
c) North d) West
- Q.8 If A is the brother of B; B is the sister of C; and C is the father of D, how D is related to A?
a) Brother
b) Sister
c) Nephew
d) Can't be determined
- Q.9 Identify the next word in the series: QAR, RAS, SAT, TAU, _____
a) UAV b) UAT
c) TAS d) TAT

Q.10 Pointing towards a girl, Abhisek says, "This girl is the daughter of only a child of my father." What is the relation of Abhisek's wife to that girl?
a) Daughter b) Mother
c) Aunt d) Sister

Q.11 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.: _____ babbba ___ a _____
a) ababb b) baaab
c) bbaba c) babbb

Q.12 In a code, CORNER is written as GSVRIV. How can CENTRAL be written in that code?
a) DFOUSBM b) GIRXVEP
c) GNFJKER d) None of these

Q.13 In a group of 100 persons, 72 people can speak English and 43 can speak French. How many can speak English only? How many can speak French only and how many can speak both English and French?
a) 28,15 b) 27,15
c) 30,16 d) 28,18

Q.14 If person is coded as PLPOEE, how is trend coded?
a) TNERD b) DNERT
c) NDETR d) TRDNE

Q.15 Of the 200 candidates who were interviewed for a position at a call center, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both, a two-wheeler and a credit card, 30 had both, a credit card and a mobile phone and 60 had both, a two wheeler and mobile phone and 10 had all three. How many candidates had none of the three?
a) 0 b) 20
c) 10 d) 18

Q.16 If \times stands for 'subtraction', \div stands for 'addition', $+$ stands for 'division' and $-$ stands for 'multiplication', then $20 \times 8 \div 8 - 4 + 2 = ?$
a) 18 b) -12
c) 40 d) -4

Q.17 The number of boys in a class is three times the number of girls. Which one of the following numbers cannot represent the total number of children in the class?
a) 48 b) 44
c) 42 d) 40

Directions for questions 18 to 22: Which one will replace the question mark in the following figures?

Q.18

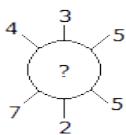
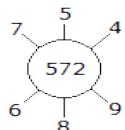
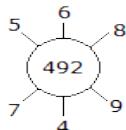
a) 5 b) 6
c) 7 d) 9

Q.19

2	4	0
1	2	4
3	1	3
36	?	91

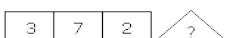
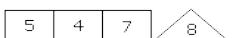
- a) 73 b) 173
 c) 70 d) 130

Q.20



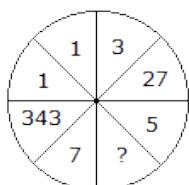
- a) 115 b) 130
 c) 135 d) 140

Q.21



- a) 1 b) 4
 c) 3 d) 6

Q.22



- a) 125 b) 165
 c) 600 d) 625

- Q.23 In a garden, there are 10 rows and 12 columns of mango trees. The distance between the two trees is 2 meters and a distance of one meter is left from all sides of the boundary of the garden. The length of the garden is
 a) 20 m b) 22 m
 c) 24 m d) 26 m

- Q.24 In a class, 18 boys are over 160 cm tall. If these constitute three-fourths of the boys and the total number of boys is two-thirds of the total number of students in the class, what is the number of girls in the class?
 a) 6 b) 12
 c) 18 d) 24

- Q.25 If A is to the south of B and C is to the east of B, in what direction is A with respect to C?
 a) South-East b) North
 c) None of these d) South-West

- Q.26 A man is facing north-west. He turns 90 degree in the clockwise direction and then 135 degree in the anticlockwise direction. Which direction is he facing now?
 a) East b) West
 c) North d) South

- Q.27 Shreyas walks northwards. After a while, he turns to his right and a little further to his

left. Finally, after walking a distance of one kilometer, he turns to his left again. In which direction is he moving now?

- a) North b) South
- c) West d) East

Q.28 Pointing to a photograph, a man said, "I have no brother or sister but that man's father is my father's son." Whose photograph was it?

- a) His own b) His son
- c) His Father d) His Grandfather

Directions for questions Q. 29 to

Q. 33: A cube painted red on two adjacent faces and black on the faces opposite to the red faces and green on the remaining faces, is cut into 64 smaller cubes of equal size.

Q.29 How many cubes are there which have no face painted?

- a) 0 b) 4
- c) 8 d) 16

Q.30 How many cubes have only one face painted?

- a) 8 b) 4
- c) 24 d) 32

Q.31 How many cubes have less than three faces painted?

- a) 44 b) 24
- c) 48 d) 36

Q.32 How many cubes are there with three faces painted?

- a) 4 b) 8
- c) 16 d) 24

Q.33 How many cubes have one face green and one of the adjacent faces black or red?

- a) 8 b) 16
- c) 24 d) 28

Q.34 Choose the box that is similar to the box formed from the given sheet of paper (X).



- a) 1, 2 and 3 only
- b) 2 and 3 only
- c) 1, 3 and 4 only
- d) 2, 3 and 4 only

Q.35 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

- _ _ aba _ _ ba _ ab
- a) abbba b) abbab
 - c) baabb b) bbaba

Q.36 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

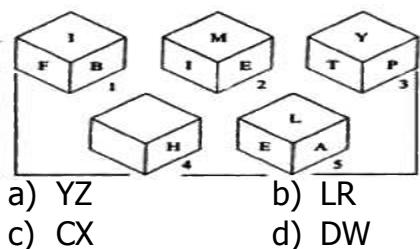
- _ bcdbc _ dcabd _ bcdbc _ dc _ bd
 a) aaaaaa b) ccccc
 c) bbbbb d) dddddd

- Q.37 In the AMS club, all the members participate either in the Tambola or the Fete. 420 participate in the Fete, 350 participate in the Tambola and 220 participate in both. How many members does the club have?
 a) 410 b) 550
 c) 440 d) 140

Directions for Questions Q. 38 —

Q. 39: Refer to the data below and answer the questions that follow. In a test in which 120 students appeared, 90 passed in History, 65 passed in Sociology and 75 passed in Political Science. 30 students passed in only one subject and 55 students in only two. Five students passed in no subject.

- Q.38 How many students passed in all the three subjects?
 a) 25 b) 30
 c) 35 d) Data Insufficient
- Q.39 Find the number of students who passed in at least two subjects.
 a) 85 b) 95
 c) 90 d) Data Insufficient
- Q.40 Debashish walks towards East then towards North and turning 45° right walks for a while and lastly turns towards left. In which direction is he walking now?
 a) North b) East
 c) South-East d) North-West
- Q.41 What letters are missing from cube 4?



- a) YZ
 b) LR
 c) CX
 d) DW

- Q.42 Rahul told Anand, 'Yesterday I defeated the only brother of the daughter of my grandmother.' Whom did Rahul defeat?
 a) Son b) Father
 c) Mother d) Daughter

Directions for questions Q. 43 to

Q. 46: In a family of six, C is the sister of F, B is the brother of E's husband; D is the father of A and grandfather of F. There are two father's and three brothers in the family:-

- Q.43 How is D related to B?
 a) Father b) Mother
 c) Brother d) Grandfather
- Q.44 Who is C's mother?
 a) E b) B
 c) F d) D

- Q.45 Which of the following are not siblings?
a) A & B, A & C b) B & A, C & F
c) C & F d) A & C
- Q.46 If F is married to an outsider G, how is B related to G?
a) Uncle b) Aunt
c) Sister in law d) None of these
- Q.47 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.
ab _ aa _ bbb _ aaa _ bbba
a) abba b) baab
c) aaab d) abab
- Q.48 Sandeep is 40 metres South-West of Ananya, Prashant is 40 meters South-East of Ananya, Prashant is in which direction of Sandeep?
a) South b) West
c) East d) North-East
- Q.49 Vaibhavi who is the sister-in-law of Arpit is the daughter-in-law of Kiran. Divyansh is the father of Shrey who is the only brother of Arpit. How Kiran is related to Arpit?
a) Mother-in-law b) Aunt
c) Wife d) Mother
- Q.50 A man said to a lady, "Your mother's husband's sister is my aunt". How is that lady related to that man?
a) Daughter b) Sister
c) Grand-daughter d) Mother

End Semester Examination, May 2019

B. Tech. – Second Semester

APPLIED PHYSICS-II (PH-201B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are Miller indices? Give their significance.
- b) Define crystalline, amorphous and poly-crystalline materials.
- c) What is Hall Effect?
- d) How does the optical absorption affect the conductivity of the sample?
- e) Explain the gain factor of a photoconductor.
- f) What is superconductivity?
- g) Name two high temperature superconductors.
- h) Give two reasons why the properties of a material change at nanoscale.
- i) Why X-rays are used to detect crystal structure?
- j) What is Mosley's Law?

2×10

PART-A

- Q.2**
- a) What is hexagonal close packed (HCP) structure? Show that c/a ratio for HCP crystal structure is $(8/3)^{1/2}$. **10**
 - b) Write a short note on Schottky defects and Frenkel defects. **6**
 - c) A simple cubic crystal has atomic radius of 1.50 \AA . Determine the spacing of planes having Miller indices (200) and (001). **4**
- Q.3**
- a) What are semiconductors? Discuss physical properties of semiconductors. **4**
 - b) Distinguish between direct and indirect band gap semiconductors. **6**
 - c) What is epitaxial crystal growth technique? Discuss briefly any two epitaxial techniques used for crystal growth. **10**
- Q.4**
- a) What are traps? Discuss the modified model to show the effect of traps on the photoconductivity. **12**
 - b) State the principle of photoconductive cell. Describe its construction, working and applications. **8**

PART-B

- Q.5**
- a) Describe the effects of magnetic field on a superconductor. **4**
 - b) Derive London equations and discuss how its solution explains Meissner effect and flux penetration? **10**
 - c) Explain in brief the BCS theory of superconductors. **6**
- Q.6**
- a) What are nanomaterials? Discuss the different approaches in building nanomaterials. **4**
 - b) What are carbon nanotubes? Describe two methods for fabrication of carbon nanotubes. **12**
 - c) Describe the important applications of nanomaterials. **4**
- Q.7**
- a) What are X-rays? How are they produced? **6**
 - b) Describe Bragg's spectrometer and explain how it is used to analyze the crystal structure. **8**
 - c) Write a short note on Rutherford Back Scattering spectroscopy. **6**

End Semester Examination, May 2019

B. Tech. – Second Semester

APPLIED PHYSICS-II (PH-201A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Bragg's law.
- b) Calculate the ratio $d_{100}:d_{110}:d_{111}$ for simple cubic lattice.
- c) How does the change in temperature affect the resistivity of a semiconductor?
- d) Is hetero-epitaxy different than homo-epitaxy? Give an example of each.
- e) What are trapping centres in a photoconductor?
- f) Write an expression for Bohr's magneton.
- g) Write one application each of soft and hard magnetic materials.
- h) Briefly discuss the formation of Cooper pairs.
- i) Give two examples of superconductors.
- j) What do you understand by nanotechnology?

2×10

PART-A

- Q.2** a) Discuss briefly the types of defects in crystals. Derive an expression for concentration of Schottky defects. **12**
- b) Explain the method for determination of Miller Indices. Draw the following planes in a simple cubic unit cell: (111), (222), (123) and (001). **8**
- Q.3** a) Derive an expression for Hall coefficient. The carrier concentration in p-type semiconductor is 10^{19} per m^3 . What is the value of Hall coefficient? **10**
- b) Describe any two of the following epitaxial techniques for crystal growth:
i) vapour phase epitaxy
ii) molecular beam epitaxy
iii) liquid phase epitaxy. **10**
- Q.4** a) What is photoconductivity? Discuss the simple model of a photoconductor. **10**
- b) Which cell converts solar energy into electrical energy? Explain its construction, working, characteristics and applications. **10**

PART-B

- Q.5** a) Distinguish between diamagnetism, paramagnetism and ferromagnetism. **10**
- b) Describe the method for plotting the hysteresis curve for a magnetic material and explain important features of this curve such as retentivity and coercivity. **10**
- Q.6** a) Distinguish between Type I and Type II superconductors. Also give four applications of superconductors. **10**
- b) What is Meissner effect in superconductors? Derive the London equations and discuss how its solution explains Meissner effect? **10**
- Q.7** a) Explain top down and bottom up techniques for building nanomaterials. Briefly discuss quantum well, quantum wire and quantum dot. **10**
- b) What are different types of carbon nanotubes? Describe any one method for the fabrication of carbon nanotubes. **10**

End Semester Examination, May 2019

B. Tech. – Fifth / Sixth Semester

AIRCRAFT SYSTEMS (AE-505)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer very briefly (**any ten**) of the following:

- a) What are the primary and secondary controls? What are the different types of tabs used on flying control devices?
- b) What is the difference between the electro-mechanical and electro-hydraulic actuators?
- c) Draw a sketch of a hydraulic filter assembly and explain the function of its by-pass valve.
- d) What checks are carried out in a fuel system for preparing the aircraft for flying? Why fuel venting and fuel dumping systems are required in aircraft?
- e) What functions are performed by canard surfaces and ruddervators?
- f) Explain the concept of cabin altitude, cabin differential pressure and cabin rate of climb.
- g) Name the air supply sources for air conditioning and pressurization system of an aircraft.
- h) What do you understand by solid oxygen? Explain how it is utilized in aircraft? Why do we need an engine oxygen system in an aircraft?
- i) What is the difference between de-icing and anti-icing? How are these carried out?
- j) Explain how temperature control is carried out inside the aircraft passenger cabin?
- k) How is the oxygen leak check carried out and what precautions are taken during the oxygen leak check and oxygen charging?

2×10

PART-A

- Q.2**
- a) Describe with the help of a schematic diagram, a typical fly-by-wire control system used in an aircraft. **10**
 - b) What is the basic difference between cable control system and push-pull rod control system? Explain with the help of diagram a typical push-pull rod type flying control system. Why is a tab required in a control surface? Explain the difference between a fixed tab and a control tab? **10**
- Q.3**
- a) What are the advantages and disadvantages of pneumatic system over the hydraulic system? Explain the emergency operation of undercarriage with the help of a schematic diagram of the system. **10**
 - b) Explain the construction of an aircraft tyre and function of brake system and purpose of anti-torque brackets. **10**
- Q.4**
- a) Discuss various indications and warnings installed in aircraft fuel system. **8**
 - b) Describe various checks that are required to be carried out in aircraft fuel system as part of the fuel discipline. **8**
 - c) Explain the purpose of fuel shut-off valve and fuel-cooled oil cooler used in the fuel system. **4**

PART-B

- Q.5**
- a) With suitable examples, analyze differences between active and passive systems of ice protection on an aircraft. Compare and contrast anti icing and de-icing systems. **8**

- b) You have been nominated as the design specialist for suggesting method of ice protection on following additional systems being fitted on indigenous AWACS aircraft:
- i) AAR probe.
 - ii) AESA radar antenna.
 - iii) Podded aero engine.

Briefly list out design inputs you would render to the design team.

12

- Q.6 a) Analyze oxygen requirements at various altitudes with variation in the composition of lung gas due to changes in atmospheric conditions. **10**
- b) Compare and contrast GOX, LOX and OBOGS with reference to the amount of oxygen that can be carried on the aircraft for duration and flexibility of various missions. **10**

- Q.7 a) What do you understand by 2-shot fire bottle. With the help of a sketch, explain its functioning. **10**
- b) With the help of a labeled diagram, explain purpose and functioning of engine and APU fire protection system. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

INTRODUCTION TO WIND ENERGY (AE-825A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) parts. All parts carry equal marks.

- a) When do we call a wind turbine a wind generator or a windmill? Discuss the advantages and disadvantages of wind generators.
- b) What are the stall-controlled and pitch-controlled wind turbines?
- c) Explain the plot between power coefficient of a wind turbine and its blade tip speed to wind speed ratio.
- d) Explain with the help of plots how wind power and wind power density would vary with increase in wind speed.
- e) List of various types of economic incentives that are generally provided to the entrepreneurs who choose to set up the WECS.
- f) What are the different energy storage options relevant to WECS operations?

4×5

PART-A

- Q.2 a) Describe a typical HAWT and a Darrius type VAWT with the help of suitable sketches and basic technical features of each type. What are the advantages and disadvantages of HAWT and VAWT? **12**
- b) Explain the meaning of rated power, rated speed of a wind turbine system. What are generally referred wind power classes? **8**
- Q.3 a) What are upwind and downwind types of wind turbines? Explain the vertical extrapolation of wind speed based on the 1/7 power law. **10**
- b) Explain how the lift and drag resulting on the wind turbine blades contribute towards the development of torque of the rotor. **10**

Q.4 a) Explain:

- i) Torque-speed curve,
- ii) Power density variation with wind speed,
- iii) Wind frequency distribution plot and
- iv) Annual wind energy yield of a site.

3×4

- b) Discuss the aerodynamic braking system and aerodynamic efficiency of a wind turbine? **8**

PART-B

- Q.5 a) What do you understand by direct heat applications of wind energy? Describe such applications with the help of sketches. **10**
- b) List out typical industrial processes that might be able to use low temperature heat produced by wind energy. **10**
- Q.6 a) What is electromagnetic interference? How can we classify it? Describe electromagnetic interference of the telecommunication, navigational and radar services that can be caused by the operation of wind turbines. **10**
- b) What are the major impacts of the use of wind energy systems on the environment? Discuss the impacts of wind farm operations on bird-life and the public attitude toward the installation and operation of wind turbines **10**
- Q.7 a) What is the difference between a standby energy facility and a storage energy facility? Give examples of each type in support of your answer. **8**
- b) What aspects of wind availability are considered for undertaking a WECS design? **6**
- c) List out the important parameters used in determining the cost of energy produced. **6**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

AERODYNAMICS-I (AE-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 Answer (**any five**) parts. All parts carry equal marks.
- Define pressure coefficient and skin friction coefficient.
 - Define and explain Kutta-Joukowski theorem.
 - What is downwash? Explain its effect on the local flow over an airfoil section of a finite wing.
 - Write the Navier-Stokes equations for an unsteady, compressible, three-dimensional viscous flow.
 - What purpose is served by installing a gurney flap on a racing car? Describe the aerodynamic effect caused by the gurney flap.
 - Work out an expression for momentum thickness of a boundary layer.
- 4×5**

PART-A

- Q.2 a) How can we determine lift coefficient from cp distribution over upper and lower surfaces of an airfoil? **5**
- b) With the help of suitable diagrams, show the equivalent ways of specifying force and moment system on an airfoil. What is center of pressure and how can we determine its location? For a low speed incompressible flow, the data for an airfoil section at an angle of attack of 4° is as follows: $c_l = 0.85$, and $c_{m,c/4} = -0.09$. Calculate the location of center of pressure. **15**
- Q.3 a) Write potential function, stream function and velocity components for the following elementary flows: Uniform flow, source flow, vortex flow and doublet flow. **12**
- b) Explain Kelvin's theorem and the concept of starting vortex. **8**
- Q.4 a) What is an elliptic wing? How does it influence induced drag? Explain analytically the effect of aspect ratio on induced drag. **10**
- b) Derive a relationship between the slopes of infinite wing and finite wing and discuss the effect of aspect ratio. **10**

PART-B

- Q.5 a) Discuss the methodology used in applying the lifting-surface theory to determine the normal velocity $w(x, y)$ induced at any point of the wing surface due to the system of vortices considered in the lifting-surface theory. **12**
- b) Discuss the conditions for occurrence of boundary layer separation over an airfoil. Explain the adverse pressure gradient and location of separation point. **8**
- Q.6 a) What is a multi-element airfoil? Draw sketch of such an airfoil and explain the likely maximum lift coefficient obtained by it vis-a-vis the lift coefficient obtained from an airfoil with plain flap deflected. **12**
- b) Discuss various drag reduction methods for each form of drag. **8**
- Q.7 The wing on a Piper Cherokee general aviation aircraft is rectangular, with a span of 9.75 m and a chord of 1.6 m. The aircraft is flying at cruising speed 63.04 m/s at sea level. Assume that the skin friction drag on the wing can be approximated by the drag on a flat plate of the same dimensions.
- Calculate the boundary-layer thickness at the trailing edge for
 - completely laminar flow
 - completely turbulent flow.
 - Calculate the skin friction drag accounting for transition. Assume the transition Reynolds number = 5×10^5 .
- 20**

End Semester Examination, May 2019

B. Tech. – Second Semester

APPLIED MATHEMATICS-II (MA-201B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1**
- Solve: $y \, dx - x \, dy + \log x \, dx = 0$
 - Write the potential difference across the components: L, C, R
 - Show that the frequency of the free vibrations in closed electrical circuits with inductance L and capacity C in series is $\frac{30}{\pi\sqrt{LC}}$ per minute.
 - Solve: $p - q = x - y$
 - Form the partial differential Equation: $xyz = \phi(x + y + z)$.
 - Classify the following partial differential equation: $2\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 3\frac{\partial^2 u}{\partial y^2} = 0$
 - Evaluate: $\int_0^\infty t^2 e^{-t} \sin 2t \, dt$
 - Find the Inverse Laplace transform of the following functions: $\frac{e^{-s}}{(s+2)^3}$
 - Explain periodic function with examples.
 - Write the fourier series for odd and even function in $(-\pi, \pi)$. **2x10**

PART-A

- Q.2**
- Solve: $(y^4 + 2y) \, dx + (xy^3 + 2y^4 - 4x) \, dy = 0$ **10**
 - Find the orthogonal trajectories of the family of the curve $r = a(1 + \cos \theta)$ **10**
- Q.3**
- Solve the following differential equation by the method of variation of parameter:

$$\frac{d^2 y}{dx^2} + y = \cos ec x$$
 10
 - A body executes damped forced vibrations given by the equation:

$$\frac{d^2 x}{dt^2} + 2k \frac{dx}{dt} + b^2 x = e^{-kt} \sin wt$$
, solve the equation for both the cases, when
 $w^2 \neq b^2 - k^2$ and $w^2 = b^2 - k^2$ **10**
- Q.4**
- Solve each of the following partial differential equations by Charpit's method:

$$z^2 = pqxy$$
 10
 - Solve: $\left(\frac{1}{z} - \frac{1}{y}\right)p + \left(\frac{1}{x} - \frac{1}{z}\right)q = \left(\frac{1}{y} - \frac{1}{x}\right)$. **10**

PART-B

- Q.5**
- A string is stretched and fastened to two points / apart. Motion is started by displacing the string in the form of $y = a \sin \frac{\pi x}{l}$ from which it is released at time $t = 0$. Show that the displacement of any point at a distance x from one end at time t is given by $y(x, t) = a \sin \frac{\pi x}{l} \cos \frac{\pi c t}{l}$. **10**
 - Solve the following differential equations by the method of separation of variables:

$$4\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$$
, given $u = 3e^{-y} - e^{-5y}$, when $x = 0$ **10**

Q.6 a) Solve the following differential equation by transform method:

$$\frac{dx}{dt} + y = \sin t, \quad \frac{dy}{dt} + x = \cos t, \text{ given } x(0) = 2, y(0) = 0.$$

10

b) Use convolution theorem to evaluate: $L^{-1}\left\{\frac{1}{(s+2)^2(s-2)}\right\}$

10

Q.7 a) Prove that $x \sin x = 1 - \frac{1}{2} \cos x - \frac{2}{1.3} \cos 2x + \frac{2}{2.4} \cos 3x + \frac{2}{3.5} \cos 4x + \dots, -\pi < x < \pi$

Hence show that

$$\frac{\pi}{4} = \frac{1}{2} + \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots$$

10

b) A Obtain a half-range sine and cosine series for: $f(x) = \begin{cases} x & , \quad 0 \leq x \leq \frac{\pi}{2} \\ \pi - x & , \quad \frac{\pi}{2} \leq x \leq \pi \end{cases}$

10

End Semester Examination, May 2019

B. Tech. – Second Semester

APPLIED MATHEMATICS-II (MA-201A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 a) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$. What are the Eigen values of A^{-1} .

b) Find the sum and product of the Eigen values of $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$.

c) Explain periodic function with examples.

d) Write the Dirichlet conditions for the expansion of a function as a Fourier series.

e) Solve: $(pq - p - q)(z - px - qy) = pq$.

f) Form the partial differential equation: $xyz = \phi(x + y + z)$.

g) Evaluate: $\int_0^\infty t^3 e^{-t} \sin t dt$.

h) Given that $L\left\{2\sqrt{\frac{t}{\pi}}\right\} = \frac{1}{s^{\frac{3}{2}}}$, show that $L\left\{\frac{1}{\sqrt{\pi t}}\right\} = \frac{1}{s^{\frac{1}{2}}}$.

i) State and prove modulation theorem.

j) What is the relation between Fourier transform and Laplace transform?

2×10

PART-A

Q.2 a) Find the Eigen values and Eigen vectors of the matrix: $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$. **10**

b) Verify Cayley-Hamilton theorem for the matrix: $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. **10**

Q.3 a) Prove that $x \sin x = 1 - \frac{1}{2} \cos x - \frac{2}{1.3} \cos 2x + \frac{2}{2.4} \cos 3x + \frac{2}{3.5} \cos 4x + \dots$,
 $-\pi < x < \pi$

Hence show that $\frac{\pi}{4} = \frac{1}{2} + \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots$ **10**

b) Find the Fourier cosine series for $f(x) = x^3$, $0 < x < L$ **10**

Q.4 a) A string is stretched and fastened to two points / apart. Motion is started by displacing the sting in the form of $y = a \sin \frac{\pi x}{l}$ from which it is released at time

$t = 0$. Show that the displacement of any point at a distance x from one end at time t is given by $y(x, t) = a \sin \frac{\pi x}{l} \cos \frac{\pi c t}{l}$. **10**

b) Solve: $\left(\frac{1}{z} - \frac{1}{y}\right)p + \left(\frac{1}{x} - \frac{1}{z}\right)q = \left(\frac{1}{y} - \frac{1}{x}\right)$ **10**

PART-B

Q.5 a) Expand the function in Laurent's series $f(z) = \frac{1}{z(e^z - 1)}$ for the region $0 < |z| < 2\pi$ **10**

b) Evaluate the following integrals using residuals theorem

$$\int_C \frac{12z - 7}{(z-1)^2(2z+3)} dz \text{ where } C : |z| = 2 \quad \text{10}$$

Q.6 a) Evaluate using convolution theorem $L^{-1} \left\{ \frac{s}{(s^2 + a^2)^2} \right\}$ **10**

b) Find the Laplace transform of $|t-1| + |t+1| + |t-2| + |t-2|$, $t \geq 0$. **10**

Q.7 a) Find the Fourier sine transform of the $\frac{e^{-ax}}{x}$. **10**

b) State and prove convolution theorem for Fourier transforms. **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

MATHEMATICS FOR BIOTECHNOLOGY-II (MA-203)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- Solve $ydx - xdy + \log x dx = 0$
- Solve: $(\sec x \tan x \tan y - e^x)dx + \sec x \sec^2 y dy = 0$
- Find C. F. for the differential equation $y'' + a^2 y = 0$
- Find P.I for the differential equation $(D^2 - 4D + 3)y = e^x \cos 2x$
- Form the partial differential Equation $f(xy + z^2, x + y + z) = 0$
- Solve $xp + yq = z$
- Evaluate $\int_0^\infty t^3 e^{-t} \sin t dt$
- Find the Inverse Laplace transform $\frac{e^{-\pi s}}{s^2 + 1}$
- In the Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$, what is the value of b_n
- Find the number of words, with or without meaning that can be formed with the letters of the word 'CHAIR'. **2x10**

PART-A

Q.2 Solve the following differential equations:

- $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$ **10**
- $\frac{dy}{dx} + x^2 y = \cos x$ **10**

- Q.3**
- Solve $\frac{d^2 y}{dx^2} + a^2 y = \tan ax$ **10**
 - Solve $(D^4 - 4D + 4)y = 8x e^{2x} \sin x$ **10**

Q.4 a) Solve the following differential equations:

$$x^2(y-z)p + y^2(z-x)q = z^2(x-y) \quad \text{10}$$

b) Solve the following differential equations by the method of separation of variables:

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u, \text{ given } u = 3e^{-y} - e^{-5y}, \text{ when } x = 0 \quad \text{10}$$

PART-B

- Q.5**
- State and prove Convolution theorem for Laplace Transform. **10**
 - Solve the following differential equation by Laplace Transform.

$$\frac{dx}{dt} - y = e^t, \frac{dy}{dt} + x = \sin t, \text{ given } x(0) = 1, y(0) = 0. \quad \text{10}$$

Q.6 a) Prove that $x \sin x = 1 - \frac{1}{2} \cos x - \frac{2}{1.3} \cos 2x + \frac{2}{2.4} \cos 3x + \frac{2}{3.5} \cos 4x + \dots, -\pi < x < \pi$ Hence
show that $\frac{\pi}{4} = \frac{1}{2} + \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots$ 15

b) Find the Fourier series expansion for $f(x) = \pi x, \quad 0 \leq x \leq 1$ 5

Q.7 a) In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Of this output 5, 4, 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C? 15

b) Find the mean number of heads in three tosses of a coin. 5

End Semester Examination, May 2019

B. Tech. – Sixth Semester

AIRCRAFT DESIGN (AE-604)

Time: 3 hrs

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B.** Each question carries equal marks.

Q.1 Answer (**any five**) of the following:

- a) Write the definition of 'Design'.
- b) Distinguish between wetted area and the reference area.
- c) What do you understand by 'multi-bogey landing gear'?
- d) What is canard?
- e) What is the lift distribution profile for an elliptical shaped wing?
- f) Draw a typical drag polar.
- g) Draw a mission profile including combat.
- h) What is taper ratio of a wing; compare the taper ratio of swept and un-swept wing, all other things remaining the same.
- i) What is a Sears-Haack body?
- j) During a design 56, 49, 65, 104 and 27 were calculated for wing loading what value should be chosen for proceeding.

4×5

PART-A

- Q.2 a) List and discuss all aspects of the wing geometry, state the criteria for the design of all the geometrical parameters. **10**
- b) What is a flap? Sketch and label various types of flaps and also plot C_L vs curves for the wing with and without for each type of flap. **10**
- Q.3 a) Derive the expression for weight ratio during cruise and loiter of a jet as well as a propeller aircraft. **10**
- b) Find the ratio of weights of a jet plane cruising a distance of 3000 km. at a velocity of 650 km/hr. maximum L/D found is 16 and SFC is 0.5 per hour. **5**
- c) Derive the relation for determining L/D as function of W/S etc. **5**
- Q.4 a) What objective is to be kept in mind for choosing wing tip configuration? Sketch various configurations and discuss their characteristics. **10**
- b) Sketch and discuss various tail arrangements. Discuss the requirement of horizontal tail location to ensure rudder effectiveness for spin recovery. **10**

PART-B

- Q.5 a) Describe the more refined method of determining the gross take-off weight and empty weight fraction and fuel weight. **6**
- b) Derive the expression for L/D for cruise and loiter required to compute the weight ratio for jet as well as propeller aircraft. **7**
- c) Describe the method for weight ratio during combat for a known time. **7**
- Q.6 a) Derive expression for weight ratios for 'cruise' and 'loiter' for a jet as well as propeller aircraft. How is the (L/D) ratio found? **10**
- b) Derive the relations between C_{D0} and C_{Di} for minimum thrust and minimum power and prove $(L/D)_{\min \text{ power}} = 0.866 (L/D)_{\min \text{ thrust}}$. **10**
- Q.7 a) Discuss, with the help of suitable sketch, the inlet location for the buried and the

podded engines.

7

- b) How to scale-up (length, diameter and weight) your design engine from an existing nearest one? 6
- c) What is 'carry through' structure? Describe structural concepts for fuselage and preferred integration of fuselage and wing. 7

End Semester Examination, May 2019

B. Tech. – Fourth Semester

AIRCRAFT MATERIALS (AE-404)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B.** Each question carries equal marks.

- Q.1 a) Define pickling and casehardening.
b) Draw binary-phase diagram for iron-carbon.
c) Classify and explain nickel alloys.
d) What is anisotropic lamina?
e) What is gun metal alloy?
f) What are the different aspects that lead to failure of any structure?
g) What is k-monel?
h) Draw temperature variation sketch for concorde.
i) What will be S.A.E steel numbering system for carbon steel and plain carbon steel?
j) What do you mean by anodic metal (in relation to corrosion of dissimilar metal)?

2x10

PART-A

- Q.2 a) Write factors that affects the choice of materials for different parts of aircraft from economic points of view. **10**
b) What is Rockwell hardness and Izod test? **10**
- Q.3 a) Explain aluminum-copper. Binary diagram. **6**
b) Briefly write the corrosion protection process for different materials in aerospace industry. **6**
c) Arrange magnesium, aluminum, zinc, chromium, iron, nickel, brass, copper in anodic series i.e. element with higher electric potential on top. **4**
d) What is weldability and formability? **4**
- Q.4 a) Write normalizing steps for mild carbon steel. **7**
b) What is spot welding? Write formula for finding heat energy generated in this welding process. **7**
c) What are the uses of corrosion resisting steel? **6**

PART-B

- Q.5 a) Explain two varieties of aluminium alloy. **7**
b) Write a note on magnesium alloy and its use. **7**
c) Write various causes of magnesium corrosion. **6**
- Q.6 a) What is inconel alloy and its use? **10**
b) What are the constituent's elements of brass and bronze and their uses? **10**
- Q.7 a) Why do we need composite materials? **6**
b) What are the advanced fibres? **7**
c) What are the functions of a matrix material? **7**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

BOUNDARY LAYER THEORY (AE-802)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) What do you understand by the concept of an effective body?
b) Define the boundary layer thickness.
c) Define 'laminar flow'.
d) What do you understand by energy thickness, explain briefly?
e) What is the objective of theory of stability?
f) Define 'parallel flow'.
g) Define 'turbulent flow'.
h) What determines the scale of turbulence?
i) How can one design wind tunnels of low turbulence intensity?
j) Define 'thermal boundary layer'.

2x10

PART-A

- Q.2 a) Derive the expression for boundary layer thickness with the help of appropriate diagrams. **10**
b) Write any three general properties of the boundary layer equation. **10**
- Q.3 Using approximate methods for steady equations show the importance of boundary layer on a body of revolution with the help of an appropriate diagram. **20**
- Q.4 a) Define 'critical reynolds number'. **10**
b) What are the factors that affect the transition? **10**

PART-B

- Q.5 a) Explain any three methods of control for boundary layer with the help of appropriate diagrams. **10**
b) Explain the general properties Orr-Sommerfeld equation. **10**
- Q.6 a) Explain the 'law of the wall' and the 'law of the wake', in detail. **12**
b) When suction is applied to a wing, what two distinct problems may arise? **8**
- Q.7 a) Deduce the relationship between the mean motion and Reynolds stresses caused by the fluctuations. **10**
b) Explain the two universal velocity distribution laws. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

BASICS OF COMPUTATIONAL FLUID DYNAMICS (AE-827)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer (**any five**) of the following questions:

- a) What is substantial derivative? What are its components? Explain their physical meaning.
- b) What are the pros and cons of obtaining higher order accuracy of difference quotients?
- c) Define:
 - i) Stability criteria based on the round off error and
 - ii) Courant number
- d) Explain briefly the difference between under relaxation and over relaxation.
- e) Define Peclet number and Transportiveness.
- f) Define:
 - i) Turbulence kinetic energy and
 - ii) Probability density function

4x5

PART-A

- Q.2 a) Define Cramer's rule and explain how it is used to classify partial differential equations. **15**
- b) Discuss briefly the general behavior of hyperbolic equations. Name the types of flow which are governed by hyperbolic equations. **5**
- Q.3 a) Explain the explicit and implicit approach for simple one dimensional heat conduction equation for writing a finite difference equation. **15**
- b) What are the relative advantages and disadvantages of explicit and implicit approaches used for CFD solutions? **5**

Q.4 Explain the transformations used for the generation of:

- i) Stretched grids in case of boundary flow over a flat surface.
- ii) Elliptic grid for flow around airfoil.

10x2

PART-B

- Q.5 Explain the Lax-Wendroff technique for time marching solution of flow parameter. Specify the flow conditions assumed. Write about the difficulty in using this technique which makes Mc Cormack 's technique more suitable. **20**
- Q.6 a) Write a note on upwind differencing scheme. **10**
- b) Discuss the assessment of upwind differencing scheme with respect to conservativeness, boundedness, transportiveness, accuracy. **10**
- Q.7 a) Write a note on LES. **10**
- b) Explain the Reynold's Averaged Navier Stokes equations for incompressible flow and the various terms and coefficients associated with them. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

APPLIED MATHEMATICS-IV (MA-441A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Find Fourier sine transform of $f(x) = \frac{1}{x}$ **3**
- b) Find b_n for $f(x) = \begin{cases} x + \pi, & 0 \leq x \leq \pi \\ -x - \pi, & -\pi \leq x < 0 \end{cases}$ **3**
- c) Solve: $p - x^2 = q + y^2$ **3**
- d) Form a partial differential equation from $z = f(x^2 - y^2)$ **2**
- e) Evaluate $L^{-1} \left\{ \frac{s^2 + 2s + 6}{s^4} \right\}$. **3**
- f) For which value of b the rank of the matrix $A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ b & 13 & 10 \end{bmatrix}$ is 2. **3**
- g) Solve $\frac{d^2y}{dx^2} + 11 \frac{dy}{dx} - 6y = 0$ **3**

PART-A

- Q.2** a) Solve: $(D+2)(D-1)^2 y = e^{-2x} + 2 \sin x$, where $D = \frac{d}{dx}$. **10**
- b) Solve: $\frac{dx}{dt} = 2y, \frac{dy}{dt} = 2y, \frac{dz}{dt} = 2x$ **10**
- Q.3** a) Evaluate: $L^{-1} \left\{ \frac{e^{-s} - 3e^{-3s}}{s^2} \right\}$ **7**
- b) Evaluate: $\int_0^\infty t^3 e^{-t} \sin t dt$ **5**
- c) Solve: $\frac{d^3y}{dx^3} - 3 \frac{d^2y}{dt^2} + 3 \frac{dy}{dt} - y = t^2 e^t$ by using Laplace transform. **8**

- Q.4** a) If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, find 2 non-singular matrices P and Q such that $PAQ=I$. **10**

- b) Find eigen values and eigen vectors of matrix $A = \begin{bmatrix} 1 & 2 & 4 \\ 0 & 3 & 4 \\ 0 & 0 & 1 \end{bmatrix}$. **10**

PART-B

- Q.5 a) Find Fourier series for $f(x) = x + x^2$, $-\pi < x < \pi$ **10**
 b) Find half-Range cosine series for $f(x) = e^x$ in $(0,1)$. **10**
- Q.6 a) Solve: $p(1+q^2) = q(z-a)$ **7**
 b) Solve: $y^2 p - xyq = x(z-xy)$. **6**
 c) Using method of separation of variables, find the solution for
 $u \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 3u$, $u = 3e^{-x} - e^{-5x}$ at $t=0$. **7**
- Q.7 a) Find Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$. **10**
 b) State and prove convolution theorem for Fourier transform. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PRINCIPLES OF HELICOPTER ENGINEERING (AE-826)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

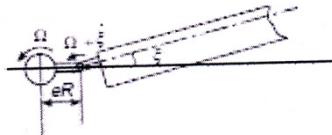
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Briefly explain the basic parts of the helicopter.
b) Define solidity and its effects.
c) Explain the vortex ring state.
d) Explain the concept of autorotation.
e) What is the advantage of ground effect?

4x5

PART-A

- Q.2 a) With the help of a hinge arrangement, show the flapping, lagging and feathering motion and briefly explain the importance of each motion. **10**
b) Derive the equation of lagging motion by assuming the flapping angle to be zero and the blade moving forward on the drag hinge through angle ξ . Refer the diagram shown as shown below.



10

- Q.3 a) In actuator-disc analysis why do we assume that the rotor has infinite number of blades? Explain. **10**
b) Explain the ground effect on the lifting rotor with the help of relevant diagrams. **10**

- Q.4 a) Derive the characteristic equation for longitudinal dynamic stability using all the assumptions. **10**

Given:

$$\begin{aligned}\frac{du}{d\tau} - x_u u - x_w w - x_q \frac{d\theta}{d\tau} + w_c \theta \cos \tau_c &= x_{B1} B_1 + x_{\theta o} \theta_o \\ -z_u u + \frac{dw}{d\tau} - z_w w - \left(\hat{V} + z_q \right) \frac{d\theta}{d\tau} + w_c \theta \sin \tau_c &= z_{B1} B_1 + z_{\theta o} \theta_o \\ -m_u u - m_w w - m_w \frac{dw}{d\tau} + \frac{d^2 \theta}{d\tau^2} - m_q \frac{d\theta}{d\tau} &= m_{B1} B_1 + m_{\theta o} \theta_o\end{aligned}$$

- b) The longitudinal derivatives for the hovering case (c.g. on shaft axis) are:

$$x_u = -0.032, x_w = 0, x_q = 0$$

$$z_u = -0, z_w = -0.52, z_q = 0$$

$$m'_u = 0.016, m'_w = 0, m'_q = -0.099$$

$$\text{Given: } \mu^* = 47.6, t = 1.82 \text{ seconds}, w_c = 0.0856 \text{ and } i_B = 0.11$$

$$m_u = 6.8, m_w = 0, m_q = -0.90$$

Calculate the time to halve amplitude and time to double amplitude. Also comment on the stability characteristics. **10**

PART-B

- Q.5 a) What is the advantage of an electromechanical device over the stabilizing bar? **10**
 b) Explain in detail the control response with the help of B_1 derivative. **10**

- Q.6 Explain any one type of active control of vibration. **20**

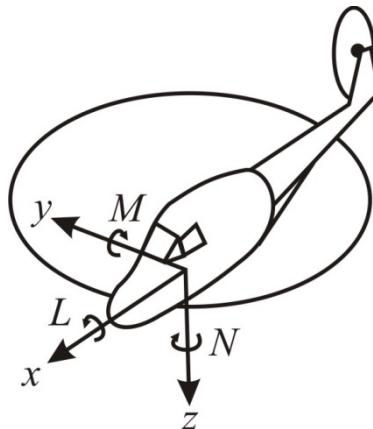
- Q.7 a) The exciting forces i.e. hub forces and moments from each blade can be resolved into force components X , Y , Z and moment components L , M , N relative to fixed axes in the helicopter. With the help of the information provided, show that:

$$X = -\frac{1}{2}b \sum_{m=1}^{\infty} [P_{mb-1} + T_{mb-1} + P_{mb+1} - T_{mb+1}] \cos mb\varphi$$

$$-\frac{1}{2}b \sum_{m=1}^{\infty} [Q_{mb-1} - S_{mb-1} + Q_{mb+1} + S_{mb-1}] \sin mb\varphi$$

Given: azimuth angle of k^{th} blade, $\varphi_k = \varphi + 2\pi k/b$

$$X_k = -R_{1k} \cos \varphi_k + R_{2k} \sin \varphi_k$$



10

- b) Why elimination or reduction of vibration is important? Explain. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ROCKET PROPULSION (AE-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is mass ratio of a vehicle? What is the resultant velocity increment in a multistage rocket?
- b) State the difference between effective exhaust velocity and characteristic velocity.
- c) What are the main components of a solid propellant rocket?
- d) Differentiate between insulator and inhibitor used in solid propellant rockets.
- e) What is the relation for burn rate in solid as well as in hybrid rockets?
- f) Explain the use of “ullage” in liquid rockets.
- g) Explain the difference between electric and chemical propulsion system.
- h) What are the different types of injectors used in liquid rocket systems?
- i) Explain any two problems pertaining to cryogenic stage.
- j) What is the relation between, mass flow rate and injector pressure drop in liquid rocket system

2x10

PART-A

- Q.2** a) Derive the rocket equation and write the important assumptions used in deriving it. **10**
b) Explain isentropic flow through a C-D Nozzle with diagram. **10**
- Q.3** a) Explain the different propellant configurations with diagram. **6**
b) What are the types of solid propellants, explain with examples. **10**
c) What are the desired properties of solids propellants **4**

- Q.4** a) Differentiate between pyrotechnic and pyrogen igniter. **6**
b) Explain the classification of solid rocket motors. **14**

PART-B

- Q.5** a) What are the main components of liquid propellant rocket? Explain with schematic diagram. **10**
b) What are the types of liquid propellants? Write the desired properties of liquid propellants. **10**
- Q.6** a) Describe the two types of propellant feed systems. **10**
b) What is combustion instability in liquid propellant rockets, describe in terms of POGO and slosh. **10**
- Q.7** a) Describe the operation of resistojet with diagram. **10**
b) Explain the principle and working of electron bombarded ion thruster with diagram. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

APPLIED MATHEMATICS-IV (MA-441A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Solve $\frac{dy}{dx} + xy = x^2$ **3**
- b) Find the Laplace Transform of $f(t) = e^{2t} \cos at$ **3**
- c) Find the Eigen values and Eigen vectors of $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ **3**
- d) Check whether the function is odd or even $f(x) = \begin{cases} -x^2, & -\pi < x < 0 \\ x^2, & 0 < x < \pi \end{cases}$ **2**
- e) Write down auxiliary equation for Lagrange's method for $Pp + Qp = R$. **3**
- f) Find the Fourier Transform of $f(t) = 1$. **3**
- g) Form a differential equation from $y = mx + c$. **3**

PART-A

- Q.2** a) Solve $\frac{d^2y}{dx^2} + a^2y = e^x + \cos 2x$. **10**
- b) Solve $\frac{dy}{dt} = 2x, \frac{dx}{dt} = 2z, \frac{dz}{dt} = 2y$. **10**
- Q.3** a) Solve $L^{-1}\left[\frac{s^2}{s^4 - a^4}\right]$ **10**
- b) Solve the following initial value problems:
 $(D^2 - 2D + 1)x = e^t$ with $x = 2$ $\frac{dx}{dt} = -1$ at $t = 0$ **10**

- Q.4** a) Solve $x+3y-2z=0, 2x-y+4z=0, x-11y+14z=0$. **10**
- b) Find the rank of the matrix $A = \begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & 4 & 6 & 2 \\ -1 & 5 & 4 & 6 \end{bmatrix}$. **10**

PART-B

- Q.5** a) Expand $f(x) = |\cos x|$ as a Fourier series in the interval $-\pi < x < \pi$ **10**
- b) Develop $\sin x$ in half range cosine series in the range $0 < x < \pi$. **10**
- Q.6** a) Using Method of Separation of Variables solve the equation

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$$
 Given that $u = 3e^{-y} - e^{-5y}$ when $x=0$. **15**
- b) Solve by Charpits Method $z = p^2x + q^2y$. **5**

- Q.7 a) Express the function $f(x) = \begin{cases} 1 & |x| < 1 \\ 0 & |x| > 1 \end{cases}$ as a Fourier Integral and hence evaluate $\int_0^\infty \frac{\sin \lambda \cos \lambda}{\lambda} d\lambda$. **10**
b) State and prove convolution theorem for Fourier transform. **10**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

BIOSTATISTICS (MA-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) The table below shows how Alice spends each part of her earnings. Construct a pie chart to visually display this data:

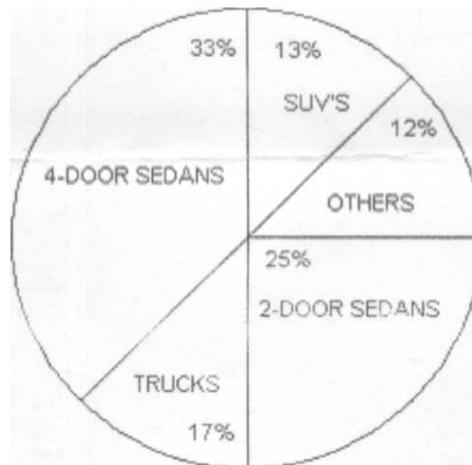
Expense	Percent
Rent	50
Food	20
Clothing	15
Entertainment	10
Others	5

- b) A jar contains 3 red marbles, 7 green marbles and 10 white marbles. If a marble is drawn from the jar at random, what is the probability that this marble is white?
 c) If x is the average (arithmetic mean) of m and 9. y is the average of $2m$ and 15 and z is the average of $3m$ and 18, what is the average of x , y and z ?
 d) Is chi-square test a parametric or non-parametric test? What is the test statistic for Chi-square test?
 e) What is the difference between correlation and regression? How can one calculate correlation coefficient?

4×5

PART-A

Q.2 a) If XYZ Auto Company sold 23,000 vehicles in 1999, how many were SUV's, Trucks and 2-door sedans?



10

2

- b) How is inter-quartile range different from range?
 c) Calculate median, range, the upper and lower quartiles and the interquartile range for: 34,47, 1, 15,57,24,20, 11, 19,50,28,37

8

Q.3 a) The frequency table of the monthly salaries of 20 people is shown below:

salary(in \$)	frequency
3500	5
4000	8
4200	5
4300	2

90/5

Calculate the standard deviation of the salaries of the 20 people.

12

b) Explain different type of skewness and kurtosis diagrammatically.

8

- Q.4 a) The number of industrial injuries per working week in a particular factory is known to follow a Poisson distribution with mean 0.5. Find the probability that in a particular week there will be: (i) less than 2 accidents, (ii) more than 2 accidents.
- b) X is the median for 4, 3, 8, X and 7. Find the possible values for X
- c) How is geometric mean different from harmonic mean? Write the formulae.

10

5

5

PART-B

- Q.5 a) Write short notes on (i) Cluster sampling (ii) One tailed test (iii) Region of acceptance (iv) Null hypothesis (v) Chi-square test

10

b) A investigator's raw data is given below. Evaluate her experiment using the criteria of $p < .05$.

Assume it is a two tailed paired test, critical value at $df = 14$ is 2.145

10

GI	38	40	35	36	35	32	31	30	28	26	24	21	18	34	22
G2	35	32	30	34	30	32	28	27	22	22	18	17	17	25	21

- Q.6 a) carry out Wilcoxon Rank Sum Test for the following data given that reject H_0 if test statistic is < 10 .

Old Program	8	7	6	2	5	8	7	3
New Program	9	9	7	8	10	9	6	

12

8

b) How is sign test different from Wilcoxon Rank Sign test? Explain with an example.

- Q.7 a) What are the differences between correlation and regression?
- b) Calculate the Spearman's correlation coefficient for the following data:

6

	X	14.4	7.2	27.5	33.8	38.0	15.9	r4.9
	Y	54	64	44	32	37	68	62

12

2

c) What does r signify?

End Semester Examination, May 2019

B. Tech. – Sixth Semester

INTRODUCTION TO ORBITAL MECHANICS (AE-607)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer (**any five**) of the following:

- a) Kepler's laws of planetary motion.
- b) Classical orbital elements.
- c) Euler angles.
- d) Simple impulse maneuvers.
- e) Two-impulse transfers.
- f) Elliptical transfer orbits.

4×5

PART-A

- Q.2 a) Derive the rotation matrix R for the given sequence of Euler angles successive principle rotations:
- A rotation ψ about the original z-axis.
- A rotation ϑ about the intermediate y-axis.
- A rotation ϕ about the transformed x-axis. **10**
- b) Derive the expression for the angular velocity in terms of Euler angle rates, considering the Euler angles as ψ , ϑ , and ϕ along the three axis, respectively. **10**
- Q.3 a) Derive the expression for angular momentum for a system of 10 particles. **10**
b) Derive the expression for the angular momentum for a rigid body. **10**

- Q.4 a) Derive the expression for translational kinetic energy for a rigid body. Express the rotational kinetic energy in terms of moment of inertia about the center of mass of the rigid body. **10**
b) State the Kepler's laws of planetary motion and derive Kepler's second law and third law for an elliptical orbit. **10**

PART-B

- Q.5 a) The position and velocity vectors of a satellite in ECI frame are stated as:
 $r = < 6000, 12.5, 30 >$ km
 $v = < 1.5, 0.5, 1.0 >$ km/s
Express the position and velocity vectors of the above satellite in terms of classical orbital elements. **10**
- b) A satellite is initially in a low-Earth circular orbit of radius 6778.14 km and needed to be transferred into a high-Earth orbit of radius 42,658 km radius, such that the angle between the orbital planes of the two orbits is 15° . Find the most efficient transfer for the above process and total velocity impulse required.
Given data: $\mu_{\text{Earth}} = 398600.4 \text{ Km}^3/\text{s}^2$, radius of third transfer orbit in case of bi-elliptical transfer = 60,000 km, radius of Earth = 6378.14 km. **10**
- Q.6 a) A spacecraft's dry mass is 75,000 kg and the effective exhaust gas velocity of its main engine is 3,100 m/s. How much propellant must be carried if the propulsive system is to produce a total Δv of 700 m/s? **10**
- b) A two-stage rocket has the following masses:
1st stage propellant mass: 120,000 kg

2nd stage propellant mass: 30,000 kg

1st stage dry mass: 9,000 kg

2nd stage dry mass: 3,000 kg

Payload mass: 3,000 kg

The specific impulse for the first and second stages are 260 s and 320 s, respectively. Calculate the rocket's total Δv . **10**

Q.7 Write a short note on the Mars Science Laboratory.

20

End Semester Examination, May 2019

B. Tech. — Eighth Semester

FLIGHT DYNAMIC (AE-824A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- a) Define the generalized body axes system.
- b) Differentiate between sideslip and yaw with diagram.
- c) What are stability derivatives? Give expression for any one stability derivative.
- d) What are Euler angles?
- e) Define transfer functions and root laws.
- f) Explain briefly the function of aircraft longitudinal autopilot.

4x5

PART-A

Q.2 a) Derive the expression for stick fixed neutral point. Also explain what is neutral point and static margin? **15**

- b) What do you understand by static stability analysis? Describe mathematically the equilibrium slot during flight in the plane of symmetry. **5**

Q.3 a) Derive the expression for contribution of using to $C_{\eta\beta}$. Also give the criterion for static directional stability. **10**

- b) What do you understand by pedal free static stability? Derive the expression for free rudder deflection. **10**

Q.4 a) What do you understand by characteristic equation of the dynamic system? What are the types of roots which indicate dynamic stability? **10**

- b) What are the different modes of longitudinal motion? How are they determined from the characteristic equation of the system? **10**

PART-B

Q.5 a) What are the characteristics of the following modes of stability in an aircraft?

- i) Roll mode.
- ii) Dutch roll mode.
- iii) Spinal mode. **15**

- b) For the given characteristic equation $2\lambda^3 + 4\lambda^2 + 4\lambda + 12 = 0$, check the stability of aircraft system based on Routh Hurwitz Criterion. **5**

Q.6 What do you understand by criterion for controllability and observability? For the dynamic system given below, check the controllability and observability of the system.

$$x = A_x + B_n, \text{ where}$$

$$y = C_x + D_n$$

$$A = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = [1 \ 0]$$

20

Q.7 Determine the feedback gains so that the airplane's short period characteristics are $\lambda_{sp} = -2.1 \pm 2.14i$. Assume that the original short period dynamics are given by.

$$\begin{bmatrix} \Delta & \dot{\gamma} \\ \Delta & \dot{q} \end{bmatrix} = \begin{bmatrix} -0.334 & 1.0 \\ -2.52 & -0.387 \end{bmatrix} \begin{bmatrix} \Delta & \gamma \\ \Delta & q \end{bmatrix} + \begin{bmatrix} -0.027 \\ -2.6 \end{bmatrix} [\Delta \delta e]$$

20

End Semester Examination, May 2019

B. Tech. – Sixth Semester

FLIGHT MECHANICS-II (AE-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- What do you understand by stick fixed static longitudinal stability?
- What are the different types of tabs used on airplanes? Briefly explain any one tab's function?
- What are stick force gradients? Give expression for the same.
- What is asymmetric flight?
- What is dihedral effect?
- Write the three equations of motion for longitudinal dynamic stability.

4×5

PART-A

Q.2 a) An airplane has the following characteristics obtain the stick fixed neutral point for the same.

$$x_{ac} = 0.25\tau, C_{max} = 0.12 \text{ rad}^{-1}$$

$$\eta = 1, l_t = 4.8 \text{ m}, St = 3.87 \text{ m}^2$$

$$S = 16.83 \text{ m}^2, \tau = 1.71 \text{ m}, C_{Lat} = 3.91 \text{ rad}^{-1}$$

$$C_{L_{aw}} = 4.3 \text{ rad}^{-1} \frac{dt}{d\alpha} = 0.45.$$

15

b) Explain the process of in-flight measurement of stick fixed neutral point.

5

Q.3 a) Derive the expression for aerodynamic hinge moment.

10

b) What are floating and restoring tendencies?

10

Q.4 a) Derive the expression for stick free neutral point.

15

b) What do you understand by stick free static margin?

5

PART-B

Q.5 a) Differentiate between pedal fixed and pedal free stability and derive the expression for the same.

15

b) What is weather cock effect?

5

Q.6 a) Differentiate between sideslip and yaw. What is the physical phenomena responsible for causing dihedral effect?

15

b) What does lateral static stability analysis deals with? Write the expression for rolling moment coefficient.

5

Q.7 a) Differentiate between short period and long period modes of an airplane. Explain if Phugoid is a short period or long period mode.

15

b) What is the necessary condition for lateral and directional dynamic stability?

5

End Semester Examination, May 2019

B. Tech. — Fourth Semester APPLIED MATHEMATICS-III (MA-302)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) If $f(z) = \log i$ find the real and imaginary part of
- b) State the Cauchy Reimann equation in Cartesian Form.
- c) Write Cauchy's integral formula.
- d) Expand $f(z) = \sin z$ about $z = \frac{\pi}{4}$ using Taylor's series.
- e) Write the complex form of Fourier transform.
- f) Find the fourier sine transform of $f(t) = e^{-t}$.
- g) A speaks truth in 70% cases and B in 85% cases. In what percentage of cases are they likely to contradict each other in stating the same fact?
- h) Five men in a company of 20 are graduates. If 3 men are picked out of 20 at random. What is the probability that they all are graduates?
- i) Define "Alternate hypothesis".
- j) A bag contains defective article, the exact number of which is not known. A sample of 100 from the bag gives 15 defective articles. Check whether to accept or reject the null hypothesis.

2×10

PART-A

Q.2 a) If the potential function is $\log(x^2 + y^2)$. Find the flux function and the complex potential function. **10**

b) If prove that $\frac{f(z) - f(0)}{z} \rightarrow 0$ as $z \rightarrow 0$ along any radius vector but not as $z \rightarrow 0$ along $y = mx^3$. **10**

Q.3 a) Expand the function in Laurent's series $f(z) = \frac{1}{z^2 - 4z + 3}$, for $1 < |z| < 3$. **10**

b) Evaluate: $\int_C \frac{e^{2z}}{(z - \frac{1}{2})(z - \frac{3}{2})} dz$ where C: $|z|=2$. **10**

Q.4 a) Express the function $f(x) = \begin{cases} 1 & |x| < 1 \\ 0 & |x| > 1 \end{cases}$ as a Fourier Integral and hence evaluate $\int_0^\infty \frac{\sin \lambda \cos \lambda}{\lambda} d\lambda$. **10**

b) Find fourier cosine and fourier sine transform of the function f defined by $f(t) = e^{-at}$, a is a constant. **10**

PART-B

Q.5 a) Find the probability that at most 5 defective components will be found in a lot of 200, if experience shows that 2% of such components are defective. Also find the probability of more than 5 defective components. (Given: $e^{-4} = 0.018$). **10**

b) A laboratory blood test is 99% effective in detecting a certain disease when it is, in fact, present. However, the test also yields a false positive result for 0.5% of the healthy person tested (i.e., if a healthy person is tested, then, with probability 0.005, the test will imply he has the disease). If 0.1 percent of the population actually has the disease, what is the

probability that a person has the disease given that his test result is positive?

10

- Q.6 a) A set of 5 coins are tossed 32,000 times and the number of heads appearing each time is noted. The results are given below:

No. of heads	0	1	2	3	4	5
Frequency	80	570	1100	900	500	50

Test the Hypothesis that coins are unbiased.

(Hint: for $v = 5$, $\chi^2 = 11.070$ at 5% level of significance).

10

- b) The average mark in English of sample of 100 students was 51 with a S.D. of 6 marks. Could this have been a random sample from a population with average marks 50? (Hint: $|z_\alpha| = 1.966$ at 5% level of significance). **10**

- Q.7 a) Find the Coe-efficient of Correlation for the following table:

x	10	14	18	22	26	30
y	18	12	24	6	30	36

10

- b) Fit a straight line to the following data:

x	120	150	210	250
y	1500	700	1000	1200

10

End Semester Examination, May 2019

B. Tech. – Sixth Semester

BASICS OF COMPUTATIONAL FLUID DYNAMICS (AE-827)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer (**any five**) of the following briefly:

- What is the physical principle of the continuity equation? Write the different forms of continuity equation.
- Explain the difference between the conservation form and the non-conservation forms of equations
- Define Jacobian and discuss its mathematical forms.
- Plot the discrete checkerboard velocity distribution.
- Define:
 - Length scale ratio,
 - Velocity scale ratio,
 - Turbulent Prandtl number
 - Turbulence kinetic energy.
- Explain the concept of staggered grid.

4×5

PART-A

Q.2 a) What are the different kinds of forces that can occur on a moving fluid element?
Derive a 3D momentum equation for a viscous flow in conservation form. **12**
b) How do we arrive at the Euler Equations from the Navier-Stokes equations? **8**

Q.3 a) Write the finite difference representation of the following:

- First order forward difference for first partial derivative.
- First order rearward difference for first partial derivative.
- Second order central difference for first partial derivative.
- Second order central difference for second partial derivative.

2×4
b) Explain the explicit and implicit approaches followed in CFD with examples. **4**
c) Differentiate between the discretization error and the round-off error. **8**

Q.4 a) Consider the continuity equation in Cartesian coordinates for steady viscous flow over a flat plate representing the physical plane (x, y):

$$\frac{\partial(pu)}{\partial x} + \frac{\partial(pv)}{\partial y} = 0$$

Transform this equation into computational plane (ξ, η) using the transformation:

$$\xi = x; \eta = \ln(y + I)$$

What type of grid-generation technique is represented by the above case? **10**

b) Describe the metrics and Jacobian determinants that are used in the transformation process in CFD applications. **5**

c) Discuss the transformation of a curvilinear grid as shown in the figure into a uniform grid in computational plane.

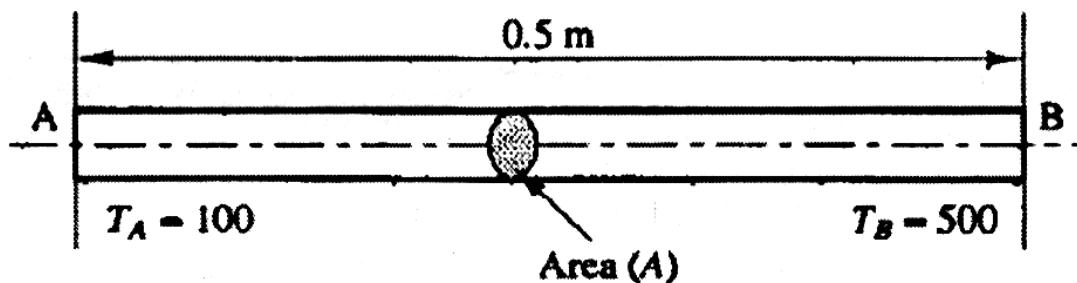


Q.5 a) Starting with an unsteady two-dimensional, inviscid flow and assuming no body force and no volumetric heat addition, discuss the procedure showing the essence of the Lax-Wendroff technique. 12

b) Plot the computational modules for the x-momentum equation and y-momentum equation showing the control volume in each case, as used in the pressure correction method. 8

Q.6 a) Discuss the one-dimensional application of the finite volume method to the solution of the simple diffusion problem involving conductive heat transfer as shown in Fig. This is source-free heat conduction in an insulated rod whose ends are maintained at constant temperatures of 100°C and 500°C respectively. Cross-sectional area $A = 10 \times 10^{-3}\text{m}^2$, thermal conductivity $k = 1000 \text{ W/mk}$.

Derive the set of algebraic equations in terms of steady-state temperature for five different nodes of the problem domain. Write the set of equations in matrix form.



14

b) Define conservativeness, boundedness and transportiveness. 6

Q.7 a) Discuss Prandtl's mixing length model of turbulence. 8

b) Define eddy viscosity. Discuss the transport equations for standard k-e model of turbulence. 12

End Semester Examination, May 2019

B. Tech. – Fourth Semester

AIRCRAFT PROPULSION-I (AE-403)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) How does thermal efficiency vary with compression ratio in Otto cycle?
- b) What is over-expanded and under-expanded nozzle?
- c) In normal shock wave, oblique shock wave flow with heat addition what happens to total temperature and total pressure (increase, decrease or constant)?
- d) Draw the value timing diagram for four stroke SI engine.
- e) Write down area velocity relation.
- f) Draw p-v diagram for Otto cycle.
- g) Show pressure variation through a convergent-divergent nozzle.
- h) What is choked nozzle?
- i) Write the expression for the 'speed coefficient' for a propeller.
- j) Discuss the concepts of stagnation temperature and stagnation pressure.

2x10

PART-A

Q.2 Consider a rocket engine burning hydrogen and oxygen; the combustion chamber temperature and pressure are 3517 K and 25 atm, respectively. The molecular weight of chemically reacting gas in the combustion chamber is 16 and $\gamma = 1.22$. The pressure at the exit of the convergent-divergent rocket nozzle is 1.174×10^{-2} atm. The area of the throat is 0.4 m^2 . Assuming a calorically perfect gas and isentropic flow, calculate:
a) the exit Mach number,
b) the exit velocity,
c) the mass flow through the nozzle,
d) the area of the exit.

20

Q.3 a) Draw a schematic of a turbojet engine and explain its working. Draw the T-S ad the P-V plots and explain the Brayton cycle for this engine. **10**
b) Draw the schematic diagram and T-S diagram of Ramjet engine and explain its working. Write down the advantages and disadvantages of the Ramjet engine. **10**

Q.4 In a diesel cycle, the compression ratio is 12. Compression begins at 0.25 MPa, 55 degree Celsius. The heat added is 1.675 MJ/kg. Find out:
a) the maximum temperature in the cycle,
b) work done per kg of air,
c) the cycle efficiency,
d) the temperature at the end of the isentropic expansion,
e) the cut off ration.
f) the mean effective pressure of the cycle.

20

PART-B

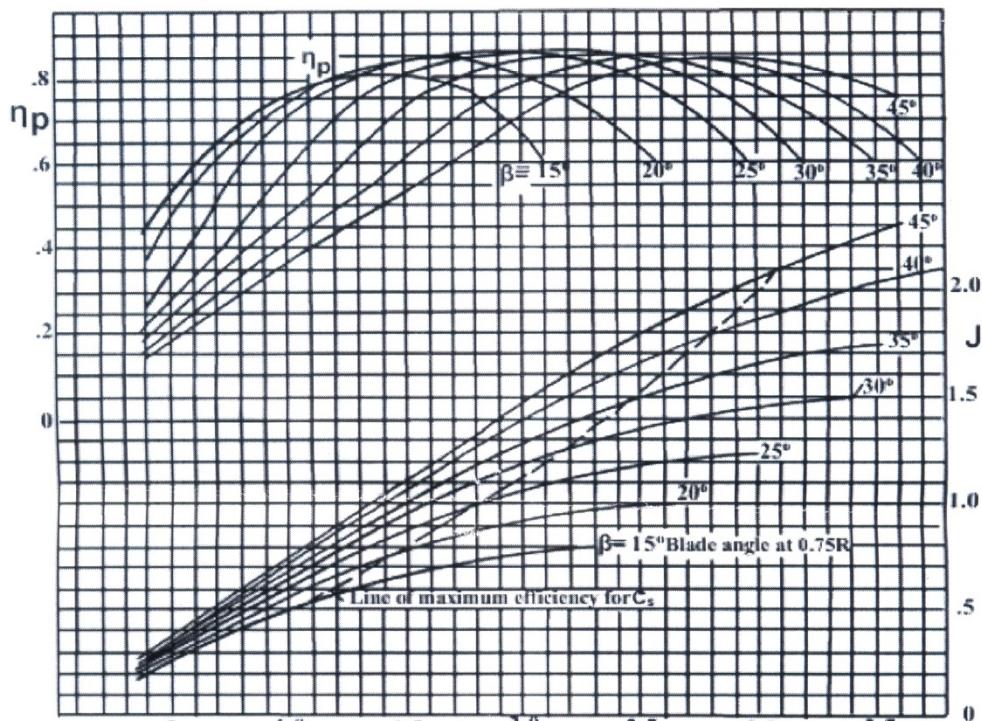
Q.5 The following data apply to a turbojet aircraft flying at an altitude of 6.1 km where the

ambient conditions are 0.458 bar and 248 K.	
Speed of the aircraft:	805 km/h
Compression total head pressure ratio:	4:1
C V of fuel	43 MJ/kg
Combustion chamber pressure loss:	0.21 bar
Intake duct efficiency:	95%
Turbine inlet temperature:	1100 K
Isentropic efficiency of compressor:	85%
Isentropic efficiency of turbine:	90%
Mechanical efficiency of transmission:	99%
Isentropic efficiency of nozzle:	95%
Nozzle outlet area:	0.0935 m ²

Find the thrust and specific fuel consumption in kg/Nh of thrust. Assume convergent nozzle. Take $C_p = 1.005 \text{ kJ/kg K}$ and γ (air) = 1.4, $C_p = 1.147 \text{ kJ/kg K}$ and γ (gas) = 1.33.

20

Q.6 An aircraft cruises at 500 km/hr speed at sea level, is powered by a 3-bladed propeller rotates at 1100 rpm, and is supplied 1491.5 kW of power. The propeller is designed with blades of NACA blade sections. Compute the propeller diameter and the efficiency of the propeller at this operating condition. If the propeller is a variable pitch propeller what would be its efficiency at 161 km/hr. Use design chart to find advance ratio, blade angle and propeller efficiency.



Design Chart

20

- Q.7
- a) Air flowing in a duct has a velocity of 300 m/s, pressure of 1.0 bar and temperature 290 K. Taking $\gamma = 1.4$ and $R = 287 \text{ J/kg.K}$ determine:
 - i) Stagnation pressure and temperature,
 - ii) Velocity of sound in the dynamic and stagnation conditions.
 - b) A normal shock wave is standing in the test section of a supersonic wind tunnel. Up stream of the wave, $M_1 = 3$, $p_1 = 0.5 \text{ atm}$, and $T_1 = 200 \text{ K}$. Find M_2 , p_2 , T_2 and u_2 (velocity) downstream of the wave.

10

End Semester Examination, May 2019

B. Tech. – Third Semester

BASICS OF AUTOMOBILE ENGINEERING (AU-405)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Name main four car body styles.
- b) Name four ways of classification of two wheel vehicle.
- c) Give reason for changing lubricating oil at specific periods.
- d) What do you mean by DTSSI technology?
- e) Calculate air resistance at 30Kmph if the air resistance at 10 kmph is W.
- f) What is aspect ratio of a tyre?
- g) How tandem master cylinder different from normal master cylinder?
- h) Name four types of steering gears.
- i) Why skidding take place in a vehicle? How it can be prevented?
- j) Why clutch should have less size and weight?

2×10

PART-A

Q.2 a) Name the different parameters used for specifying a vehicle and explain the importance of each. **10**

- b) A car has a weight of 11280 N, including four passengers and luggage. The engine is running in top gear at 5000 rpm. The size of the wheel tyre is 0.508 m. The crown wheel to pinion ratio is 4.3. The frontal area of body is 2.2m^2 . Assuming the coefficient of rolling friction and air resistance as 0.012 and 0.007 respectively and transmission efficiency as 80%. Find the brake power of the vehicle. **10**

Q.3 a) With the help of neat sketch explain liquid cooling systems used in I.C. engines. **10**
b) With the help of neat sketch explain the working of ignition system. **10**

Q.4 a) Explain the principle of working of automatic transmission with the help of neat sketch. **10**
b) What is the necessity of a transmission in a vehicle? Explain with the help of total resistance - tractive effort curve. **10**

PART-B

Q.5 a) With the help of neat sketch explain the working of telescopic type shock absorber. **10**
b) Name four types of steering gears. Explain working of a rack and pinion type of steering gear. **10**

Q.6 a) Draw a simple diagram to show the layout of hydraulic operated four wheel brakes system and explain its working in detail. **10**
b) With the help of neat sketch, explain the working of air brake system. **10**

Q.7 a) State the various function performed by an automobile tyre. Discuss the properties expected in the same. **10**
b) Name different type wheel rims. Explain anyone with the help of a neat sketch. **5**
c) A tyre is designated-as 150-HR-15. What do the different symbols signify. **5**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

COMPUTER AIDED VEHICLE DESIGN (AU-802)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is the importance of downward visibility?
- b) Write various cylinder arrangement used for IC engine.
- c) Classify the vehicle according to its body shapes.
- d) Write criteria for selection of number of cylinder for IC engines.
- e) What are the factors affecting vehicle acceleration?
- f) What information we get from performance curve?
- g) What is meant by lift and pitching?
- h) What are the steps to be followed for painting process?
- i) Describes two particle objectives of aerodynamics.
- j) What are the general characteristic of sheet metal used for a vehicle body construction?

2x10

PART-A

- | | | |
|------------|---|-----------|
| Q.2 | a) Explain how varying number of cylinder of an IC engine affect its performance. | 10 |
| | b) Explain how liquid cooling system for IC engine work. | 10 |
| Q.3 | a) Describe in detail the usage of safety equipment. | 10 |
| | b) Explain the crash test on full scale model. | 10 |
| Q.4 | a) Illustrate the different form of aerodynamic drag. | 10 |
| | b) Explain air flow visualization test can be conducted using a closed wind tunnel. | 10 |

PART-B

- | | | |
|------------|--|-----------|
| Q.5 | a) Explain the typical performance curve for diesel engine. | 10 |
| | b) Explain gradability in different gears for a truck. | 10 |
| Q.6 | a) Explain how side thrust on cylinder wall affect performance of an IC engine. | 10 |
| | b) Define the terms: <ul style="list-style-type: none">i) Compression ratio.ii) Brake horse power.iii) Indicated power.iv) Piston displacement. | 10 |
| Q.7 | a) How selections of material for a car body affect its performance? | 10 |
| | b) Explain about the modern painting process for vehicle bodies. | 10 |

End Semester Examination, May 2019
B. Tech. — Eighth Semester
OFF-ROAD VEHICLES (AU-713)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1** is compulsory. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 Answer the following questions:
- a) Name four companies having earth moving machine manufacturing plants in India.
 - b) Why tractors have large diameter rear wheel?
 - c) Explain the purpose of Ditchers.
 - d) Differentiate between on highway and off highway vehicles.
 - e) What is rated power for tractors? What does it indicate?
 - f) What do you mean by pitch in dozers?
 - g) Name five types of dump trucks.
 - h) Give three advantages of Crawler mounted dozer.
 - i) How are graders classified? Provide two ways of classification of graders.
 - j) Give specifications of a dumper.
- 2×10**

PART-A

- Q.2 a) Discuss how power is transmitted from engine to wheels in Common Dump Trucks? **10**
b) With the help of a neat sketch, explain the important parts of a Backhoe loader. **10**
- Q.3 Explain the construction and working of forklift with the help of neat sketch. **20**
- Q.4 a) What are the new developments for comfort and safety of a tractors? **10**
b) What is bore ratio? How this parameter helps in engine design of tractors? **10**

PART-B

- Q.5 How will you explain capacity of following earth moving machines?
a) Wheel loader.
b) Crawler dozer.
c) Hydraulic Excavator. **20**
- Q.6 a) How are bush cutter classified? Explain the purpose and construction of a bush cutter in detail. **10**
b) Differentiate between scrappers and graders. **10**
- Q.7 a) Explain the specific application of Crawler mounted dozer? Give one specification of such a dozer. **10**
b) Draw a neat sketch and label important parts of power shovel. Write four applications of a power shovel. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

EMERGING AUTOMOTIVE TECHNOLOGIES (AU-817)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What environmental challenges are created because of vehicle emission?
- b) What are the main benefits of fuel cell?
- c) What are ultra-capacitors?
- d) How fuel cell is better than battery?
- e) How EGR affects the emission of diesel engine?
- f) How X-by wire technology's advanced as compared to hydraulic system.
- g) How regenerative brakes system work?
- h) What are benefits of supercharging?
- i) What is the advantage of a PHEV to the environment?
- j) What are reformers?

2x10

PART-A

- Q.2** a) What are the steps automobile industry is taking to meet the design challenges for 21st century? **10**
- b) What are the crucial issues faced by automobile industries in today's environment? **10**
- Q.3** a) How incorporation of fuel cell drive technology help in reducing emission? **10**
- b) Explain the working of fuel cell and how its working is different from battery? **10**
- Q.4** How today's diesel engine is different from that used a decade before? Discuss in terms of:
i) Performance. **10**
ii) Emission. **10**

PART-B

- Q.5** Describe the hybrid electric vehicle architecture in:
a) Series. **10**
b) Parallel Combination. **10**
- Q.6** a) Discuss the need of new energy storage media? **10**
b) What is start stop operation? How it is achieved in today's automobiles? **10**
- Q.7** a) Explain the construction and working of X by wire technology with the help of neat labeled sketch. **10**
b) Explain what are the advantages of fully active suspension system. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

VEHICLE DYNAMICS (AU-512)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define the term vibration isolation.
- b) Define the terms: i) Damping coefficient ii) Damping factor
- c) What is tractive property of tyre?
- d) What is slip angle?
- e) What is active suspension in context of vehicle?
- f) What are the factors that influence rolling resistance?
- g) Enumerate the aerodynamic force and moment acting on the vehicle.
- h) What is meant by steady state handling characteristics of a vehicle?
- i) What is meant by understeer in a vehicle?
- j) What is independent suspension?

2x10

PART-A

Q.2 A machine part having a mass of 2.5 kg vibrates in a viscous medium. A harmonic exciting force of 30N acts on the part and causes resonant of 14 mm with a period of 0.22 second. Find the damping co-efficient. **20**

Q.3 a) Explain why radial ply tyre is preferred over bias ply tyre. **7**
b) Briefly explain magic formula for tyre model. **13**

Q.4 a) Explain merits and demerits of H infinite control method. **7**
b) Briefly explain the various sources of vibration in design of suspension system. **13**

PART-B

Q.5 a) What are the factors that influence rolling resistance? **7**
b) Explain the functions of traction control system. **13**

Q.6 a) Explain yaw velocity gain with respect to steady state cornering. **7**
b) Write down the expressions for limiting speed and overturning speed when the vehicle is running on a banked track. **13**

Q.7 a) Explain with a neat sketch multi-link suspension system. **10**
b) Briefly explain trailing rear suspension system. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MEASURING TECHNIQUES (AU-626)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Explain resolution and linearity.
- b) How active transducer is different from passive transducer?
- c) How torque and shaft power is measured?
- d) Define absolute and gauge pressures.
- e) What is the application of exhaust gas analyzer? **4x5**

PART-A

Q.2 Define dynamic response of a system and distinguish between steady state response and transient response. **20**

Q.3 Give an overview of various modes of operation of piezo-electric transducers with their applications. **20**

Q.4 Elucidate the construction and working of hydraulic load cells. Write their advantages and disadvantages. **20**

PART-B

Q.5 Give a detailed account of the construction of a pitot tube and show how it can be used for measurement of velocity of a fluid flowing in a pipe. **20**

Q.6 Write in brief about the materials commonly used for RTD's. Which one has the most linear characteristics? **20**

Q.7 a) Differentiate between tool and equipment. **4**
b) Explain the working of battery hydrometer and armature growler. **16**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

AUTOMOTIVE ENGINES (AU-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer in brief:

- a) What is a rich air-fuel mixture?
- b) Name the sensors used in a MPFI system.
- c) Compare the carburetion system in S.I engines with fuel injection system in C.I engines in terms of fuel and air speed.
- d) Justify the statement "S.I engine size is generally limited to 100 mm bore".
- e) Define the term 'ignition lag' in SI engine combustion.
- f) Name the primary reference fuels used for octane rating of any fuel.
- g) What is octane number?
- h) What are different types of CI engine combustion chambers?
- i) Define indicated power and brake power.
- j) Why do supercharged petrol engines employ lower compression ratio?

2x10

PART-A

- Q.2** a) Draw and explain the actual valve timing diagram of a 4-stroke diesel engine. **10**
b) With the help of a neat sketch, explain the working of MPFI system. **10**
- Q.3** a) What is solid injection system? Discuss the various types of solid injection system. **10**
b) What are the steps required to calibrate a fuel injection pump? **10**
- Q.4** a) Discuss "normal and abnormal combustion" in S.I engine. **4**
b) Discuss the effect of the following engine variables on flame propagation:
i) Air-fuel ratio.
ii) Compression ratio.
iii) Engine load.
iv) Engine speed. **3x4**

PART-B

- Q.5** a) What are the various stages of combustion in S.I Engines? **10**
b) A 4 cylinder 4 stroke engine of 8 cm bore and 7 cm stroke with a compression ratio of 6 is tested at 4500 rpm on a dynamometer which has 54 cm radius. During a 10 min test, the dynamometer reading was 42 kg and the engine consumed 4.4 kg of fuel having a calorific value of 44000 kJ/kg. Air at 300K and 100 kPa was supplied at the rate of 6 kg/minute. Find:
i) Brake power.
ii) Brake specific fuel consumption (bsfc).
iii) Brake specific air consumption (bsac).
iv) Brake thermal efficiency. **10**
- Q.6** a) With the help of a suitable diagram, explain the working of battery ignition system. **10**
b) Explain the effect of supercharging of CI engines on:
i) Mechanical efficiency
ii) Fuel consumption **5x2**
- Q.7** A full load test on a two-stroke engine yielded following results:

Speed = 450rpm; brake load = 450 N; mean effective pressure = 290 kPa; fuel consumption = 5.4 kg/hr; cooling water flow rate = 440 kg/hr; water inlet temperature = 20°C ; water outlet temperature = 56.1°C, test room temperature = 20°C; barometric pressure = 101.325 kPa; temperature of exhaust gases = 355°C; air-fuel ratio = 31; brake diameter = 1.2m; calorific value of fuel = 44000 kJ/kg; proportion of hydrogen in fuel = 15 %; specific heat of dry exhaust gases = 1.005 kJ/kgK; specific heat of dry steam = 2.05 kJ/kgK; latent heat of steam = 2250 kJ/kg; specific heat of water= 4.187 kJ/kgK and R=0.287 kJ/kgK.

Draw heat balance sheet in kJ/min and also in percentage.

20

End Semester Examination, May 2019

B. Tech. — Fourth Semester

FUEL AND LUBRICANTS (AU-406A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the various hydro carbons present in crude oil?
- b) Give the general formulae with necessary properties of Naphthene and Aromatics.
- c) Discuss the effect of engine variables on knock.
- d) Discuss the usage of benzol and acetone as a substitute for regular used fuels.
- e) Discuss about synthetic lubricants. Give advantages and disadvantages.

4×5

PART-A

Q.2 With a neat sketch, write about the setup and the procedure of petroleum refining process. Give tabulation of various products derived through distillation process. **20**

Q.3 a) With a neat sketch, explain how calorific value of fuel is measured using bomb calorimeter. **10**

- b) Explain the following lubricant properties:
 - i) Decomposition stability.
 - ii) Ash content.
 - iii) Neutralization number.
 - iv) Iodine value.

2½×4

Q.4 With a neat sketch, explain the stages of combustion in SI engines, flame front propagation and discuss the factors affecting the flame speed. **20**

PART-B

Q.5 a) Draw and explain in detail the block diagram of a hybrid electric vehicle. **15**
b) Can hydrogen be used as alternative fuel in automobile? Write your views. **5**

Q.6 a) What are the specific requirements for automotive lubricants? **10**
b) Explain the properties of a semisolid lubricant. **10**

Q.7 With a neat sketch, explain the lubrication system in a 4 cylinder petrol engine. **20**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

AUTOMOTIVE POLLUTION AND ITS CONTROL (AU-610)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer in brief:

- a) What is Air Pollution? Explain the constituents of air pollution.
- b) With a neat sketch describe pollutant formation in a two stroke engine.
- c) Which types of bonds are available in Alkenes and Alkynes? Draw the molecular structures of both and differentiate their properties.
- d) What will be the phenomenon of NO_x formation due to under-mixing & over-mixing of Fuel in a Diesel Engine?
- e) What is Gas Chromatograph? Explain with a neat diagram.

4x5

PART-A

Q.2 a) What is global warming? How global warming is causing decline in the quality of life on planet Earth? **10**

b) What are the human health and environment concerns due to pollution? **10**

Q.3 What are the effects of the following on emissions formation in a SI Engine?

- a) Design parameters.
- b) Operating variables.

10x2

Q.4 Explain in detail about Poly nuclear aromatic Hydro Carbon and the types of Hydro Carbon emissions. **20**

PART-B

Q.5 What is vehicle noise? Elaborate the sources of noise from an automobile. Explain the various methods of analyzing vehicle noise. **20**

Q.6 Explain the following methods of Emission controls for SI and CI engines.

- a) Secondary air injection.
- b) Exhaust Gas recirculation.

10x2

Q.7 Explain the following emission test procedures:

- a) ECE.
- b) FTP Tests.

10x2

End Semester Examination, May 2019

B. Tech. — Seventh Semester

EMERGING AUTOMOTIVE TECHNOLOGIES (AU-817)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are capacitors?
- b) List features to be considered for car designed for aging population.
- c) What are the advantages of regenerative braking system?
- d) How diesel engine emission is controlled by EGR?
- e) What is fuel cell?
- f) What are the various methods for changing valve timing of an engine?
- g) How cylinder deactivation is done in an engine?
- h) Write the name of types of combination of hybrid vehicle.
- i) List the various types of sensors used in an automobile.
- j) What is turbo log?

2×10

PART-A

Q.2 a) Explain following terms:

- i) Brand management.
- ii) Customer relationship management.

5x2

b) What are 10 challenges of automobile industry for 21st century vehicle in terms of energy and environment? **10**

Q.3 a) Explain the working of fuel cell with neat sketch. How it's working is different from batteries? **5x2**

b) Explain the working of the following:

- i) Alkaline fuel cell.
- ii) Proton exchange membrane fuel cell.

5x2

Q.4 a) Explain the potential benefit and challenges of 42 volt system. **10**

b) Explain the working of:

- i) Electromagnetic valves.
- ii) Camless engine actuation.

5x2

PART-B

Q.5 a) Briefly explain the working principle of 'series-parallel 2x2 architecture' with neat sketch. **10**

b) What are the advantages and disadvantages of series hybrid? **10**

Q.6 a) Discuss 'start-stop operation'. How is it an environment friendly technology? **10**

b) Briefly explain the working and chemical reaction of lead acid battery with neat sketch. **10**

Q.7 a) Explain steer by wire and brake by wire with construction details. **10**

b) Write the advantages of fully active suspension system. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MOTOR VEHICLE AND ENVIRONMENT PROTECTION (AU-617)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer in brief:

- a) As per MV Act. 1988; define 'articulated vehicle'.
- b) What were the reason for MV Act. Implementation?
- c) Describe "Driving Schools".
- d) Under what condition a driving license can be terminated?
- e) Why the vehicle is registered before it is allowed to run on Indian road?
- f) What is the need of motor vehicle insurance?
- g) What are "SEZ"? What are the various restrictions on location?
- h) What are the by-products of combustion of fuel?
- i) Why speed Governors are mandatory in school buses?
- j) Write the methods to reduce noise from automobile.

2x10

PART-A

Q.2 Write about the procedures for the enactment and implementation of MV Act. Amendments by

- a) Central Government.
- b) State Government.

10x2

Q.3 What are the necessities for licensing of conductors of stage carriages? Under which condition a license can be granted, disqualified and revoked as per MV Act? **20**

Q.4 In vehicle registration process. Explain how

- a) to change address of ownership?
- b) to change the transfer of ownership?

10x2

PART-B

Q.5 What are permits? How many types are available as per MV Act? Differentiate between tourist and national permit. **20**

Q.6 Explain in detail, about prevention and control in addition to abatement of environment pollution. **20**

Q.7 Write short notes on:

- a) Transportation of hazardous chemicals.
- b) Rent a car scheme.

10x2

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MEASURING TECHNIQUES (AU-626)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. All questions carry equal marks.

Q.1 Explain following terms in brief:

- a) Linearity and Sensitivity.
- b) Active and passive transducer.
- c) Basic methods of measurement of force.
- d) Absolute pressure, gauge pressure and vacuum.
- e) Principle and working of constant volume thermometer.

4x5

PART-A

Q.2 a) Define the dynamic response of a system and distinguish between steady state response and transient response. **10**
b) Explain the principle of working of capacitive transducers. **10**

Q.3 What are dynamometers? How are dynamometers classified? Explain the difference between absorption, transmission and driving dynamometers. **20**

Q.4 Describe the construction of a Pitot tube and show how it can be used for measurement of velocity of a fluid flowing in a pipe. Describe its advantages and disadvantages. **20**

PART-B

Q.5 a) Name the materials commonly used for RTDs. Which one has the most linear characteristics? **10**
b) Explain the principle and working of optical pyrometer. **10**

Q.6 a) Discuss the importance of tools and equipments used in workshop. **10**
b) Explain Peltier and Thomson effects and their application in temperature measurement. **10**

Q.7 a) Explain the common types of screwdrivers used in the automotive industry. **10**
b) What is the function of Growler? **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

AUTO ELECTRICALS AND ELECTRONICS (AU-503)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are thermal circuit breakers?
- b) How solenoid is different from a diode?
- c) What is the function of regulator fitted in an automobile?
- d) What is sulphation of a lead acid battery?
- e) What is commutation?
- f) What is induction of sine wave?
- g) Explain Piezo electric ignition system.
- h) What is mutual and self-inductance?
- i) What is wiring Harness?
- j) What is the significance of cable colours?

2x10

PART-A

- Q.2** a) What is the difference between solenoid and relay as applied to automotive practice? **10**
b) Give the advantages and disadvantages of positive and negative earthing. **10**
- Q.3** a) Describe the construction and working of the battery hydrometer. **10**
b) Elaborate the defects caused in lead acid batteries such as self-discharge and internal short circuiting. **10**
- Q.4** a) Write short notes on the following associates with regulator:
i) Characteristic curves.
ii) Temperature effect on voltage regulator.
iii) Bucking coil. **5x3**
b) With a neat sketch explain a spark plug. Also explain its different parts. **5**

PART-B

- Q.5** Describe with the help of a neat diagram the working of 3 unit regulator with current limiter used in an alternator. **20**
- Q.6** Explain the following:
 - a) Electronic Engine Management System.
 - b) Exhaust oxygen level sensor.
 - c) Crank shaft position sensor.
 - d) Solenoid switch. **5x4**
- Q.7** a) Draw layout of lighting and accessories in an automobile with nomenclatures. **10**
b) Explain wiper system of an automobile with a neat sketch. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

VEHICLE MAINTENANCE (AU-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Explain preventive maintenance.
- b) What is the importance of a job card?
- c) What is a Wheel Aligner?
- d) Why engine balancing is important?
- e) Draw an injector tester and label its parts.
- f) What are the possible causes for White or Grey smoke?
- g) What are possible faults in automatic transmission?
- h) What are high pressure fuel lines?
- i) What is the importance of correct tyre pressure?
- j) What is king pin inclination?

2x10

PART-A

- Q.2** a) Differentiate between breakdown and preventive maintenance. **10**
b) Name the different types of service stations. Explain each of them in detail. **10**
- Q.3** a) Explain Engine Analyzer and its significance in a workshop. **10**
b) Explain a hydraulic jack with a neat sketch. **10**
- Q.4** a) Name the different engine testing methods. Explain compression test in detail. **15**
b) What are the sources in engine cylinders from where generally compression leakage takes place? **5**

PART-B

- Q.5** Describe various components of a diesel injection system. Explain common services to be carried out for a diesel injection system. **20**
- Q.6** a) What is fly wheel run out and how it is measured? **10**
b) What is electronically controlled automatic transmission (ECAT)? **10**
- Q.7** a) How power steering systems are diagnosed? **10**
b) How wheel alignment is conducted for correct steering geometry? **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

AUTOMOTIVE COMPONENTS DESIGN (AU-506)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is endurance limit?
- b) Write the expression for the effect of surface factor under bending load.
- c) What are the properties of material used for shaft?
- d) What is meant by spring rate and spring index?
- e) What are the different types of bearing? Describe briefly.
- f) What is the usefulness of gear over the belt and chain drive?
- g) What is module of gear?
- h) Why cylinder liners are used?
- i) State the function of piston rings?
- j) What are the different forces acting on a connecting rod? **2x10**

PART-A

Q.2 a) Find the maximum stress concentration induced in a rectangular plate 60mmX10mm with a hole of 12mm diameter and subjected to a tensile load of 12KN. The value of theoretical stress concentration factor is 2.5. **10**

- b) Drive the expression for Good man criterion for combination of stress under reversed axial loading for ductile materials. **10**

Q.3 a) A solid-circular shaft is subjected to a bending moment of 3000 Nm and a torque of 10,000 N-m. The shaft is made of 45C8 steel having ultimate tensile stress of 700 MPa and a ultimate shear stress of 500 MPa. Assume a factor of safety as 6. Determine the diameter of the shaft. **13**

- b) A compression coil spring made of alloy steel is having the following specification: Mean diameter of coil = 50mm, Wire diameter = 5mm, Number of active coil = 20. If the spring is subjected to an axial load of 500N. Calculate the maximum shear stress (neglect the curvature effect) to which the spring material is subjected. **7**

Q.4 A full journal bearing is 50mm diameter and 100mm long has a bearing pressure of 1.4 N/mm². The speed of the journal is 900 rpm and the ratio of journal diameter to the diametral clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 Kg/M-s. The room temperature is 35°C.

Find:

- i) The amount of artificial cooling required.
- ii) The mass of the lubricating oil required,

If the difference between the outlet and inlet temperature of the oil is 10°C.

Take specific heat of the oil as 1850 J/Kg/°C. **20**

PART-B

Q.5 A bronze spur pinion rotating at 600 rpm. Drive a cast iron spur gear at a transmission ratio of 4:1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20° full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the stand point of strength. **20**

Q.6 a) What are different design consideration for a piston? 4

b) The cylinder of a four-stroke diesel engine has the following specifications:

Brake power = 7.5 KW, Speed = 1400 rpm,

Indicated mean effective pressure = 0.35 MPa.

Mechanical efficiency = 80%

Max. gas pressure = 3.5 MPa.

The cylinder liner and head are made of grey cast iron Fa260 ($S_{ut}=260\text{N/mm}^2$ and $\mu=0.25$). The studs are made of plain-carbon steel 40C8

($S_{yt}=380\text{N/mm}^2$). The factor of safety for all parts is 6. Calculate:

i) Bore and length of the cylinder.

ii) Thickness of the cylinder head. 16

Q.7 Design a plain carbon steel centre crank shaft for a single acting four stroke single cylinder engine for the following data: Bore = 400mm, stroke = 600mm Engine speed = 200rpm. Mean effective pressure = 0.5N/mm² maximum combustion pressure = 2.5 N/mm²; weight of fly wheel used as a pulley = 50 KN, total belt pull = 6.5.

When the crank has turned through 35° from the top dead centre, the pressure on the piston is 0.5 N/mm² and the torque at the crank is maximum. The ratio of connecting rod length to crank radius is 5. Assume any other data required for design. 20

End Semester Examination, May 2019

B. Tech. – Seventh Semester

VEHICLE BODY ENGINEERING (AU-619)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following:

- a) What are the differences between a racing car and a sports car?
- b) What is meant by pitching, rolling and yawing for a passenger car?
- c) Name the most preferred geometrical shape for a tanker body and give the reason for its selection.
- d) Write about the anticorrosion techniques commonly used for the passenger car body.
- e) What do you mean by an 'Articulated Vehicle'?

4x5

PART-A

Q.2 Write brief notes on following:

- a) Minimum space requirements in a car. **10**
- b) Methods of improving space in a car. **10**

Q.3 a) Write in detail about body trimming and what are the various items required for body trimming? **15**

- b) Write a short note on 'different types of seats'. **5**

Q.4 Write short notes on:

- a) Skeleton construction.
- b) Chassis frame. **10x2**

PART-B

Q.5 With the aid of sketches, explain different layouts for passenger buses. **20**

Q.6 List out the different types of body used for heavy commercial vehicles and with the aid of sketches, explain any two of them. **20**

Q.7 Write short notes on:

- a) Flow visualization techniques.
- b) Body trim. **10x2**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

VEHICLE DYNAMICS (AU-512)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is free and forced vibration?
b) Define the term transmissibility.
c) What is rolling resistance of tire?
d) What is passive suspension?
e) What is cornering property a tire?
f) What is trail arm suspension?
g) What is meant by over steer?
h) What is roll axis of vehicle?
i) What is Braking torque?
j) What is steady state condition?

2×10

PART-A

- Q.2 A vibrating system consists of a mass of 50 Kg, a spring of stiffness 30 kN/m and a damper. The damping provides is only 20% of the critical value. Determine:
a) The damping factor
b) Critical damping coefficient.
c) Natural frequency of damped vibration.
d) Logarithmic decrement.
e) Ratio of two consecutive amplitudes.

20

- Q.3 a) Explain the cornering property of tire. **8**
b) Briefly describe the performance of tire on coated surface. **12**

- Q.4 a) Explain the effect of suspension stiffness and damping on vehicle vibration. **10**
b) Explain suspension system using quarter car model with label sketch. **10**

PART-B

- Q.5 a) Write the expression for the reactions at the front and rear wheels of a rear wheel drive vehicle. **10**
b) Explain the function of ABS. **10**
- Q.6 a) Explain transient respond characteristic. **8**
b) Sketch the curvature response of neutral steer, over steer and under steer vehicles at a fixed steer angle and briefly define. **12**
- Q.7 a) Explain with neat sketch of solid axel suspension system? **10**
b) Explain Anti-squat and anti-pitch suspension. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MOTOR VEHICLE AND ENVIRONMENT PROTECTION (AU-617)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) As per MV act 1988 define “goods carriage”.
b) Elaborate significance of MV Act.
c) What are driving schools?
d) Under what conditions a driving license can be suspended.
e) Explain why vehicle registrations are mandatory in India.
f) What is the procedure for vehicle insurance claim settlement?
g) What are special economic zone?
h) During normal combustion of fuel, what are the various gases obtained.
i) What is national permit?
j) Write the importance of motor vehicle insurance. **2x10**

PART-A

- Q.2 Explain motor vehicle Act 1988 in details, with description of chapter XIII on offences, penalties and procedure. **20**
- Q.3 a) What is the procedure for licensing of conductors of stage carriages? **10**
b) What is the importance of driving license? Elaborate the types of license used in India. **10**
- Q.4 a) What are the requirement of new registration for staying in other states? **10**
b) Explain “hire and purchase” with suitable example. **10**

PART-B

- Q.5 a) Differentiate between “tourist permit” and “national permit”. **10**
b) What is motor vehicle insurance? Explain in terms of procedures and claims. **10**
- Q.6 Explain the general power of central government to protect / improve environment and rules to regulate environment pollution in details. **20**
- Q.7 Explain the following terms:
a) Auto exhaust pollution. **10**
b) Transportation of hazardous chemicals. **10**

End Semester Examination, May 2019

B. Tech. – Third / Fourth Semester

BASICS OF AUTOMOBILE ENGINEERING (AU-405)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B.** Each question carries equal marks.

Q.1 Answer briefly:

- a) What are the salient features of saloon cars?
- b) What is the function of differential?
- c) What do you mean by DTSSI technology?
- d) Where are multiplate plate clutch used and why?
- e) What is scrub radius?
- f) Explain turning circle.
- g) How tandem master cylinder different from normal master cylinder?
- h) How do we designate a tyre?
- i) State the advantages of magnesium and aluminium alloy wheels?
- j) When does the necessity of bleeding the brakes arise?

2x10

PART-A

- Q.2 a) Draw a schematic diagram showing the layout of the transmission system of a rear wheel driven car and explain the importance of each component. **10**
- b) Write the short notes on:
i) Propeller shaft.
ii) Differential. **5x2**
- Q.3 a) Draw a neat sketch of MPFI system used on today's car engine and briefly describe its functioning. **10**
- b) Describe a battery ignition with a neat sketch. **10**
- Q.4 a) Explain the construction and working of constant mesh gear bar. **10**
- b) What are the advantages of diaphragm spring clutch over helical coil spring clutch? **10**

PART-B

- Q.5 a) Name any four steering gear box. Explain the working of any steering gear box used in the Indian cars. **10**
- b) Write a short note on characteristics of coil spring. **10**
- Q.6 a) Describe the construction and working of drum brakes. Compare the same in details with the disc brakes. **10**
- b) Write short notes on:
i) Leading and trailing shoe.
ii) Characteristics of brake fluid. **5x2**
- Q.7 Write short notes on:
i) Wheel balancing.
ii) Tubeless tyres.
iii) Spoke wheel.
iv) Carcass. **5x4**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

AUTOMOTIVE ENGINES (AU-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is lean air-fuel mixture?
b) Define “self-ignition temperature”.
c) Define the term injection timing.
d) Justify the statement “the compression ratios of S.I engines is generally limited to 10”.
e) What are the effects of detonation in S.I engines.
f) Name the primary reference fuels used for cetane rating of any fuel.
g) What is cetane number?
h) Define the term swirl.
i) Why does a supercharged petrol engine have greater fuel consumption than naturally aspirated engines?
j) Define indicated power and brake power. **2x10**

PART-A

- Q.2 a) Explain the working of a simple carburetor with the help of a neat sketch. **10**
b) Draw and explain the actual valve timing diagram of a 4-stroke petrol engine. **10**
- Q.3 a) Explain the working of Common Rail Direct Injection System (CRDI) with the help of a neat sketch. **10**
b) What is solid injection system? Discuss the various types of solid injection system. **10**
- Q.4 a) What are the various stages of combustion in S.I Engines? **10**
b) Discuss the effects of supercharging and flame travel distance, on the knocking tendency in S.I engine. **5**
c) Explain the phenomenon of Pre-ignition in SI engines. **5**

PART-B

- Q.5 a) An 8 cylinder 4 stroke engine of 9 cm bore and 8 cm stroke with a compression ratio of 7 is tested at 4500 rpm on a dynamometer which has 54cm radius. During a 10 min test, the dynamometer reading was 42 kg and the engine consumed 4.4 kg of fuel having a calorific value of 44000 kJ/kg. Air at 300K and 100 kPa was supplied at the rate of 6 kg/minute. Find:
i) Brake power
ii) Brake specific fuel consumption (bsfc).
iii) Brake specific air consumption (bsac)
iv) Brake thermal efficiency **10**
- b) Discuss the effect of the following engine variables on delay period in CI engines:
i) Injection pressure and size of fuel droplet
ii) Compression ratio
iii) Injection advance angle
iv) Intake air temperature **10**
- Q.6 a) With the help of suitable diagram explain the working of magneto ignition system. **10**
b) Explain the effect of supercharging of CI engines on the following:

- i) Mechanical efficiency
- ii) Fuel consumption

5×2

Q.7 A test on a 2 stroke engine give following results:

Speed = 350 rpm; brake load = 65 kg; mean effective pressure = 300 kPa; fuel consumption = 4 kg/hr; cooling water flow rate = 500 kg/hr; water inlet temperature = 20°C; water outlet temperature = 40°C; test room temperature = 20°C; temperature of exhaust gases = 400°C; air-fuel ratio = 32 : cylinder diameter = 22 cm; stroke length = 28 cm; brake diameter 1m; calorific value of fuel = 43000 kJ/kg; proportion of hydrogen in fuel = 15%; specific heat of steam = 2.1 kJ/kgK; latent heat of steam = 2250 kJ/kg; R = 0.287 kJ/kgK.

Draw heat balance sheet in kJ/min and also on percentage basis.

20

End Semester Examination, May 2019

B. Tech. – Eighth Semester

COMPUTER AIDED VEHICLE DESIGN (AU-802)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B**. Each question carries equal marks.

- Q.1 a) Write design variables affecting performance of CI engines.
b) Write operating variables affecting emission of CI engines.
c) Give two examples for each: saloon and convertible cars.
d) Differentiate between sedan and hard top.
e) Write two practical objectives of vehicle aerodynamics.
f) What is the significance of flow visualization techniques?
g) Define 'mean effective pressure'.
h) What are the different driving forces against vehicle motion?
i) What are the properties required for material of automobile bodies?
j) What are the different coats of paint needed to paint an automobile body? **2x10**

PART-A

- Q.2 Explain how liquid cooling system for IC Engine works? For a single cylinder engine what changes in performance will be observed if we use liquid cooling system instead of air cooling system? **20**
- Q.3 a) Describe in detail the usage of safety equipment in cars. **10**
b) Explain how visibility of a vehicle can be enhanced? **10**
- Q.4 a) Explain the effect and control of lift and drag on vehicle body design. **10**
b) Explain how wind tunnel testing is important in vehicle design. **10**

PART-B

- Q.5 a) Plot and explain the typical performance curves for a petrol engine. **10**
b) Draw the performance curve for driving force against vehicle speed. How gear ratios can be obtained from them? **10**
- Q.6 a) Define and explain the following terms:
i) Mean effective pressure.
ii) Side thrust on cylinder walls. **10**
b) Explain the steps to be followed for a new engine design. **10**
- Q.7 a) List out the major factors to be considered for selection of material for a vehicle body fabrication. **10**
b) List out the different types of vehicle body corrosions and explain the step by step procedure of a vehicle body painting process. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

AUTOMOTIVE POLLUTION AND ITS CONTROL (AU-610)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) How global warming causes torrential down powers?
b) List out various pollutants from an automobiles.
c) What is evaporative emission?
d) What are sulphides?
e) What are aldehydes?
f) What do you mean by EURO thousands of pollution?
g) What is the reason for greenhouse effect?
h) Draw layout of a chassis dynamometer.
i) What is FED test?
j) What is engine knocking?

2x10

PART-A

- Q.2 a) What is crank case emission? How the emission is hazardous to human health and environment? **15**
b) What is air pollution? **5**
- Q.3 What are nitric oxides? Elaborate the effect of various operating variables on NOX emission formation? **20**
- Q.4 Explain the following terms in context of emissions:
a) Poly nuclear aromatic hydrocarbon. **10**
b) Ice-tones. **10**

PART-B

- Q.5 What is noise pollution? What are the sources of noise pollution from an automobile? How noise can be reduced to permissible limit? **20**
- Q.6 a) Elaborate the role of catalytic convertor in controlling the pollutant emission. **10**
b) How fuel cells can be used in automobiles with a neat diagram? **10**
- Q.7 Explain the following with neat sketches/charts:
a) Chemiluminescent analyzers. **10**
b) Indian Emission Standards. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MEASURING TECHNIQUES (AU-626)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1** is **Compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. All questions carry equal marks.

Q.1 Explain following terms in brief:

- a) Hysteresis and dead zone.
- b) Input characteristics of a transducer.
- c) Any two methods of torque measurement.
- d) Working of corrugated diaphragms used in pressure gauge.
- e) Hex-Nut screwdriver working.

4x5

PART-A

Q.2 Justify the following statements:

- a) A potentiometer is a Zeroth order device.
- b) A bare thermocouple is a first order device.

10

10

Q.3 How sensors are classified? Explain in detail about eddy current proximity sensors. **20**

Q.4 An Engine is expected to develop 8 kW of mechanical output while running at an angular speed of 1200 rpm. A brake drum of 280 mm diameter is available. It is proposed to design a prony brake dynamometer using a spring balance as the force measuring instrument. The spring balance can measure a maximum force of 120N. Make calculations for proper torque arm for the dynamometer. **20**

PART-B

Q.5 What are the important and desirable properties of the Manometry fluids? Explain in detail about at least five properties. **20**

Q.6 What is temperature – resistance relation of resistance thermometers? Explain with the help of temperature – resistance graph. **20**

Q.7 Explain the following:

- a) Torque wrench.
- b) Ratcheting screwdriver
- c) C-Clamp
- d) Needle – nose pliers.

5x4

End Semester Examination, May 2019

B. Tech. – Sixth Semester

EMERGING AUTOMOTIVE TECHNIQUES (AU-817)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1** is **Compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. All questions carry equal marks.

Q.1 Answer the following:

- a) How EGR affects the emission of a diesel engine?
- b) Define Turbo lag?
- c) How fuel cell is better than battery?
- d) What is integrated starter generator?
- e) Define hydrogen fuel cell.
- f) List benefits of brake by wire technology.
- g) Describe cylinder deactivators in vehicle engine.
- h) What are the different types of combination of hybrid vehicle?
- i) What environmental challenges are created because of vehicle emission? **2x10**

PART-A

Q.2 a) What advantages do fuel cell powered vehicles have over battery electric vehicles? **10**
b) Explain the working principle of solid oxide fuel cell and molten carbonate fuel cell. **10**

Q.3 a) Discuss challenges of automobile industry in terms of:

- i) Urban mobility (parking and congestion).
 - ii) Safety. **5x2**
- b) What are the challenges for designing of 21st century vehicle? What are the steps automobile industries take to meet these challenges? **10**

Q.4 a) Explain variable valve timing technology. How can this be achieved? **10**
b) What are the various devices used to enhance the performance of a diesel engine? **10**

PART-B

Q.5 a) What is start stop operation? How it can be achieved in a vehicle? **10**
b) Define the terms:

- i) Advanced lead acid batteries
- ii) Rapid charging ultra-capacities **5x2**

Q.6 a) What are the future development and prospects of hybrid vehicles? **8**
b) What is the difference between hybrid electric vehicles and battery electric vehicles? Explain with constructional and fundamental details. **12**

Q.7 a) Discuss the use of micro-controller in automobiles. How does it enhance the performance of automobiles? **10**
b) Explain semi-active and full active suspension system in details? **10**

End Semester Examination, May 2019
B. Tech. — Eighth Semester
OFF ROAD VEHICLES (AU-713)

Time: 3 hrs. Max Marks: **100**
 No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **Part-B.** Marks are indicated against each question.

- Q.1 Answer the following questions: **2×10**
- a) What is differential lock? What purpose does it serve in tractor?
 - b) Define “ROPS”?
 - c) Give five application of forklift.
 - d) Differentiate between land cleaning and earth moving machines.
 - e) What are hoes? For what purpose they are used?
 - f) Explain three ways of classification of bulldozers.
 - g) Name three important parts of bush cutter.
 - h) What is a grader? For what purpose it is used?
 - i) Name three Indian companies manufacturing scrappers.

PART-A

- Q.2 Write short notes on the following: **5×4**
- a) Hand saws.
 - b) Shovels.
 - c) Pick axes.
 - d) Rakes.
- Q.3 a) Differentiate between scissor jack and house jack. **10**
 b) Explain the important features of outriggers? **10**
- Q.4 What are the recent trends in tractor design? Explain in detail. **10×2**

PART-B

- Q.5 a) With help of neat sketch explain the important parts of Crawler mounted dozer? Give six application of a dozer? **10**
 b) Differentiate between front cast and angle mounted dozers? **10**
- Q.6 a) Explain the purpose, construction and working of power shovel. **10**
 b) What is a ripper? For what purpose it is used? **10**
- Q.7 Write short notes on the following: **10×2**
- a) Drag lines.
 - b) Ditchers.

End Semester Examination, May 2019

B. Tech. – Eighth Semester

EMERGING AUTOMOBILE TECHNOLOGIES (AU-817)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Define proton exchange membrane fuel cell.
b) Enlist features to be considered for car designed for aging population.
c) Explain the term product development management.
d) How fuel cell is better than battery?
e) What is the difference between turbocharging and supercharging?
f) What is the need for hybrid electric vehicle in today's era?
g) Why there is requirement of 42 V systems in automobile?
h) What is integrated starter generator?
i) What is x-by wire technology?
j) How hybrid electric vehicle reduce the emission problem? **2x10**

PART-A

- Q.2 a) How production of electron in a fuel cell is different from that of battery? Explain giving chemical reaction. **10**
b) Explain the following:
i) Solid oxide fuel cell.
ii) Molten carbonate fuel cell. **5x2**
- Q.3 Discuss challenges of automobile industry for 21st century vehicles in terms of:
a) Energy.
b) Environment.
c) Safety.
d) Urban mobility (parking and congestion). **5x4**

- Q.4 a) Explain variable value timing technology. How can this be achieved? **10**
b) Explain gasoline direct fuel injection system. How does it enhance the performance of engine? **10**

PART-B

- Q.5 a) Explain semi-active and fully active suspension system in detail. **10**
b) Discuss use of micro-controller in automobiles. How does it enhance the performance of automobiles? **10**
- Q.6 a) Discuss the need of new energy storage media in detail. **10**
b) How is integrated starter generator beneficial? **10**
- Q.7 Discuss need and suitability of hybrid electric vehicle in term of:
a) Energy.
b) Environment.
c) For urban transportation. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

FLUID MECHANICS AND MACHINES (AU-403)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Define / explain briefly:

- a) Flow net.
- b) Surface tension.
- c) Specific gravity.
- d) Orifice meter.
- e) Pitot tube.
- f) Hydraulic gradient.
- g) Cavitation.
- h) Air Vessel.
- i) Manometer.
- j) Vane Pump.

2x10

PART-A

Q.2 a) One litre of liquid ghee at 40°C temperature has mass of 900 gm. Calculate the mass density, specific weight, specific volume and specific gravity of liquid ghee.

10

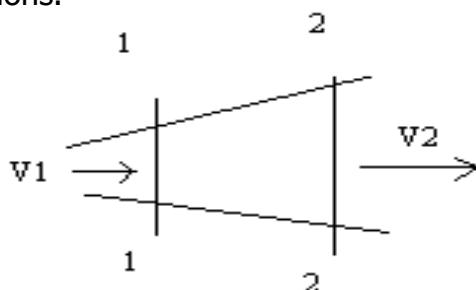
b) A 5 mm diameter glass tube is immersed in i) Water ii) Mercury. Calculate the capillary effect in millimeters in the glass tube. The values of surface tension for water and mercury are 0.0735 N/m and 0.530 N/m, respectively. The angle of contact for water is 25° and that for mercury 128° .

10

Q.3 a) Explain the different types of fluid flows.

10

b) The diameters of the pipe at section 1-1 and 2-2 are 100 mm and 250 mm respectively. If the discharge through pipe is $0.06 \text{ m}^3/\text{s}$, find the average velocities at the two sections.



10

Q.4 a) Explain Bernoulli's theorem.

3

b) Water is flowing through a pipe of 80 mm diameter under a gauge pressure of 60 kPa and with a mean velocity of 2 m/s. Neglecting friction, find the total head if the pipe is 7 m above the datum line.

7

c) With the help of a neat sketch, explain the working of a venturimeter.

10

PART-B

Q.5 a) Explain with the help of a neat sketch, different types of minor energy losses in pipes.

10

b) An oil of specific gravity 0.7 is flowing through a pipe of diameter 300 mm at the rate of 500 litre/s. Find the head lost due to friction and power required to maintain

the flow for a length of 1000 m. Take kinematic viscosity $v=0.29$ stokes, coefficient of friction $f= 0.0048$. **10**

- Q.6 a) A jet of water of diameter 10 cm strikes a flat plate normally with a velocity of 15 m/s. the plate is moving with a velocity of 6m/s in the direction of the jet and away from the jet.

Find: i) The force exerted by the jet on the plate.

ii) Work done by the jet on the plate per second. **10**

- b) Explain the working of Pelton wheel with the help of a neat sketch. **10**

- Q.7 a) Explain the construction and working of centrifugal pump. **10**
- b) A single acting reciprocating pump running at 50 rpm delivers $0.01 \text{ m}^3/\text{s}$ of water.

The diameter of the piston is 200 mm and stroke length is 400 mm.

Determine: i) The theoretical discharge of the pump.

ii) Coefficient of discharge, and

iii) Slip and the percentage slip of the pump. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

BIO CHEMISTRY (BT-303C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define "Bioenergetics" and give two examples of help energy compounds.
- b) Differentiate between transamination and deamination.
- c) Discuss the cause of alkaptonuria.
- d) What is the full form of PDH and write about the reaction catalyzed by it?
- e) What is difference between de-novo and salvage pathway?
- f) Give 2 examples of unsaturated fatty acids.
- g) What are components of complex-I of ETC and write about its role?
- h) Which are the significant enzymes of glycogenesis?
- i) Why are ketone bodies formed in the body?
- j) Define "Oxidative decarboxylation".

4×5

PART-A

Q.2 a) How thermodynamic principles are significant for biochemical reaction in body. **10**
b) How does ATP participate in metabolic network? **10**

Q.3 a) Which is the first amino group entering into urea cycle? Draw and discuss urea cycle in detail. **10**
b) Pyruvate is the precursor of which amino acid. Describe the synthesis of that amino acid. **10**

Q.4 a) What is the role of hexokinase? Describe glycolysis in detail. **10**
b) Write short notes on the following:
i) Glyoxylate cycle.
ii) Glycogenesis. **5×2**

PART-B

Q.5 a) What products of glucose oxidation are essential for oxidative phosphorylation? Explain mitochondrial oxidative phosphorylation in detail. **10**
b) What is final product of ETC? Discuss the hypothesis of electron transport chain. **10**

Q.6 a) Describe the following:
i) B oxidation of plasmatic acid.
ii) Biosynthesis of membrane phospholipids.
iii) Formation of ketone bodies.
iv) Biosynthesis of cholesterol. **5×4**

Q.7 a) Explain de-novo synthesis of purines in detail. **10**
b) Discuss the breakdown of pyrimidine nucleotide by de-novo and salvage pathways. **10**

End Semester Examination, May, 2019

B.A./B.Sc.(Hons) Economics–First Semester

ENVIRONMENTAL STUDIES (CH-202B)

Time: 3 Hours

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all. **Q.No.1 (PART-A)** and **Q.No.2 (PART-B)** are **compulsory**. Attempt any **Three** questions each from **PART-C**. Marks are indicated against each question.

PART-A

Q.1 Answer the following questions:

- a) Which is the major cause of global warming?
- b) Name two renewable sources of energy.
- c) Define the term biodiversity.
- d) What is meant by deforestation?
- e) Mention two major objectives of environmental education.
- f) Differentiate between producers and consumers.
- g) What is meant by population explosion?
- h) Define the term 'poaching'.
- i) Expand the term 'AIDS'
- j) What is the chemical formula of ozone?

2x10

PART-B

Q.2 Answer **any four** of the following:

- a) What are the major threats to biodiversity?
- b) Define food chain, food web and ecological pyramids.
- c) What are the causes of water pollution and how to prevent water pollution?
- d) Describe the factors that affect human population growth rate.
- e) With the help of examples for each explain the 3Rs. Principle of waste management.

5x4

PART-C

Q.3 Answer **any three** of the following:

Enumerate the effects of various climatic changes with special emphasis one;

- a) Global warming and
- b) Ozone layer depletion.

20

Q.4 a) Discuss the scope and importance of environmental studies as a part of formal education. **10**
b) What are the different methods to prorogate environmental consciousness in younger generation? **10**

Q.5 a) What do you mean by eco-system? Explain different components of an ecosystem in detail. **10**
b) What are natural resources? Give a detailed account of forest resources. **10**

Q.6 a) What is the role of women welfare and empowerment in population control.? **10**
b) What is population explosion? Discuss the preventive measures of population explosion. **10**

Q.7 a) What is meant by biodiversity? Why it is important to conserve biodiversity? **10**
b) Give a detailed account of causes, effects and control measures of air pollution. **10**

End Semester Examination, May 2019

B. Tech. (Biotechnology) — Eighth Semester

STEM CELLS AND ITS APPLICATIONS (BT-803)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) Define the term potency. Which cells have the property of pluripotency?
- b) Write advantages and disadvantages of iPSC and embryonic stem cells.
- c) What would happen if the spindle integrity checkpoint is by-passed?
- d) What is the role of MPF in cell cycle?
- e) How can embryonic stem cells be maintained in culture?
- f) What are embryonal carcinoma cells? Write about its characteristic features.
- g) Name the cells that are formed when neural stem cell undergo asymmetric divisions.
- h) What is the role of neurotransmitter? Name one neurotransmitter and the disease caused due to its imbalance.
- i) Which factors are involved in transition of iPS cells to insulin expressing cells?
- j) How can we avoid graft-vs- host disease?

2×10

PART-A

- Q.2**
- a) Write a note on various factors affecting stem cell pluripotency. **10**
 - b) What do you understand by stem cell? Write about its different types and their characteristics features or properties. **10**
- Q.3**
- a) On what basis cell cycle have been categorized in different phases? Name the cyclins involved in these phases and explain their roles. **10**
 - b) Write in detail about the various methodologies employed for mapping the fate of stem celis. **10**
- Q.4**
- a) With the help of diagrams explain about the various phases of spermiogenesis. **10**
 - b) Define embryonic stem cells. Write a note on sources from where these can be obtained or harvested or collected? Briefly explain about its applications. **10**

PART-B

- Q.5**
- a) What do you understand by the term "Hematopoiesis"? Briefly elaborate about the two lineages when hematopoietic stem cells differentiate. From where can we harvest these cells? **10**
 - b) What do you understand by the term "Lymphopoiesis"? Briefly explain B- and T-lymphocyte Development. **10**
- Q.6**
- a) What are neural stem cell? With the help of an example elaborate how can they be useful in treating a neurodegenerative diseases? **8**
 - b) Write briefly about the pathophysiology of Parkinson's disease. Which part of the brain is affected in this disease? **6**
 - c) What are the symptoms and cause of Alzheimer's disease? How can it be cured with the help of stem cells? **6**
- Q.7**
- a) What are the characteristic features of liver stem cells? Write in detail about the applications of liver stem cells. **10**
 - b) What is the health condition and pathological characteristics of individual suffering from Diabetes Mellitus? What are the different therapies an individual can undergo for treating Diabetes Mellitus? **10**

End Semester Examination, May 2019

B. Tech. (Biotechnology) — Eighth Semester

ENTREPRENEURSHIP OPPORTUNITIES IN FOOD INDUSTRIES (BT-834)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) Mention the characteristics and functions of an entrepreneur.
- b) What are the different food business opportunities available in India?
- c) What is a trademark?
- d) Why most the Food Business failed after some period of time?
- e) Mention the objects that could be patentable and non-patentable.
- f) How many different types of market we have?
- g) What is the core concept of marketing?
- h) Explain about capital structure.
- i) Define Finance and its categories.
- j) Differentiate between the term unit of sell and unit price.

2×10

PART-A

- Q.2** a) Enumerate the entrepreneur traits and planning to become a successful entrepreneur. **10**
b) What are the different food business opportunities in India and Abroad? **10**
- Q.3** a) What is Trade mark? How one can do the registration for trade mark? **10**
b) What are the different licenses and conditions required for Food Business? Explain about the renewal and cancellation of license. **10**
- Q.4** a) Explain the market feasibility report. Illustrate the steps of starting new small scale food industry. **10**
b) Describe the factors that must be considered before finalizing the food business idea. **10**

PART-B

- Q.5** a) Explain the principles and concepts of marketing. **10**
b) Discuss about different methods and importance of marketing research. **10**
- Q.6** a) Define Finance and its categories. **10**
b) Differentiate between Sole Proprietorship and Partnerships. Mention advantages and disadvantages. **10**
- Q.7** a) Write a note on 'breakeven analysis'. **10**
b) Discuss about cash flow analysis. Explain the significance of budgeting to run a food business successfully. **10**

End Semester Examination, May 2019

B. Tech. (Biotechnology) — Eighth Semester

MOLECULAR THERAPEUTICS (BT-832)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) What does DTaP-IPV-Hib stand for?
- b) Do you agree that Stem cells might cure the common cold? Justify.
- c) Type-I and Type II interferons are present on which chromosomes? What are the different types of Type I and Type II interferons?
- d) What is clotting factor therapy?
- e) How does packing parameter affect the type of liposomes?

4×5

PART-A

Q.2 a) Discuss in brief the nanoparticles mediated gene delivery. **12**
b) How can one classify stem cells? Explain with suitable examples. **8**

Q.3 a) How is insulin lispro different from insulin glargine? **6**
b) Why is streptokinase not preferred over urokinase as thrombolytic agents? **6**
c) Discuss the role of Calcineurin inhibitors in organ transplant. **8**

Q.4 a) Discuss briefly three interleukins used for cancer therapy. **12**
b) Write short notes on: i) Gene therapy ii) Adult stem cells. **8**

PART-B

Q.5 a) Which of the following is a Live attenuated vaccine: BCG. OPV. Measles. Rotavirus, whole-cell Pertussis and Yellow fever vaccines? **4**

- b)** Discuss Subunit vaccines in detail. **10**
- c) How is miRNA different from siRNA? **6**

Q.6 a) Discuss JAK-STAT pathway. **10**
b) Write briefly about the clinical applications of stem cell therapy. **10**

Q.7 a) Name and discuss the type of commercially available inetrferons. **10**
b) Discuss the role of monoclonal antibodies in cancer therapy. **10**

End Semester Examination, May 2019

**B.A. (Journalism and Mass Communication) — Third Semester
ENVIRONMENTAL STUDIES (CH-202B)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **NINE** questions in all; **PART-A** is compulsory. Attempt **ANY SIX** questions from **Part-B** and **ONE** question from **PART-C**. Marks are indicated against each question.

PART-A

- Q.1 a) Fill in the blanks:
- i) _____ means that the land is barren and covered in thin dust and cracks appear in the earth.
ii) _____ is the interlocking pattern of various food chains in an ecosystem.
iii) _____ is clearing earth's forests on a massive scale often resulting in damage to quality of the land and related ecosystem.
iv) _____ is the term used to describe a gradual increase in the average temperature of earth's atmosphere and its ocean.
v) _____ is a socio-ecological process characterized by the fulfillment of human needs while maintaining the quality of natural environment. **1×5**

- b) Match the following:

1.	Western Ghats	Environmental movement
2.	Coal	Paper
3.	Bio-degradable wastes	Bio-diversity hotspot
4.	Silent valley	Non-renewable resource
5.	Ponds, Streams, Lakes, Rivers etc.	Aquatic ecosystem

1×5

- Q.2 Define the following terms:

- | | |
|-------------------------|----------------|
| a) Noise pollution. | b) Ecotels. |
| c) Disaster management. | d) 3 R' |
| | e) Food chain. |

2×5

PART-B

- Q.3 Define “Deforestation”. What are the impacts of deforestation? **10**
- Q.4 Discuss the multidisciplinary nature or environmental studies? **10**
- Q.5 Differentiate between “Renewable resources and Non-Renewable resources”. **10**
- Q.6 Explain “Water act and Forest act” in detail. **10**
- Q.7 Define “Waste”, and discuss the controlling measures of solid waste management. **10**
- Q.8 Discuss the various environmental movements. **10**
- Q.9 Define “Climate Change”. What are the causes of climate change? **10**

PART-C

- Q.10 a) Define “Biodiversity”. **2**
b) Write about threats to biodiversity. **9**
c) Explain conservation methods of biodiversity? **9**
- Q.11 a) Define “Ecosystem”. **2**
b) Explain the structure of an ecosystem. **9**
c) Explain the function of an ecosystem. **9**

End Semester Examination, May 2019

B. Tech. (Biotechnology) — Eighth Semester

BIOSAFETY, BIOETHICS AND IPR (BT-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) Define 'bioethics'.
- b) What are the applications of modern biotechnology?
- c) Enlist the bioethical issues associated with stem cell research.
- d) What are the demerits of monoculture farming?
- e) What is OECD and its' objectives?
- f) Enlist the merits of GM-crops.
- g) What are the criteria need to be followed to assess the biosafety?
- h) What are the main objectives of CBD?
- i) Name the basic requirements for filing a patent.
- j) Write a note on Protection of Plant Variety and Farmers Right Act, 2001.

2×10

PART-A

- Q.2 a) What are the ethical issues associated with Medical Biotechnology? **10**
 b) Discuss the developments in biosafety regulations at national and international levels. **10**
- Q.3 a) What are the conflicts associated with GMOs and genetically modified foods? **10**
 b) How IPR Technology is important for international relations and business? **10**
- Q.4 a) Discuss in detail the Biosafety assessment procedures for biotech foods. **10**
 b) Enumerate the potential merits and demerits of GM-Foods. **10**

PART-B

- Q.5 a) Explain the main objectives and important features of Catagena protocol. **10**
 b) Discuss the biosafety measures initiated by GOI in Academia and Industries. **10**
- Q.6 a) Trademark is an IPR. Explain with examples. **5**
 b) How IPR issues will be covered in collaborative research? **5**
 c) Elaborate the composition of a patent. **10**
- Q.7 a) Discuss the role of patents in Pharmaceutical and Agricultural industry. **10**
 b) What are the recent developments in India in IP legislation? **10**

End Semester Examination, May, 2019

B.A. (JMC)—Fourth Semester

ENTREPRENEURSHIP DEVELOPMENT (CH-610)

Time: 2 Hours

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.No.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) Define 'Joint Hindu Family Business'.

- b) What do you understand by financial viability in any business?
c) Name any two successful entrepreneurs.
d) What do we mean by 'internal environment' when we talk about scanning the business environment?
e) Explain the term 'Unique Selling Proposition'. **5x2**

PART-A

- Q.2 Explain the process of a product development step by step. **10**
Q.3 Discuss five major kinds of risks involved in starting a new business. **10**
Q.4 "Market research is a must before starting any business". Explain. **10**

PART-B

- Q.5 Develop a business model defining the nature of business, name, target audience, competitors and the USP. **10**
Q.6 Explain the four most important functions involved in the process of management. **10**
Q.7 Write a note on 'Building and managing terms'. **10**

End Semester Examination, May 2019

B. Tech. (Biotechnology) – Sixth Semester

STEM CELLS IN HUMAN HEALTH (BT-623A1)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) Explain the fate mapping of stem cells.
- b) Briefly explain the internal checkpoints during the cell cycle.
- c) How Trophoblast Stem Cells can be derived from developing embryos and differentiated **in vitro?**
- d) How are stem cells used to treat Parkinson's disease?
- e) What are primitive Hematopoietic Stem Cells'?

4×5

PART-A

Q.2 a) Explain the factors that contribute in maintaining self-renewal and Pluripotency. **10**

b) What is Stem Cell Therapy? How does it work? **10**

Q.3 Discuss different checkpoint pathways and the consequences of their dysfunction on cell fate. **20**

Q.4 a) Explain the characteristics of mammalian primordial germ cells that maintain their pluripotent state. **10**

b) Discuss Embryonal Carcinoma Cells as Embryonic Stem Cells. **10**

PART-B

Q.5 a) What are the sources of Hematopoietic Stem Cells? **10**

b) How are repopulating patterns of primitive hematopoietic stem cells important for clinical applications? **10**

Q.6 a) Give an account of Embryonic and Adult stem cells as a source for cell therapy in Parkinson's disease. **10**

b) Discuss stem cells in nervous system. **10**

Q.7 What is diabetes? Discuss the role of pancreatic stem/progenitor cell for the treatment of diabetes. **20**

End Semester Examination, May 2019

B. Sc. (Data Science) – Second Semester

ENVIRONMENTAL STUDIES (CH-202B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Describe the scope of environmental studies.
- b) Explain sustainable development with example.
- c) Differentiate between food chain and food web.
- d) How natural resources can be conserved?
- e) What do you mean by timber extraction?
- f) Differentiate species diversity and genetic diversity.
- g) Compare the point and nonpoint sources of water pollution.
- h) What are greenhouse gases?
- i) Justify any two objectives of rehabilitation.
- j) Define chemical weapons convention (CWC).

2×10

PART-A

- Q.2** a) Justify the multidisciplinary nature of environmental studies. **10**
b) Describe the salient features of grassland and desert ecosystem. **10**
- Q.3** a) Classify and explain energy resources in detail. **10**
b) Compose the role of individual to conserve the natural resources. **10**
- Q.4** a) Analyze the major threats to biodiversity. **10**
b) What do you mean by conservation of biodiversity? Explain types of conservation in detail. **10**

PART-B

- Q.5** a) State the causes, effects and controls of air pollution in detail. **10**
b) Write brief notes on noise pollution and nuclear hazards. **10**
- Q.6** a) Describe ozone layer depletion and acid rain with the impacts on human communities and agriculture **10**
b) Evaluate the salient features of Forest Conservation Act and Air (Prevention and pollution Control) Act. **10**
- Q.7** a) Describe various causes and effects of flood and earthquake. Explain the role of disaster management to manage these disasters. **10**
b) Classify and explain weapons of mass destructions. What are the consequences of weapons of mass destructions? **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

ENVIRONMENTAL STUDIES (CH-202B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define sustainable development.
- b) Differentiate between biotic and abiotic factors.
- c) Name any two renewable energy resources.
- d) What do you mean by hotspots of biodiversity?
- e) Differentiate between primary and secondary pollutions.
- f) State the objective of Kyoto protocol.
- g) Write any two causes of landslides.
- h) Define the term "Disarmament".
- i) Name any two acids responsible for acid rain.
- j) State the "ten percent rule of energy transfer".

2×10

PART-A

- Q.2** a) Explain multidisciplinary nature of environmental studies and justify it with suitable examples. **10**
- b) Describe the structure and salient characteristics of desert ecosystem. **10**
- Q.3** a) Discuss the effects of building of dams on forests, biodiversity and tribal populations in detail. **10**
- b) What do you mean by alternate energy resources? Compare various types of alternate energy resources mentioning their pros and cons. **10**
- Q.4** a) Explain various levels of biodiversity with suitable examples. **10**
- b) Write short notes on the following:
i) Ex-situ conservation.
ii) Man-wildlife conflicts. **5×2**

PART-B

- Q.5** a) Describe causes, adverse effects and preventive measures of noise pollution. **10**
- b) State various problems associated with urban solid waste and compare different methods used for their management. **10**
- Q.6** a) Highlight the significance of stratospheric ozone and comment on its depletion. Suggest some remedial measures to prevent it. **10**
- b) Discuss the salient features of Forest Conservation Act. **10**
- Q.7** a) List out the causes of population explosion. How does it affect the environment and human welfare? **10**
- b) Write brief notes on the following:
i) Chipko movement.
ii) Bishnois of Rajasthan. **5×2**

End Semester Examination, May 2019

B. Tech. — First Semester

INDUSTRIAL CHEMISTRY (CH-101B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are TDS?
- b) Define "Alkalinity".
- c) What is difference between dry and wet corrosion?
- d) Define condensed phase rule.
- e) Define "Viscosity index".
- f) What are the constituents of composites?
- g) Write any three characteristics of good lubricating oil.
- h) Write a brief note on non-material.
- i) Define triple point in water system.
- j) Write any two applications of green chemistry.

2×10

PART-A

- Q.2** a) Explain EDTA process. What is the advantage of this process? **10**
b) 50ml of water sample require 10ml of N/50 H₂SO₄ acid using methyl orange as indicator but did not give any color with phenolphthalein indicator. What type of alkalinity is present? Express in ppm. **10**
- Q.3** a) Explain chemical reaction of the following with diagram:
i) Differential Aeration corrosion.
ii) Stress corrosion. **5×2**
b) Write any five factors affecting corrosion and explain cathodic protection? **10**
- Q4** a) Explain eutectic system with suitable phase diagram and the application phase rule. **10**
b) Explain water system with need and clean phase diagram. **10**

PART-B

- Q.5** a) Write difference between thick film and thin film lubrication explain with suitable diagram. **10**
b) Explain sol-gel process. **10**
- Q.6** a) Discuss the principle and application of AFM. Is AFM a better technique than SEM? Explain in detail. **10**
b) Write the principle and application of IR spectroscopy? **10**
- Q.7** a) Writes the 7 principle of green chemistry. **10**
b) Explain any one method of green synthesis. **10**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

BIOINFORMATICS AND COMPUTER APPLICATIONS (BT-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Name two Genomic databank.
- b) What do you mean by MAN?
- c) What type of information one can extract from primary database?
- d) How pair wise sequence alignment is related to homology studies?
- e) Enlist two feature of Smith Waterman algorithm.
- f) What is the role of EMBL?
- g) Expand the PIR format.
- h) Enumerate the advantages of X-ray crystallography?

2½×8

PART-A

- | | | |
|-----|---|-----------|
| Q.2 | a) How internet, intranet and extranet are different from each other? | 10 |
| | b) Discuss networking protocol. | 10 |
| Q.3 | a) How cDNA is different from ESTs? | 6 |
| | b) Discuss any DNA sequencing method. | 14 |
| Q.4 | a) Briefly explain PDB and EMBL databank. | 10 |
| | b) Databases are heart of bioinformatics, Justify it. | 10 |

PART-B

- | | | |
|-----|--|-----------------------|
| Q.5 | Align the given sequence using Smith-Waterman programming algorithm for the given sequences ATCGTT and AGCGAT upto trace back using +2, -1 and 0 for match, mismatch and gap penalty respectively. | 20 |
| Q.6 | a) How multiple sequence alignment is helpful in evolutionary studies? Justify using an example.
b) What are the different methods used for multiple sequence alignment? | 8
12 |
| Q.7 | a) Discuss different steps involved in homology modeling.
b) Enumerate different problem faced during threading. | 14
6 |

End Semester Examination, May 2019

B. Tech. – Sixth Semester

NUTRACEUTICALS AND FUNCTIONAL FOODS (BT-638)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Write short answers:

- a) Define the term "Nutraceuticals and differentiate between potential and established nutraceuticals.
- b) Why dietary fibres are important in nutraceutical supplements?
- c) Write briefly on sphingolipids emphasizing types and sources.
- d) What are the complications associated with obesity?
- e) How probiotics are strengthening our immune system?

4×5

PART-A

- Q.2**
- a) Briefly discuss about CVD and how nutraceuticals are used as prophylactic or therapeutics to treat CVD? **10**
 - b) Discuss the types of omega-3-fatty acids, their sources and the medical benefits. **10**
- Q.3**
- a) Why antioxidants are important for our health? Name the different sources of antioxidants and their medical benefits. **10**
 - b) Discuss the role of phytoestrogens, sources and various medical benefits. **10**
- Q.4**
- a) How flavonoids are classified. Give one example in each class. **10**
 - b) Name the different sources of carotenoids. Explain the extraction and purification procedures of carotenoids. **10**

PART-B

- Q.5**
- a) Discuss the selection criteria and types of probiotics and prebiotics. **10**
 - b) Explain the various medical benefits of probiotics. **10**
- Q.6**
- a) What is diabetes? Explain different types of diabetes in detail. **10**
 - b) Discuss in detail the different nutraceutical options for the preventive or therapeutic intervention of diabetes mellitus. **10**
- Q.7**
- a) What types of research needed to improve nutraceuticals and functional food domain? **10**
 - b) Give a detailed account of nutrigenomics and its applications in health industry. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

CLINICAL MICROBIOLOGY (BT-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions briefly:

- a) Differentiate between toxin and toxoids.
- b) Write a short note on 'gram negative cell wall'.
- c) Write a note on the classification of helminths.
- d) Name any two intestinal protozoal infection causative organisms.
- e) What are the symptoms and causative organism of amoebic dysentery?
- f) Name any two infections caused by aerobic bacteria.
- g) Mention the symptoms and name of the causative organism for Rabies.
- h) What are Prions?
- i) Discuss the principle and procedure of staining techniques used for the identification of Fungi.
- j) How are the diagnosis of anaerobic intracellular parasites done?

2x10

PART-A

Q.2 a) Mention the names of small intestinal microbiota and the importance of normal bacterial and fungal microbiota to host. **10**
b) What are virulence factors? Discuss various types of virulence factors in detail. **10**

Q.3 a) What is the disease caused by Plasmodium? Explain the life cycle of Malaria Parasite. **10**

- b) Differentiate between nematodes and trematodes. Explain the life cycle of any nematode in detail. **10**

Q.4 a) Write a note on 'gram enteric rods'. **10**

- b) Name two gram positive spore forming bacteria. Write a note on the Bacillus Anthracis infection and its lab diagnosis. **10**

PART-B

Q.5 a) How viruses are classified on the basis of nucleic acid type? Explain with example. **10**
b) Describe the types and the life cycle of Hepatitis virus in detail. **10**

Q.6 a) What are the general characteristics of Fungi? Discuss about the different media used for the isolation of Fungi. **10**
b) Differentiate between cutaneous mycosis and superficial mycosis with examples. **10**

Q.7 a) Describe on the strategy for laboratory diagnosis for viral infection. **5**
b) Explain the molecular diagnostic procedure for the identification of pathogen. **15**

End Semester Examination, May 2019
M.A. (Applied Psychology) – Fourth Semester
CASE DISCUSSION AND ANALYSIS (MA-AP-401)

Time: 3 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Part-B is compulsory**. Attempt any **FOUR** questions from **Part-A**. Marks are indicated against each question.

PART-A

- Q.1 Despite several demerits the case study method is used exclusively in medicine social sciences. What according to you are the merits of the caste study? **10**
- Q.2 What is the importance of case analysis and discussion and why it is a must in psychology? **10**
- Q.3 Rohenhaa's study being same in insane places' is a classic study. What light did it throw en our understanding of mental illness? **10**
- Q.4 Discuss any case study that has left its impact on you changed you understanding of Psychology. **10**
- Q.5 What according to you are the perfect building blocks if a good case study? **10**

PART-B

- Q.6 Discuss and analyze any case study that you have done in your internship in detail. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

FOOD BIOTECHNOLOGY (BT-507)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer briefly:

- a) What are the importance of microorganisms in Food Biotechnology?
- b) What should be the important characteristics of microorganisms, if they are used in food fermentation?
- c) Define redox potential, E_h .
- d) How can we perform microbial analysis by measuring electrical impedance?
- e) Name two bacterial and fungal agents that are involved in spoilage of fruits and vegetables.
- f) What do you understand by ropiness and which bacterial strain is the causative agent of it?
- g) What are the primary functions of blanching?
- h) What is the effect of drying on microbes?
- i) Give two merits and demerits of SCP compare to conventional source of proteins.
- j) How one can utilize wastes for the production of valuables? Explain with one example.

2x10

PART-A

Q.2 a) Discuss the characteristics of important genera of bacteria associated with food. **10**
b) Give a synopsis of different genera of moulds common to food. **10**

Q.3 a) Give an account of various intrinsic parameters that affect the growth of microorganisms. **10**
b) Describe the conventional methods for enumeration of microbes. **10**

Q.4 a) Discuss the food microbiology of canned foods in detail. **10**
b) Give an account of microbial spoilage of bakery and egg products. **10**

PART-B

Q.5 a) Discuss the effect of irradiation on Foodbome Microbial Pathogens. **10**
b) Give an account of flavorings for the food industry. **10**

Q.6 a) What is single cell protein? Write down the steps for production of SCP. Mention the advantages and disadvantages of SCP. **10**
b) Describe the principle of acetic acid fermentation. **10**

Q.7 Discuss the application of pectolytic enzymes in juice processing industries. **20**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Second Semester

GENETIC ENGINEERING AND APPLICATIONS (BT-S-201A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Briefly answer the following:

- a) What are restriction endonucleases? Why are they important for recombinant DNA technology?
- b) What are the main features of a plasmid used for recombinant DNA?
- c) What is yeast two hybrid system?
- d) Where would one require the concept of mRNA enrichment?
- e) Explain the technique used to detect RNA expression?
- f) What are the limitations of gene therapy?

2×6

UNIT-I

Q.2 a) How do the principles of genetic engineering apply to biotechnology? **8**
b) Elaborate the different guidelines to be implemented while working to produce a recombinant protein. **4**

Q.3 Summarize the importance of the following in genetic engineering:

- a) Nucleic acid amplification.
- b) DNA sequencing.
- c) Patenting of life forms.

4×3

UNIT-II

Q.4 a) What are cloning vector? Discuss their characteristic features with advantages and disadvantages.
b) Describe any three types of cloning vectors in detail. **6×2**

Q.5 Discuss the process of gene library construction and screening. **12**

UNIT-III

Q.6 Write short notes on:

- a) Gene regulation.
- b) Expression vector system.
- c) Phage display technique.

4×3

Q.7 Elaborate the following:

- a) Gene knockout technologies.
- b) Targeted gene replacement.
- c) Gene regulation.

4×3

End Semester Examination, May 2019

B. Tech. – Fourth Semester

INDUSTRIAL MICROBIOLOGY (BT-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are primary metabolites? Give an example.
- b) Define the term "Bio-transformation".
- c) What are cloning vectors? Give an example.
- d) Write the microbial producer & industrial use of butanol.
- e) What is the core molecule of penicillin?
- f) What are hops? Give their significance.
- g) Name two biopesticides produced at large scale.
- h) Name some algal strains used as biofertilizers.
- i) What do you mean by Malting?
- j) Differentiate between submerged and solid state fermentation.

2×10

PART-A

- Q.2** a) Describe in detail the various component parts of a fermentation process. **10**
b) Differentiate between Batch and Fed-batch fermentation. **10**
- Q.3** a) What are the different methods used for the preservation of microbial strains? **10**
b) Discuss in detail "Protoplast Fusion" technique and explain its role in strain improvement process. **10**
- Q.4** a) What are alcoholic beverages? Explain the production of beer in brief. **10**
b) What are the microbial strains used for the production of citric acid? Explain the biosynthesis of citric acid. **10**

PART-B

- Q.5** a) Describe the production of riboflavin in detail. How is it purified? **10**
b) Discuss in detail the structure, mode of action and large scale production of an antibiotic. **10**
- Q.6** a) What are biofertilizers? Discuss the application of biofertilizers in agricultural fields. **10**
b) What are single cell proteins? Explain the production of single cell protein in food industries. **10**
- Q.7** What are the basic objectives used in the development of a fermentation process economically viable. **20**

End Semester Examination, May 2019
B. Tech. — Sixth Semester
THERMODYNAMICS OF BIOPROCESS (BT-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define and give the properties of enthalpy, internal energy and entropy.
- b) State and give equations for Raoult's law and Henry's law?
- c) What are non-equilibrium systems? Give their significance.
- d) Describe the role of coupled reactions in biological processes.
- e) Briefly explain cooperative transitions and partition function.

4×5

PART-A

- Q.2** a) How does temperature effect free energy change? **10**
- b) Compute the internal energy change and temperature change for the two processes involving 1 mole of an ideal monatomic gas:
i) 1500 J of heat are added to the gas and the gas does no work and no work is done on the gas.
ii) 1500 J of work are done on the gas and the gas does no work and no heat is added or taken away from the gas. **10**
- Q.3** a) Define and derive the equation for partial molar property. **10**
b) Write a note on thermo analysis of dissolving solute in a solvent. **10**
- Q.4** a) What are the difference between steady state and dynamic equilibrium? Explain the different types of equilibrium. **10**
b) Discuss "Life and irreversibility". **10**

PART-B

- Q.5** a) What does Prigogien's principle state? Explain in detail. **10**
b) Discuss the equations for flux and force in a continuous system. **10**
- Q.6** a) Write briefly about ordering principle and explain their equations. **10**
b) Describe the thermodynamics of sodium pump. **10**
- Q.7** a) Derive the constitutive equations for oxidative phosphorylation. **10**
b) Write short notes on Benard's problem. **10**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Second Semester

BIOPROCESS TECHNOLOGY (BT-S-202A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the advantages of bioprocess over chemical process?
- b) Discuss feeding strategies in fed batch culture.
- c) What are the applications of packed fed bioreactor?
- d) Enumerate important properties of a tracer.
- e) How do resistance temperature detectors work?
- f) Define Kla.

2×6

UNIT-I

Q.2 a) Which of the following modes of fermentation is suitable for the production of secondary metabolites?
i) Batch mode.
ii) Fed Batch mode.
iii) Continuous mode. Justify your answer.
b) Explain Monod's growth model. **6×2**

Q.3 a) Describe the steps in material balance analysis.
b) Discuss the Luedeking and Piret model for product formation kinetics. **6×2**

UNIT-II

Q.4 Describe in detail the construction and working of stirred tank bioreactor with special emphasis on:
a) Aeration.
b) Agitation.
c) Probes. **12**

Q.5 Analyze the reasons for non-ideality existing in stirred tank bioreactors. **12**

UNIT-III

Q.6 What are the general components of microbial media? Discuss significant factors that determine the choice of medium components. **12**

Q.7 Explain in detail the following:
a) Molecular diffusion.
b) Convective mass transfer. **6×2**

End Semester Examination, May 2019
B. Tech. (Bio-Technology) – Fourth Semester
BASICS OF CHEMICAL ENGINEERING (BT-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) How can zero, first and second order reactions be represented graphically?
- b) What is a Newtonian fluid? Give examples.
- c) Draw and discuss the phase diagram for a single component system.
- d) Explain Fick's first law of diffusion.
- e) How does rate of cooling affect crystallization? Explain.

5x4

PART-A

Q.2 a) Discuss the functioning of a batch reactor.

8

- b) Consider the reaction: $A+B \rightarrow C+D$. A rate study of this reaction was conducted at 298 K. The data that were obtained are shown in the table:

[A], mol/L	[B], mol/L	Initial Rate, mol/(L.s)
0.050	0.100	$5 \times 75 \times 10^{-2}$
0.100	0.100	$2 \times 30 \times 10^{-1}$
0.100	0.050	1.15×10^{-1}

Calculate the order with respect to both the reactants and also the overall order of the reaction. Also calculate the rate constant.

12

Q.3 a) How can one determine viscosity?

8

- b) State Haygen Poiseuille equation for incompressible as well as compressible fluids.

4

- c) Define: (i) Boundary layer, and (ii) Entrance Length for flow of fluid through a circular pipe.

8

Q.4 a) What is convective heat transfer?

4

- b) Give equations for (i) Conductive heat transfer (ii) Radiative heat transfer.

6

- c) Discuss the types of heat exchangers on the basis of construction.

10

PART-B

Q.5 a) State film theory.

3

- b) Write short notes on: (i) Solid liquid mass transfer (ii) Gas liquid mass transfer with respect to oxygen.

10

- c) Derive Fick's laws of diffusion.

7

Q.6 a) What are adsorption isotherms? Discuss its various types.

12

- b) How can one calculate partition coefficient of benzoic acid in a diethyl-ether-water system.

6

- c) What is acid extraction?

2

Q.7 a) What are the different ways of fluid flow?

8

- b) Explain the functioning of a manometer.

8

- c) What is a thermocouple? Explain its principle.

4

(End Semester Examination, May 2019

B. Tech. (Bio-Technology) – Fourth Semester

BASICS OF CHEMICAL ENGINEERING (BT-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) Differentiate between a homogeneous and heterogeneous reaction with examples.
- b) What is a non-Newtonian fluid? Give two examples.
- c) What is a triple point? Explain diagrammatically.
- d) Explain Fick's law of diffusion.
- e) Does geometry play a role in crystallization? Explain.

4×5

PART-A

Q.2 a) How is order different from molecularity of a reaction?

4

b) Consider the reaction: $SO_2 + O_3 \rightarrow SO_3 + O_2$. A rate study of this reaction was conducted at 298 K. The data that were obtained are shown in the table

[SO ₂], mol/L	[O ₃], mol/L	Initial Rate, mol/(L . s)
0.25	0.40	0.118
0.25	0.20	0.118
0.75	0.20	1.062

Calculate the order with respect to both the reactants and also the overall order of the reaction. Also, calculate the rate constant.

12

c) What is an ideal reactor? Name two types of ideal reactors.

4

Q.3 a) Differentiate between dynamic and kinematic viscosity.

4

b) Classify type of flow of fluids on the basis of velocity, compressibility and thickness.

8

c) What is the dimension of Reynold's number? Calculate Reynold's number and determine the type of flow, if a fluid having viscosity of 0.4 Ns/m² and relative density of 900 Kg/m³ is flowing through a pipe of diameter 20 mm with a velocity of 2.5 m/s.

8

Q.4 a) How is kinetic energy related to heat transfer?

2

b) Define:

i) Emissivity

ii) Heat exchanger

2×2

c) Discuss the types of heat exchangers on the basis of flow arrangement.

10

d) Name two parameters which form the basis of heat transfer.

4

PART-B

Q.5 a) Give the rate equation for convective mass transfer. What are the factors affecting mass transfer coefficient?

10

b) Write short notes on:

i) Partition coefficient

ii) Aqueous two-phase

5×2

- Q.6 a) Derive the Gibbs free energy for adsorption. **6**
b) Explain liquid-liquid and solid solid mixing with examples. **6**
c) How is vapor pressure related to distillation? What are the laws governing the same?**8**
- Q.7 a) What are the different ways of measuring pressure? **8**
b) Explain the functioning of a pH probe. **8**
c) What is a thermistor? Explain its principle. **4**

End Semester Examination, May 2019

M. Tech. (Biotechnology) – Second Semester

ADVANCED PLANT BIOTECHNOLOGY (PC-BT-M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Answer briefly:

- a) What are the advantages of callus culture?
- b) What is the purpose behind carrying out in-vitro pollination?
- c) Mention the mechanism of action of elicitation of secondary metabolites in plant tissue.
- d) Give examples of alkaloid production in genetically engineered plants?
- e) Elaborate the role of Cryopreservation in Germplasm conservation.

4×5

UNIT-I

- Q.2 Explain the process and mechanism of somatic embryogenesis. Differentiate between zygotic embryos and somatic embryos. **20**
- Q.3 a) Describe various ways by which triploids can be produced. **10**
b) What is the process of selection of somaclonal variants? **10**

UNIT-II

- Q.4 Give a broad outline of commercial crop production through micropropagation technique. **20**
- Q.5 Describe the technique of Biotransformation for conversion of low cost precursors to high value products, using plant tissue cultures? **20**

UNIT-III

- Q.6 Explain various methods of germplasm conservation. What is the need to conserve plant genetic resources? **20**
- Q.7 Write short notes on:
a) Convention on biological diversity.
b) Plant quarantine. **10×2**

End Semester Examination, May 2019

M.A. (Applied Psychology) – Fourth Semester

SOCIOCULTURAL CONTEXT OF MENTAL HEALTH (MAAP-341-4)

Time: 3 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **PART-B** is compulsory. Attempt any **FOUR** questions from **PART-A**. Marks are indicated against each question.

PART-A

- Q.1 Discuss how Indian culture has influenced the diagnostic system of illness in India. **10**
- Q.2 Keeping in mind cultural differences is psychotherapy in India practiced differently from the western world. Explain. **10**
- Q.3 Discuss how sexual orientation is experienced in the Indian sociocultural context in India. **10**
- Q.4 Why are suicide rates of Indian youth rising as compared to earlier years? Explain. **10**
- Q.5 Are cases of somatization in India actually cases of depression? Discuss. **10**

PART-B

- Q.6 Discuss any one patient case in detail, which underlines the impact of the Indian sociocultural context on mental health. **10**

End Semester Examination, May 2019

Bachelor of Physiotherapy – Second Semester

ENVIRONMENTAL STUDIES (CH-202B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **EIGHT** questions in all; **Q.1 is compulsory**. Attempt any **FOUR** questions from **Part-A** and **THREE** questions from **Part-B**. Marks are indicated against each question.

Q.1 Explain answer briefly:

- a) Grassland ecosystem.
- b) Scope of environmental studies.
- c) Deforestation.
- d) Biodiversity.
- e) Acid rain.
- f) Global warming.
- g) Population growth.
- h) Water pollution.
- i) Montreal protocol.
- j) Endangered animals.

2×10

PART-A

Q.2 What do you mean by sustainable development? **5**

Q.3 Desert ecosystem is an important ecosystem. Explain. **5**

Q.4 Renewable and non-renewable energy sources are different form each other. Explain in brief. **5**

Q.5 What are the threats to biodiversity? **5**

Q.6 Explain Forest Conservation Act. **5**

PART-B

Q.7 What are the different levels of biological diversity? Explain the importance of diversity. Also explain in-situ and ex-situ conservation of it. **20**

Q.8 What are the causes of environmental pollution? Explain all types of pollutions with their causes, affects and controlling measures. **20**

Q.9 How change in climate, global warming, ozone layer depletion and acid rain are caused? Explain all these impacts on human health. **20**

Q.10 What is the dual role of chemistry in various peaceful as well as for toxic chemicals and chemical weapons? **20**

Q.11 What are the major cause of growth of human population? Explain what is its impact on quality of life in detail. Also explain how it can be controlled. **20**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DRUG DESIGNING (BT-632)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Enlist two drugs each from plant, animal and microbial sources. **3**
- b) What are the major hurdles in new drug design? **3**
- c) Calculate the therapeutic index of a drug having LD₅₀: 200 mg and the ED₅₀: 20 mg. **3**
- d) What are orphan drugs? **2**
- e) What is the difference between nicotinic and muscarinic cholinergic receptors? **3**
- f) Explain giving example the function of protecting groups in organic synthesis. **3**
- g) You have protein sequence and you wish to know what other proteins look like it. Which of the five Basic Blast programs should you use? **3**

PART-A

- Q.2** a) Explain in detail different types of chemical bonding involved in drug target interactions. **10**
- b) Relate the physicochemical properties of the drug with action of the drug. **10**
- Q.3** a) Discuss the possible strategies for drug repurposing. **10**
- b) Describe any one disease model used for developmental disorders. **10**
- Q.4** a) Describe different types of enzyme inhibitors. Give examples of enzyme inhibitors as drugs. **10**
- b) Explain different types of drug-receptor interactions with the help of suitable diagrams. Explain the physiology of ion channels. **10**

PART-B

- Q.5** What are prodrugs? Give any two examples and explain in detail their particular application and activation. **20**
- Q.6** Discuss briefly solid phase synthesis, How is solid phase synthesis applied for preparation of combinatorial libraries? Explain its utility in drug discovery. **20**
- Q.7** a) Discuss and compare two different molecular energy minimization techniques. **8**
- b) How is computer assisted drug design helpful in new drug discovery and development? **12**

End Semester Examination, May 2019

BCA/B.Sc. (IT)/BBA (G)/Banking/B.Com. (Hons.) I.I/BBA (G) IB / B.Sc. Data

Science/BA (H) English/ BPT/B.Sc. (N&D) – Second Semester

ENVIRONMENTAL STUDIES (CH-202B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define sustainable development.
b) Differentiate between producers and consumers.
c) Mention any two natural causes of soil erosion.
d) Name two hotspots present in India.
e) State the objectives of Montreal protocol.
f) List out few safety measures suggested during an earthquake.
g) Define bioterrorism.
h) Differentiate between endangered and extinct species.
i) Elaborate "Ten percent rule of energy transfer" in ecosystems.
j) Write any two anthropogenic causes of soil pollution. **2×10**

PART-A

- Q.2 a) Discuss the scope of environmental studies and highlight its significance in achieving sustainability. **10**
b) Write brief notes on the following:
i) Food web.
ii) Ocean ecosystem. **5×2**
- Q.3 a) What are the causes of over-exploitation of water resources? List out its impact on environment and suggest some preventive measures. **10**
b) Discuss various types of alternate sources of energy along with their limitations. Why renewable sources of energy should be preferred to non-renewable sources? **10**
- Q.4 a) Define biodiversity and discuss its types with suitable examples. **10**
b) Give a detailed account of conservation methods of biodiversity. **10**

PART-B

- Q.5 a) Discuss the problems associated with industrial and urban solid waste. Suggest some methods to manage them. **10**
b) What do you mean by nuclear hazards and how do they pose risk to human health? Suggest some remedial measures also. **10**
- Q.6 a) Discuss the causes and adverse impacts of global warming on environment. How can we prevent it? **10**
b) Describe the significant features of wild life protection act. **10**
- Q.7 a) Write short notes on the following:
i) Population explosion.
ii) Bishnois of Rajasthan. **5×2**
b) Define weapons of mass destruction and discuss their classification with suitable examples. **10**

End Semester Examination, May 2019

MA (Applied Psychology) – Fourth Semester

STRESS MANAGEMENT (MA-AP-331)

Time: 3 hrs

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **PART-B** is **compulsory**. Attempt any **FOUR** questions from **PART-A**. Marks are indicated against each question.

PART-A

- | | | |
|-----|---|-----------|
| Q.1 | Define stress and discuss the concept of Eustress. | 10 |
| Q.2 | Discuss the causes of work related stress and list the associated physical symptom. | 10 |
| Q.3 | Create an Action Plan to stop smoking using Behavioral Principles. | 10 |
| Q.4 | Explain how managing your boundaries helps to reduce Stress? | 10 |
| Q.5 | Explain how Type A personality is linked to higher stress levels? | 10 |

PART-B

- | | | |
|-----|---|-----------|
| Q.6 | Explain the General Adaptation Syndrome with a diagram. | 10 |
|-----|---|-----------|

End Semester Examination, May 2019

M. Tech - Second Semester

ADVANCED ENVIRONMENTAL BIOTECHNOLOGY (PC-BT-M-202)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **FOUR** more questions out of six, **taking at least ONE question** from each unit. Each question carries equal marks.

Q.1 Answer briefly:

- a) What do you mean by biological process for waste water treatment?
- b) Define GMOs.
- c) What do you mean by phytoremediation?
- d) Explain (bio-piracy).
- e) What are various sources of heavy metal pollutants?

4x5

UNIT-I

- Q.2 a) Give an account of different waste water treatment methods. **10**
b) Discuss the method used to remove specific pollutants from dairy industry. **10**
- Q.3 Explain the bioprocess and clearance techniques for removal of pollutants from paper industry. **20**

UNIT-II

- Q.4 a) What do you mean by microbial metal resistance. **10**
b) Explain various ways of microbial transformation. **10**
- Q.5 How Genetic engineering is engaged to improve phytoremediation? Justify using case study. **20**

UNIT-III

- Q.6 a) Explain the global and regional issues associated with sustainable development. **10**
b) What is the importance of local and indigenous knowledge in relation with biological diversity? **10**
- Q.7 Write short notes on:
a) Sustainable development. **10**
b) Biodiversity conservation legislation. **10**

End Semester Examination, May 2019
M. Tech. (Biotechnology) – Second Semester
FOOD PACKAGING TECHNOLOGY (PE-BT-M-221)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Briefly explain the following:

- a) What is the difference between tinplate and tin free steel?
- b) Which paper is used to package fats such as butter?
- c) What Nutritional Information or nutritional facts per 100 gm or 100 ml or per serving of the product should be given on the label?
- d) Why Manganese is added during Aluminum can manufacturing as alloying agent?
- e) Co-extrusion and lamination of plastic can be sources of packaging reduction.
Comment.

4×5

UNIT-I

Q.2 a) Enumerate the packaging requirements for the following:

- i) Canned Meat Products.
- ii) Fruits and Vegetables Products.
- iii) Milk and Milk Products.

5×3

b) How Bioactive Packaging is different from intelligent packaging? **5**

Q.3 Explain active packaging with two suitable examples and mode of action of active ingredients. **20**

UNIT-II

Q.4 Describe the advantages and disadvantages of the following as packaging materials.

- a) Glass
- b) Aluminium
- c) PETE
- d) PVC

5×4

Q.5 a) Briefly classify the interactions between foods and the packaging materials. Highlight both the positive and negative interactions. **15**

b) Diagrammatically represent the different types of migration processes. **5**

UNIT-III

Q.6 Briefly enumerate the EPA guidelines for hierarchical and integrated management of municipal solid waste. Also discuss the challenges in the implementation of solid waste management practices. **20**

Q.7 a) Illustrate the manufacture of two-piece cans and their advantages over three-piece cans. **16**

b) To what treatments the pulp subjected to during manufacture of paper board as packaging material? **4**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Second Semester

IMMUNOLOGY (BT-S-203A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **UNIT.** Marks are indicated against each question.

Q.1 Briefly answer the following:

- a) What do you understand by hapten, antigen and antibody?
- b) How monocytes are different from macrophages?
- c) Draw a labeled diagram of IgM and IgA.
- d) What are natural killer cells?
- e) Why an autoimmune disorder can occur?
- f) Briefly explain the tumor biomarkers.

2×6

UNIT-I

Q.2 Differentiate between the following:

- a) Primary Immune Response and Secondary Immune Response.
- b) MHC I and MHC II.

6×2

Q.3 What is complement? Mention the types and explain in detail alternative complement system. **12**

UNIT-II

Q.4 Write short notes on the following:

- a) T cell regulation.
- b) Mechanism of Natural killer cell mediated lysis.

6×2

Q.5 What are super antigens? Discuss the antigen processing of endocytic and exocytic pathways. **12**

UNIT-III

Q.6 What is Hypersensitivity? Mention its types and describe the hypersensitivity I in detail. **12**

Q.7 a) Discuss how the immune system works against viral infections? **6**
b) Explain transplantation, its type and the methods for transplantation graft rejection. **6**

End Semester Examination, May 2019

B. Tech – Sixth Semester

ENVIRONMENT BIOTECHNOLOGY (BT-602A)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer briefly the following:

- a) Greenhouse effect.
- b) Air-Lift Bioreactor.
- c) Persistence and biomagnifications of xenobiotic molecules.
- d) Bio-mining.
- e) Biogas production.

4x5

PART-A

- Q.2 a) What do you understand by Greenhouse effect? How it affects the environmental conditions of earth? **10**
- b) Give causes of Soil Pollution. What are its effects on public health? **10**
- Q.3 What are bioreactors? Explain working of Air-Lift Bioreactor with principle. **20**
- Q.4 a) Explain different types of Hazardous wastes. **10**
- b) Give an account of different treatment technologies used for the hospital and industrial wastes. **10**

PART-B

- Q.5 Define biodegradation. State the factors affecting the process of biodegradation. **20**
- Q.6 Explain:
a) In situ and Ex situ technologies for bioremediation. **10**
b) Phytoremediation and applications. **10**
- Q.7 Explain:
a) Biotechnology for management of environmental resources. **10**
b) Water recycling and harvesting. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

MOLECULAR BIOLOGY (BT-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Why DNA needs to be organized?
- b) What three informational macromolecules are involved in genetic information flow?
- c) The two closely related species have two fold differences in their genetic material. What inference can be drawn from this?
- d) What is rho protein?
- e) What is the function of polyA polymerase?
- f) How mutation in the resolvase gene of Tn3 affects the process of transposition?
- g) What sequences in bacterial mRNA promotes recognition by the 30S subunit?
- h) What are zinc finger and leucine zipper? **2½×8**

PART-A

Q.2 a) How will the lengthy linear DNA molecule be accommodate in the nucleus as condensed chromosomal structures? **15**
b) Draw cot curve of eukaryotes and briefly explain what it depicts. **5**

Q.3 a) How DNA polymerase and its associates carry out the process of replication in prokaryotes? **15**
b) How many polymerases are involved in replication in eukaryotes? How are their activities different? **5**

Q.4 a) Briefly describe how 7 methylguanylate is added to the pre mRNA to yield mRNA in eukaryotes? **10**
b) Tata binding protein is a positioning factor for RNA polymerase in eukaryotic transcription. Comment on it. **10**

PART-B

Q.5 a) How arabinose is utilized as a carbon source in a bacterial cell? What happens if glucose is added into the medium? **20**

OR

- b) In what ways, the activities of transcriptional factors are regulated to affect the expression of genes in eukaryotes. What are the other ways in which the expression of genes can be regulated? **20**

Q.6 Briefly explain (**any two**) of the following:

- a) Protein degradation via proteasomes.
- b) Selenylation of proteins.
- c) Elongation of translation in bacteria.

10×2

Q.7 a) Discuss the features of Ac-Ds elements in plants. Describe their mechanism of transposition. **12**
b) Illustrate of the use of P elements to introduce genes into the "Drosophila" genome. **8**

End Semester Examination, May 2019

M. Tech. (Biotechnology) – Second Semester

NUTRACEUTICALS AND FUNCTIONAL FOODS (PE-BT-M-226)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **FOUR** questions out of six, taking at least **ONE** question from each **UNIT**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) How nutraceuticals are classified? Explain with examples.
- b) Name the functional components and mechanism of actions of tomato, flaxseed, soybean and cruciferous vegetables?
- c) Explain the common techniques employed to purify isoprenoids.
- d) How EPA and DHA are isolated?
- e) Discuss the complications associated with obesity.

4×5

UNIT-I

Q.2 a) Briefly discuss about CVD and how nutraceuticals are used as prophylactic or therapeutics to treat CVD? **10**
b) Discuss the types of omega-3-fatty acids, their sources and the medical benefits. **10**

Q.3 a) Why antioxidants are important for our health? Name the different sources of antioxidants and their medical benefits. **10**
b) Discuss the role of dietary fibres, sources and various medical benefits. **10**

UNIT-II

Q.4 a) How flavonoids are classified? Give 1 example in each class. **10**
b) Name the different sources of carotenoids. Explain the extraction and purification procedures of carotenoids. **10**

Q.5 a) Discuss the selection criteria and types of probiotics and prebiotics. **10**
b) Explain the various medical benefits of probiotics. **10**

UNIT-III

Q.6 a) What is diabetes? Explain different types of diabetes. **5**
b) Discuss in detail the different nutraceutical options for the preventive or therapeutic intervention of diabetes mellitus. **15**

Q.7 a) What types of research needed to improve nutraceuticals and functional food domain? **5**
b) Give a detailed account of nutrigenomics and its applications in health industry. **15**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PLANT BIOTECHNOLOGY (BT-601A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) **What are gynogenic haploids?**
- b) **Differentiate between hybrid and cybrid.**
- c) **Define cytogenic and organogenic differentiation.**
- d) **Write down any two examples of abiotic stress resistance.**
- e) **Write a short note on 'Flavr Savr Tomato'.**

4×5

PART-A

- Q.2** a) **Define 'micro-propagation'. Explain different steps by taking suitable examples.** **10**
- b) **Explain anther culture for obtaining androgenic haploids.** **10**
- Q.3** a) **Explain the technique of cybridization and its application in detail.** **10**
- b) **Write different methods for protoplast isolation.** **10**
- Q.4** a) **Describe the process of nodulation in detail.** **10**
- b) **How we can produce pathogen free plants?** **10**

PART-B

- Q.5** a) **Discuss genetic linkage and gene mapping with suitable examples.** **12**
- b) **Write down any one method for sequencing of DNA.** **8**
- Q.6** a) **Discuss any two vectorless methods for gene transfer.** **12**
- b) **Write a short note on chimeric gene vectors with diagram.** **8**
- Q.7** a) **Write a note on any two methods for insect resistance in plants.** **12**
- b) **Discuss use of transgenic technology in crop improvement in detail.** **8**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Second Semester

BIOINFORMATICS AND COMPUTATIONAL BIOLOGY (BT-S-204A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Briefly answer:

- | | |
|--|----------|
| a) What do you mean by orthologs? How it is different from paralogs? | 2 |
| b) Differentiate between PAM 250 and BLOSUM 62? | 3 |
| c) Discuss different types of sequence repeats. | 3 |
| d) What is ORF? How it is different from CDS? | 2 |
| e) How global sequence alignment is different from local sequence alignment? | 2 |

UNIT-I

- Q.2 a) How sequence is collected and stored in laboratory? **9**
b) Using appropriate example discuss cDNA. **3**

- Q.3 a) What do you mean by NGS? **4**
b) Discuss Sanger method of DNA sequencing? **8**

UNIT-II

- Q.4 Align the given sequence using dynamic programming for the given sequences GCTGTT and GTTCAT upto trace back using +2, -1 and 0 for match, mismatch and gap penalty respectively. **12**

- Q.5 a) What are the different methods used in phylogenetic prediction? **4**
b) Using distance method construct phylogenetic tree taking five species. **8**

UNIT-III

- Q.6 a) Discuss the different steps involved in ORF prediction. **8**
b) What are the information one can extract from comparison of different genome? **4**

- Q.7 a) Briefly describe functional classification of protein. **7**
b) How fold recognition is used in protein structure prediction? **5**

End Semester Examination, May 2019
M. Sc. (Biotechnology) – Second Semester
BIOETHICS, BIOSAFETY AND IPR (BT-S-205D1)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- | | |
|--|----------|
| a) What is difference between values and ethics? | 3 |
| b) Define trademark. | 2 |
| c) What is biological containment? | 2 |
| d) Give two example of bio-hazardous material. | 2 |
| e) What is a bioterrorism attack? | 3 |

UNIT-I

Q.2 a) What are the public acceptance issues in biotechnology? **6**
b) Explain the different benefit associated with biosafety. **6**

Q.3 a) Illustrate bioethics vs business ethics. **6**
b) Discuss international relations and globalization in biotechnology. **6**

UNIT-II

Q.4 a) Discuss different biosafety assessment procedures in India. **8**
b) What are the benefits of GM foods? **4**

Q.5 a) What is the general content of the cartagena protocol? **9**
b) What is an example of a biological weapon? **3**

UNIT-III

Q.6 a) Define 'patents'. What are the basic requirements and conditions for patentability? **10**
b) What does it mean to have a copyright? **2**

Q.7 a) Why are patents important to pharmaceuticals? **8**
b) What does plant variety protection mean? **4**

End Semester Examination, May 2019

B. Tech. — First Semester

MATHEMATICS-I (BSC-MA-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the Following questions:

a) Evaluate:

$$\text{i) } \Gamma\left(\frac{3}{2}\right) \quad \text{ii) } B(4, 6)$$

b) Find the area between the x-axis and the curve $y = \sin x$ from $x=0$ to π .

c) Find the maxima and minima for the curve $f(x) = x^3 - 3x + 2$.

d) Find the n^{th} derivative of $f(x) = \log(ax+b)$.

e) Is it possible to write Fourier sine series for the function $f(x) = \cos x$ in the interval $(-1, 1)$?

f) What is the half range cosine series for $f(x) = k$ in $(0, 2)$.

g) Evaluate the following limit: $\lim_{\substack{x \rightarrow 1 \\ y \rightarrow 2}} \frac{3x^2y}{x^2 + y^2 + 5}$

h) Verify that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$, where $u(x, y) = \log\left(\frac{x^2 + y^2}{xy}\right)$.

i) If $u = \sin^{-1}\left(\frac{x+2y+3z}{\sqrt{x^8+y^8+z^8}}\right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} + 3 \tan u = 0$.

j) If $A = \begin{bmatrix} 3 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ What are the eigen values of A^{-1} . **2×10**

PART-A

Q.2 a) Show that: $\frac{B(p,q+1)}{q} = \frac{B(p+1,q)}{p} = \frac{B(p,q)}{p+q}$ **10**

b) Evaluate the following integrals

$$\text{i) } \int_0^{\frac{\pi}{2}} \frac{2+3 \sin x}{\cos^2 x} dx \quad \int_0^{\pi/4} \sec^2 x dx \quad \text{span style="float: right;">**10**$$

Q.3 a) Verify Rolle's Theorem for the function: $f(x) = 2 + (x-1)^{2/3}$, $x \in [0, 2]$. **10**

b) Expand $f(x) = \log(1-x)$, $\forall x \in [-1, 1]$. **10**

Q.4 a) Test for the convergence of the series $\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!} x^{2n}$, $x > 0$ **10**

b) Find the Fourier cosine series of $x(\pi-x)$ in $(0, \pi)$. **10**

PART-B

Q.5 If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and $\|\vec{r}\| = r$, show that:

$$\text{i) } \text{grad } r = \frac{\vec{r}}{r};$$

$$\text{ii) } \text{grad}(1/r) = -\frac{\vec{r}}{r^3}$$

iii) $\text{grad} \frac{1}{r^2} = -\frac{2\vec{r}}{r^4}$

iv) $\nabla r^n = n r^{n-2} \vec{r}$

v) $\nabla(\vec{a} \cdot \vec{r}) = \vec{a}$, where \vec{a} is a constant vector.

20

Q.6 a) Find the value of λ for which the equations:

$$(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0; \quad (\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$$

$$2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$$

10

b) Find the Eigen values and Eigen vectors of the matrix: $A = \begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$

10

Q.7 a) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} \right)^2 u = \frac{-9}{(x+y+z)^2}$

10

b) Find the characteristic equation of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$. Also find the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$

10

End Semester Examination, May 2019

B. Tech. — Sixth Semester

FOOD PACKAGING TECHNOLOGY (BT-637)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) State the various types of food packaging.
- b) Briefly mention the various requirements needed in the process of packaging and labeling.
- c) What is the shelf life of a food material?
- d) Set the distinction between the raw food from processed food.
- e) Signify the importance of maintaining the aseptic conditions during food packaging. **4x5**

PART-A

Q.2 a) Why do we need to package food? What are the various aspects of food packaging? **10**
b) Justify the concept of green packaging technology. **10**

Q.3 Discuss:

- a) Whole sale packaging.
- b) Recommended date of last consumption.
- c) Labeling.
- d) Regulations act 2011.
- e) Best before date. **4x5**

Q.4 a) Discuss various types of food packaging elaborating their characteristic features. **10**
b) What are the preventions and precautions required during packaging to avoid deterioration of food material for a long time? **10**

PART-B

Q.5 a) How would one consider the packaging of processed food? How would these processes be any different from raw food? **10**
b) Describe the packaging of:

- i) Meat.
- ii) Fresh fruits and vegetables. **5x2**

Q.6 a) Mark a distinction between the packaging requirement of baked food products from beverages. Support your answer with examples wherever necessary. **14**
b) What are the different types of cereals available for packaging? **6**

Q.7 Discuss the process of:

- a) Canning.
- b) Modified atmospheric packaging.
- c) Sterile packaging conditions.
- d) Recycling of packaging material. **5x4**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

MOLECULAR DIAGNOSTICS (BT-633)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are snRNA, snoRNA and scRNA?
- b) Why are eukaryotic genes spilt?
- c) Differentiate between paraacentric and pericentric inversion with a help of a diagram.
- d) What are CD markers? State their significance.
- e) Enlist the applications of DNA testing.

4x5

PART-A

- Q.2** a) Describe the various steps involved in digital data processing of whole exome sequencing. **10**
b) Discuss the different levels of DNA packaging into chromosomes. **10**
- Q.3** a) What are the various reasons that lead to genomic instability? **10**
b) Explain the various mutations developed at the level of chromosomes. **10**
- Q.4** a) How does technology using restriction enzyme help in mutation identification? **10**
b) Describe in detail the process of Sanger sequencing. What are its limitations? **10**

PART-B

- Q.5** a) What are the different methods to identify hereditary disorders pre-symptomatically? **10**
b) Briefly describe the various molecular diagnostic methods for identifying herpes. **10**
- Q.6** a) Write short notes on FACS. **10**
b) Describe the role of HLA and its genotyping in disease diagnosis and treatment. Add a note on its significance. **10**
- Q.7** a) Explain the pro and cons of genetic testing using suitable examples. **10**
b) Why is DNA testing still not a gold standard for hereditary disease diagnosis? **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DNA MICROARRAY TECHNOLOGY (BT-631)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define ordered array and list the basic criteria for ordered array.
- b) What are the different types of spot masks developed during image segmentation?
- c) Why do we construct and MVA plot?
- d) Differentiate between squared Euclidean and standardized Euclidean distance.
- e) Enlist the limitations of network modeling.
- f) What is the main purpose of principle component analysis?
- g) Briefly explain the significance of resequencing.
- h) List the different databases used in system biology.
- i) How do you perform factorial design based experiment?
- j) Define redundant and Parsimonious network.

2x10

PART-A

- Q.2** a) How so you perform a simple SAGE experiment? Illustrate with neat labeled diagram. **10**
- b) Explain Affymetrix technology of creating microarray. **10**
- Q.3** a) Describe the method of constructing PCA. **10**
- b) What is k-means clustering? Explain. **10**
- Q.4** a) How do you identify and rectify dye bias and print tip bias in a micro array experiment? **10**
- b) Discuss the different methods of estimating expression indices. **10**

PART-B

- Q.5** a) Explain the steady state model with an example. **15**
- b) Differentiate between time series analysis and time series approach. **5**
- Q.6** a) Write a short notes on 'systems biology'. **10**
- b) How do you evaluate the performance of a molecular classifier? **10**
- Q.7** a) How do we evaluate performance of microarray data? **10**
- b) Explain the significance of independent verification. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PHARMACEUTICAL TECHNOLOGY (BT-621A1)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- | | |
|---|----------|
| a) Why do we need Pharmacopoeias? | 3 |
| b) What is the difference between quality control and quality assurance? | 3 |
| c) Enlist some new drug delivery systems. | 3 |
| d) What is difference between 'Purified water' and 'Water for injection'? | 3 |
| e) Explain the principle of any one type of targeted drug delivery systems. | 3 |
| f) What is the effect of drug solubility on bioavailability? | 3 |
| g) Explain giving example any one types of drug incompatibilities. | 2 |

PART-A

- | | | |
|------------|--|-----------|
| Q.2 | a) Discuss the relevance and importance of practicing GMP in pharmaceutical industries. | 10 |
| | b) What is the purpose of investigational New Drug Application (INDA)? | 10 |
| Q.3 | a) Discuss the types of pharmaceutical additives and their applications. | 10 |
| | b) Describe in detail the principle of any one type of sustained release drug delivery system. | 10 |
| Q.4 | a) Contrast between physicochemical and therapeutic drug incompatibilities. | 10 |
| | b) How do disease states affect drug absorption? | 10 |

PART-B

- | | | |
|------------|--|-----------|
| Q.5 | a) Describe in detail manufacture of 'tablets'. | 12 |
| | b) Name and briefly describe different types of tablet packing. | 8 |
| Q.6 | a) What are suppositories? Discuss the formulation of suppositories. | 10 |
| | b) Give the desirable properties of ideal ointments. Describe the typical properties of different types of bases of ointments. | 10 |
| Q.7 | a) What are the physiological barriers to drug distribution? | 7 |
| | b) How does gastrointestinal pH affect drug absorption? | 7 |
| | c) Explain the metabolism of drugs. | 6 |

End Semester Examination, May 2019

B. Tech. (Biotechnology) – Sixth Semester

BIOMATERIALS AND DRUG DELIVERY (BT-622A1)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) **Name two implants for metals and polymers each that are used as biomaterials.**
- b) **What is a ceramic? How is it different from metal?**
- c) **How is liposome different from or similar to nanoparticles?**
- d) **Explain the significance of PEGylation.**
- e) **What do you understand by controlled delivery mechanism?**

4×5

PART-A

Q.2 a) **What are different categories of biomaterials? Explain with suitable examples.** **10**

b) **Explain the significance of pyrolytic carbon as biomaterial.** **10**

Q.3 a) **Discuss the phenomena of blood-biomaterial interactions.** **12**

b) **How do biomaterials get recognized in the host body? What are different factors involved in it?** **8**

Q.4 a) **What are ester and amide linkages? What role do they play in hydrolysis?** **10**

b) **Discuss the factors responsible for polymer erosion.** **10**

PART-B

Q.5 a) **How do hydrogels function?** **8**

b) **Discuss the various methods of synthesis for hydrogels.** **12**

Q.6 a) **How can one increase the circulation time of nanoparticles? Explain its significance.** **10**

b) **Write short notes on: (i) Polymerosomes (ii) Microemulsions.** **10**

Q.7 a) **What do you understand by biomineralization?** **4**

b) **Explain polyelectrolyte gel swelling.** **6**

c) **Write short notes on (i) targeted drug delivery (ii) Prodrug** **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

GENETICS AND CYTOGENETICS (BT-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is the difference between penetrance and expressivity of a gene?
b) Define lethal alleles with one example.
c) What are accessory chromosomes?
d) Define maternal effect.
e) Explain genetic drift. **4×5**

PART-A

- Q.2 Write down notes on the following:
a) Mendal's law of independent assortment with example.
b) Dominant epistasis with example. **10×2**
- Q.3 a) Define euploidy. Discuss origin and types of polyploidy.
b) Explain chromosomal theory of inheritance. **10×2**
- Q.4 Explain the following:
a) Polytene chromosomes with diagram. **12**
b) Repetitive and non-repetitive DNA. **8**

PART-B

- Q.5 a) Define genetic mapping. Explain gene mapping by two point test cross.
b) Illustrate different mechanism of DNA repair. **10**
10
- Q.6 a) Explain extranuclear inheritance with example.
b) Write down note on cytoplasmic male sterility. **15**
5
- Q.7 a) Illustrate Hardy-Weinberg Principle.
b) Differentiate between qualitative and quantitative inheritance. **10**
10

End Semester Examination, May 2019

B. Tech. – First Semester MECHANICS (BSC-PH-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Write the expression for velocity in spherical polar coordinates.
- b) How will you apply to third law of motion in the case of horse pulling a cart?
- c) Write relation between the force and the torque.
- d) What is non-conservative force?
- e) What do you understand by non-inertial frames of reference?
- f) State the equation for simple harmonic motion.
- g) What is resonance?
- h) Define the rigid body motion.
- i) Is the velocity of particle under uniform rotational motion constant?
- j) Give two examples of three dimensional rotational motions.

2×10

PART-A

- Q.2**
- a) Evaluate the transformation of vector components under rotation. **8**
 - b) Discuss the fundamental forces of nature. **7**
 - c) Write a short note on 'constraints'. **5**
- Q.3**
- a) Show that for a conservative force field $f(r)$, i.e. $\nabla \times f = 0$, we can define a scalar function $V(r)$ such that $F = -\nabla V$. **8**
 - b) Prove that for a particle subjected to a central force, the angular momentum is a constant of motion. **7**
 - c) Explain in detail about elliptical orbit. **5**
- Q.4**
- a) What is Foucault pendulum? How does it enable us to demonstrate the rotation of the earth about its own axis? **10**
 - b) Explain the fictitious forces. **5**
 - c) Discuss in detail about weather systems. **5**

PART-B

- Q.5**
- a) Write differential equation for a damped harmonic oscillator. Solve the differential equation and discuss the under damped case (low damping) **15**
 - b) What is forced oscillations? Write differential equation for forced oscillations. **5**
- Q.6**
- a) What is the difference between rectilinear and rotational motion? **5**
 - b) Prove that torque acting on a rigid body about a fixed axis is equal to the product of angular acceleration and moment of inertia about the same axis. **8**
 - c) Discuss the Euler's laws of motion. **7**
- Q.7**
- a) Evaluate the expression for rate of change of a vector rotating with angular velocity. **10**
 - b) Derive the expression for moment of inertia tensor. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

APPLIED PHYSICS (BSC-PH-103)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the main components of a laser device?
- b) A hologram contains the information about:
 - i) amplitude of the object
 - ii) phase of the object
 - iii) both 'a' and 'b'
 - iv) none of these
- c) Core of an optical fibre is made of:
 - i) clear plastic or glass
 - ii) copper
 - iii) aluminium
 - iv) none of these.
- d) Why optical fibre communications are important?
- e) How presence of traps modifies photocurrent?
- f) What is fill factor of solar cell?
- g) The number of atoms present in the fcc lattice is:
 - i) 1
 - ii) 2
 - iii) 3
 - iv) 4
- h) X-rays are used to detect crystal structure. Why?
- i) Give two reasons why the properties of a materials change at nanoscale.
- j) 1 metre = _____ nanometre:
 - i) 10^{-9}
 - ii) 10^9
 - iii) 10^{-10}
 - iv) 10^{10}

2×10

PART-A

- Q.2** a) Discuss Einstein's coefficients. Derive the relations between them. **10**
- b) Discuss the construction and reconstruction of image on a hologram. Also give important applications of holography. **10**
- Q.3** a) Derive the expression for the numerical aperture of an optical fibre. A light ray enters from air to a fiber. The refractive index of air, core and cladding are 1, 1.5 and 1.48 respectively. Find the critical angle and numerical aperture. **10**
- b) Describe the 'Step index fibre' and 'Graded index fibre'. How optical fibres can be used in medical and communication fields? **10**
- Q.4** a) What is photoconductivity? Discuss simple model of a photoconductor. **10**
- b) State the principle of photoconductive cell. Describe its construction, working and applications. **10**

PART-B

- Q.5** a) Explain the method for determination of Miller Indices. Also derive the formula for the distance between two adjacent planes of a simple cubic lattice. **10**
- b) Discuss in brief following defects in crystals: point, line, surface and volume, Frenkel and Schottky defects. **10**
- Q.6** a) Describe the origin, production and properties of X-rays. **10**
- b) Write a short note on any two of the following:
 - i) Bragg's law
 - ii) Raman Spectroscopy
 - iii) Rutherford Back Scattering Spectroscopy.**10**
- Q.7** a) What are nanomaterials? Discuss briefly their properties and applications. **10**
- b) Explain in brief laser evaporation and carbon arc methods for fabrication of carbon nanotubes. **10**

End Semester Examination, May 2019

B. Tech. (Biotechnology) – Seventh Semester

CHEMOINFORMATICS AND DRUG DESIGN (BT-821A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are Randic and Chi index? Explain.
- b) What is structural similarity? Explain its role in VS.
- c) What are the different types of neural networks? Explain.
- d) What is scoring in drug designing?
- e) What is Hansch analysis? Where is it used?

4x5

PART-A

- Q.2** a) Explain Lipinski's rule of five. How is it used in chemoinformatics? **10**
b) Explain ADMET. Will the optical isomers of a compound affect the ADMET properties? Give reasons with examples. **10**
- Q.3** What is a pharmacophore? Explain with examples. **20**
- Q.4** a) Explain the processes involved in optimizing "Drug likeness". **10**
b) Explain:
 - i) Kappa index.
 - ii) Partition coefficient.**10**

PART-B

- Q.5** a) What are protein libraries? Name five databases. **10**
b) How is ligand designed in chemoinformatics? **10**
- Q.6** a) What is steric analysis carried out? Explain its role in QSARs. **10**
b) Explain role of neural networks in drug designing. **10**
- Q.7** Explain role of HTS in chemoinformatics. **20**

End Semester Examination, May 2019

M. Tech. – First Semester

RESEARCH METHODOLOGY AND IPR (COM-100)

Time: 3 hrs

Max Marks: **50**

No. of pages: **1**

Note: Attempt any **FIVE** questions. Marks are indicated against each question.

- | | | |
|-----|--|-----------|
| Q.1 | a) Describe the steps to file a patent in India and outside India. | 5 |
| | b) Explain whether software is patentable in India? Is software a service or product? | 5 |
| Q.2 | a) What do you understand by IPR? | 5 |
| | b) Write short notes on following:
i) Scope of patent rights.
ii) Licensing and Technology transfer. | 5 |
| Q.3 | What do you understand by Plagiarism in research? Describe distinct forms of Plagiarism and how it can be avoided. | 10 |
| Q.4 | Illustrate the steps to develop a research proposal and its format. | 10 |
| Q.5 | a) What are the different formats of referencing? Give the format for Harvard referencing?
b) What is a bibliography? Where is bibliography found in a report? Differentiate between references and bibliography. | 5 |
| Q.6 | Describe the process of reviewing research proposals. | 10 |
| Q.7 | What do you understand by research problem? Describe various errors made by researchers while selecting a research problem. | 10 |

End Semester Examination, May 2019

B. Tech. – First Semester

MATHEMATICS-I (BSC-MA-101 (CS))

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 a) Evaluate $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$.

b) Find the n^{th} derivative of $y = (a \cdot x + b)^n$.

c) Find the rank of $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 0 & 2 \\ 3 & 0 & 3 \end{bmatrix}$.

d) Give an example of symmetric and skew symmetric matrix.

e) State rank nullity theorem.

f) Check for linear dependence the vectors $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$.

g) Find inverse of A if $A = \begin{pmatrix} 1 & 2 \\ 2 & -3 \end{pmatrix}$.

h) Explain composition of two maps.

i) State Lagrange's mean value theorem.

j) Find the product of Eigen values of $A = \begin{pmatrix} 1 & 7 & 8 \\ 2 & 0 & 1 \\ 3 & 1 & -1 \end{pmatrix}$.

2×10

PART-A

Q.2 a) Evaluate $\int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$.

10

b) Find the volume generated by the revolution of $r = 2a \cos \theta$ about the initial line. **10**

Q.3 a) Expand $f(x) = \log(1-x)$ $\forall x \in [-1, 1]$.

10

b) Prove that

$$\sin ax = ax - \frac{a^3 x^3}{3!} + \frac{a^5 x^5}{5!} + \dots$$

$$+ \frac{a^n x^n}{n!} \left(a\theta x + n \frac{\pi}{2} \right)$$

10

Q.4 a) Solve by Gauss Jordan Method:

$$x + y + z = 2$$

$$2x + y - 3z = 5$$

$$x + y - 2z = 3$$

10

b) For what values of λ and μ ; the system has

i) a unique solution;

ii) no solution

iii) infinite solutions

$$2x + 3y + 5z = 9$$

$$7x + 3y - 2z = 8$$

$$2x + 3y + \lambda z = \mu$$

10

PART-B

Q.5 a) Let $T: R^3 \rightarrow R^3$ defined by $T(x, y, z) = (3x, x-y, 2x+y+z)$ is invertible and find T^{-1} . **10**

b) Show that

$$B = \{(1, 1, 1), (1, -1, 1), (0, 1, 1)\} \text{ is a basis of } R^3.$$

10

Q.6 a) Find Eigen values and Eigen vectors of $A = \begin{pmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{pmatrix}$. **10**

b) Verify 'A' is orthogonal, where $A = \frac{1}{3} \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{pmatrix}$. **10**

Q.7 a) Find a linear transformation

$$T(x, y) \quad \text{where} \quad T: R^2 \rightarrow R^3 \quad \text{defined by} \quad T(2, -5) = (-1, 2, 3) \quad \text{and} \\ T(3, 4) = (0, 1, 5) \quad \text{10}$$

b) Find the orthogonal and orthonormal basis of vector:

$$x_1 = (1, -1, 1, -1), x_2 = (1, 1, 3, -1), x_3 = (-3, 7, 1, 3) \text{ using Gram Schmidt orthogonalization process.} \quad \text{10}$$

End Semester Examination, May 2019

B. Tech. (Biotechnology) – Fifth Semester

RECOMBINANT DNA TECHNOLOGY (BT-501 / BT-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are adapters? What is their role in rDNA technology?
- b) What do you understand by the term "Illegitimate recombination"? Where does it occur?
- c) What is the role of left and right borders in *Ti* plasmid?
- d) What is the principle behind Maxam and Gilbert DNA sequencing method?
- e) How can replacing labile amino acids be useful in protein engineering?
- f) How can insertional mutagenesis be used in gene tagging?
- g) What is the role of protein purification tags in an expression vector?
- h) What are the problems associated with *E. coli* expression system?
- i) What is the term equivalent to RNAi, in fungi? Write down its principle.
- j) Expand RISC and write down its role.

2×10

PART-A

Q.2 Write in detail about the various enzymes used in rDNA technology. Also mention their types and functions. **20**

Q.3 a) Write a comprehensive note on types of vectors used in rDNA technology. **10**
b) Write in detail about the overall infection process of *Agrobacterium*. How can it be used to transfer the gene of interest in plant? **10**

Q.4 a) Write about the detailed methodology to study only the expressed genes of an organism. **10**
b) With the help of schematic diagram explain Sanger sequencing method. **10**

PART-B

Q.5 Give detailed account of various PCR based molecular marker. Also mention their advantages and disadvantages. **20**

Q.6 a) Write a note on 'promoters used in unicellular eukaryotic expression system'. **12**
b) Write a note on 'prokaryotic hybrid promoter'. **8**

Q.7 a) Write a note on transgenic plants which are used against biotic stress. **10**
b) Write down the applications of gene therapy. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

CONCEPTS IN IMMUNOLOGY (BT-307)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following in brief:

- a) If microorganisms do penetrate the body, two main defensive operations come into play, name them.
- b) Which cells can present antigen to CD8+ T cells?
- c) What is the difference between epitope and paratope?
- d) IgG and its significance
- e) Differentiate between Hapten and Adjuvant.
- f) How does Fab fragment different from Fc fragment?
- g) How can immune system distinguish between tumor cell and normal cell?
- h) What is live attenuated vaccine and its disadvantages?
- i) What is chemotaxis?
- j) What kind of mast cell mediators are stored in granules and released upon degranulation?

2x10

PART-A

- Q.2** a) What are different antigen presenting cells? Explain different types of dendritic cells. **10**
b) Write in detail the different barriers of the innate defense **10**
- Q.3** a) What are cytokines? Explain its types and function. **10**
b) What are biological characteristics of an antigen? Explain the characteristics of an antigen antibody reaction. **10**
- Q.4** a) Discuss about the mechanism of DNA rearrangement. **10**
b) Discuss briefly the antigen processing either by MHC class I or class II pathway. **10**

PART-B

- Q.5** a) Give an account on HAT medium and its application in immunology. How it is important in the selection of MAB? **10**
b) Discuss how body fights against a bacterial or viral infection. **10**
- Q.6** a) Give full form of FACS. Write the principle and application of FACS. **10**
b) Explain the principles, procedure and applications of ELISA in medicine. **10**
- Q.7** a) Describe the various disease states caused by autoimmunity. What are the modern methods used in the treatment of autoimmune diseases. **10**
b) Discuss the importance of clinical organ transplantation in 21st century. **10**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

ANIMAL BIOTECHNOLOGY (BT-S-301 / BT-S-301A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all, taking at least **ONE question** from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each marks.

Q.1 Answer Briefly:

- a) List down the major differences between animal, plant and microbial cells.
- b) What is micromanipulator?
- c) Why are animal cells cultured in CO₂ incubator?
- d) Explain the role of apoptotic processes in normal organism.
- e) What do you understand by 'study of somatic cell genetics'?
- f) What is the role of enzyme telomerase?

2×6

UNIT-I

Q.2 a) Describe in detail the procedure for cryopreservation of animal cells. **6**
b) Explain the role of different constituents of serum in animal cell culture medium. **6**

Q.3 a) What are the major components of balanced salt solutions? **6**
b) Why is phenol red added to the animal cell culture medium? **6**

UNIT-II

Q.4 a) Explain any one method for measurement of cell viability. **6**
b) Compare the characteristics of transformed and normal cell. **6**

Q.5 Describe in detail the different methods of cell synchronization. **12**

UNIT-III

Q.6 a) What are the sources of stem cells? **6**
b) Give applications of stem cell technology. **6**

Q.7 a) Enlist the design considerations for scale up of animal cell culture. **6**
b) What is the significance of studying somatic cell genetics? **6**

End Semester Examination, May 2019

M.Sc. (Biotechnology) – First Semester

BIOMOLECULES (BT-S-103A)

Time: 3 hrs

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE question** from each Unit. All questions carry equal marks

- Q.1 a) Does ketotriose exist in D or L form? State reason of your answer.
b) What is zwitterions?
c) Name and write the structure of carbohydrate present in milk.
d) Why is TCA cycle known to be amphibolic in nature?
e) Draw the structure of NAD.
f) What is the role of SDS in SDS-PAGE?

2x6

UNIT-I

- Q.2 a) Discuss the Henderson-Hasselbalch equation and its applications. **6**
b) Explain the structure and functions of beta sheets and tropocollagen. **6**
- Q.3 Write short notes on:
a) Animal starch.
b) Phosphate esters of nucleosides.
c) Aromatic amino acids. **4x3**

UNIT-II

- Q.4 a) Write a note on various interactions and bonds involved in formation of tertiary structure of proteins. **6**
b) Write about the principle of various chromatographic techniques used in protein purification. Write in detail about the chromatographic technique in which the yield of purified protein is quite low however the specific activity of that purified protein is very high. **6**
- Q.5 Write notes on:
a) Ramachandran Map.
b) Applications of spectroscopic methods in protein analysis. **6x2**

UNIT-III

- Q.6 a) Depending on the availability of oxygen what are the various fates of pyruvate?
b) With the help of an example write down the transamination reaction in amino acid metabolism.
c) What do you understand by acid base balance in body fluids? Write a note on bicarbonate buffer system existing in human body. **4x3**
- Q.7 a) Write the various complexes and steps involved in electron transport chain in details. **8**
b) Name the scientist who discovered urea cycle. Write down the structure of urea and the source of Nitrogen and Carbon in urea formation. **4**

End Semester Examination, May 2019

B. Tech. – Third Semester

BIOCHEMICAL CALCULATIONS (BT-306 / BT-306B / BT-306C)

Time: 3 hrs

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- The mass of an electron is 9.1×10^{-31} kg. How many electrons will be there in 1 kg and 1 g, respectively?
- How many milliliters of 2.00 M copper sulfate solution must be added to 165mL of water to achieve a 0.300 M copper sulfate solution?
- Explain group displacement law with examples.
- What is Millon's Test? Explain.
- What is V_{max} and K_m ? How are they related?

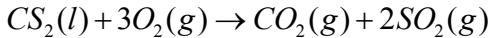
4x5

PART-A

- Q.2**
- A student carefully pipets 25.0mL of 0.525 M NaOH into a test tube and places it into a small beaker to keep it from spilling and then pipets 75.0mL of 0.355 M HCl into another test tube. He accidentally knocks the test tubes together hard enough to break them and their respectively contents combine in the bottom of the breaker. What is the pH of the resulting solution? Is the solution now formed acidic or basic? **10**
 - Given specific heat capacity of substance 'A' is 3.8 J/g/K and that of 'B' is 0.4 J/g/K. Which of the two is a good conductor of heat and why? Also, if both are liquids which one will be preferred for use as a coolant? **4**
 - What is buffering capacity? How is it related to pH and pKa? Explain with equations. **6**

- Q.3**
- What do you understand by specific heat in constant volume and constant pressure? How are they related to gas constant? **6**

b) What is the value for ΔH for the following reaction?



Given:



10

c) What is a titrant? Explain the role of indicator in titrations? **4**

- Q.4**
- How is pH related to pKa? Derive. What does a lower value of pKa indicate? **10**
 - A solution contains Cu^{2+} ions at a concentration of 3×10^{-4} M. What is the Cu^{2+} concentration in ppm? Given density of water=1mg/mL and At. Mass of Cu=63.55g. **6**
 - What are the relationship between mass, density and specific gravity? Explain with examples. **4**

PART-B

- Q.5**
- How does a spectrophotometer function? Explain in detail. **10**
 - What do you understand by coupled assays? **2**
 - Derive the value of K_m if V_o is half of V_{max} . **6**
 - What is the relationship between half life and average life of a radioactive isotope? **2**

- Q.6**
- What is feedback inhibition? Why is it important in regulating enzyme activity? **4**

- b) What is the absorbance of
i) A solution with a transmittance of 0.570
ii) A solution with 43.5%T
iii) A 0.084mM X (aq) in a 5.00 cm cell if the molar absorptivity of X is 365.
iv) 59.5% of photons are transmitted through a cell
v) A solution with 96.6%T 10
c) Derive mathematically Briggs Haldane equation. 6
- Q.7 a) What is Hopkin's Cole test? Explain 4
b) Discuss:
i) Ninhydrin reaction
ii) Alpha decay
iii) Nucleic acids
iv) Michaelis Menten eugtion
v) Flurometer 10
c) Find the half-life of a radioactive element, if its activity decreases for 1 month by 10% 6

End Semester Examination, May 2019

M.Sc. (Biotechnology) – Third Semester

PLANT BIOTECHNOLOGY (BTS-302A)

Time: 3 hrs

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; taking at least **ONE question** from each **Unit**. **Q.1 is compulsory.** All questions carry equal marks.

Q.1 Answer briefly:

- a) Differentiate between dedifferentiation and redifferentiation.
- b) Give any two examples of microelements and macroelements.
- c) Define gynogenic haploids.
- d) What are binary vectors?
- e) What do you mean by satellite RNA protection?
- f) Classify tumor cells on the basis of opine production.

2x6

UNIT-I

Q.2 a) Explain the technique of embryo culture with a suitable diagram. **8**
b) Describe enzymatic method for protoplast isolation. **4**

Q.3 a) Discuss microspore culture for obtaining androgenic haploids. **7**
b) Write a note on significance of germplasm conservation. **5**

UNIT-II

Q.4 a) Discuss the role of virulence proteins in transfer of 'T-DNA' from Agrobacterium to host a plant cell. **8**
b) Mention the factors that assist in integration of T-DNA into host genome. **4**

Q.5 Write notes on (**any two**) of the following:
a) Binary vectors.
b) Viral vectors.
c) Electroporation. **6x2**

UNIT-III

Q.6 a) What is the role of antioxidant enzymes in abiotic stress resistance in plants? **7**
b) Mention few examples of genetic transformation for improving productivity in plants. **5**

Q.7 Discuss the technique of RFLP along with its applications. **12**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

INTRODUCTION TO BIOMATERIALS (BT-532)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 a) Answer the following questions:

- i) What properties make a polymer smart biomaterial?
- ii) Explain the quadrilateral of material science and its role in biomaterials.
- iii) How can one increase bioactivity of biomaterials by incorporation of adhesion factors?
- iv) What are the key processes occurring during the *in vitro* and *in vivo* phases of tissue formation and maturation? **4×4**

b) State whether the following statements are True or False. Give suitable reasons:

- i) Ideal biomaterial will promote embolism.
- ii) A biomaterial will always be bioinert. **2×2**

PART-A

Q.2 a) What are the applications of porous biomaterial? Also, what are the parameters should be considered during the design of such a material? **10**

b) Explain the different mechanical properties studied in designing a biomaterial. **10**

Q.3 a) Explain the tensile stress-strain curve for a ductile material. **10**

b) What is protein recognition of biomaterials in biological systems? Explain in detail. **10**

Q.4 a) Which class of biomaterials is employed for?

- i) Dental implants.
 - ii) Ophthalmic biomaterials. **5×2**
- b) List five important optical and electrical properties studies for a biomaterial. **10****

PART-B

Q.5 Discuss briefly the different techniques used for implant evaluation. **20**

Q.6 a) How does a metallic biomaterial degrade in a biological system? **4**

b) What are the different parameters considered for bioreactor with respect to tissue engineering? **4**

c) Discuss in detail different blood coagulation factors involved in blood-material interactions. **12**

Q.7 a) What is inflammation? How is it related to wound healing? **10**

b) What are haptens? Discuss hypersensitivity with respect to biomaterials. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

BASIC VIROLOGY (BT-534)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Who gave the first evidence of existence of viruses?
- b) What are oncoviruses?
- c) Which is the most accepted viral classification system?
- d) EBV refers to _____.
- e) What is vaccination?
- f) Differentiate between lysis and lysogeny.
- g) What are baculoviruses?
- h) How HIV and AIDS are different?
- i) Name two subtypes of HPV.
- j) What is the difference between a prion and a virion?

2×10

PART-A

- Q.2** a) How viruses are cultivated in in-vitro conditions? **10**
b) What is the process of purification of viruses? Explain different methods. **10**
- Q.3** How negative strand RNA viruses replicate? Illustrate with example. **20**
- Q.4** Highlight the advancement of modern approaches over conventional vaccines. **20**

PART-B

- Q.5** a) How lambda phages and M13 phages are utilized as vectors in gene therapy? **10**
b) Discuss about the role of adenoviruses in gene therapy. **10**
- Q.6** What is viral containment? How bio safety is decided before starting the work on viruses? **20**
- Q.7** Discuss in detail the replication and pathogenesis of HPV. What are the problems being faced in its vaccination programs and associated risk involved? **20**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

FOOD PROCESS TECHNOLOGY (BT-538)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Give two importance of food process technology.
- b) Define thermal death time and Z value in food processing.
- c) Write down two basic steps for insect control.
- d) What do you mean by processing of cereals?
- e) Define "Pasteurization".
- f) When milk is defined as clean?
- g) What is the definition of small scale in milk processing?
- h) Write down three main purposes for egg production.
- i) Define gutting in term of fish processing.
- j) What do you mean by GMP for fruit and vegetable production?

2×10

PART-A

- Q.2** a) Give the importance of food processing technology. **10**
b) What do you mean F, Z and D values? **10**
- Q.3** a) Define "Infestation". What are the sources and basic steps for control of infestation? **12**
b) Discuss drying and milling of grains. **8**
- Q.4** a) Explain the processing of fruits by giving some example. **10**
b) Give some recent developments in post-harvest technology of vegetables. **10**

PART-B

- Q.5** a) What is milk quality control? Why has milk quality control? **12**
b) Discuss facts related to milk and milk products preservation. **8**
- Q.6** a) Write down different steps for packaging and processing of eggs. **12**
b) What are the possible types of contamination in poultry meat processing? **8**
- Q.7** a) Elaborate the quality control of packed foods. **10**
b) What is the significance of GAP for fruit and vegetable production? **10**

End Semester Examination, May 2019

B. Tech. — First Semester

INTRODUCTION TO ELECTROMAGNETIC THEORY BSC-PH-101

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Describe the interaction between two point charges.
- b) Write the uses of Faraday's cage.
- c) Briefly explain electric displacement vector.
- d) Differentiate between dielectric and insulator.
- e) Explain the term magnetostatic.
- f) Express magnetic vector potential in terms of current density.
- g) What is meant by linear magnetic material? Give some examples of linear magnetic material.
- h) Explain Quasi-static approximation.
- i) Write Maxwell's equations in vacuum.
- j) Does electromagnetic wave exert pressure on a surface? Explain.

2X10

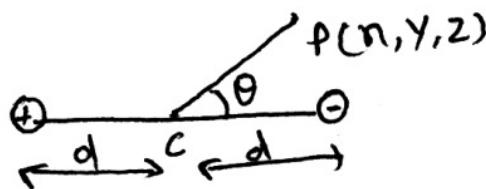
PART-A

Q.2 a) What is electric potential? Derive the expression for it for various continuous charge distribution. **7**
b) Establish the expression for divergence of electric field and give its physical significance. **5**
c) Given a potential

$$V = \frac{A}{r} + B \quad \text{where A and B are constant. Check whether the potential satisfy}$$

Laplace equation or not. **8**

Q.3 a) State and derive Gauss law in dielectrics. Calculate the expression for electric field intensity inside and outside the dielectric sphere if a charge Q is placed at the centre of sphere. **8**
b) The distance between the parallel plates of a capacitor having a dielectric with dielectric constant 2.5, is 5mm. if the electric field strength inside the dielectric is 10^5 V/m. Determine the polarization vector and displacement vector. **4**
c) Calculate the electric potential due to an electric dipole at point P as shown in the figure.



8

Q.4 a) State and derive the divergence of static magnetic field. **6**
b) Find the value of magnetic field at a point due to a long straight current carrying wire using Bio. Savart Law. **6**
c) Derive the expression for the magnetic vector potential due to a current carrying solenoid by using Stoke's theorem. **8**

PART-B

- Q.5 a) Explain the term magnetization. Derive an expression for the vector potential in terms of surface bound current and volume bound current. **8**
b) Derive Faraday's law in differential form and explain motional emf. **6**
c) Obtain the boundary conditions for B and H between two medium having permeability μ_1 and μ_2 . **6**
- Q.6 a) Explain the term current density. Derive the continuity equation for the current density. What does it signify? **7**
b) State and prove Poynting theorem. **10**
c) How could Maxwell modify Ampere's law? Explain. **3**
- Q.7 a) State Maxwell's equations for electromagnetic field and obtain the wave equations for E and B in free space. **8**
b) Show that energy carried by electric field and magnetic field in electromagnetic waves are equal. **6**
c) Derive the expressions for reflection co-efficient and transmission coefficient in terms of incident radiation. **6**

End Semester Examination, May 2019

B. Tech. — Third Semester

BIO ANALYTICAL TECHNIQUES (BT-305B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) How are accuracy and precision important criteria in an instrument? **2**
- b) What is the principle and uses of phase contrast microscopy? **3**
- c) Differentiate between cation and anion exchangers. **2**
- d) What is sedimentation? **2**
- e) Discuss about gas chromatography and its uses? **3**
- f) What is SDS? How can molecular weight be determined by SDS PAGE. **3**
- g) Explain the Lambert-Beer's law. **2**
- h) Write short notes on the properties of alpha, beta and gamma rays. **3**

PART-A

Q.2 a) Write short notes on the following

- i) Sensitivity and Resolution.
- ii) Calibration principles for an instrument.
- iii) Linearity and Threshold.

5×3

- b) Explain the functional elements of an instrument. **5**

Q.3 a) Explain in detail the principle of electron microscopy? How is transmission electron microscope different from scanning electron microscope? **10**

- b) Differentiate between isopycnic and density gradient centrifugation. **10**

Q.4 a) What is chromatography? Elaborate the principle and procedure of paper chromatography. How does it differ from thin layer chromatography? **12**

- b) How can affinity chromatography be modified to avoid steric hindrance? Explain. **8**

PART-B

Q.5 a) Discuss in detail about two dimensional electrophoresis technique. **10**

- b) Differentiate between immuno electrophoresis and capillary electrophoresis. **10**

Q.6 a) Elucidate the basic principle, working and construction of UV spectrophotometer. **10**

- b) Describe in detail about X-ray spectroscopy and its applications. **10**

Q.7 a) What is radio immuno assay? Explain in detail about its working and uses. **10**

- b) Discuss the disposal management of radioactive waste and its safety aspects. **10**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

ENVIRONMENT BIOTECHNOLOGY (BT-S-303 / BT-S-303A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all, taking at least **ONE question** from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each marks.

Q.1 Answer briefly:

- a) Sustainable development.
- b) Hotspots.
- c) Superbug.
- d) Air stripping.

3×4

UNIT-I

Q.2 Explain different processes used in primary treatment of waste water.

12

Q.3 a) Describe nitrification and denitrification processes in detail.

8

b) Discuss activated sludge process with diagram.

4

UNIT-II

Q.4 a) Discuss the factors affecting the biodegradation process.

4

b) Enlist the techniques used in determination of bioremediation.

8

Q.5 Discuss different mechanisms involved in phytoremediation.

12

UNIT-III

Q.6 a) Differentiate between in-situ and en-situ conservation of biodiversity.

6

b) How to achieve sustainable developments with green technology?

6

Q.7 a) Explain the models of sustainable developments.

6

b) Enlist the goals of UN sustainable developments.

6

End Semester Examination, May 2019

B. Tech. – First Semester

INDUSTRIAL CHEMISTRY (CH-101 / CH-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Describe the principle of electrodialysis method.
- b) Define phase and component with examples.
- c) Discuss the applications of biodegradable polymers.
- d) Define flash point and fire point.
- e) Define coagulants with examples.
- f) Differentiate between dry cell and wet cell.
- g) Discuss the different factors that affect the corrosion rates.
- h) Define triple point and metastable equilibrium.
- i) Discuss the applications of nanomaterials.
- j) Differentiate between temporary and permanent hardness.

2×10

PART-A

- Q.2** a) Describe the various processes involved in domestic water treatment. **10**
b) Explain zeolite method in detail with the help of diagram and chemical reactions. **10**
- Q.3** a) Discuss the mechanism of electrochemical theory of corrosion with suitable diagram and chemical reactions. **10**
b) Explain Differential corrosion and Galvanic corrosion in detail. **10**
- Q.4** a) Draw phase diagram of Pb-Ag system. Explain all the curves and important points in detail. **10**
b) Define congruent melting point? Explain with the help of diagram. **10**

PART-B

- Q.5** a) Discuss the following properties of lubricants.
i) Viscosity index.
ii) Aniline point. **5×2**
b) Discuss the functions of lubricants. Differentiate between thick and thin layer lubrication. **10**
- Q.6** a) Discuss the applications of smart battery and hybrid battery in detail. **10**
b) Define conducting polymers. Write their important properties and applications in different fields. **10**
- Q.7** a) Discuss the principle and applications of SEM techniques. Discuss the advantages of AFM over SEM. **10**
b) Discuss sol gel method in detail. **10**

End Semester Examination, May 2019

M. Tech. (Structural Engineering) - First Semester

ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING (PE-SE-M-124)

Time: 3 hrs

Max Marks: **75**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Find the relative error of the number 6.7 if both of its digits are correct.
 b) Why truncation errors are caused?
 c) What is the rank of the matrix $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$.
 d) For the matrix $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$ compute A^2 .
 e) Write the numerical differentiation of $\frac{d^2y}{dx^2}$.
 f) Find, from the following table, the area bounded by the curve and the x-axis from $x=7.47$ to $x=7.52$ by trapezoidal rule.
- | x | 7.47 | 7.48 | 7.49 | 7.50 | 7.51 | 7.52 |
|--------|------|------|------|------|------|------|
| $f(x)$ | 1.93 | 1.95 | 1.98 | 2.01 | 2.03 | 2.06 |
- g) $B^2 - 4AC > 0$; it falls under which form of curve of Partial Differential equation?
 h) Write the mathematical equation of Poisson equation for steady-state problems.
 i) Explain cross-over points in fuzzy logic.
 j) What is parallel distributed processing systems?

1½x10

PART-A

- Q.2 a) Evaluate the sum $S = \sqrt{3} + \sqrt{5} + \sqrt{7}$ to four significant digits and find its relative and absolute errors.
 $\sqrt{3} = 1.732$, $\sqrt{5} = 2.236$ and $\sqrt{7} = 2.646$ **5**
 b) Find the sum of the numbers 105.5, 27.25, 6.56, 0.1568, 0.000256, 208.6, 0.0235, 0.538 and 0.0571, where each number is correct to the digits given. Estimate the absolute error in the sum. **10**

- Q.3 Find a real root of the equation $x^3 - 2x - 5 = 0$ **15**

- Q.4 Find the inverse of the matrix using Gaussian Elimination method. **15**

$$A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & 4 \\ 1 & 2 & 2 \end{bmatrix}$$

PART-B

- Q.5 A rod is rotating in a plane. The following table gives the angle θ (radians) through which the rod has turned for various values of the time 't' in seconds. Find the angular velocity of the rod when $t=0.6$.

$x=(t)$	0	0.2	0.4	0.6	0.8	1.0	1.2
$x=(\theta)$	0	0.122	0.493	1.123	2.022	3.200	4.666

Q.6 a) Explain the meaning of boundary value problem. **5**
b) Given $\frac{dy}{dx} = 1 + y^2$, where $y=0$ when $x=0$; find $y(0.2)$, $y(0.4)$ and $y(0.6)$ using Runge-Kutta method. **10**

Q.7 Explain the following terminology:
a) Neuron.
b) Weight Coefficient.
c) Activation function. **5x3**

End Semester Examination, May 2019

B. Tech. (Biotechnology) — Seventh Semester

DNA MICROARRAY AND APPLICATIONS (BT-703)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) How high throughput technology helps in microarray analysis?
- b) Enlist applications of clustering gene expression data.
- c) How SNPs are helpful in DNA microarray experiment?
- d) How one can determine where the primer is binding in genome?
- e) What do you mean by normalization?
- f) Enlist two limitations of steady state approach.
- g) Briefly explain about time series analysis.
- h) What is factorial design?
- i) What do you mean by genotyping?
- j) Enlist four differences between 'cDNA and mRNA'.

2×10

PART-A

Q.2 How SOM is different from K-mean clustering? Explain hierarchical clustering with suitable examples. **20**

Q.3 a) Explain the purpose of hybridization in DNA microarray technology. **10**
b) How is data analysis performed in DNA microarray? **10**

Q.4 *How is reduction and visualization of large data matrix done? Explain anyone method used to visualize the data in detail.* **20**

PART-B

Q.5 a) How is image analysis of microarray experiment performed? **10**
b) What are molecular classifiers? Give an account of feature selection of microarray data. **10**

Q.6 a) *What do you mean by genotyping and re-sequencing chips?* **12**
b) *Give an account of molecular classifiers used in microarray experiment in detail.* **8**

Q.7 Explain different types of gene network in the context to reverse engineering of regulatory network? **20**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

ANIMAL BIOTECHNOLOGY (BT-506A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions in brief:

- a) What are feeder layers? State their role in animal cell culture. **3**
- b) Why do we use pronase to produce primary cell culture? **3**
- c) Define "Human artificial chromosome". What are the advantages of HAC? **3**
- d) Distinguish between karyotyping and FISH. **4**
- e) Expand VEGF-A. What is its role in cancer? **4**
- f) Enlist the applications of embryonic stem cells. **3**

PART-A

Q.2 a) Write a note on the various substrates and its treatment used in animal cell culture. **10**
b) What do you understand by natural and defined media? **10**

Q.3 a) How do you cryopreserve animal cells? **10**
b) What is the application of vascular endothelial cells? Briefly describe the methodology for generating the same. **10**

Q.4 Explicate the process of generating transgenic sheep using a neat labeled diagram. **20**

PART-B

Q.5 a) List and explain the different types of chromosomal aberrations leading to diseases in humans. **10**
b) Discuss the advantages and disadvantages of gene therapy. **10**

Q.6 a) Draw and explain the various antisense molecules used in antisense technology. **10**
b) How does a tumor cell differ from a normal cell? **10**

Q.7 a) What are the various sources of stem cells? Give examples. **10**
b) Classify stem cells based on their potential to differentiate. **10**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

FOOD AND ENZYME BIOTECHNOLOGY (BT-S-304 / BT-S-304A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all, taking at least **ONE question** from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each marks.

- Q.1 a) What does MPN stand for _____?
b) Mention two examples of microbes used in bakery.
c) Give two examples of SCPs.
d) What are the characteristics of active site?
e) What is dialysis used for in protein purification?
f) What are Synzymes? Give two examples. **2×6**

UNIT-I

- Q.2 a) Discuss about the various fermented foods. Explain the production for one of them. **6**
b) Enlist the different methods of food preservation. **6**
- Q.3 a) How process waste is utilized for the production of valuables? Mention the hurdles for applying it at industrial scale. **6**
b) What are the different types of sources of microbes in food? **6**

UNIT-II

- Q.4 Discuss the process of extraction and purification of enzymes. Enlist the steps involved. **12**
Q.5 Explain with appropriate examples the concept of enzyme engineering. **12**

UNIT-III

- Q.6 Discuss in detail the use of enzymes in food industry. Cite appropriate examples. **12**
Q.7 Comment on:
a) Process of brewing and role of enzymes in the process.
b) Role of enzymes in dairy industry. **6×2**

End Semester Examination, May 2019

B. Tech. — First Semester

INDUSTRIAL CHEMISTRY (CH-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are coagulants?
- b) Define "Alkalinity".
- c) What is wet corrosion?
- d) What is the formula of phase rule?
- e) Define flash point and fire point.
- f) What are the constituents of composites?
- g) Write any three characteristics of good lubricating oil.
- h) Write a brief note on hardness of water.
- i) Define triple point in water system.
- j) Write any two applications of biodegradable polymer.

2×10

PART-A

Q.2 a) Describe reverse osmosis process. What is the advantage of this process? **10**
b) Write the various process involved in Domestic water treatment process. Explain with suitable diagram and chemical reaction? **10**

Q.3 a) Explain with diagram and chemical reaction of the following:
i) Galvanic corrosion.
ii) Stress corrosion. **5×2**
b) Explain the following:
i) Pilling bed worth rule.
ii) Dry corrosion with suitable example. **5×2**

Q.4 a) Explain Pb-Ag system with suitable phase diagram and the application of phase rule. **10**
b) Write short notes on the following:
i) Definition of phase. ii) Component.
iii) Congruent M.P. iv) Super cooled water. **2½×4**

PART-B

Q.5 a) Write short notes on the following:
i) PMC ii) CMC
iii) CCC **2×3**
b) What are important functions of lubricants? Discuss the mechanism of thick Film lubrication. **8**
c) Write short notes on the following:
i) Flash point and fire point
ii) Cloud point and pour point. **3×2**

Q.6 a) What are conducting polymers? Write their important properties and application in engineering. **10**
b) What do you mean by smart batteries? Write their applications. **10**

Q.7 a) Discuss the principle and application of AFM. Is AFM a better technique than SEM? Explain in detail. **10**
b) Explain Sol-gel technique. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

INDUSTRIAL CHEMISTRY (CH-101B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Comment on the Alkalinity in water.
- a) What is TDS?
- c) Write the mathematical expression for condensed phase rule.
- d) Differentiate between temporary and permanent hardness.
- e) Name the constituents of a composite material.
- f) Define RF value in chromatographic technique.
- g) List out any three characteristics of a good lubricating oil.
- h) What do you mean by saponification number?
- i) Write any two applications of green chemistry in our daily life.
- j) Define green polymers.

2×10

PART-A

Q.2 a) Describe electro dialysis process. What are the advantages of this process? **10**
b) Write the details of ion exchange method. Explain with suitable diagram and chemical reactions. **10**

Q.3 a) What is wet corrosion? Explain with suitable chemical reactions and mechanism. **10**
b) Discuss the following:
i) Factors affecting corrosion.
ii) Cathodic protection. **5×2**

Q.4 a) Explain Pb-Ag system with suitable phase diagram and the application of phase rule. **10**
b) Write short notes on:
i) Phase.
ii) Component.
iii) Triple point.
iv) Super cooled water. **2½×4**

PART-B

Q.5 a) Discuss the principle and applications I R spectroscopy. **10**
b) Explain sol-gel technique with suitable block diagram. **10**

Q.6 a) Define electrically conducting polymers and outline their classification. Write their important properties and applications in engineering. **10**
b) Write the properties and applications of conducting and liquid crystal polymers. **10**

Q.7 a) What do you mean by green chemistry? Describe any five principles of green chemistry. **10**
b) Write brief notes on the following:
i) Bio-based plastics.
ii) Green solvents. **5×2**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

BIOPROCESS ENGINEERING (BT-508)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Why are baffles installed in the bioreactor? **3**
- b) What are main contributions to the production cost in bioprocesses? **3**
- c) Explain the mechanism of agitation in bubble column bioreactor. **3**
- d) Define "Respiratory quotient". **2**
- e) Enlist any two of the intracellular bio products. **2**
- f) Describe the technique of inoculation of a bioreactor. **3**
- g) How do solvents bring about cell disruption? **2**
- h) Briefly explain the primary purification technique used for penicillin. **2**

PART-A

- Q.2**
- a) Describe the exit gas system in bioreactors. **5**
 - b) What are the thumb rules of bioreactor design? **5**
 - c) Explain the process of sample collection from bioreactors. **5**
 - d) Enlist some of the challenges in downstream processing. **5**
- Q.3**
- a) Explain in detail the method for determination of k_{la} by sulphite oxidation method. **10**
 - b) Describe the following in detail:
 - i) Packed bed bioreactor.
 - ii) Perfusion bioreactor. **5×2**

- Q.4**
- a) Describe in detail the Luedeking-Piret model for product formation kinetics. **5**
 - b) Derive an equation that models bacterial growth in log growth phase. **5**
 - c) What are the limitations of Monod's model? **5**
 - d) Explain the process of fed batch culture. **5**

PART-B

- Q.5**
- a) Explain in detail the general components of microbial media. What is the impact of change in components on economy and quality of the products? **10**
 - b) Explain in detail the process of media optimization. **10**
- Q.6**
- a) Describe different methods of sterilization highlighting the applications of each method. **10**
 - b) Discuss the kinetics of thermal death during heat sterilization. **10**
- Q.7**
- a) Explain the process of cell disruption by homogenizer. Draw a suitable diagram. **10**
 - b) Give a detailed account of industrial process for production of insulin. **10**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

STEM CELL REGENERATIVE MEDICINE (BT-S-305B1)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE** question from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each question.

Q.1 Briefly answer the following:

- a) What kind of cells differentiate from hematopoietic stem cells?
- b) Differentiate between symmetrical and asymmetrical ES cell self-renewal.
- c) Name the 4 transcription factors used to generate iPSC.
- d) Signify the importance of stem cell niches in HSC.
- e) What is the role of BMP4 in ES cell pluripotency?
- f) Differentiate IDDM and NIDDM.

2×6

UNIT-I

- Q.2 a) Explain the term “fate mapping” and name the commonly used fate mapping techniques. **4**
- b) How Cre-LoxP technology is used in cell lineage mapping? **8**
- Q.3 a) How various transcription factors maintain ES self-renewal and pluripotency with suitable diagrams. **8**
- b) Discuss the significance of what signaling in ES cell physiology. **4**

UNIT-II

- Q.4 a) What is re-population of hematopoietic stem cells? **2**
- b) Explain with suitable cell lineage diagrams, how pHSCs are repopulated into erythroid series? **6**
- c) How is bone marrow transplantation performed? **4**
- Q.5 a) How is ES cell commitment to B-lymphopoiesis regulated? **6**
- b) Describe in detail the biomarker patterns of HSC during undifferentiated and differentiated states. **6**

UNIT-III

- Q.6 a) Why iPSC is considered break through discovery in medical and pharmaceutical field? **2**
- b) How induced pluripotent stem cells are regenerated? **5**
- c) What are the potential medical applications of iPSC? **5**
- Q.7 a) Explain the etiology and symptoms of Parkinson’s disease. **4**
- b) Describe the various strategies that can be used to repair neurodegenerative diseases. **8**

End Semester Examination, May 2019

B. Tech– Third Semester
MICROBIOLOGY (BT-302A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions in brief:

- a) How the experiments by Redi disproved the theory of spontaneous generation in regard to larger organisms?
- b) How mendosicutes are different from fermicutes?
- c) What are peptones, yeast extract, beef extract, and agar? Why are they used in media?
- d) Where and how lysozyme and penicillin act to disturb the cell wall?
- e) Is as much ATP produced in anaerobic respiration as in aerobic respiration? Why?
- f) Why is O₂ toxic to many microorganisms and how do they protect themselves?
- g) Describe the pattern of microbial death when treated with a bactericidal agent?
- h) How do substrate-level phosphorylation and oxidative phosphorylation differ from one another?
- i) What are the different physiological states of the F-factor?
- j) Define transformation and competence.

2×10

PART-A

Q.2 a) Describe the major contributions of the following people to the development of microbiology:

- i) Leeuwenhoek.
- ii) Spallanzani.
- iii) Pasteur.
- iv) Tyndall.
- v) Koch.

3×5

b) Briefly describe the five-kingdom system and give the major characteristics of each kingdom

5

Q.3 a) Describe how the two different kinds of continuous culture systems, the chemo stat and turbid stat, operate.

8

b) What kinds of inclusion bodies do prokaryotes have? What are their functions?

12

Q.4 a) Describe the following kinds of media and their uses Give an example of each kind:

- i) Complex media.
- ii) Defined or Synthetic media.
- iii) Enriched media.
- iv) Selective media.
- v) Differential media.

2×5

b) What are pure cultures, and why are they important? How are spread plates, streak plates, and pour plates prepared?

10

PART-B

Q.5 a) When two strains of *E.coli*, one carrying kanamycin resistance (Km^r) gene and other without it were mixed together in a broth, the Km^r gene could be transferred from one strain to another strain. Further, it was observed that gene transfer did not occur when two strains were kept separated in the broth using a filter membrane (size 0.45 mm pore size). What kind of genetic exchange mechanism is taking place in these organisms? How can the possibilities of other types of genetic exchange mechanisms be ruled out?

15

- b) A Hfr strain possessing the markers *his*⁺ *met*⁺ *tyr*⁺ *str*^s was mated with a *F*⁻ strain possessing the markers *his*⁻ *met*⁻ *tyr*⁻ *str*^r. The time of entry for each marker is shown below:

Donor Marker	Time (min.)
<i>his</i> ⁺	21
<i>met</i> ⁺	12
<i>tyr</i> ⁺	46

Based on the results indicate the position of the F element and the first marker to be transferred. **5**

- Q.6 a) Compare aerobic and anaerobic respiration in microorganisms with respect to electron transport chain giving suitable examples. **8**
- b) Give the substrate and products of the tricarboxylic acid cycle. Describe its organization in general terms. What are its major functions? **12**

- Q.7 a) How the following would be best sterilized:
- i) Glass pipettes and petri plates.
 - ii) Tryptic soy broth tubes.
 - iii) Nutrient agar.
 - iv) Antibiotic solution.
 - v) Interior of a biological safety cabinet.
 - vi) Wrapped package of plastic petri plates.
 - vii) Media containing spores.
 - viii) Inoculation. **1½×8**
- b) Give the advantages and disadvantages of ultraviolet light and ionizing as sterilizing agents. Provide a few examples of how each is used for this purpose. **8**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-O306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the advantages of first mover in a business?
b) What is buzz marketing and why is it preferred?
c) What are the key sections of business plan?
d) What activation are involved in organization as a function of management?
e) What are the main characteristics of venture capital investments? **4×5**

PART-A

- Q.2 Explain the common mistakes in new product development. **20**
Q.3 What factors need to be considered while assessing technical feasibility and financial viability of a project? **20**
Q.4 As a new entrepreneur how you will go about forecasting the demand for your product? **20**

PART-B

- Q.5 What is a team? How is it different from working group? Why is the team formed? **20**
Q.6 What are the main factors a VC looks for while making an investment? **20**
Q.7 ??

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-O306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the advantages of first mover in a business?
b) What is buzz marketing and why is it preferred?
c) What are the key sections of business plan?
d) What activities are involved in organization as a function of management?
e) What are the main characteristics of venture capital investments? **4×5**

PART-A

- Q.2 Explain the common mistakes in new product development. **20**
Q.3 What factors need to be considered while assessing technical feasibility and financial viability of a project? **20**
Q.4 As a new entrepreneur how you will go about forecasting the demand for your product? **20**

PART-B

- Q.5 What is a team? How is it different from working group? Why is the team formed? **20**
Q.6 What are the main factors a VC looks for while making an investment? **20**
Q.7 Explain the directing and leading function in process of management. **20**

End Semester Examination, May 2019

B. Tech. – Third Semester

CELL BIOLOGY (BT-301A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between peroxisomes and ribosomes.
- b) Define “Cell fractionation”. What all steps are involved in this process?
- c) Comment on “Proto-oncogenes”.
- d) How animal cell is different from plant cell?
- e) Explain “Cell functions”.

4×5

PART-A

Q.2 a) Explain the dynamic nature of membrane. How transportation of nutrients occur through these membranes. **14**

- b) Explain the structural aspect of membrane with well labeled diagram. **6**

Q.3 a) Give the structure and function of Endoplasmic reticulum. What is its role in protein segregation? **10**

- b) Name any two micro bodies studied by you and explain their structure and function. **10**

Q.4 a) Extra nuclear DNA is the characteristic of which all organelles in plant cell? Explain its importance. **6**

- b) Explain structure, function, biogenesis and genomics of chloroplast. **14**

PART-B

Q.5 a) Describe the Ca^{2+} /calmodulin dependent kinase signaling pathway. **10**

- b) What are the G-protein linked receptors? Explain with diagram. **10**

Q.6 a) Describe the mechanism of apoptosis. **10**

- b) Discuss different carcinogenic agents studied by you. **10**

Q.7 a) Explain the mechanism of generation of action potential by sensory stimuli. **10**

- b) Write note on the electrical and biochemical changes which occur during muscle contraction. **10**

End Semester Examination, May 2019

M. Tech. – First Semester

THEORY OF THIN PLATES AND SHELLS (PE-SE-M-121)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write a short note on 'space curves'.
b) Differentiate between synclastic and anticlastic surface of bending.
c) What do you mean by thin plate?
d) Write down the equation for flexural rigidity of plate.
e) Define Gauss curvature.
f) What do you mean by axi-symmetrical analysis?
g) Write a short note on membrane theory.
h) Write a short note on 'discontinuity in pressure vessel'.
i) Write the stress equations for Conical Shells.
j) Write a short note on 'surface of revolution'. **2×10**

PART-A

- Q.2 a) Discuss the Kirchhoff's hypothesis. **12**
b) Discuss the importance of Finite Element Method (FEM) in analysis of plates and shells. **8**
- Q.3 Derive the Navier solution for the deflection of simply supported square plate subjected to point load 'P'. **20**
- Q.4 Derive the differential equation for Symmetrical bending of laterally loaded circular plates. **20**

PART-B

- Q.5 Derive the stress resultants on a cylindrical shell element using membrane theory. **20**
- Q.6 Derive the stress resultants on a cylindrical shell element using bending theory. **20**
- Q.7 a) Write a short note on 'thermal stresses in plates'. **10**
b) Write a short note on 'thermal stresses in shells'. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

BIO CHEMISTRY (BT-303C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Give the classification of high energy compounds along with examples. **3**
- b) What causes ketosis? **3**
- c) State the significance of tetrahydro folate and biotin in amino acid metabolism. **4**
- d) Draw the structure of pyruvate dehydrogenase complex and briefly explain its function. **4**
- e) Mention some of the steroid hormones derived from cholesterol and their role in human body. **3**
- f) How is GMP synthesized through salvage pathway? **3**

PART-A

- Q.2** a) Justify the statement "Living organisms obey the first and second law of thermodynamics". **10**
- b) Draw the structure of ATP. How does it help in metabolic reactions? **10**
- Q.3** a) How is glycine metabolized? **10**
- b) What is PKU? Explain the pathway that leads to PKU. **10**
- Q.4** a) Explain in detail the process of glycogenolysis. **10**
- b) What is glycolysis? Give the pathway. **10**

PART-B

- Q.5** a) Describe "Chemiosmotic theory". **10**
- b) With the help of labeled diagram explain the movement of electrons in complex HI and Complex IV? **10**
- Q.6** a) Give the pathway for the degradation of β carbon of fatty acids. **10**
- b) Outline the various steps involved in the phospholipid biosynthesis? **10**
- Q.7** a) How are pyrimidines metabolised? **10**
- b) Explain the denovo pathway for the synthesis of purines. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

FOOD MICROBIOLOGY (BT-537)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Briefly explain the significance of food microbiology.
- b) Name two microorganisms used in the fermented foods.
- c) Define "Food Poisoning".
- d) Name two spoilage organisms affecting meat and poultry products.
- e) Elaborate MPN and give its full form.
- f) Differentiate between 'food additive' and 'adulterant'.
- g) What is the need for food additive?
- h) Differentiate between 'endotoxins' and 'exotoxins'.
- i) Name two enzymes that are important in bakery products.
- j) Define "Thermal Death Time".

2×10

PART-A

- Q.2** a) Discuss the various microorganisms associated with different food products. **10**
b) Give a synopsis of different genera of bacteria common to food. **10**
- Q.3** a) Give an account of the techniques of rapid identification of food pathogens. **10**
b) How sterilization is used in destruction of microorganisms? Explain its principle in detail. **10**
- Q.4** a) Discuss the microorganisms involved in spoilage of bread and its control measures. **10**
b) Explain how microorganisms alter the biochemical properties of food leading to food spoilage? **10**

PART-B

- Q.5** a) How the production and characteristics of sauerkraut depends upon resident microbial community and fermentation conditions? Explain in detail. **10**
b) Discuss about the role of different organisms in pickling. **10**
- Q.6** a) Discuss in detail the major food borne infections caused by bacteria and virus. **10**
b) What are the symptoms of food poisoning? Explain the most common types of food poisoning. **10**
- Q.7** a) What are some common types of food additives and why are they used? What health issues are associated with food additives? **10**
b) What are antioxidants? How do antioxidants work? **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

INTRODUCTION TO PHARMACEUTICAL TECHNOLOGY (BT-531)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term 'active pharmaceutical ingredient' with examples.
- b) What are dosage forms and their significance?
- c) How physico-chemical properties which will determine the efficacy of a drug?
- d) Explain the ideal properties of a sterile dosage forms.
- e) Define the term 'bioequivalence' with suitable examples.

4×5

PART-A

- Q.2** a) What are the salient features of THE DRUGS AND COSMETICS ACT, 1940? **10**
b) Explain the various stages of new drug development processes. **10**
- Q.3** a) Why oral route of administration is considered superior to other routes? What are the disadvantages of oral ROA? **10**
b) Why sustained release of drug concept is important in drug industry? Describe the parameters crucial for SR-drugs. **10**
- Q.4** a) Why excipients are important for drug formulation? Explain the role of binders, anti-oxidants and flavouring agents as excipients with two examples each. **10**
b) Explain the different mechanisms of chemical incompatibility of drugs. **10**

PART-B

- Q.5** a) What are the advantages and limitations of wet granulation in tablet manufacturing? **10**
b) Explain the different steps to be taken in handling and storage of capsules. **10**
- Q.6** a) How syrup is manufactured in a pharmaceutical plant? **10**
b) Explain the steps involved in automatic ointment manufacturing. **10**
- Q.7** a) What are biopharmaceuticals? Explain the various forms of bio pharmaceutics in the market with examples. **8**
b) How the drug is metabolized in the system? **12**

End Semester Examination, May 2019
B. Tech. — Fifth Semester
HUMAN GENOMICS AND PROTEOMICS (BT-533)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- | | |
|---|-----------|
| a) What do you mean by functional genomics? | 3 |
| b) How gene expression profile helps to perform comparative genomics? | 2½ |
| c) Discuss haplotype with suitable example? | 2½ |
| d) How lead time bias and length time bias helps to diagnose cancer? | 3 |
| e) Explain mechanism by which gene targets are identified. | 2 |
| f) Illustrate factors that state whether the gene is on or off. | 3 |
| g) "Personalized medicine can be prepared using pharmacogenomics technique". Justify giving an example. | 4 |

PART-A

- | | | |
|------------|---|-----------|
| Q.2 | a) What do you mean by gene map? | 6 |
| | b) Discuss Components of genome need to be considered while assembling. | 14 |
| Q.3 | a) How gene expression profile helps to perform comparative genomics? | 12 |
| | b) What are the bioinformatics approaches used in genome annotation? | 8 |
| Q.4 | a) Explain the cancer checkpoints in detail. | 6 |
| | b) Enumerate receptors which are responsible for cell differentiation? | 14 |

PART-B

- | | | |
|------------|--|-----------|
| Q.5 | a) What are the methods by which one can identify protein? | 8 |
| | b) How MALDI-TOF is used in analysis of peptide mass? | 12 |
| Q.6 | a) How gene expression profile helps to analyze genome of a species? | 8 |
| | b) Discuss tools used in proteomic study. | 12 |
| Q.7 | a) What do you mean by high throughput screening? | 6 |
| | b) Enlist applications of pharmacogenomics. | 14 |

End Semester Examination, May 2019

B. Tech. — Fifth Semester

FOOD BIOTECHNOLOGY (BT-507)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) How is food biotechnology used?
- b) Give two examples of microbes used in fermentation.
- c) Define "Water activity".
- d) Write down different varieties of cheese.
- e) What are spoilage specific organisms?
- f) How microorganisms are involved in food processing?
- g) What are the types of radiation methods used in food preservation?
- h) Write about the factors affecting quality of food during cold storage.
- i) Write down the names of the enzymes used in bio processing of oils and fats.
- j) What is process waste?

2×10

PART-A

Q.2 a) Give an account on the factors affecting microbial growth. Give a synopsis of different genera of yeast common to food. **20**

Q.3 a) Give an account of various methods used for detection of microorganisms in food. **10**
b) Give an account on spoilage and preventive measures of sugar and sugar products. **10**

Q.4 What is meant by surface examination of food? Explain the various methods used to examine the food surface microbiologically. **20**

PART-B

Q.5 a) Give a short note on the role of food additives and preservatives in product development. **10**
b) What are the applications of lactic acid bacteria in food industry? **10**

Q.6 What do you mean by term "Single cell protein"? Discuss the possibility of production of single cell protein from different sources. Write down the prospects of SCP in food chain. What are the barriers for acceptance of SCP in food? **20**

Q.7 How food waste is utilized in production of valuables? Describe how household food waste can be utilized for the production of ethanol? **20**

End Semester Examination, May 2019

B. Tech. – Second Semester

SEMICONDUCTOR PHYSICS (BSC-PH-104)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write expression for Fermi-Dirac distribution function. **2×10**
b) What are phonons?
c) What are minority carriers in p-type semiconductors?
d) Write two semiconductor material names, which are suitable for optoelectronic devices.
e) Write the expression for energy and momentum of a photon.
f) Write the rate equations for carrier density.
g) Explain radiative recombination.
h) Define quantum efficiency of a photodetector.
i) What do you mean by Vander Pauw method for resistivity?
j) Which type of parameter can be extracted from I-V characteristics?

PART-A

- Q.2 a) Discuss the Kronig-Penney model. How it explains the formation of energy bands separated by forbidden energy gap in solids. **14**
b) Write short note on effective mass of electron. **6**
- Q.3 a) Derive an expression for the carrier concentration in extrinsic semiconductors. **12**
b) Draw the energy band diagram for unbiased and forward biased p-n junction. **4**
c) Write short note on diffusion current. **4**
- Q.4 a) What do you understand by the terms absorption, spontaneous emission and stimulated emission? **6**
b) If light is incident on a semiconductor, obtain the conditions for optical loss and gain. **10**
c) Write short note on Exciton. **4**

PART-B

- Q.5 a) Give the working of a double heterojunction Light Emitting Diode (LED) and explain how the extraction efficiency is improved? **10**
b) Write short note on the device characteristics of Light Emitting Diode (LED). **5**
c) Write the full form of SLED and ELED and differentiate them. **5**
- Q.6 a) Explain the structure, working principle and characteristics of p-n junction photodiode. **10**
b) Briefly discuss the materials and their properties used in photodetectors. **5**
c) Write a short note one noise limits on performance of photodetectors. **5**
- Q.7 a) Define hot-point probe measurement and derive the expression for finding the carrier concentration for p-type semiconductor. **12**
b) What is DLTS? How we get the information of deep level impurities using these techniques? **8**

End Semester Examination, May 2019

B. Tech. – Second Semester

INTRODUCTION TO ELECTROMAGNETIC THEORY (BSC-PH-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Describe the interaction between two charged particles.
 b) Is potential gradient a vector or scalar quantity? Give reason.
 c) Explain polarization vector in dielectrics.
 d) Write note on electric displacement vector.
 e) Explain the term magnetostatics.
 f) Interpret the term $\operatorname{div} B = 0$ and $\operatorname{curl} B \neq 0$.
 g) State Ampere's law and Bio-savart's law.
 h) What is meant by Quasi-static approximation?
 i) Write Maxwell's equations in vacuum.
 j) Discuss the properties of electromagnetic waves in free space. **2×10**

PART-A

- Q.2 a) Derive an expression for curl of electrostatic field and give it's physical significance. **6**
 b) What is method of images? Determine the electric field due to a point charge above a grounded conducting plane. **7**
 c) Given a potential of the form $V = m(x^2 + y^2 + z^2)$ where m is a constant. Check if the potential satisfies Laplace equation? **7**
- Q.3 a) Derive the boundary conditions for static electric field across a boundary separated by two different dielectric media. **8**
 b) Calculate the electric potential due to a dipole at a point inclined at an angle. **7**
 c) A parallel plate capacitor has a 3 cm thick dielectric slab of dielectric constant 2.5, inserted between it's plates. If, field inside the dielectric is measured as 10^5 V/m, then determine polarization and displacement vector. **5**

- Q.4 a) Calculate the value of magnetic field at a point due to a long current carrying wire using Bio-savart's law. **8**
 b) State and derive the divergence of static magnetic field. **4**
 c) Give the expression for vector potential of a solenoid carrying current using Stake's theorem. **8**

PART-B

- Q.5 a) Derive an expression for vector potential in terms of surface bound current and volume bound current? **10**
 b) Calculate the magnetic field at a point at the equatorial line of a bar magnet? **6**
 c) Differentiate between diamagnetic and paramagnetic materials with examples. **4**
- Q.6 a) Derive Maxwell's equation in differential form. **8**
 b) State and prove Poynting theorem. Explain the term pointing vector. **12**
- Q.7 a) Solve Maxwell's equations to obtain electromagnetic wave equations for E and B in free space. **8**
 b) Calculate reflection and transmission coefficients for electromagnetic wave when it travels from one medium to another provide the mediums are nonmagnetic. **8**
 c) Show that the electromagnetic waves are transverse in nature. **4**

End Semester Examination, May 2019

M. Sc. (Biotechnology) — Second Semester

GENETIC ENGINEERING AND APPLICATIONS (BT-S-201A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE question** from each **Unit.** All questions carry equal marks.

Q.1 Answer the following in brief:

- a) Expand the term SNP.
- b) Mention the features of cosmids.
- c) Name two molecular markers used in GE.
- d) Differentiate between cDNA and gDNA.
- e) How a gene expresses itself? Mention two techniques to check gene expression.
- f) Mark the usage of restriction enzymes.

2×6

UNIT-I

Q.2 a) Explain in detail the importance of molecular markers in genetic engineering.

- b) Name and explain different molecular biology tools that have their application in genetic engineering.

6×2

Q.3 Highlight the importance of polymerase chain reaction in GE. Explain the technique and its applications in detail.

12

UNIT-II

Q.4 What is DNA Microarray? Explain its types and applications in GE.

12

Q.5 What is the concept behind protein engineering and how it is achieved?

12

UNIT-III

Q.6 What is codon optimization? Explain its applications in host and vector engineering.

12

Q.7 Write short notes on the following:

- a) DNA Transfection.
- b) RNase protection assay.
- c) Gene knockout technology.

4×3

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DIAGNOSTIC TECHNIQUES (BT-623B)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Briefly answer:

- a) What is biphasic medium and how it is used?
- b) Give examples of bacterial pathogens that are obligate intracellular parasites requiring viable host cells for propagation.
- c) Are polyclonal antibodies used for diagnostic test? Why or why not?
- d) What is a padlock probe?
- e) What are antibody drug conjugates?
- f) How can molecular beacon probes used to detect several genes in the same sample?
- g) What are the advantages of nonradioactive detection procedures?
- h) How single-stranded conformation polymorphism (SSCP) is used to identify different genomic variants?

2½x8

PART-A

- Q.2**
- a) Define and differentiate bacterial susceptibility and resistance. How are these used to assist in the identification of bacteria? **10**
 - b) Explain the use and chemical principle of the following media used in preliminary bacterial identification.
 - i) McConkey agar
 - ii) Chocolate agar
 - iii) Thioglycollate broth
 - iv) Modified thaymer martin agar**10**

- Q.3**
- a) How purification of antibodies is done for use in research and diagnostics? **14**
 - b) What is the use of flow cytometry in the diagnosis of infected cells? **6**

- Q.4**
- a) Discuss the criteria and essential for an immunoassay development and validation. **12**
 - b) How is antigen capture ELISA different from antibody ELISA? **8**

PART-B

- Q.5**
- a) List down the steps used for the production of a monoclonal antibody. What will happen if aminopterin is removed from the HAT medium? **10**
 - b) Discuss the application of monoclonal antibodies in the treatment of tumors. **10**
- Q.6**
- a) Describe and discuss the PCR/OLA detection protocol. **12**
 - b) Describe several types of nonradioactive DNA labels. What are the advantages of nonradioactive detection procedures? **8**
- Q.7**
- Summarize the steps involved in the chemical mismatch cleavage mutation detection assay. In what ways denaturing gradient gel electrophoresis is better for the detection of mutations. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

STEM CELLS AND ITS APPLICATIONS (BT-803)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Differentiate between symmetric and asymmetric cell division with respect to stem cells.
b) Define the term potency. Which cells are considered to be multipotent?
c) What is the role of tumor suppressor genes in cell cycle?
d) How can epigenetic factors play a role in pluripotency of the stem cells?
e) What are embryonal carcinoma cells? Write about its characteristic features.
f) What is the role of Sertoli cells in maturation and differentiation of spermatogenic stem cells?
g) Name the chemical used as preservative agent while cryofreezing hematopoietic stem cells. Why is it considered to be a good cryopreservant?
h) Which growth factors required to stimulate mesenchymal stem cells for osteogenic differentiation?
i) What do you understand by the term trans-differentiation?
j) How can immunocytochemistry be helpful in isolation of liver stem cells? **2×10**

PART-A

- Q.2 a) Write a note on extrinsic and intrinsic factors affecting pluripotency. **10**
b) Write in detail about the various methodologies employed for mapping the fate of stem cells. **10**
- Q.3 a) What do you understand by the term “check points” in cell cycle? Give an account of various checkpoint existing. **10**
b) Define the term “cell senescence”. State the various theories proposed for cell senescence. **10**
- Q.4 a) What do you understand by the term “spermatogenesis”? Write in detail about the various stages of spermatogenesis. **10**
b) Define embryonic stem cells. What ethical concerns are being faced by the researchers while using them in their study? **10**

PART-B

- Q.5 a) Define mesenchymal stem cells. Write a note on applications of these cells? **10**
b) What do you understand by the term “Lymphopoiesis”? Briefly explain stages of B-cell and T-cell maturation. **10**
- Q.6 a) What are the symptoms and cause of Parkinson's disease? Write in details about the various methods which are into market for the management of this disease. **12**
b) What are the symptoms and cause of amyotrophic lateral sclerosis? How can it be cured with the help of stem cells? **8**
- Q.7 a) What are the characteristic features of liver stem cells? Write in detail about the steps involved in its isolation. **10**
b) What are the symptoms and various treatments for liver cirrhosis? **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

THERMODYNAMICS OF BIOPROCESS (BT-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define and give the equation for equilibrium constant and equilibrium conversation.
b) What is partial molar property? Derive its equation.
c) State Onsager relations and give its significance.
d) Explain Fick's laws for passive transport.
e) Describe cooperative transitions and partition function. **4×5**

PART-A

- Q.2 a) Compute the internal energy change and temperature change for the two processes involving 1 mole of an ideal monatomic gas.
i) 1500 J of heat are added to the gas and the gas does no work and no work is done on the gas
ii) 1500 J of work are done on the gas and the gas does no work and no heat is added or taken away from the gas. **10**
b) What is a heat engine? How do you derive the maximum work? **10**
- Q.3 a) Define chemical potential. Explain with an example. **10**
b) State and explain Henry's law and Raoult's law by giving their equations. **10**
- Q.4 a) Why closed systems are failure in biology? Enumerate the difference between steady state and equilibrium. **10**
b) Discuss "Life and irreversibility". **10**

PART-B

- Q.5 a) With a suitable example, explain biological coupling. **10**
b) Discuss the equations for flux and force in a discontinuous system. **10**
- Q.6 a) Write briefly about Boltzmann distribution. **10**
b) Describe the thermodynamics of active transport. **10**
- Q.7 Explain the following:
a) Stability of non-equilibrium stationary state.
b) Ordering in time and space far from equilibrium. **10×2**

End Semester Examination, May 2019
 B. Tech. — Second Semester
MATHEMATICS-II (BSC-MA-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Change the order of integration $\iint_{0 \ x}^{\infty \infty} f(x, y) dx dy$.
- b) Find the value of λ , for the exact differential equation $(xy^2 + \lambda x^2 y) dx + (x + y)x^2 dy = 0$.
- c) Solve: $x^2 = 1 + p^2$
- d) Solve: $y = (x - a)p - p^2$
- e) Solve: $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 0$
- f) Find particular integral in the following differential equation:

$$\frac{d^3y}{dx^3} + y = \sin 3x - \cos^2 \frac{x}{2}$$
- g) Determine a, b, c, d so that the function $f(z) = (x^2 + axy + by^2) + i(cx^2 + dxy + y^2)$ is analytic.
- h) Define analytic function and write Cauchy Riemann equation in Cartesian form.
- i) Separate real and imaginary parts: $\operatorname{In}(6+8i)$
- j) Expand $f(z) = \sin z$ in Taylor's series about $z = \frac{\pi}{4}$ **2x10**

PART-A

- Q.2 a) Find the area enclosed between the curves: $x^2 + y^2 = a^2$ and $x + y = a$ **10**
- b) Verify Green's theorem for $\int_C [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$,
 Where C is bounded by $x = 0, y = 0$ and $y + x = 1$ **10**
- Q.3 a) Solve: $\frac{dy}{dx} = \frac{y}{2y \log y + y - x}$ **6**
- b) Solve: $(x^3 - x)\frac{dy}{dx} - (3x^2 - 1)y = x^5 - 2x^3 + x$ **6**
- c) Solve differential equation $y \log y dx + (x - \log y)dy = 0$ **8**

- Q.4 a) Solve: $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 5y = x \log x$ **5**
- b) Solve: $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = 4 \cos^2 x$ **7**
- c) Show that: $\int x J_0^2(x) dx = \frac{1}{2} x^2 [J_0^2(x) + J_1^2(x)]$ **8**

PART-B

- Q.5 a) If $f(z)$ is a regular function of z , prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4 |f'(z)|^2$ **10**

b) Determine analytic function $f(z) = u + iv$, whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ **10**

Q.6 a) State and prove the cauchy's integral formula and use it to evaluate:

$$\int_C \frac{12z-7}{(z-1)^2(2z+3)} dz \text{ Where } C : |z|=2 \text{ and } |z+i|=\sqrt{3} \quad \mathbf{10}$$

b) Solve: $\int_0^{2\pi} \frac{d\theta}{1-2p\sin\theta+p^2}$, where $p^2 < 1$ **10**

Q.7 a) For the conformal transformation $w = z^2$, show that the coefficient of magnification at $z = 1+i$ is $2\sqrt{2}$. **10**

b) Expand the function in Laurent's Series $f(z) = \frac{1}{z^2 - 4z + 3}$ for $1 < |z| < 3$. **10**

End Semester Examination, May 2019

B. Tech. — Second Semester

MATHEMATICS-II (For CSE only (BSC-MA-201))

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Three bags A, B, C contains 4 red, 3 black, 2 white; 3 red, 4 black, 4 white and 5 red, 2 black, 6 white balls respectively. If a bag is selected at random and a ball is drawn from it, find the probability if the ball is red. **3**
- b) In a certain factory turning razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Using Poisson distribution to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10000 packets. **3**
- c) Compute the variance of sum obtained when 10 independent rolls of a fair die are made. **3**
- d) Find the value of c such that $f(x) = ce^x, 0 < x < \infty$ represents probability density function. **3**
- e) Determine the binomial distribution whose mean is 9 and S.D. is 3/2. **3**
- f) What are the Sheppard's corrections for the first four moments? **2**
- g) Determine the value of median from the following series:

Marks	0-10	10-15	15-20	20-25	25-30
No. of students	7	5	8	38	42

3

PART-A

- Q.2 a) A can hit a target 4 times in 5 shots can 3 times in 4 shots and C can twice in 3 shots. They fire a volley. What is the probability that at least two shots hit? **6**
- b) In a bolt factory, there are four machines A, B, C, D manufacturing 20%, 15%, 25% and 40% of the total output. Of their outputs 5%, 4%, 3% and 2%, in the same order, are defective bolts. A bolt is chosen at random from the factory's production and is found defective. What is the probability that the bolt was manufactured by machine A or machine D. **8**
- c) Three coins are tossed simultaneously. Consider the event E 'three heads or three tails', F 'at least two heads' and G 'at most two heads'. Of the pairs (E, F), (E, G) and (F, G), which are independent? **6**
- Q.3 a) A sample of 100 dry battery cells tested to find the length of life produced the following results:
 $\bar{x} = 12$ hours, $\sigma = 3$ hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life. (i) more than 15 hours(ii) less than 6 hours(iii) between 10 and 15 hours ? **10**

b) Given: $f(x) = \begin{cases} e^{-x}, & \text{if } x > 0 \\ 0, & \text{otherwise} \end{cases}$. Determine the probability that the variate having this density will fall in the interval $1 < x < 2$. Also find the cumulative probability function $F(2)$. **10**

Q.4 a) An insurance company supposes that the number of accidents that each of its policyholders will have in a year is Poisson distributed, with the mean of the Poisson depending on the policyholder. If the Poisson mean of a randomly chosen policyholder has a gamma distribution with density function $g(\lambda) = \lambda e^{-\lambda}$, $\lambda \geq 0$. What is the probability that a randomly chosen policyholder has exactly n accidents next year? **10**

b) Find the moment generating function of the exponential distribution.

$$f(x) = \frac{1}{c} e^{\frac{-x}{c}}, 0 < x < \infty, c > 0.$$

 Hence find its mean and S.D. **10**

PART-B

Q.5 a) Ten students got the following percentage of marks in Economics and Statistics. Calculate the Coefficient of Correlation.

Marks in Economics	78	36	98	25	75	82	90	62	65	39
Marks in Statistics	84	51	91	60	68	62	86	58	53	47

10

b) Find the Kurtosis based on moments for the following distribution:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	8	12	20	30	15	10	5

10

Q.6 a) Fit a second degree parabola to the following data:

X	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y(x)	1.1	1.3	1.6	2.0	2.7	3.4	4.1

10

b) A man buys 50 electric bulbs of "Philips" and 50 bulbs of "Surya". He finds that Philips bulbs give an average life of 1,500 hours with a standard deviation of 60 hours and Surya bulbs gave an average life of 1, 512 hours with a standard deviation of 80 hours. Is there a significant difference in the mean life of the two makes of bulbs? **10**

Q.7 a) A group of 5 plots treated with nitrogen at 20 kg/ha. Yields 42, 39, 48, 60 and 41 kg whereas nitrogen at 40 kg/ha yields 38, 42, 56, 64, 68, 69 and 62 kg. Can it be concluded that nitrogen at level 40kg/ha. Increases the yield significantly ? **10**
 b) A bag contains defective article, the exact number of which is not known. A sample of 100 from the bag gives 10 defective articles. Find the limits for the proportion of defective articles in the bag. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

NUTRACEUTICALS AND FUNCTIONAL FOODS (BT-638)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following briefly:

- a) Define the term “Dietary supplements” with examples.
- b) What does FOSHU stand for? Explain with examples.
- c) Discuss the enfleurage technique for the isolation of isoprenoids.
- d) Why inulin is considered as prebiotics?
- e) How nutrigenomics add value to nutraceutical field?

4x5

PART-A

Q.2 a) Enlist the functional components present in Oats, Tomato, Cranberry and Flaxseed and their possible medical benefits. **10**

- b) Discuss the types of Omega-3-fatty acids, their sources and the medical benefits.

10

Q.3 a) Why phytoestrogens are important for our health? Name the different sources of phytoestrogens and their medical benefits. **10**

- b) Discuss the role of dietary fibres, sources and various medical benefits. **10**

Q.4 a) How flavonoids are classified. Give 1 example in each class. **10**

- b) Name the different sources of carotenoids. Explain the extraction and purification procedures of carotenoids. **10**

PART-B

Q.5 a) Discuss the selection criteria and types of probiotics. **10**

- b) Explain the various medical benefits of probiotics. **10**

Q.6 a) Differentiate between type 1 diabetes and type 2 diabetes. **5**

- b) Discuss in detail the different nutraceutical options for the preventive or therapeutic intervention of diabetes mellitus. **15**

Q.7 a) What types of research needed to improve nutraceuticals and functional food domain? **5**

- b) Give a detailed account of nutrigenomics and its applications in health industry. **15**

End Semester Examination, May 2019

B. Tech.–Sixth Semester

CLINICAL MICROBIOLOGY (BT-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions briefly:

- a) What are different types of bacterial morphology explain with examples?
- b) How gram positive cell wall is different from gram negative cell wall?
- c) Write a note on the classification of parasite.
- d) Name any two blood and tissue protozoal infection causative organisms.
- e) What are the symptoms and causative organism of cholera infection?
- f) Name any two infections caused by anaerobic bacteria.
- g) Mentions the source and types of Hepatitis viruses.
- h) What are Prions?
- i) What are the characteristics of fungi?
- j) Differentiate between mycelium and Hyphae.

2x10

PART-A

- Q.2** a) Mention the names of skin microbiota and the importance of normal bacterial and fungal microbiota to host. **10**
- b) What are Toxins? Discuss about the exotoxins and endotoxins in detail. **10**
- Q.3** a) What is the disease caused by Entamoeba histolytica? Explain the life cycle of the E. histolytica and symptoms of the disease. **10**
- b) Differentiate between nematodes and cestodes. Explain the life cycle of any nematode. **10**
- Q.4** a) What are virulence factors? Explain with example. **5**
- b) Name two gram positive spore forming bacteria. Write a note on the Clostridium tetani infection, lab diagnosis and treatment. **15**

PART-B

- Q.5** a) How viruses are classified? Discuss various modes of entry of viruses in the host. **10**
- b) What is shingles? Explain the life cycle of Herpes virus. **10**
- Q.6** a) What are the general characteristics of Fungi? Discuss about the different media use for the isolation of Fungi. **10**
- b) Differentiate between superficial mycosis and endemic mycosis with example. **10**
- Q.7** a) Describe on the strategy for laboratory diagnosis for bacterial and viral infection. **10**
- b) Explain the molecular diagnostic procedure for the identification of pathogen. **10**

End Semester Examination, May 2019

M.Sc. (Biotechnology)–Second Semester

BIOPROCESS TECHNOLOGY (BT-S-202A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: 1

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory**. Taking at least **ONE question** from each **Unit**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) Why is bioprocess engineering known as interdisciplinary field?
- b) What types of organisms are cultured in BSL-1 facility?
- c) Explain the factors that affect microbial growth rate.
- d) Compare stirred tank reactor and packed bed reactor for enzymatic reactions.
- e) Discuss some of the alternative methods for sterilization of heat labile material.
- f) How does temperature affect diffusivity? **2x6**

UNIT-I

- Q.2 a) What is the role of a bioprocess engineer in biotechnology? **4**
b) Describe the three different phases of growth curve using a suitable diagram. **8**
- Q.3 a) Give a general energy balance equation. Modify it for adiabatic steady state processes. **6**
b) Describe growth associated product formation kinetic using a suitable example. **6**

UNIT-II

- Q.4 Discuss the salient features of the following types of bioreactors:
a) Stirred tank reactor.
b) Fluidized bed bioreactor.
c) Air lift bioreactor. **3x4**
- Q.5 a) Why is foaming undesirable in reactors?
b) What is a mechanical seal?
c) What is a reference junction in pH electrode?
d) Condenser is used in exit air system of a fermenter. Why? **4x3**

UNIT-III

- Q.6 a) What is the effect of heat sterilization on nutrient quality? **6**
b) Discuss the kinetics of depth sterilization. **6**
- Q.7 a) Explain in detail microbial media formulation. **6**
b) Highlight the importance of mass transfer operations in bioprocessing. **6**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

DRUG DESIGNING (BT-632)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions.

- | | |
|--|----------|
| a) What are the hurdles in new drug discovery? | 3 |
| b) Define pharmacophore. | 2 |
| c) Compare Hydrogen bond and Van Der Waals forces. | 3 |
| d) What is parallel synthesis? | 3 |
| e) Relate Ki and IC ₅₀ values of an enzyme inhibitor drug. | 3 |
| f) Name two tools available for protein structure visualization. | 3 |
| g) You have a DNA sequence and you wish to search for other DNA sequences to find one that encodes the same or similar protein. Which of the five Basic Blast programs should you use? | 3 |

PART-A

Q.2 Write in detail about preclinical studies and assay development. **20**

Q.3 a) Discuss in detail process for lead optimization. **10**
b) Compare *E.coli*, yeast and mammalian cells as models for drug discovery and development. **10**

Q.4 a) Describe distinguishing features of four different receptor super families. **12**
b) Give Michaelis-Menten equation and explain its terms. **8**

PART-B

Q.5 What are prodrugs? Discuss significant issues in prodrug design. How are prodrugs activated? **20**

Q.6 a) Explain the benefits of microwave assisted organic synthesis. **6**
b) Describe solution phase strategies for preparation of combinatorial libraries. **14**

Q.7 a) What is E-value in BLAST result? **4**
b) What is Molecular Mechanics (MM)? What are the four main kinds of terms used in the molecular mechanics force field? **8**
c) How is energy minimization carried out? **8**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

BIOINFORMATICS AND COMPUTER APPLICATIONS (BT-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer Briefly:

- a) Enumerate the applications of bioinformatics.
- b) What do you mean by wide area network?
- c) How primary database is different from secondary database?
- d) Enlist two software for homology studies?
- e) Enumerate the advantages of NMR spectroscopy?
- f) How protein structure prediction is different from protein structure determination?
- g) Write PIR format.
- h) What do you mean by protein secondary structure?

2½×8

PART-A

- | | | |
|------------|---|-----------|
| Q.2 | a) Explain network topologies. | 10 |
| | b) Distinguish LAN and MAN with suitable example. | 10 |
| Q.3 | a) What do you mean by Biological database? | 6 |
| | b) Discuss any DNA sequencing method? | 14 |
| Q.4 | a) Briefly explain database management system. | 10 |
| | b) How ER diagram is helpful in expression of data? Explain with example. | 10 |

PART-B

- | | | |
|------------|--|-----------|
| Q.5 | Align the given sequence using Smith Waterman algorithm for the given sequences TATGTT and TGCGGT upto trace back using + 2, - 1 and 0 for match, mismatch and gap penalty respectively. | 20 |
| Q.6 | a) Discuss functional Classification of protein. | 8 |
| | b) What are the different methods used in phylogenetic studies? | 12 |
| Q.7 | Write short notes on the following: | |
| | a) Fold Recognition for Protein structure prediction. | 10 |
| | b) Challenges faced in integration of biological data. | 10 |

End Semester Examination, May 2019

B. Tech. – Fourth Semester
IMMUNOLOGY (BT-402A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Briefly answer:

- a) Describe the different main categories of professional antigen presenting cells.
- b) The T cell is said to be class I restricted. What does this mean?
- c) Differentiate between allotypic determinants and idiotypic determinants.
- d) Where are the CDR regions located on an antibody molecule and what are their functions?
- e) What are the advantages and disadvantages of live attenuated vaccines?
- f) Why are the immediate reactions immediate and the delayed type delayed?
- g) What do you mean by opsonization?
- h) What is prozone effect?
- i) How autograft differs from allograft?
- j) Explain the development of the severe hemolytic disease of the newborn (erythroblastosis fetalis).

2x10

PART-A

- Q.2** a) How do cells of the innate immune system contribute to activation of adaptive immune responses? **10**
- b) Discuss the structure and function of a lymph node. **10**
- Q.3** a) Represent diagrammatically the differences in the structure of MHC class I and class II molecules. **8**
- b) Describe the organization of immunoglobulin germ-line gene segments in light chain. How this light chain DNA undergoes rearrangements? **12**
- Q.4** a) Give an account of different antigenic determinants on immunoglobulins. **10**
- b) What are the functions of complement? How complement activation occurs via alternate pathway? **10**

PART-B

- Q.5** a) Give an account of the immune response to extracellular and intracellular bacteria. Also discuss the mechanisms through which bacteria can effectively evade the host defence. **15**
- b) List down the applications of monoclonal antibodies. **5**
- Q.6** a) What is the principle of immunofluorescence? List down the various fluorochromes that are used in immunofluorescence assays. **14**
- b) How competitive ELISA is used to detect the presence of an antigen in clinical sample? **6**
- Q.7** a) List down the properties of an ideal vaccine. How DNA vaccines raises both cellular and cell mediated immunity? **12**
- b) Explain the hypersensitive reaction induced by poison oak in sensitive individuals. **8**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Second Semester

IMMUNOLOGY (BT-S-203A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE** question from each **UNIT**.

Q.1 is compulsory. All questions carry equal marks.

Q.1 Answer the following briefly:

- a) What do you understand by epitope and hapten?
- b) How T cells is different B cell?
- c) Draw a labeled diagram of IgG and IgM.
- d) What are Dendritic cells?
- e) Why an autoimmune disorder can occur?
- f) Briefly explain the DTH.

2x6

UNIT-I

Q.2 Differentiate between the following:

- a) Primary lymphoid organ and Secondary lymphoid organs.
- b) MHCI and MHCII

6x2

Q.3 What is complement? Mention the types and explain in detail classic complement system. **12**

UNIT-II

Q.4 Write short notes on the following:

- a) Cytokines and their role in immune regulation.
- b) Antigen processing.

6x2

Q.5 a) Explain the mechanism of ADCC.

- b) Write a note on T cell regulation.

6x2

UNIT-III

Q.6 What is Hypersensitivity? Mention its types and describe the hypersensitivity in detail. **12**

Q.7 a) Discuss the how the immune system works against parasitic infections. **6**
b) What is tumor? How tumor is develop? Discuss in brief about tumor antigens. **6**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

INDUSTRIAL MICROBIOLOGY (BT-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** from **PART-B.** Marks are indicated against each question.

Q.1 Answer briefly:

- a) What are Secondary metabolites? Give an example.
- b) What is the function of restriction endonucleases?
- c) Differentiate between auxotrophs and phototrophs
- d) Write the microbial producer and industrial use of ethanol.
- e) What are β lactam antibiotics?
- f) What do you mean by malo-lactic fermentation?
- g) Name two biofertilizers produced at large scale.
- h) Differentiate between red wine and white wine.
- i) Give two merits and demerits of SCP compare to conventional source of proteins.
- j) Differentiate between aerobic and anaerobic fermentation.

2x10

PART-A

- Q.2 a) Draw a well labeled diagram of a fermenter and explain the function of impeller, Baffles and sparger in a fermenter. **10**
- b) Describe the types of fermentation. **10**
- Q.3 a) Discuss in detail the recombinant DNA approaches for strain improvement. **10**
- b) Give the characteristic features of an ideal strain for large scale processes. **10**
- Q.4 Give an account on industrial production of the following products:
a) Ethanol
b) Wine **10x2**

PART-B

- Q.5 a) Give a detailed account of media used for penicillin production and also discuss the Purification of penicillin. **10**
- b) Discuss the production of glutamic acid. **10**
- Q.6 Write short notes of the following:
a) SCP
a) Biopesticide. **10x2**
- Q.7 Give an account of critical parameters pertaining to fermentation economics. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ENTREPRENEURSHIP OPPORTUNITIES IN FOOD INDUSTRIES (BT-834)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following in brief:

- a) What do you understand by Entrepreneur traits?
- b) What are the different food business opportunities available in India?
- c) How patent is different from trademark?
- d) Mention the conditions where food business license could be cancelled.
- e) How one can search for a business idea?
- f) What is the significance of a market research to an entrepreneur?
- g) What is target market?
- h) What are the objectives of financial managements?
- i) Write a note on the various sources for financial management.
- j) How budgeting influence the business?

2x10

PART-A

- Q.2** a) Enumerate the characteristics and functions of an entrepreneur. **5**
b) Discuss the case study of any successful entrepreneur consisting of the mindset and approach to get success. **15**
- Q.3** a) What is patent? Illustrate patentable and non-patentable objects. How one can file the patent application? **10**
b) What are the different licenses and conditions required for Food Business? Explain about the validity and renewal of food license. **10**

- Q.4** Describe the different sources to search for a business idea. Prepare a project report for a food business of your choice. **20**

PART-B

- Q.5** a) Indicate and explain about the 5 Ps for marketing with examples? **10**
b) What is marketing core concept? How organizational resources and opportunities affect the planning process. **10**
- Q.6** a) What do you understand by financial Management? Enumerate the various sources for financial management. **10**
b) Describe the plan and criteria for selection and purchase of land for food business. **10**
- Q.7** a) Differentiate between the term unit of sell and unit price? Discuss in detail about the Significance of break-even analysis. **10**
b) Discuss about cash flow analysis. What is budgeting and why is important for a business **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PLANT BIOTECHNOLOGY (BT-601A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following in questions:

- a) State the term differentiation, dedifferentiation and re-differentiation.
- b) What are gynogenic haploids?
- c) Define symmetrical and asymmetrical hybrids.
- d) Which is the most commonly used culture medium for plant cell and why?
- e) Define satellite RNA protection.

4x5

PART-A

Q.2 a) Explain various stages of micropropagation with suitable diagram. **12**
b) Write down short note on cellular totipotency. **8**

Q.3 a) Describe different methods for protoplast fusion. **5**
b) What are somatic cybrids and hybrids? **5**
b) What are the different licenses and conditions required for Food Business? Explain. **10**

Q.4 a) Describe the process of nitrogen fixation by bacteria **10**
b) Define the term symbiosis and antibiosis. **10**

PART-B

Q.5 a) Define genetic mapping. Explain gene mapping by two point test cross. **12**
b) Write down any one method for sequencing of DNA **8**

Q.6 a) Discuss agro bacterium mediated gene transfer method. **12**
b) Write down short note on marker genes. **8**

Q.7 a) Elaborate any two methods for virus resistance in plants. **12**
b) Discuss use of transgenic technology in quality improvement of crops. **8**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

MOLECULAR THERAPEUTICS (BT-832)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** from **PART-B.** Marks are indicated against each question.

Q.1 Answer briefly:

- a) BCG and DPT vaccines give immunity against which diseases?
- b) Do you agree that stem cell treatments are risk free if they come from your own body? Justify?
- c) What is the difference between somatostatin and somatotropin?
- d) Explain the role of streptokinase and urokinase in molecular therapy.
- e) How is transduction different from transfection?

4x5

PART-A

Q.2 a) Explain the extra and intracellular barriers in gene therapy. **12**
b) Classify the stem cells on the basis of potency. Give examples of each. **8**

Q.3 a) Answer the following:

- i) What was the name of first commercially available biosynthetic human insulin?
 - ii) Name the vector systems where recombinant insulins are generally produced?
 - iii) What does Novolin 70/30 mean? **3x3**
- b) Which type of viral vectors is preferred for long term expression of foreign genes? Give reasons. **11**

Q.4 a) How are clotting factors concentrates commercially made?

- b) Write short notes on:
i) iPSCs
ii) tPA

10x2

PART-B

Q.5 a) Fill in the blanks:

- i) Aluminium salts used in vaccines as _____ can occasionally cause a sterile abscess at the injection site.
- ii) The effectiveness of some live attenuated vaccines can be maintained during storage by the addition of _____.
- iii) The addition of trace amounts of _____ prevents bacterial contamination of tissue culture cells in which vaccine viruses are grown.
- iv) Thiomersal is the most common of the _____ used to prevent bacterial and fungal growth in multi dose vaccines.
- v) The polioviruses used in manufacturing IPV are inactivated by treatment with _____.
- vi) The immune response to some vaccines is enhanced by the addition of _____.

12

- b) Explain RNi mechanism diagrammatically in detail. **8**

Q.6 a) Discuss the types of drugs used for immunosuppression during organ transplant. **12**

- b) Which amongst polyclonal and monoclonal antibody is more specific for cancer therapy? Give reasons. **8**

Q.7 a) Explain diagrammatically RNAi. **10**

End Semester Examination, May 2019

M. Sc. - Second Semester

**BIOINFORMATICS AND COMPUTATIONAL BIOLOGY
(BT-S-204 / BT-S-204A)**

Time: 3 hrs.

Max Marks: **60**No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q1 is compulsory.** Attempt any **TWO** questions from **PART-A**, any **ONE** from **PART-B** and any **ONE** question from **PART-C**. Marks are indicated against each question.

Q.1 Answer in brief:

- a) What do you mean by other genomic region present in eukaryotic genome?
- b) In database searches what are the role of specificity and sensitivity?
- c) Highlight the importance of information technology in the field of Bioinformatics?
- d) Why do we need file format? Write down fasta file format?
- e) How constitutive genes are different from inducible gene?
- f) What do you mean by SNP? **2x6**

PART-A

- | | | |
|-----|---|-----------|
| Q.2 | a) How one can collect and store sequences in laboratory? | 9 |
| | b) Using appropriate example discuss how LAN is different from MAN | 3 |
| Q.3 | a) How chain termination method is automated? | 9 |
| | b) Discuss any DNA sequencing method? | 3 |
| Q.4 | Align the given sequence using dynamic programming for the given sequences ACCCTT and AGCCAT upto trace back using +1, -1 and 0 for match, mismatch and gap penalty respectively. | 12 |

PART-B

- | | | |
|-----|---|-----------|
| Q.5 | When a global MSA is performed what are the observations one can make from these sequences? | 12 |
| Q.6 | What are the different methods used for multiple sequence alignment? | 12 |
| Q.7 | Discuss in detail the different steps involved in genome analysis. | 12 |

PART-C

- | | | |
|-----|--|-----------|
| Q.8 | How comparative genome analysis helps in information extraction. | 12 |
| Q.9 | a) Briefly describe the steps followed in homology modeling.
b) How fold recognition could be applied for protein secondary structure prediction? | 6 |

End Semester Examination, May 2019
B. Tech. (Biotechnology) — Eighth Semester
CHEMOINFORMATICS AND DRUG DESIGN (BT-821A1)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What do you mean by descriptors?
- b) What is SMILE?
- c) Explain two medicinal databases used in chemoinformatics studies.
- d) What do you mean by de novo ligand design?
- e) Define partition coefficient.
- f) What are the features of Pharmacophore?
- g) Define chemo informatics.
- h) Explain ADME in context to physiological properties.

2½×8

PART-A

- Q.2 How graph theory is helpful in comparing two structures? Explain in detail pharmacophore modeling. **20**
- Q.3 What do you mean by molecular similarities? Give an account of physiochemical properties of pharmacophore. **20**
- Q.4 How chemical properties of a compound are calculated? What do you mean by structural similarity and diversity? **20**

PART-B

- Q.5 What do you mean by virtual screening? Discuss different methods used in virtual screening. **20**
- Q.6 a) What do you mean by molecular docking? **12**
b) Give an account of structure based method to identify lead compounds. **8**
- Q.7 a) What do you mean by QSARs? **10**
b) Explain quantitative measurements for biological and physiological properties. **10**

End Semester Examination, May 2019

M. Tech. (Biotechnology) – Second Semester

NUTRACEUTICALS AND FUNCTIONAL FOODS (PE-BT-M-226)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **FOUR** questions out of six, taking at least **ONE** question from each **UNIT**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) How nutraceuticals are classified? Explain with examples.
- b) Name the functional components and mechanism of actions of tomato, flaxseed, soybean and cruciferous vegetables?
- c) Explain the common techniques employed to purify isoprenoids.
- d) How EPA and DHA are isolated?
- e) Discuss the complications associated with obesity.

4×5

UNIT-I

- Q.2** a) Briefly discuss about CVD and how nutraceuticals are used as prophylactic or therapeutics to treat CVD? **10**
- b) Discuss the types of omega-3-fatty acids, their sources and the medical benefits. **10**
- Q.3** a) Why antioxidants are important for our health? Name the different sources of antioxidants and their medical benefits. **10**
- b) Discuss the role of dietary fibres, sources and various medical benefits. **10**

UNIT-II

- Q.4** a) How flavonoids are classified? Give 1 example in each class. **10**
- b) Name the different sources of carotenoids. Explain the extraction and purification procedures of carotenoids. **10**
- Q.5** a) Discuss the selection criteria and types of probiotics and prebiotics. **10**
- b) Explain the various medical benefits of probiotics. **10**

UNIT-III

- Q.6** a) What is diabetes? Explain different types of diabetes. **5**
- b) Discuss in detail the different nutraceutical options for the preventive or therapeutic intervention of diabetes mellitus. **15**
- Q.7** a) What types of research needed to improve nutraceuticals and functional food domain? **5**
- b) Give a detailed account of nutrigenomics and its applications in health industry. **15**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PLANT BIOTECHNOLOGY (BT-601A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) **What are gynogenic haploids?**
- b) **Differentiate between hybrid and cybrid.**
- c) **Define cytogenic and organogenic differentiation.**
- d) **Write down any two examples of abiotic stress resistance.**
- e) **Write a short note on 'Flavr Savr Tomato'.**

4×5

PART-A

- Q.2** a) **Define 'micro-propagation'. Explain different steps by taking suitable examples.** **10**
- b) **Explain anther culture for obtaining androgenic haploids.** **10**
- Q.3** a) **Explain the technique of cybridization and its application in detail.** **10**
- b) **Write different methods for protoplast isolation.** **10**
- Q.4** a) **Describe the process of nodulation in detail.** **10**
- b) **How we can produce pathogen free plants?** **10**

PART-B

- Q.5** a) **Discuss genetic linkage and gene mapping with suitable examples.** **12**
- b) **Write down any one method for sequencing of DNA.** **8**
- Q.6** a) **Discuss any two vectorless methods for gene transfer.** **12**
- b) **Write a short note on chimeric gene vectors with diagram.** **8**
- Q.7** a) **Write a note on any two methods for insect resistance in plants.** **12**
- b) **Discuss use of transgenic technology in crop improvement in detail.** **8**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Second Semester

BIOINFORMATICS AND COMPUTATIONAL BIOLOGY (BT-S-204A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Briefly answer:

- | | |
|--|----------|
| a) What do you mean by orthologs? How it is different from paralogs? | 2 |
| b) Differentiate between PAM 250 and BLOSUM 62? | 3 |
| c) Discuss different types of sequence repeats. | 3 |
| d) What is ORF? How it is different from CDS? | 2 |
| e) How global sequence alignment is different from local sequence alignment? | 2 |

UNIT-I

- Q.2 a) How sequence is collected and stored in laboratory? **9**
b) Using appropriate example discuss cDNA. **3**

- Q.3 a) What do you mean by NGS? **4**
b) Discuss Sanger method of DNA sequencing? **8**

UNIT-II

- Q.4 Align the given sequence using dynamic programming for the given sequences GCTGTT and GTTCAT upto trace back using +2, -1 and 0 for match, mismatch and gap penalty respectively. **12**

- Q.5 a) What are the different methods used in phylogenetic prediction? **4**
b) Using distance method construct phylogenetic tree taking five species. **8**

UNIT-III

- Q.6 a) Discuss the different steps involved in ORF prediction. **8**
b) What are the information one can extract from comparison of different genome? **4**

- Q.7 a) Briefly describe functional classification of protein. **7**
b) How fold recognition is used in protein structure prediction? **5**

End Semester Examination, May 2019
M. Sc. (Biotechnology) – Second Semester
BIOETHICS, BIOSAFETY AND IPR (BT-S-205D1)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE** question from each **Unit.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- | | |
|--|----------|
| a) What is difference between values and ethics? | 3 |
| b) Define trademark. | 2 |
| c) What is biological containment? | 2 |
| d) Give two example of bio-hazardous material. | 2 |
| e) What is a bioterrorism attack? | 3 |

UNIT-I

- Q.2** a) What are the public acceptance issues in biotechnology? **6**
b) Explain the different benefit associated with biosafety. **6**

- Q.3** a) Illustrate bioethics vs business ethics. **6**
b) Discuss international relations and globalization in biotechnology. **6**

UNIT-II

- Q.4** a) Discuss different biosafety assessment procedures in India. **8**
b) What are the benefits of GM foods? **4**

- Q.5** a) What is the general content of the cartagena protocol? **9**
b) What is an example of a biological weapon? **3**

UNIT-III

- Q.6** a) Define 'patents'. What are the basic requirements and conditions for patentability? **10**
b) What does it mean to have a copyright? **2**

- Q.7** a) Why are patents important to pharmaceuticals? **8**
b) What does plant variety protection mean? **4**

End Semester Examination, May 2019

B. Tech. — First Semester

MATHEMATICS-I (BSC-MA-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the Following questions:

a) Evaluate:

$$\text{i) } \Gamma\left(\frac{3}{2}\right) \quad \text{ii) } B(4, 6)$$

b) Find the area between the x-axis and the curve $y = \sin x$ from $x=0$ to π .

c) Find the maxima and minima for the curve $f(x) = x^3 - 3x + 2$.

d) Find the n^{th} derivative of $f(x) = \log(ax+b)$.

e) Is it possible to write Fourier sine series for the function $f(x) = \cos x$ in the interval $(-1, 1)$?

f) What is the half range cosine series for $f(x) = k$ in $(0, 2)$.

g) Evaluate the following limit: $\lim_{\substack{x \rightarrow 1 \\ y \rightarrow 2}} \frac{3x^2y}{x^2 + y^2 + 5}$

h) Verify that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$, where $u(x, y) = \log\left(\frac{x^2 + y^2}{xy}\right)$.

i) If $u = \sin^{-1}\left(\frac{x+2y+3z}{\sqrt{x^8+y^8+z^8}}\right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} + 3 \tan u = 0$.

j) If $A = \begin{bmatrix} 3 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ What are the eigen values of A^{-1} . **2×10**

PART-A

Q.2 a) Show that: $\frac{B(p,q+1)}{q} = \frac{B(p+1,q)}{p} = \frac{B(p,q)}{p+q}$ **10**

b) Evaluate the following integrals

$$\text{i) } \int_0^{\frac{\pi}{2}} \frac{2+3 \sin x}{\cos^2 x} dx \quad \int_0^{\pi/4} \sec^2 x dx \quad \text{span style="float: right;">**10**$$

Q.3 a) Verify Rolle's Theorem for the function: $f(x) = 2 + (x-1)^{2/3}$, $x \in [0, 2]$. **10**

b) Expand $f(x) = \log(1-x)$, $\forall x \in [-1, 1]$. **10**

Q.4 a) Test for the convergence of the series $\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!} x^{2n}$, $x > 0$ **10**

b) Find the Fourier cosine series of $x(\pi - x)$ in $(0, \pi)$. **10**

PART-B

Q.5 If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and $\|\vec{r}\| = r$, show that:

$$\text{i) } \text{grad } r = \frac{\vec{r}}{r};$$

$$\text{ii) } \text{grad}(1/r) = -\frac{\vec{r}}{r^3}$$

iii) $\text{grad} \frac{1}{r^2} = -\frac{2\vec{r}}{r^4}$

iv) $\nabla r^n = n r^{n-2} \vec{r}$

v) $\nabla(\vec{a} \cdot \vec{r}) = \vec{a}$, where \vec{a} is a constant vector.

20

Q.6 a) Find the value of λ for which the equations:

$$(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0; \quad (\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$$

$$2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$$

10

b) Find the Eigen values and Eigen vectors of the matrix: $A = \begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$

10

Q.7 a) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} \right)^2 u = \frac{-9}{(x+y+z)^2}$

10

b) Find the characteristic equation of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$. Also find the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$

10

End Semester Examination, May 2019

B. Tech. — Sixth Semester

FOOD PACKAGING TECHNOLOGY (BT-637)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) State the various types of food packaging.
- b) Briefly mention the various requirements needed in the process of packaging and labeling.
- c) What is the shelf life of a food material?
- d) Set the distinction between the raw food from processed food.
- e) Signify the importance of maintaining the aseptic conditions during food packaging. **4x5**

PART-A

Q.2 a) Why do we need to package food? What are the various aspects of food packaging? **10**
b) Justify the concept of green packaging technology. **10**

Q.3 Discuss:

- a) Whole sale packaging.
- b) Recommended date of last consumption.
- c) Labeling.
- d) Regulations act 2011.
- e) Best before date. **4x5**

Q.4 a) Discuss various types of food packaging elaborating their characteristic features. **10**
b) What are the preventions and precautions required during packaging to avoid deterioration of food material for a long time? **10**

PART-B

Q.5 a) How would one consider the packaging of processed food? How would these processes be any different from raw food? **10**
b) Describe the packaging of:
i) Meat.
ii) Fresh fruits and vegetables. **5x2**

Q.6 a) Mark a distinction between the packaging requirement of baked food products from beverages. Support your answer with examples wherever necessary. **14**
b) What are the different types of cereals available for packaging? **6**

Q.7 Discuss the process of:

- a) Canning.
- b) Modified atmospheric packaging.
- c) Sterile packaging conditions.
- d) Recycling of packaging material. **5x4**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

MOLECULAR DIAGNOSTICS (BT-633)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are snRNA, snoRNA and scRNA?
- b) Why are eukaryotic genes spilt?
- c) Differentiate between paraacentric and pericentric inversion with a help of a diagram.
- d) What are CD markers? State their significance.
- e) Enlist the applications of DNA testing.

4x5

PART-A

- Q.2 a) Describe the various steps involved in digital data processing of whole exome sequencing. **10**
- b) Discuss the different levels of DNA packaging into chromosomes. **10**
- Q.3 a) What are the various reasons that lead to genomic instability? **10**
- b) Explain the various mutations developed at the level of chromosomes. **10**
- Q.4 a) How does technology using restriction enzyme help in mutation identification? **10**
- b) Describe in detail the process of Sanger sequencing. What are its limitations? **10**

PART-B

- Q.5 a) What are the different methods to identify hereditary disorders pre-symptomatically? **10**
- b) Briefly describe the various molecular diagnostic methods for identifying herpes. **10**
- Q.6 a) Write short notes on FACS. **10**
- b) Describe the role of HLA and its genotyping in disease diagnosis and treatment. Add a note on its significance. **10**
- Q.7 a) Explain the pro and cons of genetic testing using suitable examples. **10**
- b) Why is DNA testing still not a gold standard for hereditary disease diagnosis? **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DNA MICROARRAY TECHNOLOGY (BT-631)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define ordered array and list the basic criteria for ordered array.
- b) What are the different types of spot masks developed during image segmentation?
- c) Why do we construct and MVA plot?
- d) Differentiate between squared Euclidean and standardized Euclidean distance.
- e) Enlist the limitations of network modeling.
- f) What is the main purpose of principle component analysis?
- g) Briefly explain the significance of resequencing.
- h) List the different databases used in system biology.
- i) How do you perform factorial design based experiment?
- j) Define redundant and Parsimonious network.

2x10

PART-A

- Q.2** a) How so you perform a simple SAGE experiment? Illustrate with neat labeled diagram. **10**
- b) Explain Affymetrix technology of creating microarray. **10**
- Q.3** a) Describe the method of constructing PCA. **10**
- b) What is k-means clustering? Explain. **10**
- Q.4** a) How do you identify and rectify dye bias and print tip bias in a micro array experiment? **10**
- b) Discuss the different methods of estimating expression indices. **10**

PART-B

- Q.5** a) Explain the steady state model with an example. **15**
- b) Differentiate between time series analysis and time series approach. **5**
- Q.6** a) Write a short notes on 'systems biology'. **10**
- b) How do you evaluate the performance of a molecular classifier? **10**
- Q.7** a) How do we evaluate performance of microarray data? **10**
- b) Explain the significance of independent verification. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PHARMACEUTICAL TECHNOLOGY (BT-621A1)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- | | |
|---|----------|
| a) Why do we need Pharmacopoeias? | 3 |
| b) What is the difference between quality control and quality assurance? | 3 |
| c) Enlist some new drug delivery systems. | 3 |
| d) What is difference between 'Purified water' and 'Water for injection'? | 3 |
| e) Explain the principle of any one type of targeted drug delivery systems. | 3 |
| f) What is the effect of drug solubility on bioavailability? | 3 |
| g) Explain giving example any one types of drug incompatibilities. | 2 |

PART-A

- Q.2** a) Discuss the relevance and importance of practicing GMP in pharmaceutical industries. **10**
b) What is the purpose of investigational New Drug Application (INDA)? **10**

- Q.3** a) Discuss the types of pharmaceutical additives and their applications. **10**
b) Describe in detail the principle of any one type of sustained release drug delivery system. **10**

- Q.4** a) Contrast between physiochemical and therapeutic drug incompatibilities. **10**
b) How do disease states affect drug absorption? **10**

PART-B

- Q.5** a) Describe in detail manufacture of 'tablets'. **12**
b) Name and briefly describe different types of tablet packing. **8**

- Q.6** a) What are suppositories? Discuss the formulation of suppositories. **10**
b) Give the desirable properties of ideal ointments. Describe the typical properties of different types of bases of ointments. **10**

- Q.7** a) What are the physiological barriers to drug distribution? **7**
b) How does gastrointestinal pH affect drug absorption? **7**
c) Explain the metabolism of drugs. **6**

End Semester Examination, May 2019

B. Tech. (Biotechnology) – Sixth Semester

BIOMATERIALS AND DRUG DELIVERY (BT-622A1)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) **Name two implants for metals and polymers each that are used as biomaterials.**
- b) **What is a ceramic? How is it different from metal?**
- c) **How is liposome different from or similar to nanoparticles?**
- d) **Explain the significance of PEGylation.**
- e) **What do you understand by controlled delivery mechanism?**

4×5

PART-A

Q.2 a) **What are different categories of biomaterials? Explain with suitable examples.** **10**

b) **Explain the significance of pyrolytic carbon as biomaterial.** **10**

Q.3 a) **Discuss the phenomena of blood-biomaterial interactions.** **12**

b) **How do biomaterials get recognized in the host body? What are different factors involved in it?** **8**

Q.4 a) **What are ester and amide linkages? What role do they play in hydrolysis?** **10**

b) **Discuss the factors responsible for polymer erosion.** **10**

PART-B

Q.5 a) **How do hydrogels function?** **8**

b) **Discuss the various methods of synthesis for hydrogels.** **12**

Q.6 a) **How can one increase the circulation time of nanoparticles? Explain its significance.** **10**

b) **Write short notes on: (i) Polymerosomes (ii) Microemulsions.** **10**

Q.7 a) **What do you understand by biomineralization?** **4**

b) **Explain polyelectrolyte gel swelling.** **6**

c) **Write short notes on (i) targeted drug delivery (ii) Prodrug** **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

GENETICS AND CYTOGENETICS (BT-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is the difference between penetrance and expressivity of a gene?
b) Define lethal alleles with one example.
c) What are accessory chromosomes?
d) Define maternal effect.
e) Explain genetic drift. **4×5**

PART-A

- Q.2 Write down notes on the following:
a) Mendal's law of independent assortment with example.
b) Dominant epistasis with example. **10×2**
- Q.3 a) Define euploidy. Discuss origin and types of polyploidy.
b) Explain chromosomal theory of inheritance. **10×2**
- Q.4 Explain the following:
a) Polytene chromosomes with diagram.
b) Repetitive and non-repetitive DNA. **12**
8

PART-B

- Q.5 a) Define genetic mapping. Explain gene mapping by two point test cross.
b) Illustrate different mechanism of DNA repair. **10**
10
- Q.6 a) Explain extranuclear inheritance with example.
b) Write down note on cytoplasmic male sterility. **15**
5
- Q.7 a) Illustrate Hardy-Weinberg Principle.
b) Differentiate between qualitative and quantitative inheritance. **10**
10

End Semester Examination, May 2019

B. Tech. – First Semester
MECHANICS (BSC-PH-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Write the expression for velocity in spherical polar coordinates.
- b) How will you apply to third law of motion in the case of horse pulling a cart?
- c) Write relation between the force and the torque.
- d) What is non-conservative force?
- e) What do you understand by non-inertial frames of reference?
- f) State the equation for simple harmonic motion.
- g) What is resonance?
- h) Define the rigid body motion.
- i) Is the velocity of particle under uniform rotational motion constant?
- j) Give two examples of three dimensional rotational motions.

2×10

PART-A

- Q.2**
- a) Evaluate the transformation of vector components under rotation. **8**
 - b) Discuss the fundamental forces of nature. **7**
 - c) Write a short note on 'constraints'. **5**
- Q.3**
- a) Show that for a conservative force field $f(r)$, i.e. $\nabla \times f = 0$, we can define a scalar function $V(r)$ such that $F = -\nabla V$. **8**
 - b) Prove that for a particle subjected to a central force, the angular momentum is a constant of motion. **7**
 - c) Explain in detail about elliptical orbit. **5**
- Q.4**
- a) What is Foucault pendulum? How does it enable us to demonstrate the rotation of the earth about its own axis? **10**
 - b) Explain the fictitious forces. **5**
 - c) Discuss in detail about weather systems. **5**

PART-B

- Q.5**
- a) Write differential equation for a damped harmonic oscillator. Solve the differential equation and discuss the under damped case (low damping) **15**
 - b) What is forced oscillations? Write differential equation for forced oscillations. **5**
- Q.6**
- a) What is the difference between rectilinear and rotational motion? **5**
 - b) Prove that torque acting on a rigid body about a fixed axis is equal to the product of angular acceleration and moment of inertia about the same axis. **8**
 - c) Discuss the Euler's laws of motion. **7**
- Q.7**
- a) Evaluate the expression for rate of change of a vector rotating with angular velocity. **10**
 - b) Derive the expression for moment of inertia tensor. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

APPLIED PHYSICS (BSC-PH-103)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the main components of a laser device?
 - b) A hologram contains the information about:
 - i) amplitude of the object
 - ii) phase of the object
 - iii) both 'a' and 'b'
 - iv) none of these
 - c) Core of an optical fibre is made of:
 - i) clear plastic or glass
 - ii) copper
 - iii) aluminium
 - iv) none of these.
 - d) Why optical fibre communications are important?
 - e) How presence of traps modifies photocurrent?
 - f) What is fill factor of solar cell?
 - g) The number of atoms present in the fcc lattice is:
 - i) 1
 - ii) 2
 - iii) 3
 - iv) 4
 - h) X-rays are used to detect crystal structure. Why?
 - i) Give two reasons why the properties of a materials change at nanoscale.
 - j) 1 metre = _____ nanometre:
 - i) 10^{-9}
 - ii) 10^9
 - iii) 10^{-10}
 - iv) 10^{10}

2x10

PART-A

Q.2 a) Discuss Einstein's coefficients. Derive the relations between them. **10**
b) Discuss the construction and reconstruction of image on a hologram. Also give important applications of holography. **10**

Q.3 a) Derive the expression for the numerical aperture of an optical fibre. A light ray enters from air to a fiber. The refractive index of air, core and cladding are 1, 1.5 and 1.48 respectively. Find the critical angle and numerical aperture. **10**

b) Describe the 'Step index fibre' and 'Graded index fibre'. How optical fibres can be used in medical and communication fields? **10**

Q.4 a) What is photoconductivity? Discuss simple model of a photoconductor. **10**

PART-B

Q.5 a) Explain the method for determination of Miller Indices. Also derive the formula for the distance between two adjacent planes of a simple cubic lattice. **10**
b) Discuss in brief following defects in crystals: point, line, surface and volume, Frenkel and Schottky defects. **10**

Q.6 a) Describe the origin, production and properties of X-rays. **10**
b) Write a short note on any two of the following:
i) Bragg's law
ii) Raman Spectroscopy
iii) Rutherford Back Scattering Spectroscopy. **10**

- Q.7** a) What are nanomaterials? Discuss briefly their properties and applications. **10**
 b) Explain in brief laser evaporation and carbon arc methods for fabrication of carbon nanotubes. **10**

End Semester Examination, May 2019

B. Tech. (Biotechnology) – Seventh Semester

CHEMOINFORMATICS AND DRUG DESIGN (BT-821A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are Randic and Chi index? Explain.
- b) What is structural similarity? Explain its role in VS.
- c) What are the different types of neural networks? Explain.
- d) What is scoring in drug designing?
- e) What is Hansch analysis? Where is it used?

4x5

PART-A

- Q.2** a) Explain Lipinski's rule of five. How is it used in chemoinformatics? **10**
b) Explain ADMET. Will the optical isomers of a compound affect the ADMET properties? Give reasons with examples. **10**
- Q.3** What is a pharmacophore? Explain with examples. **20**
- Q.4** a) Explain the processes involved in optimizing "Drug likeness". **10**
b) Explain:
 - i) Kappa index.
 - ii) Partition coefficient.**10**

PART-B

- Q.5** a) What are protein libraries? Name five databases. **10**
b) How is ligand designed in chemoinformatics? **10**
- Q.6** a) What is steric analysis carried out? Explain its role in QSARs. **10**
b) Explain role of neural networks in drug designing. **10**
- Q.7** Explain role of HTS in chemoinformatics. **20**

End Semester Examination, May 2019

M. Tech. – First Semester

RESEARCH METHODOLOGY AND IPR (COM-100)

Time: 3 hrs

Max Marks: **50**

No. of pages: **1**

Note: Attempt any **FIVE** questions. Marks are indicated against each question.

- | | | |
|-----|--|-----------|
| Q.1 | a) Describe the steps to file a patent in India and outside India. | 5 |
| | b) Explain whether software is patentable in India? Is software a service or product? | 5 |
| Q.2 | a) What do you understand by IPR? | 5 |
| | b) Write short notes on following:
i) Scope of patent rights.
ii) Licensing and Technology transfer. | 5 |
| Q.3 | What do you understand by Plagiarism in research? Describe distinct forms of Plagiarism and how it can be avoided. | 10 |
| Q.4 | Illustrate the steps to develop a research proposal and its format. | 10 |
| Q.5 | a) What are the different formats of referencing? Give the format for Harvard referencing?
b) What is a bibliography? Where is bibliography found in a report? Differentiate between references and bibliography. | 5 |
| Q.6 | Describe the process of reviewing research proposals. | 10 |
| Q.7 | What do you understand by research problem? Describe various errors made by researchers while selecting a research problem. | 10 |

End Semester Examination, May 2019

B. Tech. – First Semester

MATHEMATICS-I (BSC-MA-101 (CS))

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 a) Evaluate $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$.

b) Find the n^{th} derivative of $y = (a \cdot x + b)^n$.

c) Find the rank of $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 0 & 2 \\ 3 & 0 & 3 \end{bmatrix}$.

d) Give an example of symmetric and skew symmetric matrix.

e) State rank nullity theorem.

f) Check for linear dependence the vectors $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$.

g) Find inverse of A if $A = \begin{pmatrix} 1 & 2 \\ 2 & -3 \end{pmatrix}$.

h) Explain composition of two maps.

i) State Lagrange's mean value theorem.

j) Find the product of Eigen values of $A = \begin{pmatrix} 1 & 7 & 8 \\ 2 & 0 & 1 \\ 3 & 1 & -1 \end{pmatrix}$.

2×10

PART-A

Q.2 a) Evaluate $\int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$.

10

b) Find the volume generated by the revolution of $r = 2a \cos \theta$ about the initial line. **10**

Q.3 a) Expand $f(x) = \log(1-x)$ $\forall x \in [-1, 1]$.

10

b) Prove that

$$\sin ax = ax - \frac{a^3 x^3}{3!} + \frac{a^5 x^5}{5!} + \dots$$

$$+ \frac{a^n x^n}{n!} \left(a\theta x + n \frac{\pi}{2} \right)$$

10

Q.4 a) Solve by Gauss Jordan Method:

$$x + y + z = 2$$

$$2x + y - 3z = 5$$

$$x + y - 2z = 3$$

10

b) For what values of λ and μ ; the system has

i) a unique solution;

ii) no solution

iii) infinite solutions

$$2x + 3y + 5z = 9$$

$$7x + 3y - 2z = 8$$

$$2x + 3y + \lambda z = \mu$$

10

PART-B

Q.5 a) Let $T: R^3 \rightarrow R^3$ defined by $T(x, y, z) = (3x, x-y, 2x+y+z)$ is invertible and find T^{-1} . **10**

b) Show that

$B = \{(1, 1, 1), (1, -1, 1), (0, 1, 1)\}$ is a basis of R^3 . **10**

Q.6 a) Find Eigen values and Eigen vectors of $A = \begin{pmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{pmatrix}$. **10**

b) Verify 'A' is orthogonal, where $A = \frac{1}{3} \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{pmatrix}$. **10**

Q.7 a) Find a linear transformation

$T(x, y)$ where $T: R^2 \rightarrow R^3$ defined by $T(2, -5) = (-1, 2, 3)$ and $T(3, 4) = (0, 1, 5)$ **10**

b) Find the orthogonal and orthonormal basis of vector:

$x_1 = (1, -1, 1, -1)$, $x_2 = (1, 1, 3, -1)$, $x_3 = (-3, 7, 1, 3)$ using Gram Schmidt orthogonalization process. **10**

End Semester Examination, May 2019

B. Tech. (Biotechnology) – Fifth Semester

RECOMBINANT DNA TECHNOLOGY (BT-501 / BT-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are adapters? What is their role in rDNA technology?
- b) What do you understand by the term "Illegitimate recombination"? Where does it occur?
- c) What is the role of left and right borders in *Ti* plasmid?
- d) What is the principle behind Maxam and Gilbert DNA sequencing method?
- e) How can replacing labile amino acids be useful in protein engineering?
- f) How can insertional mutagenesis be used in gene tagging?
- g) What is the role of protein purification tags in an expression vector?
- h) What are the problems associated with *E. coli* expression system?
- i) What is the term equivalent to RNAi, in fungi? Write down its principle.
- j) Expand RISC and write down its role.

2×10

PART-A

Q.2 Write in detail about the various enzymes used in rDNA technology. Also mention their types and functions. **20**

Q.3 a) Write a comprehensive note on types of vectors used in rDNA technology. **10**
b) Write in detail about the overall infection process of *Agrobacterium*. How can it be used to transfer the gene of interest in plant? **10**

Q.4 a) Write about the detailed methodology to study only the expressed genes of an organism. **10**
b) With the help of schematic diagram explain Sanger sequencing method. **10**

PART-B

Q.5 Give detailed account of various PCR based molecular marker. Also mention their advantages and disadvantages. **20**

Q.6 a) Write a note on 'promoters used in unicellular eukaryotic expression system'. **12**
b) Write a note on 'prokaryotic hybrid promoter'. **8**

Q.7 a) Write a note on transgenic plants which are used against biotic stress. **10**
b) Write down the applications of gene therapy. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

CONCEPTS IN IMMUNOLOGY (BT-307)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following in brief:

- a) If microorganisms do penetrate the body, two main defensive operations come into play, name them.
- b) Which cells can present antigen to CD8+ T cells?
- c) What is the difference between epitope and paratope?
- d) IgG and its significance
- e) Differentiate between Hapten and Adjuvant.
- f) How does Fab fragment different from Fc fragment?
- g) How can immune system distinguish between tumor cell and normal cell?
- h) What is live attenuated vaccine and its disadvantages?
- i) What is chemotaxis?
- j) What kind of mast cell mediators are stored in granules and released upon degranulation?

2x10

PART-A

Q.2 a) What are different antigen presenting cells? Explain different types of dendritic cells. **10**
b) Write in detail the different barriers of the innate defense **10**

Q.3 a) What are cytokines? Explain its types and function. **10**
b) What are biological characteristics of an antigen? Explain the characteristics of an antigen antibody reaction. **10**

Q.4 a) Discuss about the mechanism of DNA rearrangement. **10**
b) Discuss briefly the antigen processing either by MHC class I or class II pathway. **10**

PART-B

Q.5 a) Give an account on HAT medium and its application in immunology. How it is important in the selection of MAB? **10**
b) Discuss how body fights against a bacterial or viral infection. **10**

Q.6 a) Give full form of FACS. Write the principle and application of FACS. **10**
b) Explain the principles, procedure and applications of ELISA in medicine. **10**

Q.7 a) Describe the various disease states caused by autoimmunity. What are the modern methods used in the treatment of autoimmune diseases. **10**
b) Discuss the importance of clinical organ transplantation in 21st century. **10**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

ANIMAL BIOTECHNOLOGY (BT-S-301 / BT-S-301A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE question** from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each marks.

Q.1 Answer Briefly:

- a) List down the major differences between animal, plant and microbial cells.
- b) What is micromanipulator?
- c) Why are animal cells cultured in CO₂ incubator?
- d) Explain the role of apoptotic processes in normal organism.
- e) What do you understand by 'study of somatic cell genetics'?
- f) What is the role of enzyme telomerase?

2×6

UNIT-I

- Q.2** a) Describe in detail the procedure for cryopreservation of animal cells. **6**
b) Explain the role of different constituents of serum in animal cell culture medium. **6**
- Q.3** a) What are the major components of balanced salt solutions? **6**
b) Why is phenol red added to the animal cell culture medium? **6**

UNIT-II

- Q.4** a) Explain any one method for measurement of cell viability. **6**
b) Compare the characteristics of transformed and normal cell. **6**
- Q.5** Describe in detail the different methods of cell synchronization. **12**

UNIT-III

- Q.6** a) What are the sources of stem cells? **6**
b) Give applications of stem cell technology. **6**
- Q.7** a) Enlist the design considerations for scale up of animal cell culture. **6**
b) What is the significance of studying somatic cell genetics? **6**

End Semester Examination, May 2019

M.Sc. (Biotechnology) – First Semester

BIOMOLECULES (BT-S-103A)

Time: 3 hrs

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory.** Taking at least **ONE question** from each Unit. All questions carry equal marks

- Q.1 a) Does ketotriose exist in D or L form? State reason of your answer.
b) What is zwitterions?
c) Name and write the structure of carbohydrate present in milk.
d) Why is TCA cycle known to be amphibolic in nature?
e) Draw the structure of NAD.
f) What is the role of SDS in SDS-PAGE?

2x6

UNIT-I

- Q.2 a) Discuss the Henderson-Hasselbalch equation and its applications. **6**
b) Explain the structure and functions of beta sheets and tropocollagen. **6**
- Q.3 Write short notes on:
a) Animal starch.
b) Phosphate esters of nucleosides.
c) Aromatic amino acids. **4x3**

UNIT-II

- Q.4 a) Write a note on various interactions and bonds involved in formation of tertiary structure of proteins. **6**
b) Write about the principle of various chromatographic techniques used in protein purification. Write in detail about the chromatographic technique in which the yield of purified protein is quite low however the specific activity of that purified protein is very high. **6**
- Q.5 Write notes on:
a) Ramachandran Map.
b) Applications of spectroscopic methods in protein analysis. **6x2**

UNIT-III

- Q.6 a) Depending on the availability of oxygen what are the various fates of pyruvate?
b) With the help of an example write down the transamination reaction in amino acid metabolism.
c) What do you understand by acid base balance in body fluids? Write a note on bicarbonate buffer system existing in human body. **4x3**
- Q.7 a) Write the various complexes and steps involved in electron transport chain in details. **8**
b) Name the scientist who discovered urea cycle. Write down the structure of urea and the source of Nitrogen and Carbon in urea formation. **4**

End Semester Examination, May 2019

B. Tech. – Third Semester

BIOCHEMICAL CALCULATIONS (BT-306 / BT-306B / BT-306C)

Time: 3 hrs

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- The mass of an electron is 9.1×10^{-31} kg. How many electrons will be there in 1 kg and 1 g, respectively?
- How many milliliters of 2.00 M copper sulfate solution must be added to 165mL of water to achieve a 0.300 M copper sulfate solution?
- Explain group displacement law with examples.
- What is Millon's Test? Explain.
- What is V_{max} and K_m ? How are they related?

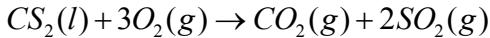
4x5

PART-A

- Q.2**
- A student carefully pipets 25.0mL of 0.525 M NaOH into a test tube and places it into a small beaker to keep it from spilling and then pipets 75.0mL of 0.355 M HCl into another test tube. He accidentally knocks the test tubes together hard enough to break them and their respectively contents combine in the bottom of the breaker. What is the pH of the resulting solution? Is the solution now formed acidic or basic? **10**
 - Given specific heat capacity of substance 'A' is 3.8 J/g/K and that of 'B' is 0.4 J/g/K. Which of the two is a good conductor of heat and why? Also, if both are liquids which one will be preferred for use as a coolant? **4**
 - What is buffering capacity? How is it related to pH and pKa? Explain with equations. **6**

- Q.3**
- What do you understand by specific heat in constant volume and constant pressure? How are they related to gas constant? **6**

- b) What is the value for ΔH for the following reaction?



Given:



10

- c) What is a titrant? Explain the role of indicator in titrations? **4**

- Q.4**
- How is pH related to pKa? Derive. What does a lower value of pKa indicate? **10**
 - A solution contains Cu^{2+} ions at a concentration of 3×10^{-4} M. What is the Cu^{2+} concentration in ppm? Given density of water=1mg/mL and At. Mass of Cu=63.55g. **6**
 - What are the relationship between mass, density and specific gravity? Explain with examples. **4**

PART-B

- Q.5**
- How does a spectrophotometer function? Explain in detail. **10**
 - What do you understand by coupled assays? **2**
 - Derive the value of K_m if V_o is half of V_{max} . **6**
 - What is the relationship between half life and average life of a radioactive isotope? **2**

- Q.6**
- What is feedback inhibition? Why is it important in regulating enzyme activity? **4**

- b) What is the absorbance of
i) A solution with a transmittance of 0.570
ii) A solution with 43.5%T
iii) A 0.084mM X (aq) in a 5.00 cm cell if the molar absorptivity of X is 365.
iv) 59.5% of photons are transmitted through a cell
v) A solution with 96.6%T 10
c) Derive mathematically Briggs Haldane equation. 6
- Q.7 a) What is Hopkin's Cole test? Explain 4
b) Discuss:
i) Ninhydrin reaction
ii) Alpha decay
iii) Nucleic acids
iv) Michaelis Menten eugtion
v) Flurometer 10
c) Find the half-life of a radioactive element, if its activity decreases for 1 month by 10% 6

End Semester Examination, May 2019

M.Sc. (Biotechnology) – Third Semester

PLANT BIOTECHNOLOGY (BTS-302A)

Time: 3 hrs

Max Marks: **60**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all; taking at least **ONE question** from each **Unit**. **Q.1 is compulsory.** All questions carry equal marks.

Q.1 Answer briefly:

- a) Differentiate between dedifferentiation and redifferentiation.
- b) Give any two examples of microelements and macroelements.
- c) Define gynogenic haploids.
- d) What are binary vectors?
- e) What do you mean by satellite RNA protection?
- f) Classify tumor cells on the basis of opine production.

2x6

UNIT-I

Q.2 a) Explain the technique of embryo culture with a suitable diagram. **8**
b) Describe enzymatic method for protoplast isolation. **4**

Q.3 a) Discuss microspore culture for obtaining androgenic haploids. **7**
b) Write a note on significance of germplasm conservation. **5**

UNIT-II

Q.4 a) Discuss the role of virulence proteins in transfer of 'T-DNA' from Agrobacterium to host a plant cell. **8**
b) Mention the factors that assist in integration of T-DNA into host genome. **4**

Q.5 Write notes on (**any two**) of the following:
a) Binary vectors.
b) Viral vectors.
c) Electroporation. **6x2**

UNIT-III

Q.6 a) What is the role of antioxidant enzymes in abiotic stress resistance in plants? **7**
b) Mention few examples of genetic transformation for improving productivity in plants. **5**

Q.7 Discuss the technique of RFLP along with its applications. **12**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

INTRODUCTION TO BIOMATERIALS (BT-532)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 a) Answer the following questions:

- i) What properties make a polymer smart biomaterial?
- ii) Explain the quadrilateral of material science and its role in biomaterials.
- iii) How can one increase bioactivity of biomaterials by incorporation of adhesion factors?
- iv) What are the key processes occurring during the *in vitro* and *in vivo* phases of tissue formation and maturation? **4×4**

b) State whether the following statements are True or False. Give suitable reasons:

- i) Ideal biomaterial will promote embolism.
- ii) A biomaterial will always be bioinert. **2×2**

PART-A

Q.2 a) What are the applications of porous biomaterial? Also, what are the parameters should be considered during the design of such a material? **10**

b) Explain the different mechanical properties studied in designing a biomaterial. **10**

Q.3 a) Explain the tensile stress-strain curve for a ductile material. **10**

b) What is protein recognition of biomaterials in biological systems? Explain in detail. **10**

Q.4 a) Which class of biomaterials is employed for?

- i) Dental implants.
 - ii) Ophthalmic biomaterials. **5×2**
- b) List five important optical and electrical properties studies for a biomaterial. **10****

PART-B

Q.5 Discuss briefly the different techniques used for implant evaluation. **20**

Q.6 a) How does a metallic biomaterial degrade in a biological system? **4**

b) What are the different parameters considered for bioreactor with respect to tissue engineering? **4**

c) Discuss in detail different blood coagulation factors involved in blood-material interactions. **12**

Q.7 a) What is inflammation? How is it related to wound healing? **10**

b) What are haptens? Discuss hypersensitivity with respect to biomaterials. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

BASIC VIROLOGY (BT-534)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Who gave the first evidence of existence of viruses?
- b) What are oncoviruses?
- c) Which is the most accepted viral classification system?
- d) EBV refers to _____.
- e) What is vaccination?
- f) Differentiate between lysis and lysogeny.
- g) What are baculoviruses?
- h) How HIV and AIDS are different?
- i) Name two subtypes of HPV.
- j) What is the difference between a prion and a virion?

2×10

PART-A

- Q.2** a) How viruses are cultivated in in-vitro conditions? **10**
b) What is the process of purification of viruses? Explain different methods. **10**
- Q.3** How negative strand RNA viruses replicate? Illustrate with example. **20**
- Q.4** Highlight the advancement of modern approaches over conventional vaccines. **20**

PART-B

- Q.5** a) How lambda phages and M13 phages are utilized as vectors in gene therapy? **10**
b) Discuss about the role of adenoviruses in gene therapy. **10**
- Q.6** What is viral containment? How bio safety is decided before starting the work on viruses? **20**
- Q.7** Discuss in detail the replication and pathogenesis of HPV. What are the problems being faced in its vaccination programs and associated risk involved? **20**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

FOOD PROCESS TECHNOLOGY (BT-538)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Give two importance of food process technology.
- b) Define thermal death time and Z value in food processing.
- c) Write down two basic steps for insect control.
- d) What do you mean by processing of cereals?
- e) Define "Pasteurization".
- f) When milk is defined as clean?
- g) What is the definition of small scale in milk processing?
- h) Write down three main purposes for egg production.
- i) Define gutting in term of fish processing.
- j) What do you mean by GMP for fruit and vegetable production?

2×10

PART-A

- Q.2** a) Give the importance of food processing technology. **10**
b) What do you mean F, Z and D values? **10**
- Q.3** a) Define "Infestation". What are the sources and basic steps for control of infestation? **12**
b) Discuss drying and milling of grains. **8**
- Q.4** a) Explain the processing of fruits by giving some example. **10**
b) Give some recent developments in post-harvest technology of vegetables. **10**

PART-B

- Q.5** a) What is milk quality control? Why has milk quality control? **12**
b) Discuss facts related to milk and milk products preservation. **8**
- Q.6** a) Write down different steps for packaging and processing of eggs. **12**
b) What are the possible types of contamination in poultry meat processing? **8**
- Q.7** a) Elaborate the quality control of packed foods. **10**
b) What is the significance of GAP for fruit and vegetable production? **10**

End Semester Examination, May 2019

B. Tech. — First Semester

INTRODUCTION TO ELECTROMAGNETIC THEORY BSC-PH-101

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Describe the interaction between two point charges.
- b) Write the uses of Faraday's cage.
- c) Briefly explain electric displacement vector.
- d) Differentiate between dielectric and insulator.
- e) Explain the term magnetostatic.
- f) Express magnetic vector potential in terms of current density.
- g) What is meant by linear magnetic material? Give some examples of linear magnetic material.
- h) Explain Quasi-static approximation.
- i) Write Maxwell's equations in vacuum.
- j) Does electromagnetic wave exert pressure on a surface? Explain.

2X10

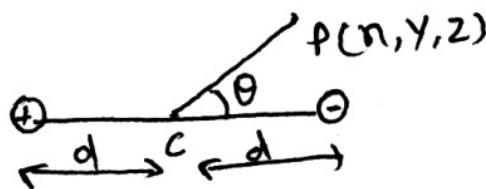
PART-A

Q.2 a) What is electric potential? Derive the expression for it for various continuous charge distribution. **7**
b) Establish the expression for divergence of electric field and give its physical significance. **5**
c) Given a potential

$$V = \frac{A}{r} + B \quad \text{where A and B are constant. Check whether the potential satisfy}$$

Laplace equation or not. **8**

Q.3 a) State and derive Gauss law in dielectrics. Calculate the expression for electric field intensity inside and outside the dielectric sphere if a charge Q is placed at the centre of sphere. **8**
b) The distance between the parallel plates of a capacitor having a dielectric with dielectric constant 2.5, is 5mm. if the electric field strength inside the dielectric is 10^5 V/m. Determine the polarization vector and displacement vector. **4**
c) Calculate the electric potential due to an electric dipole at point P as shown in the figure.



8

Q.4 a) State and derive the divergence of static magnetic field. **6**
b) Find the value of magnetic field at a point due to a long straight current carrying wire using Bio. Savart Law. **6**
c) Derive the expression for the magnetic vector potential due to a current carrying solenoid by using Stoke's theorem. **8**

PART-B

- Q.5 a) Explain the term magnetization. Derive an expression for the vector potential in terms of surface bound current and volume bound current. **8**
b) Derive Faraday's law in differential form and explain motional emf. **6**
c) Obtain the boundary conditions for B and H between two medium having permeability μ_1 and μ_2 . **6**
- Q.6 a) Explain the term current density. Derive the continuity equation for the current density. What does it signify? **7**
b) State and prove Poynting theorem. **10**
c) How could Maxwell modify Ampere's law? Explain. **3**
- Q.7 a) State Maxwell's equations for electromagnetic field and obtain the wave equations for E and B in free space. **8**
b) Show that energy carried by electric field and magnetic field in electromagnetic waves are equal. **6**
c) Derive the expressions for reflection co-efficient and transmission coefficient in terms of incident radiation. **6**

End Semester Examination, May 2019

B. Tech. — Third Semester

BIO ANALYTICAL TECHNIQUES (BT-305B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- | | |
|--|----------|
| a) How are accuracy and precision important criteria in an instrument? | 2 |
| b) What is the principle and uses of phase contrast microscopy? | 3 |
| c) Differentiate between cation and anion exchangers. | 2 |
| d) What is sedimentation? | 2 |
| e) Discuss about gas chromatography and its uses? | 3 |
| f) What is SDS? How can molecular weight be determined by SDS PAGE. | 3 |
| g) Explain the Lambert-Beer's law. | 2 |
| h) Write short notes on the properties of alpha, beta and gamma rays. | 3 |

PART-A

Q.2 a) Write short notes on the following

- i) Sensitivity and Resolution.
- ii) Calibration principles for an instrument.
- iii) Linearity and Threshold.

5×3

- b) Explain the functional elements of an instrument.

5

Q.3 a) Explain in detail the principle of electron microscopy? How is transmission electron microscope different from scanning electron microscope?

10

- b) Differentiate between isopycnic and density gradient centrifugation.

10

Q.4 a) What is chromatography? Elaborate the principle and procedure of paper chromatography. How does it differ from thin layer chromatography?

12

- b) How can affinity chromatography be modified to avoid steric hindrance? Explain.

8

PART-B

Q.5 a) Discuss in detail about two dimensional electrophoresis technique.

10

- b) Differentiate between immuno electrophoresis and capillary electrophoresis.

10

Q.6 a) Elucidate the basic principle, working and construction of UV spectrophotometer.

10

- b) Describe in detail about X-ray spectroscopy and its applications.

10

Q.7 a) What is radio immuno assay? Explain in detail about its working and uses.

10

- b) Discuss the disposal management of radioactive waste and its safety aspects.

10

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

ENVIRONMENT BIOTECHNOLOGY (BT-S-303 / BT-S-303A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE question** from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each marks.

Q.1 Answer briefly:

- a) Sustainable development.
- b) Hotspots.
- c) Superbug.
- d) Air stripping.

3×4

UNIT-I

Q.2 Explain different processes used in primary treatment of waste water.

12

Q.3 a) Describe nitrification and denitrification processes in detail.

8

b) Discuss activated sludge process with diagram.

4

UNIT-II

Q.4 a) Discuss the factors affecting the biodegradation process.

4

b) Enlist the techniques used in determination of bioremediation.

8

Q.5 Discuss different mechanisms involved in phytoremediation.

12

UNIT-III

Q.6 a) Differentiate between in-situ and en-situ conservation of biodiversity.

6

b) How to achieve sustainable developments with green technology?

6

Q.7 a) Explain the models of sustainable developments.

6

b) Enlist the goals of UN sustainable developments.

6

End Semester Examination, May 2019

B. Tech. – First Semester

INDUSTRIAL CHEMISTRY (CH-101 / CH-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Describe the principle of electrodialysis method.
- b) Define phase and component with examples.
- c) Discuss the applications of biodegradable polymers.
- d) Define flash point and fire point.
- e) Define coagulants with examples.
- f) Differentiate between dry cell and wet cell.
- g) Discuss the different factors that affect the corrosion rates.
- h) Define triple point and metastable equilibrium.
- i) Discuss the applications of nanomaterials.
- j) Differentiate between temporary and permanent hardness.

2×10

PART-A

- Q.2** a) Describe the various processes involved in domestic water treatment. **10**
b) Explain zeolite method in detail with the help of diagram and chemical reactions. **10**
- Q.3** a) Discuss the mechanism of electrochemical theory of corrosion with suitable diagram and chemical reactions. **10**
b) Explain Differential corrosion and Galvanic corrosion in detail. **10**
- Q.4** a) Draw phase diagram of Pb-Ag system. Explain all the curves and important points in detail. **10**
b) Define congruent melting point? Explain with the help of diagram. **10**

PART-B

- Q.5** a) Discuss the following properties of lubricants.
i) Viscosity index.
ii) Aniline point. **5×2**
b) Discuss the functions of lubricants. Differentiate between thick and thin layer lubrication. **10**
- Q.6** a) Discuss the applications of smart battery and hybrid battery in detail. **10**
b) Define conducting polymers. Write their important properties and applications in different fields. **10**
- Q.7** a) Discuss the principle and applications of SEM techniques. Discuss the advantages of AFM over SEM. **10**
b) Discuss sol gel method in detail. **10**

End Semester Examination, May 2019

M. Tech. (Structural Engineering) - First Semester

ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING (PE-SE-M-124)

Time: 3 hrs

Max Marks: **75**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1

 - Find the relative error of the number 6.7 if both of its digits are correct.
 - Why truncation errors are caused?
 - What is the rank of the matrix $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$.
 - For the matrix $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$ compute A^2 .
 - Write the numerical differentiation of $\frac{d^2y}{dx^2}$.
 - Find, from the following table, the area bounded by the curve and the x-axis from $x=7.47$ to $x=7.52$ by trapezoidal rule.

x	7.47	7.48	7.49	7.50	7.51	7.52
$f(x)$	1.93	1.95	1.98	2.01	2.03	2.06

 - $B^2 - 4AC > 0$; it falls under which form of curve of Partial Differential equation?
 - Write the mathematical equation of Poisson equation for steady-state problems.
 - Explain cross-over points in fuzzy logic.
 - What is parallel distributed processing systems?

1½x10

PART-A

- Q.2 a) Evaluate the sum $S = \sqrt{3} + \sqrt{5} + \sqrt{7}$ to four significant digits and find its relative and absolute errors. 5
 $\sqrt{3} = 1.732, \sqrt{5} = 2.236$ and $\sqrt{7} = 2.646$

b) Find the sum of the numbers 105.5, 27.25, 6.56, 0.1568, 0.000256, 208.6, 0.0235, 0.538 and 0.0571, where each number is correct to the digits given. Estimate the absolute error in the sum. 10

Q.3 Find a real root of the equation $x^3 - 2x - 5 = 0$ 15

Q.4 Find the inverse of the matrix using Gaussian Elimination method. 15

$$A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & 4 \\ 1 & 2 & 2 \end{bmatrix}$$

PART-B

- Q.5 A rod is rotating in a plane. The following table gives the angle θ (radians) through which the rod has turned for various values of the time 't' in seconds. Find the angular velocity of the rod when $t=0.6$.

$x \equiv (t) \quad 0 \quad 0.2 \quad 0.4 \quad 0.6 \quad 0.8 \quad 1.0 \quad 1.2$

x=(θ)	0	0.122	0.493	1.123	2.022	3.200	4.666
-------	---	-------	-------	-------	-------	-------	-------

- Q.6 a) Explain the meaning of boundary value problem. **5**
- b) Given $\frac{dy}{dx} = 1 + y^2$, where $y=0$ when $x=0$; find $y(0.2)$, $y(0.4)$ and $y(0.6)$ using Runge-Kutta method. **10**
- Q.7 Explain the following terminology:
a) Neuron.
b) Weight Coefficient.
c) Activation function. **5x3**

End Semester Examination, May 2019

B. Tech. (Biotechnology) — Seventh Semester

DNA MICROARRAY AND APPLICATIONS (BT-703)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions briefly:

- a) How high throughput technology helps in microarray analysis?
- b) Enlist applications of clustering gene expression data.
- c) How SNPs are helpful in DNA microarray experiment?
- d) How one can determine where the primer is binding in genome?
- e) What do you mean by normalization?
- f) Enlist two limitations of steady state approach.
- g) Briefly explain about time series analysis.
- h) What is factorial design?
- i) What do you mean by genotyping?
- j) Enlist four differences between 'cDNA and mRNA'.

2×10

PART-A

Q.2 How SOM is different from K-mean clustering? Explain hierarchical clustering with suitable examples. **20**

Q.3 a) Explain the purpose of hybridization in DNA microarray technology. **10**
b) How is data analysis performed in DNA microarray? **10**

Q.4 *How is reduction and visualization of large data matrix done? Explain anyone method used to visualize the data in detail.* **20**

PART-B

Q.5 a) How is image analysis of microarray experiment performed? **10**
b) What are molecular classifiers? Give an account of feature selection of microarray data. **10**

Q.6 a) *What do you mean by genotyping and re-sequencing chips?* **12**
b) *Give an account of molecular classifiers used in microarray experiment in detail.* **8**

Q.7 Explain different types of gene network in the context to reverse engineering of regulatory network? **20**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

ANIMAL BIOTECHNOLOGY (BT-506A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions in brief:

- a) What are feeder layers? State their role in animal cell culture. **3**
- b) Why do we use pronase to produce primary cell culture? **3**
- c) Define "Human artificial chromosome". What are the advantages of HAC? **3**
- d) Distinguish between karyotyping and FISH. **4**
- e) Expand VEGF-A. What is its role in cancer? **4**
- f) Enlist the applications of embryonic stem cells. **3**

PART-A

Q.2 a) Write a note on the various substrates and its treatment used in animal cell culture. **10**
b) What do you understand by natural and defined media? **10**

Q.3 a) How do you cryopreserve animal cells? **10**
b) What is the application of vascular endothelial cells? Briefly describe the methodology for generating the same. **10**

Q.4 Explicate the process of generating transgenic sheep using a neat labeled diagram. **20**

PART-B

Q.5 a) List and explain the different types of chromosomal aberrations leading to diseases in humans. **10**
b) Discuss the advantages and disadvantages of gene therapy. **10**

Q.6 a) Draw and explain the various antisense molecules used in antisense technology. **10**
b) How does a tumor cell differ from a normal cell? **10**

Q.7 a) What are the various sources of stem cells? Give examples. **10**
b) Classify stem cells based on their potential to differentiate. **10**

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

FOOD AND ENZYME BIOTECHNOLOGY (BT-S-304 / BT-S-304A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE question** from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each marks.

- Q.1 a) What does MPN stand for _____?
b) Mention two examples of microbes used in bakery.
c) Give two examples of SCPs.
d) What are the characteristics of active site?
e) What is dialysis used for in protein purification?
f) What are Synzymes? Give two examples. **2×6**

UNIT-I

- Q.2 a) Discuss about the various fermented foods. Explain the production for one of them. **6**
b) Enlist the different methods of food preservation. **6**
- Q.3 a) How process waste is utilized for the production of valuables? Mention the hurdles for applying it at industrial scale. **6**
b) What are the different types of sources of microbes in food? **6**

UNIT-II

- Q.4 Discuss the process of extraction and purification of enzymes. Enlist the steps involved. **12**
Q.5 Explain with appropriate examples the concept of enzyme engineering. **12**

UNIT-III

- Q.6 Discuss in detail the use of enzymes in food industry. Cite appropriate examples. **12**
Q.7 Comment on:
a) Process of brewing and role of enzymes in the process.
b) Role of enzymes in dairy industry. **6×2**

End Semester Examination, May 2019

B. Tech. – First Semester

INDUSTRIAL CHEMISTRY (CH-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1** Answer the following questions:

 - What are coagulants?
 - Define "Alkalinity".
 - What is wet corrosion?
 - What is the formula of phase rule?
 - Define flash point and fire point.
 - What are the constituents of composites?
 - Write any three characteristics of good lubricating oil.
 - Write a brief note on hardness of water.
 - Define triple point in water system.
 - Write any two applications of biodegradable polymer.

2×10

PART-A

- Q.2** a) Describe reverse osmosis process. What is the advantage of this process? **10**
b) Write the various process involved in Domestic water treatment process. Explain with suitable diagram and chemical reaction? **10**

- Q.3 a) Explain with diagram and chemical reaction of the following:
i) Galvanic corrosion.
ii) Stress corrosion. 5×2

b) Explain the following:
i) Pilling bed worth rule.
ii) Dry corrosion with suitable example. 5×2

- Q.4 a) Explain Pb-Ag system with suitable phase diagram and the application of phase rule. **10**
 b) Write short notes on the following:
 i) Definition of phase. ii) Component.
 iii) Congruent M.P. iv) Super cooled water. **2½×4**

PART-B

- Q.6 a) What are conducting polymers? Write their important properties and application in engineering. **10**
b) What do you mean by smart batteries? Write their applications. **10**

- Q.7** a) Discuss the principle and application of AFM. Is AFM a better technique than SEM?
 Explain in detail. **10**
 b) Explain Sol-gel technique. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

INDUSTRIAL CHEMISTRY (CH-101B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Comment on the Alkalinity in water.
- a) What is TDS?
- c) Write the mathematical expression for condensed phase rule.
- d) Differentiate between temporary and permanent hardness.
- e) Name the constituents of a composite material.
- f) Define RF value in chromatographic technique.
- g) List out any three characteristics of a good lubricating oil.
- h) What do you mean by saponification number?
- i) Write any two applications of green chemistry in our daily life.
- j) Define green polymers.

2×10

PART-A

Q.2 a) Describe electro dialysis process. What are the advantages of this process? **10**
b) Write the details of ion exchange method. Explain with suitable diagram and chemical reactions. **10**

Q.3 a) What is wet corrosion? Explain with suitable chemical reactions and mechanism. **10**
b) Discuss the following:
i) Factors affecting corrosion.
ii) Cathodic protection. **5×2**

Q.4 a) Explain Pb-Ag system with suitable phase diagram and the application of phase rule. **10**
b) Write short notes on:
i) Phase.
ii) Component.
iii) Triple point.
iv) Super cooled water. **2½×4**

PART-B

Q.5 a) Discuss the principle and applications I R spectroscopy. **10**
b) Explain sol-gel technique with suitable block diagram. **10**

Q.6 a) Define electrically conducting polymers and outline their classification. Write their important properties and applications in engineering. **10**
b) Write the properties and applications of conducting and liquid crystal polymers. **10**

Q.7 a) What do you mean by green chemistry? Describe any five principles of green chemistry. **10**
b) Write brief notes on the following:
i) Bio-based plastics.
ii) Green solvents. **5×2**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

BIOPROCESS ENGINEERING (BT-508)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- | | |
|--|----------|
| a) Why are baffles installed in the bioreactor? | 3 |
| b) What are main contributions to the production cost in bioprocesses? | 3 |
| c) Explain the mechanism of agitation in bubble column bioreactor. | 3 |
| d) Define "Respiratory quotient". | 2 |
| e) Enlist any two of the intracellular bio products. | 2 |
| f) Describe the technique of inoculation of a bioreactor. | 3 |
| g) How do solvents bring about cell disruption? | 2 |
| h) Briefly explain the primary purification technique used for penicillin. | 2 |

PART-A

- | | | |
|------------|--|------------|
| Q.2 | a) Describe the exit gas system in bioreactors. | 5 |
| | b) What are the thumb rules of bioreactor design? | 5 |
| | c) Explain the process of sample collection from bioreactors. | 5 |
| | d) Enlist some of the challenges in downstream processing. | 5 |
| Q.3 | a) Explain in detail the method for determination of k_{la} by sulphite oxidation method. | 10 |
| | b) Describe the following in detail:
i) Packed bed bioreactor.
ii) Perfusion bioreactor. | 5×2 |

- | | | |
|------------|---|----------|
| Q.4 | a) Describe in detail the Luedeking-Piret model for product formation kinetics. | 5 |
| | b) Derive an equation that models bacterial growth in log growth phase. | 5 |
| | c) What are the limitations of Monod's model? | 5 |
| | d) Explain the process of fed batch culture. | 5 |

PART-B

- | | | |
|------------|--|-----------|
| Q.5 | a) Explain in detail the general components of microbial media. What is the impact of change in components on economy and quality of the products? | 10 |
| | b) Explain in detail the process of media optimization. | 10 |
| Q.6 | a) Describe different methods of sterilization highlighting the applications of each method. | 10 |
| | b) Discuss the kinetics of thermal death during heat sterilization. | 10 |
| Q.7 | a) Explain the process of cell disruption by homogenizer. Draw a suitable diagram. | 10 |
| | b) Give a detailed account of industrial process for production of insulin. | 10 |

End Semester Examination, May 2019

M. Sc. (Biotechnology) – Third Semester

STEM CELL REGENERATIVE MEDICINE (BT-S-305B1)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE question** from each **UNIT**.

Q.1 is compulsory. Marks are indicated against each question.

Q.1 Briefly answer the following:

- a) What kind of cells differentiate from hematopoietic stem cells?
- b) Differentiate between symmetrical and asymmetrical ES cell self-renewal.
- c) Name the 4 transcription factors used to generate iPSC.
- d) Signify the importance of stem cell niches in HSC.
- e) What is the role of BMP4 in ES cell pluripotency?
- f) Differentiate IDDM and NIDDM.

2×6

UNIT-I

- Q.2** a) Explain the term “fate mapping” and name the commonly used fate mapping techniques. **4**
- b) How Cre-LoxP technology is used in cell lineage mapping? **8**
- Q.3** a) How various transcription factors maintain ES self-renewal and pluripotency with suitable diagrams. **8**
- b) Discuss the significance of what signaling in ES cell physiology. **4**

UNIT-II

- Q.4** a) What is re-population of hematopoietic stem cells? **2**
- b) Explain with suitable cell lineage diagrams, how pHSCs are repopulated into erythroid series? **6**
- c) How is bone marrow transplantation performed? **4**
- Q.5** a) How is ES cell commitment to B-lymphopoiesis regulated? **6**
- b) Describe in detail the biomarker patterns of HSC during undifferentiated and differentiated states. **6**

UNIT-III

- Q.6** a) Why iPSC is considered break through discovery in medical and pharmaceutical field? **2**
- b) How induced pluripotent stem cells are regenerated? **5**
- c) What are the potential medical applications of iPSC? **5**
- Q.7** a) Explain the etiology and symptoms of Parkinson’s disease. **4**
- b) Describe the various strategies that can be used to repair neurodegenerative diseases. **8**

End Semester Examination, May 2019

B. Tech– Third Semester
MICROBIOLOGY (BT-302A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions in brief:

- a) How the experiments by Redi disproved the theory of spontaneous generation in regard to larger organisms?
- b) How mendosicutes are different from fermicutes?
- c) What are peptones, yeast extract, beef extract, and agar? Why are they used in media?
- d) Where and how lysozyme and penicillin act to disturb the cell wall?
- e) Is as much ATP produced in anaerobic respiration as in aerobic respiration? Why?
- f) Why is O₂ toxic to many microorganisms and how do they protect themselves?
- g) Describe the pattern of microbial death when treated with a bactericidal agent?
- h) How do substrate-level phosphorylation and oxidative phosphorylation differ from one another?
- i) What are the different physiological states of the F-factor?
- j) Define transformation and competence.

2×10

PART-A

Q.2 a) Describe the major contributions of the following people to the development of microbiology:

- i) Leeuwenhoek.
- ii) Spallanzani.
- iii) Pasteur.
- iv) Tyndall.
- v) Koch.

3×5

b) Briefly describe the five-kingdom system and give the major characteristics of each kingdom

5

Q.3 a) Describe how the two different kinds of continuous culture systems, the chemo stat and turbid stat, operate.

8

b) What kinds of inclusion bodies do prokaryotes have? What are their functions?

12

Q.4 a) Describe the following kinds of media and their uses Give an example of each kind:

- i) Complex media.
- ii) Defined or Synthetic media.
- iii) Enriched media.
- iv) Selective media.
- v) Differential media.

2×5

b) What are pure cultures, and why are they important? How are spread plates, streak plates, and pour plates prepared?

10

PART-B

Q.5 a) When two strains of *E.coli*, one carrying kanamycin resistance (Km^r) gene and other without it were mixed together in a broth, the Km^r gene could be transferred from one strain to another strain. Further, it was observed that gene transfer did not occur when two strains were kept separated in the broth using a filter membrane (size 0.45 mm pore size). What kind of genetic exchange mechanism is taking place in these organisms? How can the possibilities of other types of genetic exchange mechanisms be ruled out?

15

- b) A Hfr strain possessing the markers *his*⁺ *met*⁺ *tyr*⁺ *str*^s was mated with a *F*⁻ strain possessing the markers *his*⁻ *met*⁻ *tyr*⁻ *str*^r. The time of entry for each marker is shown below:

Donor Marker	Time (min.)
<i>his</i> ⁺	21
<i>met</i> ⁺	12
<i>tyr</i> ⁺	46

Based on the results indicate the position of the F element and the first marker to be transferred. **5**

- Q.6 a) Compare aerobic and anaerobic respiration in microorganisms with respect to electron transport chain giving suitable examples. **8**
- b) Give the substrate and products of the tricarboxylic acid cycle. Describe its organization in general terms. What are its major functions? **12**

- Q.7 a) How the following would be best sterilized:
- i) Glass pipettes and petri plates.
 - ii) Tryptic soy broth tubes.
 - iii) Nutrient agar.
 - iv) Antibiotic solution.
 - v) Interior of a biological safety cabinet.
 - vi) Wrapped package of plastic petri plates.
 - vii) Media containing spores.
 - viii) Inoculation. **1½ × 8**
- b) Give the advantages and disadvantages of ultraviolet light and ionizing as sterilizing agents. Provide a few examples of how each is used for this purpose. **8**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-O306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the advantages of first mover in a business?
b) What is buzz marketing and why is it preferred?
c) What are the key sections of business plan?
d) What activation are involved in organization as a function of management?
e) What are the main characteristics of venture capital investments? **4×5**

PART-A

- Q.2 Explain the common mistakes in new product development. **20**
Q.3 What factors need to be considered while assessing technical feasibility and financial viability of a project? **20**
Q.4 As a new entrepreneur how you will go about forecasting the demand for your product? **20**

PART-B

- Q.5 What is a team? How is it different from working group? Why is the team formed? **20**
Q.6 What are the main factors a VC looks for while making an investment? **20**
Q.7 ??

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-O306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the advantages of first mover in a business?
b) What is buzz marketing and why is it preferred?
c) What are the key sections of business plan?
d) What activities are involved in organization as a function of management?
e) What are the main characteristics of venture capital investments? **4×5**

PART-A

- Q.2 Explain the common mistakes in new product development. **20**
Q.3 What factors need to be considered while assessing technical feasibility and financial viability of a project? **20**
Q.4 As a new entrepreneur how you will go about forecasting the demand for your product? **20**

PART-B

- Q.5 What is a team? How is it different from working group? Why is the team formed? **20**
Q.6 What are the main factors a VC looks for while making an investment? **20**
Q.7 Explain the directing and leading function in process of management. **20**

End Semester Examination, May 2019

B. Tech. – Third Semester

CELL BIOLOGY (BT-301A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between peroxisomes and ribosomes.
- b) Define “Cell fractionation”. What all steps are involved in this process?
- c) Comment on “Proto-oncogenes”.
- d) How animal cell is different from plant cell?
- e) Explain “Cell functions”.

4×5

PART-A

Q.2 a) Explain the dynamic nature of membrane. How transportation of nutrients occur through these membranes. **14**

- b) Explain the structural aspect of membrane with well labeled diagram. **6**

Q.3 a) Give the structure and function of Endoplasmic reticulum. What is its role in protein segregation? **10**

- b) Name any two micro bodies studied by you and explain their structure and function. **10**

Q.4 a) Extra nuclear DNA is the characteristic of which all organelles in plant cell? Explain its importance. **6**

- b) Explain structure, function, biogenesis and genomics of chloroplast. **14**

PART-B

Q.5 a) Describe the Ca^{2+} /calmodulin dependent kinase signaling pathway. **10**

- b) What are the G-protein linked receptors? Explain with diagram. **10**

Q.6 a) Describe the mechanism of apoptosis. **10**

- b) Discuss different carcinogenic agents studied by you. **10**

Q.7 a) Explain the mechanism of generation of action potential by sensory stimuli. **10**

- b) Write note on the electrical and biochemical changes which occur during muscle contraction. **10**

End Semester Examination, May 2019

M. Tech. – First Semester

THEORY OF THIN PLATES AND SHELLS (PE-SE-M-121)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write a short note on 'space curves'.
b) Differentiate between synclastic and anticlastic surface of bending.
c) What do you mean by thin plate?
d) Write down the equation for flexural rigidity of plate.
e) Define Gauss curvature.
f) What do you mean by axi-symmetrical analysis?
g) Write a short note on membrane theory.
h) Write a short note on 'discontinuity in pressure vessel'.
i) Write the stress equations for Conical Shells.
j) Write a short note on 'surface of revolution'. **2×10**

PART-A

- Q.2 a) Discuss the Kirchhoff's hypothesis. **12**
b) Discuss the importance of Finite Element Method (FEM) in analysis of plates and shells. **8**
- Q.3 Derive the Navier solution for the deflection of simply supported square plate subjected to point load 'P'. **20**
- Q.4 Derive the differential equation for Symmetrical bending of laterally loaded circular plates. **20**

PART-B

- Q.5 Derive the stress resultants on a cylindrical shell element using membrane theory. **20**
- Q.6 Derive the stress resultants on a cylindrical shell element using bending theory. **20**
- Q.7 a) Write a short note on 'thermal stresses in plates'. **10**
b) Write a short note on 'thermal stresses in shells'. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

BIO CHEMISTRY (BT-303C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Give the classification of high energy compounds along with examples. **3**
- b) What causes ketosis? **3**
- c) State the significance of tetrahydro folate and biotin in amino acid metabolism. **4**
- d) Draw the structure of pyruvate dehydrogenase complex and briefly explain its function. **4**
- e) Mention some of the steroid hormones derived from cholesterol and their role in human body. **3**
- f) How is GMP synthesized through salvage pathway? **3**

PART-A

- Q.2** a) Justify the statement "Living organisms obey the first and second law of thermodynamics". **10**
- b) Draw the structure of ATP. How does it help in metabolic reactions? **10**
- Q.3** a) How is glycine metabolized? **10**
- b) What is PKU? Explain the pathway that leads to PKU. **10**
- Q.4** a) Explain in detail the process of glycogenolysis. **10**
- b) What is glycolysis? Give the pathway. **10**

PART-B

- Q.5** a) Describe "Chemiosmotic theory". **10**
- b) With the help of labeled diagram explain the movement of electrons in complex HI and Complex IV? **10**
- Q.6** a) Give the pathway for the degradation of β carbon of fatty acids. **10**
- b) Outline the various steps involved in the phospholipid biosynthesis? **10**
- Q.7** a) How are pyrimidines metabolised? **10**
- b) Explain the denovo pathway for the synthesis of purines. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

FOOD MICROBIOLOGY (BT-537)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Briefly explain the significance of food microbiology.
- b) Name two microorganisms used in the fermented foods.
- c) Define "Food Poisoning".
- d) Name two spoilage organisms affecting meat and poultry products.
- e) Elaborate MPN and give its full form.
- f) Differentiate between 'food additive' and 'adulterant'.
- g) What is the need for food additive?
- h) Differentiate between 'endotoxins' and 'exotoxins'.
- i) Name two enzymes that are important in bakery products.
- j) Define "Thermal Death Time".

2×10

PART-A

- Q.2** a) Discuss the various microorganisms associated with different food products. **10**
b) Give a synopsis of different genera of bacteria common to food. **10**
- Q.3** a) Give an account of the techniques of rapid identification of food pathogens. **10**
b) How sterilization is used in destruction of microorganisms? Explain its principle in detail. **10**
- Q.4** a) Discuss the microorganisms involved in spoilage of bread and its control measures. **10**
b) Explain how microorganisms alter the biochemical properties of food leading to food spoilage? **10**

PART-B

- Q.5** a) How the production and characteristics of sauerkraut depends upon resident microbial community and fermentation conditions? Explain in detail. **10**
b) Discuss about the role of different organisms in pickling. **10**
- Q.6** a) Discuss in detail the major food borne infections caused by bacteria and virus. **10**
b) What are the symptoms of food poisoning? Explain the most common types of food poisoning. **10**
- Q.7** a) What are some common types of food additives and why are they used? What health issues are associated with food additives? **10**
b) What are antioxidants? How do antioxidants work? **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

INTRODUCTION TO PHARMACEUTICAL TECHNOLOGY (BT-531)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term 'active pharmaceutical ingredient' with examples.
- b) What are dosage forms and their significance?
- c) How physico-chemical properties which will determine the efficacy of a drug?
- d) Explain the ideal properties of a sterile dosage forms.
- e) Define the term 'bioequivalence' with suitable examples.

4×5

PART-A

- Q.2** a) What are the salient features of THE DRUGS AND COSMETICS ACT, 1940? **10**
b) Explain the various stages of new drug development processes. **10**
- Q.3** a) Why oral route of administration is considered superior to other routes? What are the disadvantages of oral ROA? **10**
b) Why sustained release of drug concept is important in drug industry? Describe the parameters crucial for SR-drugs. **10**
- Q.4** a) Why excipients are important for drug formulation? Explain the role of binders, anti-oxidants and flavouring agents as excipients with two examples each. **10**
b) Explain the different mechanisms of chemical incompatibility of drugs. **10**

PART-B

- Q.5** a) What are the advantages and limitations of wet granulation in tablet manufacturing? **10**
b) Explain the different steps to be taken in handling and storage of capsules. **10**
- Q.6** a) How syrup is manufactured in a pharmaceutical plant? **10**
b) Explain the steps involved in automatic ointment manufacturing. **10**
- Q.7** a) What are biopharmaceuticals? Explain the various forms of bio pharmaceutics in the market with examples. **8**
b) How the drug is metabolized in the system? **12**

End Semester Examination, May 2019
B. Tech. — Fifth Semester
HUMAN GENOMICS AND PROTEOMICS (BT-533)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- | | |
|---|-----------|
| a) What do you mean by functional genomics? | 3 |
| b) How gene expression profile helps to perform comparative genomics? | 2½ |
| c) Discuss haplotype with suitable example? | 2½ |
| d) How lead time bias and length time bias helps to diagnose cancer? | 3 |
| e) Explain mechanism by which gene targets are identified. | 2 |
| f) Illustrate factors that state whether the gene is on or off. | 3 |
| g) "Personalized medicine can be prepared using pharmacogenomics technique". Justify giving an example. | 4 |

PART-A

- | | | |
|------------|---|-----------|
| Q.2 | a) What do you mean by gene map? | 6 |
| | b) Discuss Components of genome need to be considered while assembling. | 14 |
| Q.3 | a) How gene expression profile helps to perform comparative genomics? | 12 |
| | b) What are the bioinformatics approaches used in genome annotation? | 8 |
| Q.4 | a) Explain the cancer checkpoints in detail. | 6 |
| | b) Enumerate receptors which are responsible for cell differentiation? | 14 |

PART-B

- | | | |
|------------|--|-----------|
| Q.5 | a) What are the methods by which one can identify protein? | 8 |
| | b) How MALDI-TOF is used in analysis of peptide mass? | 12 |
| Q.6 | a) How gene expression profile helps to analyze genome of a species? | 8 |
| | b) Discuss tools used in proteomic study. | 12 |
| Q.7 | a) What do you mean by high throughput screening? | 6 |
| | b) Enlist applications of pharmacogenomics. | 14 |

End Semester Examination, May 2019

B. Tech. — Fifth Semester

FOOD BIOTECHNOLOGY (BT-507)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) How is food biotechnology used?
- b) Give two examples of microbes used in fermentation.
- c) Define "Water activity".
- d) Write down different varieties of cheese.
- e) What are spoilage specific organisms?
- f) How microorganisms are involved in food processing?
- g) What are the types of radiation methods used in food preservation?
- h) Write about the factors affecting quality of food during cold storage.
- i) Write down the names of the enzymes used in bio processing of oils and fats.
- j) What is process waste?

2×10

PART-A

Q.2 a) Give an account on the factors affecting microbial growth. Give a synopsis of different genera of yeast common to food. **20**

Q.3 a) Give an account of various methods used for detection of microorganisms in food. **10**
b) Give an account on spoilage and preventive measures of sugar and sugar products. **10**

Q.4 What is meant by surface examination of food? Explain the various methods used to examine the food surface microbiologically. **20**

PART-B

Q.5 a) Give a short note on the role of food additives and preservatives in product development. **10**
b) What are the applications of lactic acid bacteria in food industry? **10**

Q.6 What do you mean by term "Single cell protein"? Discuss the possibility of production of single cell protein from different sources. Write down the prospects of SCP in food chain. What are the barriers for acceptance of SCP in food? **20**

Q.7 How food waste is utilized in production of valuables? Describe how household food waste can be utilized for the production of ethanol? **20**

End Semester Examination, May 2019

B. Tech. – Second Semester

SEMICONDUCTOR PHYSICS (BSC-PH-104)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write expression for Fermi-Dirac distribution function. **2×10**
b) What are phonons?
c) What are minority carriers in p-type semiconductors?
d) Write two semiconductor material names, which are suitable for optoelectronic devices.
e) Write the expression for energy and momentum of a photon.
f) Write the rate equations for carrier density.
g) Explain radiative recombination.
h) Define quantum efficiency of a photodetector.
i) What do you mean by Vander Pauw method for resistivity?
j) Which type of parameter can be extracted from I-V characteristics?

PART-A

- Q.2 a) Discuss the Kronig-Penney model. How it explains the formation of energy bands separated by forbidden energy gap in solids. **14**
b) Write short note on effective mass of electron. **6**
- Q.3 a) Derive an expression for the carrier concentration in extrinsic semiconductors. **12**
b) Draw the energy band diagram for unbiased and forward biased p-n junction. **4**
c) Write short note on diffusion current. **4**
- Q.4 a) What do you understand by the terms absorption, spontaneous emission and stimulated emission? **6**
b) If light is incident on a semiconductor, obtain the conditions for optical loss and gain. **10**
c) Write short note on Exciton. **4**

PART-B

- Q.5 a) Give the working of a double heterojunction Light Emitting Diode (LED) and explain how the extraction efficiency is improved? **10**
b) Write short note on the device characteristics of Light Emitting Diode (LED). **5**
c) Write the full form of SLED and ELED and differentiate them. **5**
- Q.6 a) Explain the structure, working principle and characteristics of p-n junction photodiode. **10**
b) Briefly discuss the materials and their properties used in photodetectors. **5**
c) Write a short note one noise limits on performance of photodetectors. **5**
- Q.7 a) Define hot-point probe measurement and derive the expression for finding the carrier concentration for p-type semiconductor. **12**
b) What is DLTS? How we get the information of deep level impurities using these techniques? **8**

End Semester Examination, May 2019

B. Tech. – Second Semester

INTRODUCTION TO ELECTROMAGNETIC THEORY (BSC-PH-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Describe the interaction between two charged particles. **2×10**
 b) Is potential gradient a vector or scalar quantity? Give reason.
 c) Explain polarization vector in dielectrics.
 d) Write note on electric displacement vector.
 e) Explain the term magnetostatics.
 f) Interpret the term $\text{div } B = 0$ and $\text{curl } B \neq 0$.
 g) State Ampere's law and Bio-savart's law.
 h) What is meant by Quasi-static approximation?
 i) Write Maxwell's equations in vacuum.
 j) Discuss the properties of electromagnetic waves in free space.

PART-A

- Q.2 a) Derive an expression for curl of electrostatic field and give it's physical significance. **6**
 b) What is method of images? Determine the electric field due to a point charge above a grounded conducting plane. **7**
 c) Given a potential of the form $V = m(x^2 + y^2 + z^2)$ where m is a constant. Check if the potential satisfies Laplace equation? **7**
- Q.3 a) Derive the boundary conditions for static electric field across a boundary separated by two different dielectric media. **8**
 b) Calculate the electric potential due to a dipole at a point inclined at an angle. **7**
 c) A parallel plate capacitor has a 3 cm thick dielectric slab of dielectric constant 2.5, inserted between it's plates. If, field inside the dielectric is measured as 10^5 V/m, then determine polarization and displacement vector. **5**
- Q.4 a) Calculate the value of magnetic field at a point due to a long current carrying wire using Bio-savart's law. **8**
 b) State and derive the divergence of static magnetic field. **4**
 c) Give the expression for vector potential of a solenoid carrying current using Stake's theorem. **8**

PART-B

- Q.5 a) Derive an expression for vector potential in terms of surface bound current and volume bound current? **10**
 b) Calculate the magnetic field at a point at the equatorial line of a bar magnet? **6**
 c) Differentiate between diamagnetic and paramagnetic materials with examples. **4**
- Q.6 a) Derive Maxwell's equation in differential form. **8**
 b) State and prove Poynting theorem. Explain the term pointing vector. **12**
- Q.7 a) Solve Maxwell's equations to obtain electromagnetic wave equations for E and B in free space. **8**
 b) Calculate reflection and transmission coefficients for electromagnetic wave when it travels from one medium to another provide the mediums are nonmagnetic. **8**

c) Show that the electromagnetic waves are transverse in nature.

4

End Semester Examination, May 2019

M. Sc. (Biotechnology) — Second Semester

GENETIC ENGINEERING AND APPLICATIONS (BT-S-201A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Taking at least **ONE question** from each **Unit**. All questions carry equal marks.

Q.1 Answer the following in brief:

- a) Expand the term SNP.
- b) Mention the features of cosmids.
- c) Name two molecular markers used in GE.
- d) Differentiate between cDNA and gDNA.
- e) How a gene expresses itself? Mention two techniques to check gene expression.
- f) Mark the usage of restriction enzymes.

2×6

UNIT-I

Q.2 a) Explain in detail the importance of molecular markers in genetic engineering.

- b) Name and explain different molecular biology tools that have their application in genetic engineering.

6×2

Q.3 Highlight the importance of polymerase chain reaction in GE. Explain the technique and its applications in detail.

12

UNIT-II

Q.4 What is DNA Microarray? Explain its types and applications in GE.

12

Q.5 What is the concept behind protein engineering and how it is achieved?

12

UNIT-III

Q.6 What is codon optimization? Explain its applications in host and vector engineering.

12

Q.7 Write short notes on the following:

- a) DNA Transfection.
- b) RNase protection assay.
- c) Gene knockout technology.

4×3

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DIAGNOSTIC TECHNIQUES (BT-623B)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Briefly answer:

- a) What is biphasic medium and how it is used?
- b) Give examples of bacterial pathogens that are obligate intracellular parasites requiring viable host cells for propagation.
- c) Are polyclonal antibodies used for diagnostic test? Why or why not?
- d) What is a padlock probe?
- e) What are antibody drug conjugates?
- f) How can molecular beacon probes used to detect several genes in the same sample?
- g) What are the advantages of nonradioactive detection procedures?
- h) How single-stranded conformation polymorphism (SSCP) is used to identify different genomic variants?

2½x8

PART-A

- Q.2**
- a) Define and differentiate bacterial susceptibility and resistance. How are these used to assist in the identification of bacteria? **10**
 - b) Explain the use and chemical principle of the following media used in preliminary bacterial identification.
 - i) McConkey agar
 - ii) Chocolate agar
 - iii) Thioglycollate broth
 - iv) Modified thaymer martin agar**10**

- Q.3**
- a) How purification of antibodies is done for use in research and diagnostics? **14**
 - b) What is the use of flow cytometry in the diagnosis of infected cells? **6**

- Q.4**
- a) Discuss the criteria and essential for an immunoassay development and validation. **12**
 - b) How is antigen capture ELISA different from antibody ELISA? **8**

PART-B

- Q.5**
- a) List down the steps used for the production of a monoclonal antibody. What will happen if aminopterin is removed from the HAT medium? **10**
 - b) Discuss the application of monoclonal antibodies in the treatment of tumors. **10**
- Q.6**
- a) Describe and discuss the PCR/OLA detection protocol. **12**
 - b) Describe several types of nonradioactive DNA labels. What are the advantages of nonradioactive detection procedures? **8**
- Q.7**
- Summarize the steps involved in the chemical mismatch cleavage mutation detection assay. In what ways denaturing gradient gel electrophoresis is better for the detection of mutations. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

STEM CELLS AND ITS APPLICATIONS (BT-803)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Differentiate between symmetric and asymmetric cell division with respect to stem cells.
b) Define the term potency. Which cells are considered to be multipotent?
c) What is the role of tumor suppressor genes in cell cycle?
d) How can epigenetic factors play a role in pluripotency of the stem cells?
e) What are embryonal carcinoma cells? Write about its characteristic features.
f) What is the role of Sertoli cells in maturation and differentiation of spermatogenic stem cells?
g) Name the chemical used as preservative agent while cryofreezing hematopoietic stem cells. Why is it considered to be a good cryopreservant?
h) Which growth factors required to stimulate mesenchymal stem cells for osteogenic differentiation?
i) What do you understand by the term trans-differentiation?
j) How can immunocytochemistry be helpful in isolation of liver stem cells? **2×10**

PART-A

- Q.2 a) Write a note on extrinsic and intrinsic factors affecting pluripotency. **10**
b) Write in detail about the various methodologies employed for mapping the fate of stem cells. **10**
- Q.3 a) What do you understand by the term “check points” in cell cycle? Give an account of various checkpoint existing. **10**
b) Define the term “cell senescence”. State the various theories proposed for cell senescence. **10**
- Q.4 a) What do you understand by the term “spermatogenesis”? Write in detail about the various stages of spermatogenesis. **10**
b) Define embryonic stem cells. What ethical concerns are being faced by the researchers while using them in their study? **10**

PART-B

- Q.5 a) Define mesenchymal stem cells. Write a note on applications of these cells? **10**
b) What do you understand by the term “Lymphopoiesis”? Briefly explain stages of B-cell and T-cell maturation. **10**
- Q.6 a) What are the symptoms and cause of Parkinson's disease? Write in details about the various methods which are into market for the management of this disease. **12**
b) What are the symptoms and cause of amyotrophic lateral sclerosis? How can it be cured with the help of stem cells? **8**
- Q.7 a) What are the characteristic features of liver stem cells? Write in detail about the steps involved in its isolation. **10**
b) What are the symptoms and various treatments for liver cirrhosis? **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

THERMODYNAMICS OF BIOPROCESS (BT-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define and give the equation for equilibrium constant and equilibrium conversation.
b) What is partial molar property? Derive its equation.
c) State Onsager relations and give its significance.
d) Explain Fick's laws for passive transport.
e) Describe cooperative transitions and partition function. **4×5**

PART-A

- Q.2 a) Compute the internal energy change and temperature change for the two processes involving 1 mole of an ideal monatomic gas.
i) 1500 J of heat are added to the gas and the gas does no work and no work is done on the gas
ii) 1500 J of work are done on the gas and the gas does no work and no heat is added or taken away from the gas. **10**
b) What is a heat engine? How do you derive the maximum work? **10**
- Q.3 a) Define chemical potential. Explain with an example. **10**
b) State and explain Henry's law and Raoult's law by giving their equations. **10**
- Q.4 a) Why closed systems are failure in biology? Enumerate the difference between steady state and equilibrium. **10**
b) Discuss "Life and irreversibility". **10**

PART-B

- Q.5 a) With a suitable example, explain biological coupling. **10**
b) Discuss the equations for flux and force in a discontinuous system. **10**
- Q.6 a) Write briefly about Boltzmann distribution. **10**
b) Describe the thermodynamics of active transport. **10**
- Q.7 Explain the following:
a) Stability of non-equilibrium stationary state.
b) Ordering in time and space far from equilibrium. **10×2**

End Semester Examination, May 2019

B. Tech. — Second Semester

MATHEMATICS-II (BSC-MA-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Change the order of integration $\int_0^\infty \int_x^\infty f(x, y) dx dy$.
- b) Find the value of λ , for the exact differential equation $(xy^2 + \lambda x^2 y) dx + (x + y)x^2 dy = 0$.
- c) Solve: $x^2 = 1 + p^2$
- d) Solve: $y = (x - a)p - p^2$
- e) Solve: $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 0$
- f) Find particular integral in the following differential equation:
- $$\frac{d^3y}{dx^3} + y = \sin 3x - \cos^2 \frac{x}{2}$$
- g) Determine a, b, c, d so that the function $f(z) = (x^2 + axy + by^2) + i(cx^2 + dxy + y^2)$ is analytic.
- h) Define analytic function and write Cauchy Riemann equation in Cartesian form.
- i) Separate real and imaginary parts: $\operatorname{In}(6+8i)$
- j) Expand $f(z) = \sin z$ in Taylor's series about $z = \frac{\pi}{4}$ **2x10**

PART-A

- Q.2 a) Find the area enclosed between the curves: $x^2 + y^2 = a^2$ and $x + y = a$ **10**
- b) Verify Green's theorem for $\int_C [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$,
- Where C is bounded by $x = 0, y = 0$ and $y + x = 1$ **10**
- Q.3 a) Solve: $\frac{dy}{dx} = \frac{y}{2y \log y + y - x}$ **6**
- b) Solve: $(x^3 - x)\frac{dy}{dx} - (3x^2 - 1)y = x^5 - 2x^3 + x$ **6**
- c) Solve differential equation $y \log y dx + (x - \log y)dy = 0$ **8**

- Q.4 a) Solve: $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 5y = x \log x$ **5**
- b) Solve: $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = 4 \cos^2 x$ **7**
- c) Show that: $\int x J_0^2(x) dx = \frac{1}{2} x^2 [J_0^2(x) + J_1^2(x)]$ **8**

PART-B

- Q.5 a) If $f(z)$ is a regular function of z , prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4 |f'(z)|^2$ **10**
- b) Determine analytic function $f(z) = u + iv$, whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ **10**

Q.6 a) State and prove the cauchy's integral formula and use it to evaluate:

$$\int_C \frac{12z-7}{(z-1)^2(2z+3)} dz \text{ Where } C : |z|=2 \text{ and } |z+i|=\sqrt{3}$$

10

b) Solve: $\int_0^{2\pi} \frac{d\theta}{1-2p\sin\theta+p^2}$, where $p^2 < 1$

10

Q.7 a) For the conformal transformation $w=z^2$, show that the coefficient of magnification at $z=1+i$ is $2\sqrt{2}$.

10

b) Expand the function in Laurent's Series $f(z)=\frac{1}{z^2-4z+3}$ for $1 < |z| < 3$.

10

End Semester Examination, May 2019

B. Tech. — Second Semester

MATHEMATICS-II (For CSE only (BSC-MA-201))

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Three bags A, B, C contains 4 red, 3 black, 2 white; 3 red, 4 black, 4 white and 5 red, 2 black, 6 white balls respectively. If a bag is selected at random and a ball is drawn from it, find the probability if the ball is red. **3**
- b) In a certain factory turning razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Using Poisson distribution to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10000 packets. **3**
- c) Compute the variance of sum obtained when 10 independent rolls of a fair die are made. **3**
- d) Find the value of c such that $f(x) = ce^x, 0 < x < \infty$ represents probability density function. **3**
- e) Determine the binomial distribution whose mean is 9 and S.D. is 3/2. **3**
- f) What are the Sheppard's corrections for the first four moments? **2**
- g) Determine the value of median from the following series:

Marks	0-10	10-15	15-20	20-25	25-30
No. of students	7	5	8	38	42

3

PART-A

- Q.2 a) A can hit a target 4 times in 5 shots can 3 times in 4 shots and C can twice in 3 shots. They fire a volley. What is the probability that at least two shots hit? **6**
- b) In a bolt factory, there are four machines A, B, C, D manufacturing 20%, 15%, 25% and 40% of the total output. Of their outputs 5%, 4%, 3% and 2%, in the same order, are defective bolts. A bolt is chosen at random from the factory's production and is found defective. What is the probability that the bolt was manufactured by machine A or machine D. **8**
- c) Three coins are tossed simultaneously. Consider the event E 'three heads or three tails', F 'at least two heads' and G 'at most two heads'. Of the pairs (E, F), (E, G) and (F, G), which are independent? **6**
- Q.3 a) A sample of 100 dry battery cells tested to find the length of life produced the following results:
 $\bar{x} = 12$ hours, $\sigma = 3$ hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life. (i) more than 15 hours(ii) less than 6 hours(iii) between 10 and 15 hours ? **10**

b) Given: $f(x) = \begin{cases} e^{-x}, & \text{if } x > 0 \\ 0, & \text{otherwise} \end{cases}$. Determine the probability that the variate having this density will fall in the interval $1 < x < 2$. Also find the cumulative probability function $F(2)$. **10**

Q.4 a) An insurance company supposes that the number of accidents that each of its policyholders will have in a year is Poisson distributed, with the mean of the Poisson depending on the policyholder. If the Poisson mean of a randomly chosen policyholder has a gamma distribution with density function $g(\lambda) = \lambda e^{-\lambda}$, $\lambda \geq 0$. What is the probability that a randomly chosen policyholder has exactly n accidents next year? **10**

b) Find the moment generating function of the exponential distribution.

$$f(x) = \frac{1}{c} e^{\frac{-x}{c}}, 0 < x < \infty, c > 0.$$

 Hence find its mean and S.D. **10**

PART-B

Q.5 a) Ten students got the following percentage of marks in Economics and Statistics. Calculate the Coefficient of Correlation.

Marks in Economics	78	36	98	25	75	82	90	62	65	39
Marks in Statistics	84	51	91	60	68	62	86	58	53	47

10

b) Find the Kurtosis based on moments for the following distribution:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	8	12	20	30	15	10	5

10

Q.6 a) Fit a second degree parabola to the following data:

X	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y(x)	1.1	1.3	1.6	2.0	2.7	3.4	4.1

10

b) A man buys 50 electric bulbs of "Philips" and 50 bulbs of "Surya". He finds that Philips bulbs give an average life of 1,500 hours with a standard deviation of 60 hours and Surya bulbs gave an average life of 1, 512 hours with a standard deviation of 80 hours. Is there a significant difference in the mean life of the two makes of bulbs? **10**

Q.7 a) A group of 5 plots treated with nitrogen at 20 kg/ha. Yields 42, 39, 48, 60 and 41 kg whereas nitrogen at 40 kg/ha yields 38, 42, 56, 64, 68, 69 and 62 kg. Can it be concluded that nitrogen at level 40kg/ha. Increases the yield significantly ? **10**
 b) A bag contains defective article, the exact number of which is not known. A sample of 100 from the bag gives 10 defective articles. Find the limits for the proportion of defective articles in the bag. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

NUTRACEUTICALS AND FUNCTIONAL FOODS (BT-638)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following briefly:

- a) Define the term “Dietary supplements” with examples.
- b) What does FOSHU stand for? Explain with examples.
- c) Discuss the enfleurage technique for the isolation of isoprenoids.
- d) Why inulin is considered as prebiotics?
- e) How nutrigenomics add value to nutraceutical field?

4x5

PART-A

Q.2 a) Enlist the functional components present in Oats, Tomato, Cranberry and Flaxseed and their possible medical benefits. **10**
b) Discuss the types of Omega-3-fatty acids, their sources and the medical benefits. **10**

Q.3 a) Why phytoestrogens are important for our health? Name the different sources of phytoestrogens and their medical benefits. **10**
b) Discuss the role of dietary fibres, sources and various medical benefits. **10**

Q.4 a) How flavonoids are classified. Give 1 example in each class. **10**
b) Name the different sources of carotenoids. Explain the extraction and purification procedures of carotenoids. **10**

PART-B

Q.5 a) Discuss the selection criteria and types of probiotics. **10**
b) Explain the various medical benefits of probiotics. **10**

Q.6 a) Differentiate between type 1 diabetes and type 2 diabetes. **5**
b) Discuss in detail the different nutraceutical options for the preventive or therapeutic intervention of diabetes mellitus. **15**

Q.7 a) What types of research needed to improve nutraceuticals and functional food domain? **5**
b) Give a detailed account of nutrigenomics and its applications in health industry. **15**

End Semester Examination, May 2019

B. Tech.–Sixth Semester

CLINICAL MICROBIOLOGY (BT-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions briefly:

- a) What are different types of bacterial morphology explain with examples?
- b) How gram positive cell wall is different from gram negative cell wall?
- c) Write a note on the classification of parasite.
- d) Name any two blood and tissue protozoal infection causative organisms.
- e) What are the symptoms and causative organism of cholera infection?
- f) Name any two infections caused by anaerobic bacteria.
- g) Mentions the source and types of Hepatitis viruses.
- h) What are Prions?
- i) What are the characteristics of fungi?
- j) Differentiate between mycelium and Hyphae.

2x10

PART-A

- Q.2** a) Mention the names of skin microbiota and the importance of normal bacterial and fungal microbiota to host. **10**
- b) What are Toxins? Discuss about the exotoxins and endotoxins in detail. **10**
- Q.3** a) What is the disease caused by Entamaeba histolytica? Explain the life cycle of the E. histolytica and symptoms of the disease. **10**
- b) Differentiate between nematodes and cestodes. Explain the life cycle of any nematode. **10**
- Q.4** a) What are virulence factors? Explain with example. **5**
- b) Name two gram positive spore forming bacteria. Write a note on the Clostridium tetani infection, lab diagnosis and treatment. **15**

PART-B

- Q.5** a) How viruses are classified? Discuss various modes of entry of viruses in the host. **10**
- b) What is shingles? Explain the life cycle of Herpes virus. **10**
- Q.6** a) What are the general characteristics of Fungi? Discuss about the different media use for the isolation of Fungi. **10**
- b) Differentiate between superficial mycosis and endemic mycosis with example. **10**
- Q.7** a) Describe on the strategy for laboratory diagnosis for bacterial and viral infection. **10**
- b) Explain the molecular diagnostic procedure for the identification of pathogen. **10**

End Semester Examination, May 2019

M.Sc. (Biotechnology)–Second Semester

BIOPROCESS TECHNOLOGY (BT-S-202A)

Time: 3 hrs.

Max Marks: **60**

No. of pages: 1

Note: Attempt any **FIVE** questions in all; **Q.1 is compulsory**. Taking at least **ONE question** from each **Unit**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) Why is bioprocess engineering known as interdisciplinary field?
- b) What types of organisms are cultured in BSL-1 facility?
- c) Explain the factors that affect microbial growth rate.
- d) Compare stirred tank reactor and packed bed reactor for enzymatic reactions.
- e) Discuss some of the alternative methods for sterilization of heat labile material.
- f) How does temperature affect diffusivity? **2x6**

UNIT-I

- Q.2 a) What is the role of a bioprocess engineer in biotechnology? **4**
b) Describe the three different phases of growth curve using a suitable diagram. **8**
- Q.3 a) Give a general energy balance equation. Modify it for adiabatic steady state processes. **6**
b) Describe growth associated product formation kinetic using a suitable example. **6**

UNIT-II

- Q.4 Discuss the salient features of the following types of bioreactors:
a) Stirred tank reactor.
b) Fluidized bed bioreactor.
c) Air lift bioreactor. **3x4**
- Q.5 a) Why is foaming undesirable in reactors?
b) What is a mechanical seal?
c) What is a reference junction in pH electrode?
d) Condenser is used in exit air system of a fermenter. Why? **4x3**

UNIT-III

- Q.6 a) What is the effect of heat sterilization on nutrient quality? **6**
b) Discuss the kinetics of depth sterilization. **6**
- Q.7 a) Explain in detail microbial media formulation. **6**
b) Highlight the importance of mass transfer operations in bioprocessing. **6**

End Semester Examination, Dec. 2018

B. Tech. – Sixth / Eighth Semester

PROJECT PLANNING AND MANAGEMENT (C-826)

Time: 3 hrs

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1 a) What is dummy activity?
 b) What is need for planning of a project?
 c) State EST and LST with numerical expressions.
 d) List types of project plans that are made in every project before execution.
 e) List kinds of networks that are used in project planning.
 f) Draw network logics of bursting and merging situation.
 g) **What do you mean by updating of project?**
 h) **What is project crashing?**
 i) **What is economic life of construction equipment?**
 j) **List different types of concrete mixers.**

2x10

PART-A

- Q.2 a) What is work breakdown structure? Explain its methodology along with a neat sketch. **8**
 b) Explain Bar charts along with an example and a neat sketch. **6**
 c) Explain milestone charts along with an example and a neat sketch. **6**

- Q.3 a) **What is the difference between activity and event?**

5

- b) What kind of distribution is assumed in PERT technique between optimistic, pessimistic and most likely time and discuss their probabilities of occurrences? **5**
 c) **A project consists of 06 activities as listed in following table. The table details optimum, most likely and pessimistic durations, of each activity along with preceding and succeeding activities.**

Draw the network, determine the critical path and total expected duration.

Activity	Preceding Activity	Succeeding Activity	Optimistic duration	Most likely duration	Pessimistic duration
A	-	D	2	5	14
B	-	C,F	3	12	21
C	B	E	2	5	8
D	A	E	5	14	17
E	D,C	-	1	4	7
F	B	-	6	15	30

10

- Q.4 a) Draw network logics of the following situations activities:
 i) A precedes B.
 ii) C has A and B as predecessor.
 iii) B and C having predecessor A.

4

- b) Draw AOA and AON networks of the activities having following relationship.

Activity	Preceding Activity	Succeeding Activity
A	-	B
B	A	E
C	A	E
D	A	E
E	B, C, D	-

4

- c) A building project consists of 10 activities is listed in following table. The table details normal duration of each activity along with preceding and succeeding activities. Draw the network and determine the critical path.

Activity	A	B	C	D	E	F	G	H	I	J
Preceding activity	-	A	A	B	B	C	C	D	E, F	G
Succeeding activity	B, C	D, E	F, G	H	I	I	J	-	-	-
Estimated duration	04	03	07	05	04	03	07	08	07	03

12

PART-B

- Q.5 a) State the relationships of direct and indirect costs with respect to time with the help of a plot. **6**
- b) The following table details normal duration of each activity along with preceding and succeeding activities. Draw the network .The following table also gives data for duration and costs of each activity of a project. The indirect cost of project is Rs 3000/- per week. Determine the optimum duration of project and the corresponding minimum cost. Draw the time scaled version of network at every stage of crashing. Plot Cost versus time relation of the project and mark the point of optimum duration of project and the corresponding minimum cost.

Activity	Preceding	Succeeding	Normal Duration (weeks)	Normal Cost (Rs)	Crash Duration (Weeks)	Crash Cost (Rs)
1-2	-	2-4, 2-3	6	7000	3	14500
1-3	-	3-4	8	4000	5	8500
2-3	1-2	3-4	4	6000	1	9000
2-4	1-2	-	5	8000	3	15000
3-4	1-3, 2-3	-	5	5000	3	11000

14

- Q.6 a) State advantages of crawler mounted and wheel mounted construction equipments. **4**
- b) Write the list of hoisting equipment, discuss any four of them in detail stating purpose, applications, and capacities along with a line diagram. **16**

- Q.7 a) Define 'batching and mixing'.

4

- b) Describe in detail working of ready-mix concrete plants and discuss processes involved using a neat sketch. **8**
- c) Describe in detail working of Hot-mix plants and discuss processes involved with a neat sketch. **8**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

FOUNDATION ENGINEERING (C-804)

Time: 3 hrs.

Max Marks: **100**

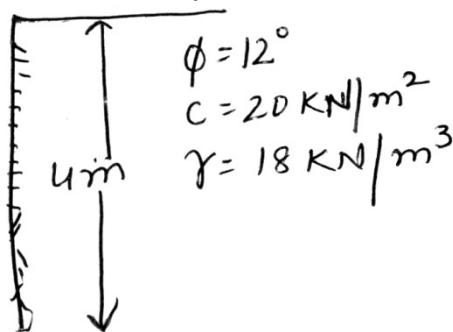
No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Compare Rankine's and Coulomb's earth pressure theories.
b) Write Rankine's formula for the minimum depth of foundation.
c) Mention different steps involved in soil exploration.
d) List graphical methods used to find out stability of slopes.
e) What are the different factor of safety used in stability of slopes?
f) What is machine foundation? Explain types of machine foundation?
g) What are the corrections applied for SPT 'N' value?
h) Where do we anchored sheet piles?
i) How would you fix the depth of foundation?
j) List different types of anchored sheet piles. **2×10**

PART-A

- Q.2 a) Explain friction circle method of finding stability of slopes in detail. **10**
b) What are different types of slope failures? Explain. **10**
- Q.3 a) Determine the stresses at the top and bottom of the cut as shown in figure.



- b) What are the assumption of Rankine theory? Derive the expression for active pressure. **10**
- Q.4 a) Draw the pressure distribution diagram for sheet piles and explain. **15**
b) What are different methods of providing anchors for a sheet pile wall? **5**

PART-B

- Q.5 a) Discuss deep foundations, its types and suitability. **10**
b) What are the factors affecting depth of shallow foundation? **10**
- Q.6 a) Describe plate load test with the help of neat sketch. What are its limitation and use? **10**
b) A strip footing of 2 m width is founded at a depth of 4 m below the G.L. Determine the net ultimate bearing capacity using I.S. code method. The soil is clay ($\phi = 0, C = 10 \text{ kN/m}^2$) and unit weight 20 kN/m^3 . Take $N_c = 7.0$. **10**
- Q.7 a) Discuss general criterion for design of machine foundations. **10**
b) Derive the expression for design of foundation for free vibration with damping. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ENVIRONMENTAL IMPACT ASSESSMENT (C-834)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define primary impacts.
- b) List any two factors on which duration of EIA hinge.
- c) Define project footprint.
- d) Based on duration of study, how many types of EIA do we have?
- e) Describe landforms.
- f) Explain appraisal in context of EIA.
- g) List any four benefits availed by local communities opting for EIA.
- h) What types of activities are allowed at site prior to Environmental Clearance?
- i) What is the purpose of environmental management plan?
- j) List any two project categories which are exempted from public hearing.

2×10

PART-A

- Q.2** a) Develop the purpose of EIA and discuss how it can be an instrument for sustainable development. **10**
b) Construct a flowchart of step-by-step process of EIA and briefly explain various components. **10**
- Q.3** a) Construct a flow-chart illustrating use of network method with example of road network. **10**
b) Discuss the role of stakeholder's in identification of alternatives. **10**
- Q.4** a) Explain the procedure of public hearing in EIA. **10**
b) Discuss the constitution of expert appraisal committee and the tenure to be served by experts. **5**
c) Prepare a list of components you will include as a consultant to understand the socio-economic environment of an upcoming project. **5**

PART-B

- Q.5** a) Compute the rainwater harvesting potential of an area with the following given data: roof-top area (4205 m^2), circulation area (4205 m^2) and open greens (5000 m^2). The annual rainfall data may be taken as 1041 mm . Assume any other data as required suitably. **8**
b) Develop a plan for management of solid and hazardous waste during construction and operation phase of a project. **12**
- Q.6** a) Construct a flowchart of EIA process stating timelines of various activities. **10**
b) Make a comparison of 2006 vs 1994 EIA notification. **10**
- Q.7** Compute the capacity of STP proposed for an upcoming township with the following master plant components:
Residential Units : 8000
Staff members : 400
Visitors : 525
Green areas : 4200 m^2
4 DG Cooling sets : 2000 KVA operating 8 hours/day
Develop the water balance diagram for judicious use of groundwater for rainy season and non-rainy season. **20**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

ADVANCED TRAFFIC ENGINEERING (C-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term "off tracking".
- b) Explain spot speed, running speed, space mean speed and time mean speed.
- c) Define various measures that may be taken to decrease accident rate.
- d) List out two signs for each i) Warning sign ii) Informatory sign iii) Mandatory sign.
- e) Explain collision and condition diagram of accidental study.
- f) Explain PIEV theory.
- g) Differentiate between angle parking and parallel parking.
- h) Define motor vehicle act.
- i) Estimate the theoretical capacity of a traffic lane with one way traffic flow at a stream speed of 40 kmph. Assume the average space gap between vehicles to follow the relation $S_g=0.278 V \cdot t$ where V is the speed in kmph, t is the average reaction time =0.7 sec; assume average length of vehicle=5.0m
- j) Write down the expression to calculate cycle time of Webster's method. **2x10**

PART-A

Q.2 a) Draw a flow chart showing the organizational setup of traffic engineering department in India. **10**
b) Explain the objective and scope of traffic engineering in detail. **10**

Q.3 a) Enumerate the different methods of carrying out origin and destination studies. Indicate the significance of each. **10**
b) Spot speed studies were carried out at a certain stretch of a highway with mixed traffic flow and the consolidated data is given below:

Speed range (kmph)	No. of vehicles observed	Speed range (kmph)	No. of vehicles observed
0 to 10	16	50 to 60	270
10 to 20	22	60 to 70	130
20 to 30	76	70 to 80	56
30 to 40	98	80 to 90	42
40 to 50	240	90 to 100	12

Determine i) the upper and lower values or speed limits for installing regulation signs at this road stretch ii) the design speed for checking the geometric design elements of the highway. **10**

Q.4 a) Explain the level of service concept while deciding the design capacity of a road. **10**
b) Define the factors on which PCU values depend? Discuss briefly. **10**

PART-B

- Q.5 a) Explain clearly how the actual crossing manoeuvre of traffic is avoided in a traffic rotary though the traffic may have to otherwise go in cross directions of radiating roads. **10**
- b) Classify the different types of traffic signs and mention the general objectives of each type of sign. **10**
- Q.6 a) Write down the regulation of speed as per Govt. of India. **10**
- b) Define the role of Government agencies for the enforcement of regulation related to road users. **5×2**
- Q.7 a) Explain detrimental effects of traffic on the environment. **10**
- b) Enumerate the vehicular air pollution situation in India. **10**

End Semester Examination, May 2019

B. Tech. (Civil) — Eighth Semester

PRE-STRESSED CONCRETE (C-827A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.
Use of IS 1343:1980 or IS 1343:2012 code for prestressed concrete is allowed.

- Q.1 a) Prestressing steel has an ultimate tensile strength nearly _____.
i) Twice that of HYSD bars ii) thrice that of mild steel reinforcements iii) four times that of HYSD bars. Briefly explain why?
b) Elaborate creep of concrete in structural members.
c) Why are curved cables used in prestressed members?
d) Explain cracking moment.
e) Explain pressure line with diagram.
f) Draw variation of stress in prestressing steel.
g) Explain elastic shortening for pretensioned member.
h) Differentiate between creep of concrete and shrinkage of concrete.
i) "Post tensioned member do not suffer the loss of prestress due to elastic deformation". Why?
j) Describe anchorage slip. **2x10**

PART-A

- Q.2 a) Describe following terms:
i) Tendon ii) Anchorage iii) Pretensioning iv) Bonded prestressed concrete
v) Concordant prestressing. **10**
b) Enlist advantages of prestressed concrete over reinforced concrete. **2**
c) Describe basic concepts of prestressing. **4**
d) Write about deformation characteristics of concrete. **4**

- Q.3 a) Write the applications of post-tensioning.
b) Describe chemical prestressing.
c) Enlist types of losses of prestress.
d) Derive the equation of loss due to elastic deformation of concrete. **5x4**

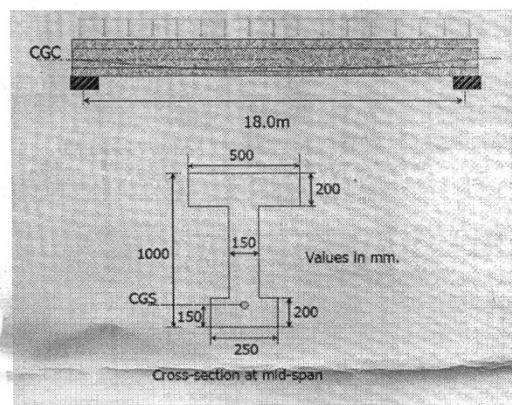
- Q.4 a) A rectangular concrete beam, 300 mm deep and 200 mm wide, is prestressed by means of 15 nos 5 mm dia wires located 65 mm from the bottom of the beam and three 5 mm wires, located 25 mm from the top of the beam. If the wires are initially tensioned to a stress of 800 N/mm², calculate the percentage loss of stress in steel immediately after transfer, allowing for the loss of stress due to elastic deformation of concrete only. **10**
b) A post tensioned concrete beam of rectangular section 100 mm wide and 300 mm deep, is stressed by a parabolic cable with zero eccentricity at the supports and an eccentricity of 50 mm at the centre of span. The area of the cable is 200 mm² and initial stress in the cable is 1200 N/mm². If the ultimate creep strain is 30×10^{-6} and modulus of elasticity of steel is 2×10^5 N/mm², compute the loss of stress in steel only due to creep of concrete. **10**

PART-B

Q.5 A prestressed concrete beam, 200 mm wide and 300 mm deep, is prestressed with wires (area=320 mm²) located at a constant eccentricity of 50 mm and carrying an initial stress of 1000 N/mm². The span of the beam is 10 m. Calculate the percentage loss of stress in wires if a) the beam is pretensioned and b) the beam is post-tensioned, using the following data: $E_s = 210 \text{ kN} / \text{mm}^2$, $E_c = 35 \text{ kN} / \text{mm}^2$, relaxation of steel stress= 5 percent of the initial stress, shrinkage of concrete= 300×10^{-16} for pretensioning and 200×10^{-6} for post tensioning, creep coefficient=1.6, slip at anchorage=1mm, frictional coefficient for wave effect=0.0015 per m. **20**

Q.6 For the post-tensioned beam with a flanged section as shown, the profile of the CGS is parabolic, with no eccentricity at the ends. The live load moment due to service loads at mid-span (M_{LL}) is 700 kNm. The prestress after transfer (P) is 1800 kN. Assume 10% loss at service. Grade of concrete is M35. Evaluate:
 a) Kern levels.
 b) Cracking moment.
 c) The stresses at the top and bottom fibres at transfer and at service.
 d) Compare the stresses with allowable stresses at transfer and at service.

For compression $f_{cc,all} = -18.0 \text{ N} / \text{mm}^2$ for tension, $f_{ct,all} = 1.5 \text{ N} / \text{mm}^2$.



20

Q.7 Design a post tensioned roof girder to suit the following data:
 Effective span=30m, live load=9 kN/m, Dead load=2 kN/m dead load factor=1.4, live load factor=1.6,
 $f_{ci} = 35 \text{ N} / \text{mm}^2$, $f_t = 1.7 \text{ N} / \text{mm}^2$, $E_c = 34 \text{ kN} / \text{mm}^2$
 $f_{ck} = 50 \text{ N} / \text{mm}^2$ loss ratio = $\eta = 0.85$, $f_{pu} = 1500 \text{ N} / \text{mm}^2$, $E_s = 210 \text{ kN} / \text{mm}^2$, 8mm dia wires.
 (Check for minimum section modulus). **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ESTIMATING AND COSTING (C-801-A)

Time: 3 hrs

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

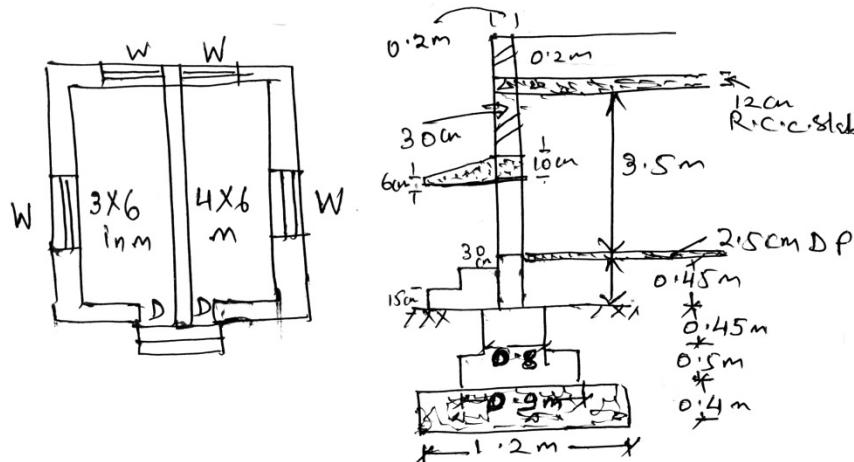
Q.1 Write short notes on:

- What do you understand by Prismoidal method?
- Write down the unit of Measurement; Excavation and concrete.
- Write general specification of brick.
- What do you understand by establishment cost?
- Write down type of tendering and define any one of them.
- What is earnest money? Write down importance of earnest money?
- What is difference between lump sum contract and item rate contract?
- Write down selection of arbitrator in case of international dispute.
- Define scrap value and depreciation.
- Method of depreciation and define any one of them.

2x10

PART-A

Q.2 a) List out the principle of units of measurement normally consists in estimation based IS 1200. **3**
 b) Calculate the quantity of earth for 1200m length for a portion of a canal in an uniform ground. The height of the banks at the two ends are 2.5 m and 3.2 m. The formation width is 20 meter and side slopes are 3:1. Assume that there is no transverse slope. **5**
 c) Estimate the following work of double room building (load bearing type of structure) by long wall and short wall or centre line method.



Reference: D Door 1000 x 2000

W Window 1000 x 1200

- Earth work in excavation.
- C.C. bed in foundation (1:4:8)
- R.R. Masonry in foundation and plinth (1:8)
- D.P.C. 2.5 cm ($1:1\frac{1}{2}:3$)
- Brick work in super structure.

12

- Q.3 a) Write down detailed specification of reinforced cement concrete (R.C.C.). **10**
 b) Briefly explain detailed specification of white washing, colour washing and distempering. **10**
- Q.4 a) Calculate rate per m³ of lime concrete in terrace with 25 mm gauge brick ballast.
 Allow $1\frac{1}{2}\%$ water charge and 10% contractor's profit. **10**
 b) Estimate rate per m² of 12 mm cement plastering in ceiling 1:3 with coarse sand.
 Allow $1\frac{1}{2}\%$ of water charge and 10% contractor's profit. **10**

PART-B

- Q.5 a) Write down process of issue and receipt of tender. **5**
 b) Briefly explain preparation of comparative statement of tender. **5**
 c) Write short notes on:
 i) Administrative sanction. ii) Technical sanction. **10**
- Q.6 a) Write down procedure for maintaining cash book. **10**
 b) Write down both parts of muster Roll and briefly explain rules for preparation of Muster Roll. **10**
- Q.7 a) A building is situated by the side of a main road of Lucknow city on a land of 500 sqm. The buildup portion is 20 m x 15 m. The building is first class type and provided with water supply, sanitary and electric fittings and the age of the building is 30 years. Workout the valuation of the property. **10**
 b) What is arbitration? Briefly explain procedure of arbitration and selection of arbitrator. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

SOLID WASTE MANAGEMENT (C-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define biodegradable materials.
- b) Expand MSW and BMW.
- c) Per capita commercial waste generation can be taken as _____.
- d) Vermi composting is suitable for quantities less than _____ TPD generation of MSW.
- e) Landfill site shall be large enough to cater for _____ years.
- f) What is infectious waste?
- g) Enlist any four categories of waste suitable for landfilling.
- h) What is the duration of post-closure care of a closed landfill site?
- i) No untreated biomedical waste shall be stored beyond _____ hours.
- j) Define design life of a landfill.

2x10

PART-A

Q.2 List and discuss various sources of waste generation.

20

Q.3 a) A residential area consisting of 1500 houses has an average of four residents per house. For estimating the quantity of solid waste generated, the following observations were made at disposal site for a week:

Type of Vehicle	Number of Trips	Volume (m ³)	Specific Weight (kg/m ³)
I	10	15	300
II	8	2	150
III	25	0.5	100
IV	14	7	175
V	25	5	200

Determine the unit rate of solid waste generation.

12

- b) Make a list of any four categories of biomedical waste and their proposed treatment and disposal actions.

8

Q.4 a) Discuss the consequences of improper waste management in detail.

10

- b) How is analysis of waste composition useful in planning and waste management system?

10

PART-B

Q.5 a) Discuss the process of incineration in context of MSW.

10

- b) Discuss the process of vermin-composting the problems and possible solutions.

10

Q.6 a) Discuss the site selection criteria of landfill as stipulated in schedule-III of MSW rules of landfill.

10

- b) You have been entrusted an assignment for data collection for potential sites to be considered for development of a sanitary landfill. What data will you procure from different departments? Also include the name of departments.

10

Q.7 a) As per schedule-II of MSWM rules, what compliance is mandatory for transportation of MSW?

10

b) What is the role of public participation and awareness in solid waste management? **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

BRIDGE ENGINEERING (C-504A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Explain the following terms in brief:

- a) Impact allowance for class A.
- b) Pigeaud's method.
- c) Secure depth.
- d) Aesthetic of bridge design.
- e) Force on piers.
- f) Plate girder-bridge.
- g) Rocker bearing.
- h) Articulation in bridge.
- i) Grip length.
- j) Well curb.

2x10

PART-A

Q.2 a) Explain with figure various components of bridges. **10**
b) Explain topographic details to be considered in the investigations in details. **10**

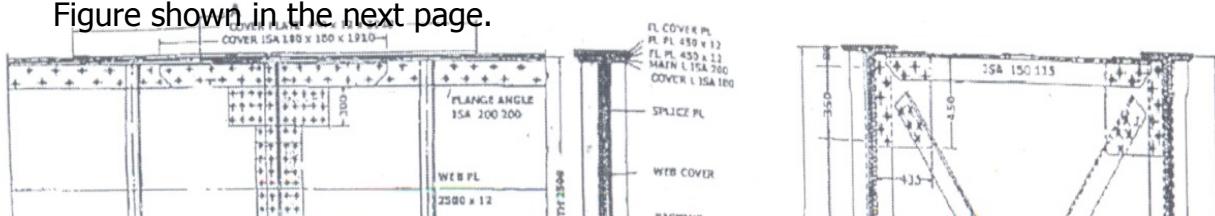
Q.3 a) Explain the IRC class B loading with the help of a sketch. **10**
b) What is economical span? Explain with formula. **10**

Q.4 Design deck slab for a state highway bridge with following data for class AA tracked vehicles. Check for shear.
a) Width of bridge 12 meter.
b) No footpath provided.
c) M25 and Fe415 grade of concrete and steel.
d) Clear span 5 meter.
e) Depth of foundation 1.35 meter.
f) Waering course 56 mm thick asphaltic concrete.
g) $T_c = 0.28 \text{ MPa}$ **20**

PART-B

Q.5 a) Typical details of elevations, plan, web splice and cross section for a deck type riveted plate girder railway bridge of effective span 30 meter are shown in the figure. The bridge is meant for a single track on broad gauge main line, with the following given data:
i) Dead load of sleeper, rails and fitting at 20KN/meter = 600KN.
ii) Dead load of girder assumed at 4KN/meter of span = 120.

Figure shown in the next page.

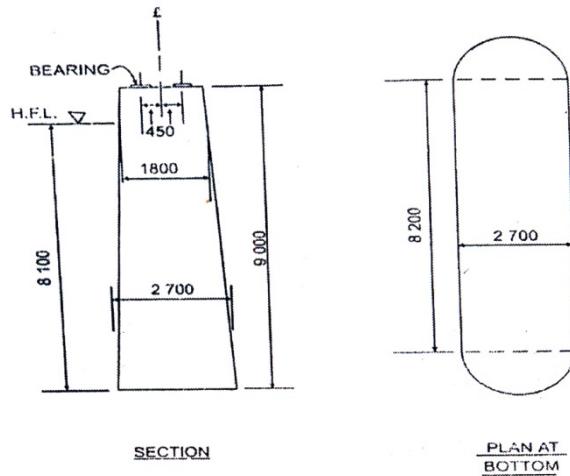


10

- b) Explain the design steps, types and components of Arch bridges.

10

- Q.6 a) What are the main features which are taken up for the design of abutment including forces acting on the abutments? **10**
- b) Design the pier for a bridge with the give data as simply supported T-beam of 21.3 meter span, foundation as well foundation, dimension as per given figure, dead load from each span as 2250 KN, reaction due to live load on one span as 900KN, Maximum mean velocity of current as 3.6 meter/seconds, M20 grade of concrete.



SECTION

PLAN AT BOTTOM

10

- Q.7 a) What is the function of wing wall and how can you classify wing walls? **10**
- b) Explain the design procedure of well foundation with sinking of wells. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester
FLUID MECHANICS-II (C-408A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **3**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

Q.1 Write short notes on the following:

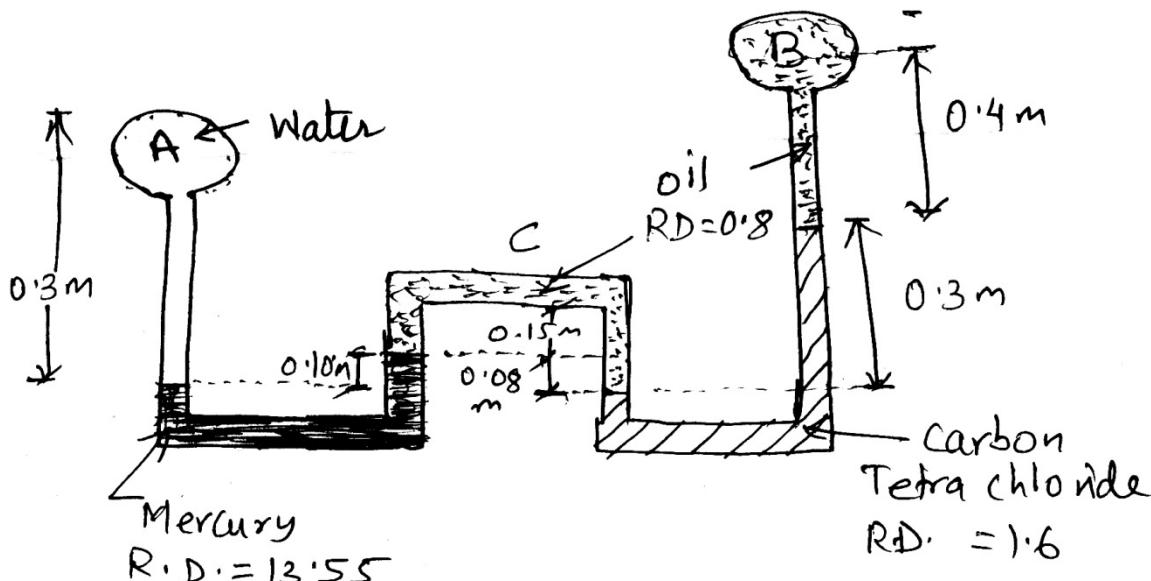
- a) Mass density and specific weight.
- b) Newtonian and non-newtonian fluid.
- c) Hydrostatic pressure distribution in oceans atmosphere.
- d) Stability of floating and submerged bodies.
- e) One dimensional, two dimensional and three dimensional flows.
- f) Vorticity, circulation and rotation.
- g) Factor influence thickness of boundary layer.
- h) Major and minor head loss.
- i) Laminar sub layer and boundary layer on rough surface.
- j) Specific heat and cavitation.

2×10

PART-A

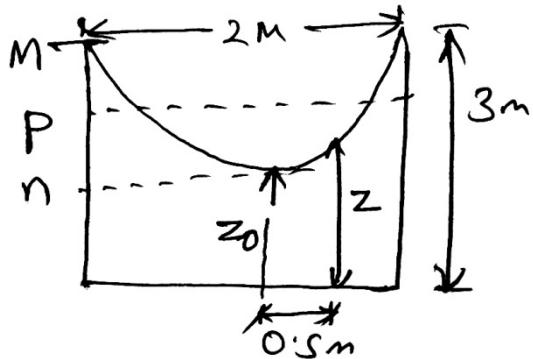
- Q.2** a) The velocity distribution for small values of y in laminar boundary layer on a flat plate is given by the equation $u = 5y + 2y^3 + y^4$ in which u is the velocity in m/second at a distance y m above the plate. Determine shear stress at $y = 0$, $y = 0.10m$ and $y = 0.2m$ if $\mu = 1.85 \times 10^{-5} \text{ kg/m-s}$. **15**
- b) Determine the Kinematic viscosity of air at 20° if its dynamic viscosity is 1.85×10^{-4} poise and its mass density is 1.208 kg/m^3 . **5**

- Q.3** a) Determine $(P_A - P_B)$ and $(P_A - P_C)$ and express them in kN/m^2 :



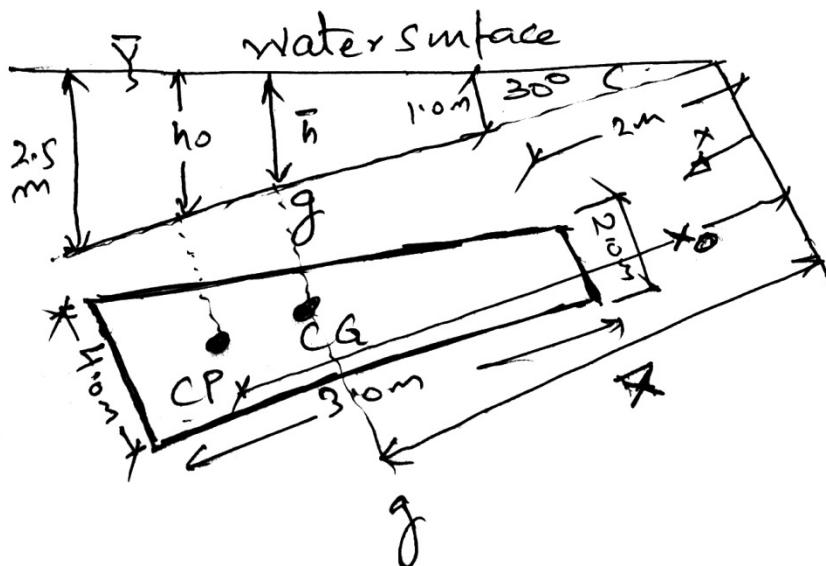
15

- b) A 2.0 m diameter open cylindrical tank is filled to the depth of 2.0 m with water. The height of the tank is 3.0 m. Determine the speed of rotation about its vertical axis at which water will just spill out the tank. What will be the depth at the centre and gauge pressure at bottom 0.5 m from the centre.



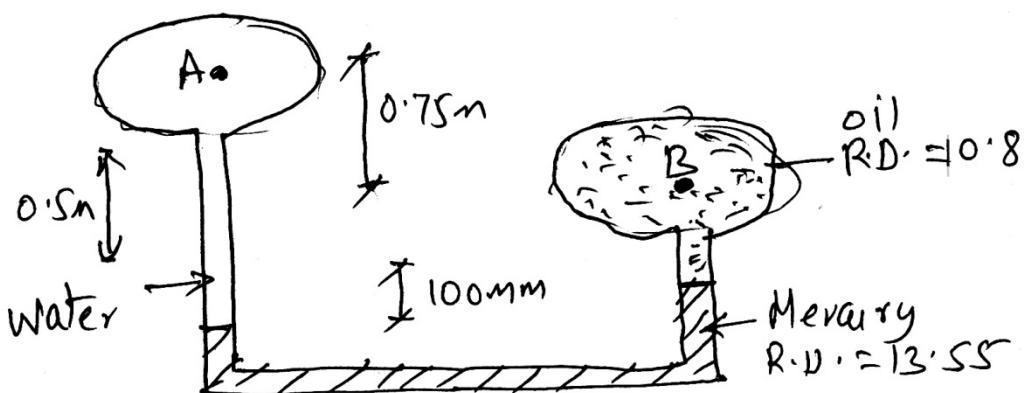
5

- Q.4 a) Briefly explain continuity equation in differential form with illustration. **5**
b) Determine the total force and position of centre of pressure for a trapezium of side 2 m and 4 m and height 3 m immersed in water at 30° inclination with top edge in below water surface.



10

- c) Determine the pressure difference in $(P_A - P_B)$ figure:



5

PART-B

- Q.5 a) Derive expression of integration of Euler's equation of motion with elementary parallelepiped subjected to pressure and body forces under condition when the flow is irrotational $\Omega + \int \frac{d\rho}{\rho} + v^2/2 - \partial\phi = F(t)$. 10
- b) Determine the discharge in a pipe of 200 mm diameter which suddenly expands to 400 mm diameter and in which the hydraulic grade line raises by 10 mm in the expansion. 10
- Q.6 a) Define thickness of boundary layer with respect to displacement, momentum and energy and write down expression of displacement thickness, momentum thickness and energy thickness. 5
- b) Define "Laminar boundary layer". Derive equation for $\frac{\delta}{x}$. 5
- c) Air flows over a flat plate 1 m long at a velocity of 6 m/s. Determine:
 i) The boundary layer thickness at end of the plate.
 ii) Total drag force per unit length on the side of plate. Take $\rho = 1.226 \text{ kg/m}^3$, $\zeta = 0.15 \times 10^{-4} \text{ m}^2/\text{sec}$ for air. 10
- Q.7 a) Find the power required to derive a centrifugal pump which delivers 40 liters of water per second to a height of 20 m through a 150 mm diameter and 10 mm diameter long pipeline. The overall efficiency of pump is 70% and Darcy's $f = 0.06$ for the pipeline. Assume inlet losses in section pipe equal to 0.33 m. 10
- b) A most efficient trapezoidal section is required to give a maximum discharge of 21.5 m^3/sec . The slope of the channel bottom is 1 in 2500. Taking $c = 70 \text{ m}^{1/2}/\text{sec}$ in Chezy's equation, determine the dimension of the channel. Also determine the value of Manning's taking the value of velocity of flow as obtained for the channel by Chezy's equation. 10

End Semester Examination, May 2019

B. Tech. – Fourth / Sixth Semester

DESIGN OF STEEL STRUCTURES-I (C-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question. Use of IS 800-2007 and steel tables is allowed.

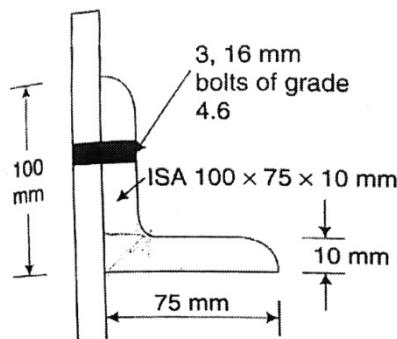
Q.1 Answer the following questions:

- a) Write full form of MOT and EOT.
- b) Differentiate lap joint and butt joint by figure.
- c) Draw the diagram of tension failure of plate.
- d) Differentiate edge and end distance by figure.
- e) "End batten is provided in latticed columns" it's true or false.
- f) Describe web buckling.
- g) Draw the cross section of diagram of built up beams.
- h) Enlist types of columns base.
- i) Explain stiffeners.
- j) Write full form of ISA.

2x10

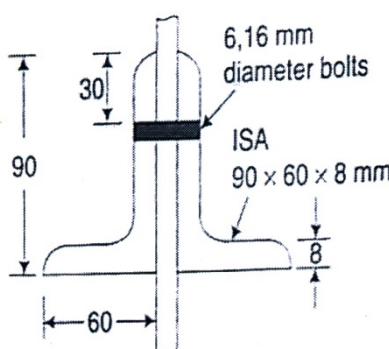
PART-A

- Q.2**
- a) Explain any four failure of riveted joints. **4**
 - b) Write any four advantages of welded joints. **4**
 - c) Design a suitable fillet weld to connect a tie bar 60 X 8 mm to a 12 mm thick gusset plate. Permissible stresses in the bar and fillet weld are 150 MPa and 108 MPa respectively. Use a 6 mm fillet weld. **4**
 - d) Calculate the strength of a 20 mm dia bolt of grade 4.6 and grade of steel Fe 410 for the lap joint. The main plates are 12mm thick. **8**
- Q.3**
- a) Determine the effective net area of the section. The angles are connected as shown in the figure. The steel is of grade Fe 410.



5

- b) Determine the tensile capacity of the sections in figure.



15

- Q.4 a) Write three assumptions of grillage foundation. 6
 b) Design a slab base for 2 column section consisting of ISC 250 with two cover plates 300X25mm carrying an axial load of 2500 kN. The safe bearing capacity of soil is 25 kN/m² and the bearing pressure on concrete is 4000 kN/m² using a grillage foundation for the column. 14

PART-B

- Q.5 Design a laterally supported beam of effective span 6m for the following data.
 Grade of steel: Fe410, max bending moment: M=150 kNm, Max shear force: V=210kN.
 Check for deflection is not required. 20
- Q.6 a) Write the specification of gantry girder. 5
 b) Describe design procedure of gantry girder. 15
- Q.7 Describe a welded plate girder 24m in span and laterally restrained throughout. It has to support a udl of 100 kN/m throughout the span exclusive of self-weight. Design the girder without intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe410. Yield stress of steel may be assumed to be 250 MPa irrespective of the thickness of plates used. Design up to shear force corresponding to web buckling. 20

End Semester Examination, May 2019

M. Tech. – First Semester

GEOMETRIC DESIGN OF STREETS AND HIGHWAYS (PC-TE-M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Write down the classification of rural and urban roads.
- b) Mark the conflict points at the intersection of cross-roads, both two-way.
- c) State the reason for not providing super elevation in a rotary.
- d) While designing a hill road with a ruling gradient of 5%, if a sharp horizontal curve of 50m radius is encountered. Calculate the compensated gradient at the curve as per the Indian Road congress specification.
- e) Define the formula to calculate total delay in urban street design. **4x5**

PART-A

- Q.2** a) Discuss briefly the factors which govern the geometric features of roads. **10**
b) List the objective of highway geometric design and also the various geometric elements to be considered in highway design. **10**
- Q.3** a) Derive an equation for finding the super elevation required if the design coefficient of lateral friction is 'f'. **15**
b) The design speed on a road is 80kmph. Assuming the driver reaction time of 2.5 seconds and coefficient of friction of pavement surface as 0.35, calculate the stopping sight distance for two-way traffic on a single lane road. **5**
- Q.4** a) Define the factors governing the width of carriage way. State the IRC specifications for width of carriage way for various classes of roads. **10**
b) Define the following:
i) Traffic separators.
ii) Kerbs.
iii) Road margins.
iv) Pavement unevenness. **2.5x4**

PART-B

- Q.5** Explain the term L.O.S and write down the steps for determining L.O.S of urban streets with flow diagram. **20**
- Q.6** a) Define the design consideration of rotary intersection in detail. **10**
b) Draw a neat sketch of clover leaf interchange, state its merits and demerits. **10**
- Q.7** a) Explain the importance and requirements of a good highway drainage system. **10**
b) Specify the design approach for surface drainage system of a highway. **10**

End Semester Examination, May 2019
M. Tech. (Transportation Engineering) – Second Semester
INTELLIGENT TRANSPORTATION SYSTEM (PC-TE-M-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Write down the objective of ITS.
- b) Write down the problems faced by vehicle road side communication and also design the term 'TMC'.
- c) Explain the problems faced by V2V communication in brief.
- d) List the importance of GIS in rural transport planning and management.
- e) Distinguish between AVI and AVL with example.

4x5

PART-A

- Q.2 a) Discuss the objective and benefits of ITS in urban world. **10**
- b) Explain the historical background of ITS and its evolution in detail from early stage to till period. **10**
- Q.3 Explain various data collection techniques of ITS and define principle of detectors in detail. **20**
- Q.4 a) Explain the term vehicle positioning system and its importance in ITS. **10**
- b) Explain the features of road side communication. **10**

PART-B

- Q.5 a) Explain the importance of operating software in advanced public transportation system (APTS). **10**
- b) Define the objectives of seven critical program of ARTS strategic plan. **10**
- Q.6 a) Write down the importance of Electronic payment in advanced public transportation system. **10**
- b) Explain the term commercial vehicle operations in brief. **10**
- Q.7 Explain the ITS of developed countries with examples. Name the different ITS programs in the world. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

STRUCTURAL ANALYSIS-II (C-401B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Write short notes on the following:

- a) Assumption made in slope deflection method.
- b) Sign convention for settlement in slope deflection method.
- c) Distribution factor.
- d) Virtual work.
- e) Strain energy due to bending.
- f) Radial shear.
- g) Rib shortening.
- h) Effects of temperature on cable.
- i) Equilibrium of cable.
- j) Guided and roller pulley support.

2×10

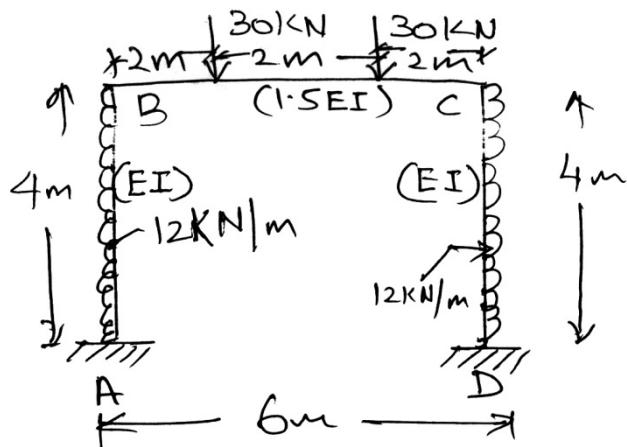
PART-A

Q.2 Analyse the continuous beam as shown in the figure by slope deflection method and draw bending moment and shear force diagram. (Young's modulus is the same throughout).



20

Q.3 Analyse the symmetric portal frame as shown in the figure by moment distribution method.

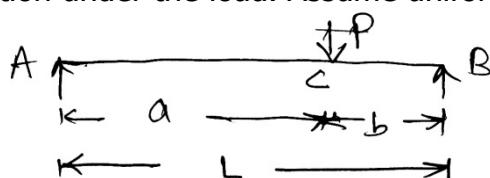


Where Young's modulus of elasticity is constant?

Draw bending moment and shear force diagram of portal frame.

20

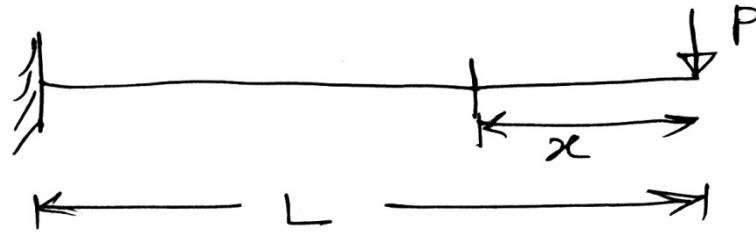
Q.4 a) A simply supported beam of span L carries a concentrated load P at a distance a from left hand side support as shown in the figure. Using Castiglione's theorem determines deflection under the load. Assume uniform flexural rigidity.



10

334/5

- b) Using strain energy method determines the depletion of the free end of a cantilever of length L subjected to a concentrated load P at the free end.



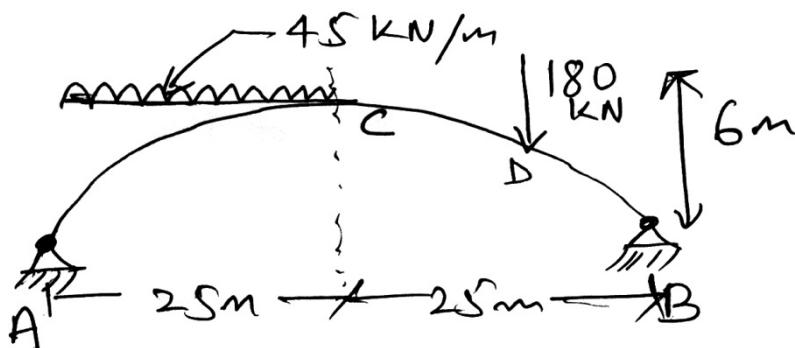
10

PART-B

- Q.5 A two hinged parabolic arch is loaded as shown in the figure. Determine the,

- Horizontal thrust.
- Maximum positive and negative moment
- Shear force and normal thrust at 10 m from the left support.

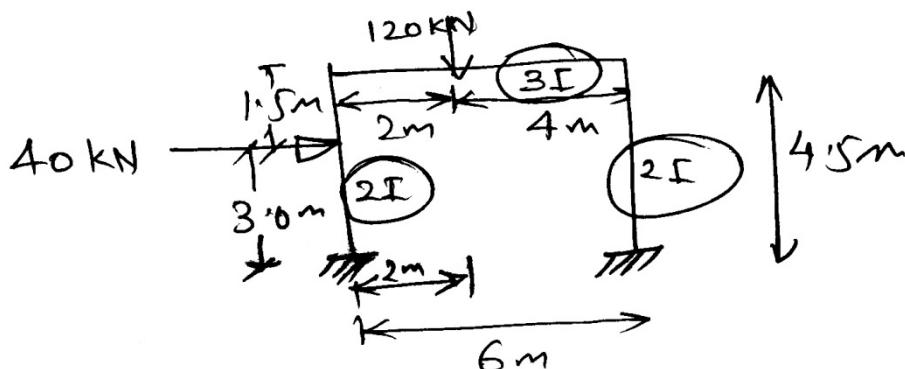
Assume $I = I_0 \sec$ where I_0 in the moment of inertia at the crown and θ is the slope at the section under consideration.



Two hinge parabolic arch.

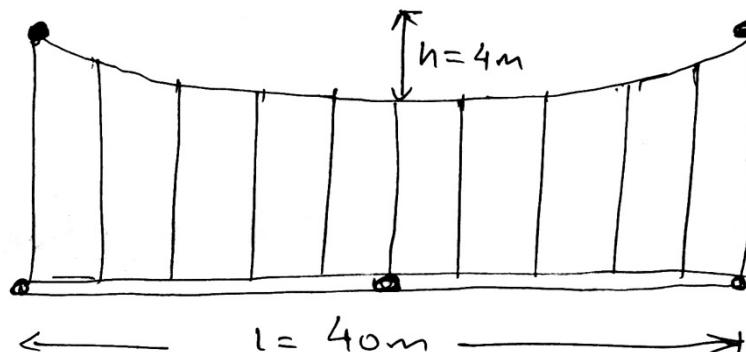
20

- Q.6 Analyze the frame shown in the figure by column Analogy method



20

- Q.7 A suspension cable of 40 m span and 4 m dip is stiffened by a three hinged girder. The dead load is 10 kN/m. Determine the maximum tension in the cable and maximum bending moment in the girder due to a concentrated load of 100 kN crossing the girder.



20

End Semester Examination, May 2019

M. Tech. – Second Semester

LEGAL ASPECT OF CONSTRUCTION ENGINEERING (PE-CM-M-223)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Enlist different types of offers.
- b) What are the qualities of Arbitrator?
- c) Enlist right and duties of Balilee and Bailor.
- d) Enlist conditions on which the bailment comes to an end.
- e) Explain different parts of Arbitral Awards.
- f) Enlist difference between permanent and Mandatory Injunction.
- g) Write down main features of Contract guarantee.
- h) What is an Industry under Industrial dispute Act?
- i) Explain Living Wage.
- j) Enlist benefits of ESI Act.

2x10

PART-A

Q.2 Define a contract and its various types. What are the essentials of valid contract? When does an agreement become a contract? **20**

Q.3 What is Indian Arbitration Act? What is the difference between arbitration and conciliation? Write down in detail about the features and requirement of Arbitral Award. **20**

Q.4 a) Define a contact of bailment. What are the rights of bailor against bailee when bailee mixes his own goods with him? **10**

b) What is the difference bailment and Pledge? What are the rights and duties of Bailee? **10**

PART-B

Q.5 a) Explain Special Relief Act 1963. Enlist different types of Injunction. **7**

b) What does indemnity and Guarantee mean? **7**

c) Why is life insurance not a contract of indemnity? Explain. **6**

Q.6 What are the objectives of Industrial dispute Act 1947? What is an industrial dispute under this act? What are the methods of settlement? Explain three tier system of adjudication. **20**

Q.7 a) Explain employee compensation act 1923, explain its objectives and its benefits. **10**
b) Elucidate Employees State Insurance. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

SURVEYING-II (C-403)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List out the objectives of triangulation surveys.
- b) Define well-conditioned triangle.
- c) Tell something about geodetical observation.
- d) State the principle of least square.
- e) Define most probable value.
- f) Recall about zenith and Nadir.
- g) What is meant by hour angle?
- h) State the concept about scale of photograph.
- i) Relate field application of photogrammetry.
- j) Define the concept of GIS.

2×10

PART-A

Q.2 a) Discuss the effect of terrestrial refraction and curvature for geodetical observations. Also drive the formula for combined correction for refraction and curvature for geodetic observations in trigonometrical leveling. **10**

b) In order to ascertain the elevation of the top(Q) of the signal on a hill, observations were made from two instrument stations P and R at a horizontal distance 100 m apart, the stations P and R being in line with Q. The angles of elevation of at P and R were $28^\circ 42'$ and $18^\circ 06'$ respectively. The staff readings upon the bench mark of elevation 287.28m were respectively 2.870 and 3.750 when the instrument was at P and at R, the telescope being horizontal. Determine the elevation of the foot of the signal if the height of the signal above its base is 3m. **10**

Q.3 a) What are the objectives of triangulation surveys demonstrate it with the help of derivation also explain the principle of triangulation? **10**

b) Compute the value of $\frac{D-C}{D}$ for the following triangulation figures if all the stations have been occupied and all the lines have been observed in both directions.

- i) A braced quadrilateral.
- ii) A four-sided central-point figure without diagonals.
- iii) A four-sided central-point figure with one diagonal. **10**

Q.4 a) Explain various kinds of errors. **10**

b) i) Form the normal equations for x, y and z in the following equation of equal weight:

$$3x + 3y + z - 4 = 0$$

$$x + 2y + 2z - 6 = 0$$

$$5x + y + 4z - 21 = 0$$

ii) If weights of the above equation are 2, 3 and 1 respectively form the normal equation for x, y and z . **10**

PART-B

- Q.5 a) Define the following terms:
i) Altitude and co-altitude.
ii) Horizon.
iii) North and South points.
iv) Azimuth.
v) Declination. **5×2**
- b) Determine the azimuth and altitude of a star from the following data:
i) Latitude of observer = 48° N.
ii) Hour angle of star = 43° .
iii) Declination of star = $18^\circ 20'$ N. **10**
- Q.6 a) Explain with reference to aerial photographs. What is meant by overlap why they are provided? **10**
b) Summarize the radial line method in detail for plotting the details form photograph. **10**
- Q.7 a) Illustrate in detail about remote sensing data processing and analysis. **10**
b) What are the various applications in the field by using GIS and remote sensing survey? **10**

End Semester Examination, May 2019

M. Tech. – Second Semester

FINITE ELEMENT METHOD IN STRUCTURAL ENGG. (PC-SE-M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

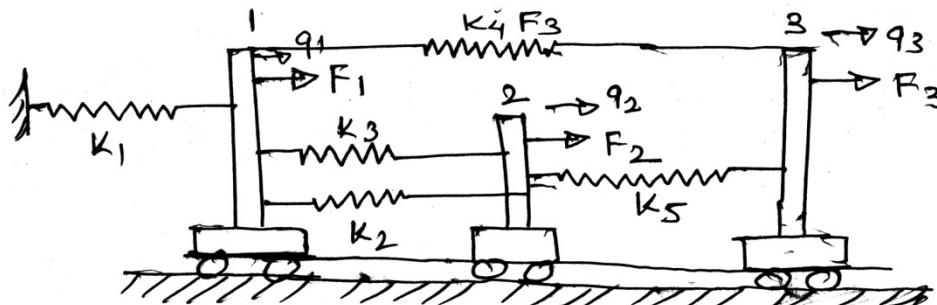
Q.1 Write short notes on the following:

- a) Notion of equilibrium deformed state of a pinned-pinned beam.
- b) Derivation of a global stiffness matrix.
- c) Assembling global stiffness matrix from element stiffness.
- d) Principle of Minimum Potential Energy (MPE).
- e) Formation of load vector.
- f) Convergence and compatibility.
- g) Criteria for the choice of displacement function.
- h) Gaussian quadrature.
- i) Concept of ISO parametric element coordinate and physical coordinate.
- j) Shape function for linear 2D element.

2×10

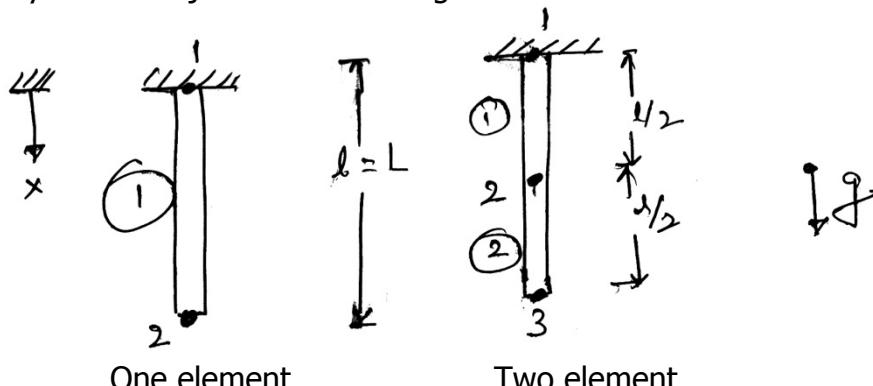
PART-A

Q.2 a) Use MPE principle and force balance method to obtain equilibrium equation.



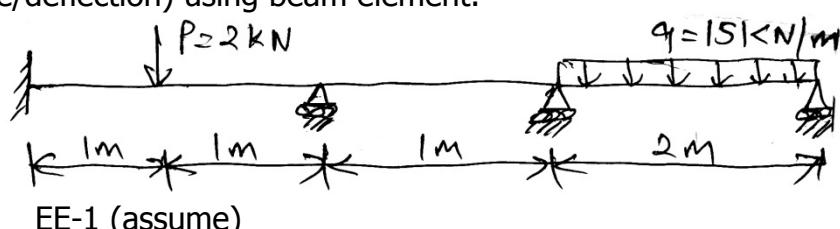
10

b) Analyse bar subjected to self-weight with one and two element.



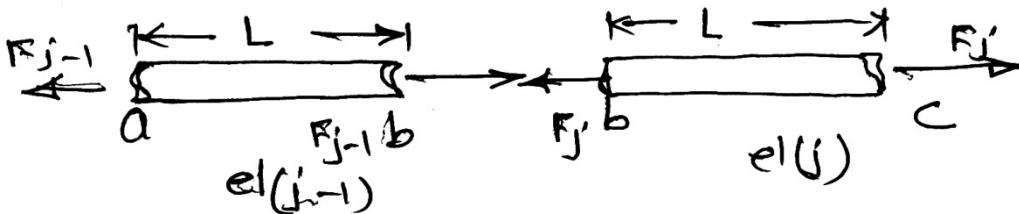
10

Q.3 Analyse continuous beam to obtain unknown displacement (i.e. rotation/translation or slope/deflection) using beam element.



20

- Q.4 a) Find out number of terms in a polynomial for constant strain triangle element (CST). **10**
 b) Explain Galerkin finite element method with a uniform bar under axial load with nodes a, b, c.



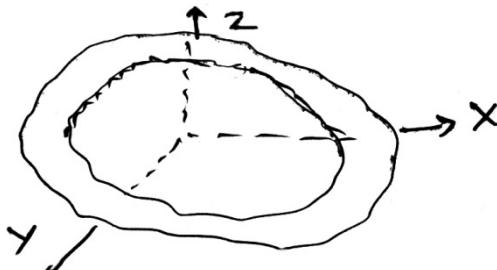
10

PART-B

- Q.5 a) Briefly explain plane stress problem and establish relationship:

$$\{\varepsilon\} = [S]\{\sigma\}$$

and Find out $[D] = [S]^{-1}$



Thin plate under plane stress

10

- b) Evaluate the integral

$$\int_{-1}^1 \int_{-1}^1 x^2 y^2 dx dy \text{ using gauss quadrature formula.}$$

10

- Q.6 a) Find out stress-strain relationship of plane stress Isoperimetric linear element.
 i) Displacement function in terms of nodal parameter of rectangular plane stress.
 ii) Strain-nodal parameter relationship.
 iii) Evaluation of $[B]$ matrix of rectangular plane stress.
 iv) Stress-strain relationship. **12**
- b) Find out displacement function in terms of Nodal displacement of three Nodal triangular plane stress element CST constant strain triangle. **5**
- c) Explain isoparametric element and its classification. **3**
- Q.7 a) List out the various operation in post processing, explain with a physical model for commercial software Ansys. **10**
 b) List out the various operations involved in pre processing, explain with physical model for commercial software Ansys. **10**

End Semester Examination, May 2019

B. Sc. (Interior Design) – Sixth Semester

PRACTICAL ASPECTS OF PROJECT MANAGEMENT (C-705)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Write short notes on **(any five)**:

- a) PERT
- b) CPM
- c) WBS
- d) Purchase order
- e) Project completion report
- f) BOQ
- g) Measurement book

4×5

PART-A

Q.2 What is “project scope definition”? Explain “WBS” and WBS diagram. **20**

Q.3 Explain GANTT CHART, elaborately. What is the basic procedure of constructing GANTT CHART, explain with diagrammatic example. **20**

Q.4 What is “RESOURCE SCHEDULING”? Explain the major problems which any project manager faces while doing the RESOURCE SCHEDULING? **20**

PART-B

Q.5 Explain the comparison between PERT and CPM elaborately. **20**

Q.6 What is project management? What does PROJECT MANAGEMENT entail? What are the advantages of using project management techniques in any project? **20**

Q.7 Write down the steps to determine the critical path. Describe the importance of PERT/CPM in the effective completion of any project in the given time. **20**

Q.8 What are the ways for better project management? What are the consequences of not using project management techniques? **20**

End Semester Examination, May 2019

M. Tech. – Second Semester

FORMWORK AND SHUTTERING (PE-CM-M-221)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Recall about the general objectives of formwork.
b) Define Lateral loads on slabs and walls.
c) Explain in detail duty props.
d) What are the causes of formwork failures?
e) State the concept of slip forms. **4x5**

PART-A

- Q.2 a) List out the key areas of cost reduction while planning the form work. **10**
b) Describe in detail about overall planning of formworks for foundations and beam walls. **10**
- Q.3 a) Recall the various vertical loads for design of slab formworks and its impacts on design. **10**
b) Explain the details of allowable withdrawal load and lateral load for various material based forms. **10**
- Q.4 Design wall forms and slab forms beam and column forms with example. **20**

PART-B

- Q.5 Explain the formwork erecting procedure for wall footing and sloped footing in detail manner with sketch. **20**
- Q.6 a) Describe in detail about the components of slip forms with sketch. **10**
b) List out the various advantages and disadvantages of slipform also write the development of slip form construction techniques. **10**
- Q.7 a) What are the various types of scaffolding available explain with the help of its components. **10**
b) Write shorts notes on measurement book and running bills preparation at construction site. **10**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

ENVIRONMENTAL ENGINEERING (C-605)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is a primary air pollutant? Give examples.
- b) Explain DWF.
- c) Classify type of sanitary sewers.
- d) Write the functions of a screen chamber.
- e) Define lapse rate.
- f) Interpret self-purification capacity of a river.
- g) Give objectives for analysis of sewage.
- h) Name a few sources of pollution.
- i) Differentiate between BOD, COD and TOD?
- j) Explain the land disposal of sludge.

2x10

PART-A

- Q.2**
- a) Briefly discuss about the adverse effects of air pollution. **6**
 - b) Discuss in detail about the sources of air pollution with examples. **4**
 - c) Calculate the effective height of stack when following data is given:
 - i) Physical stack is 200 m tall with 1.10 m inside diameter.
 - ii) Wind velocity is 4.5 m/s
 - iii) Air temperature is 20°C
 - iv) Biometric pressure is 1000 millibar.
 - v) Stack gas velocity is 10.5 m/s.
 - vi) Stack gas temperature is 152°C**10**
- Q.3**
- a) Differentiate between different categories of waste with respect to their composition suitable with examples. **10**
 - b) In a solid waste management system, per capital solid waste under community bin collection system is 350 gm/day. Given that the density of solid waste is 550 kg/m³ and the population of that municipality ward is 200000. Design the size and number of community bins required for that ward. Consider 6 person per family and 1 bin is to be provided for 25 families. Assume any missing data suitably. **10**
- Q.4**
- a) Discuss briefly advantages and disadvantages of various types of sewerage systems. What are the factors affecting the DWF? **10**
 - b) Design an outfall sewer running full in the separate system for a town with a population of 100000 persons with water supply rate of 180 lpcd. The sewer is to be brickwork rendered smooth with cement mortar ($n = 0.012$) and the slope is 1 in 1000. **10**
- ### **PART-B**
- Q.5**
- a) Discuss the objectives of sewage analysis and explain main characteristics of sewage. **10**

- b) The 5-day BOD at 20°C of waste water is found to be 200 mg/l. Taking $k_1 = 0.15 \text{ days}^{-1}$, estimate the ultimate BOD. Also determine the 8-day BOD value at 15°C . **10**

- Q.6 a) Draw the flow process of a conventional sewage treatment plant, write the objectives and working of different types of screens. **10**
- b) A high rate activated sludge plant with an aeration tank volume of 175 m^3 has an applied load of 1.5 MLD with an average BOD of 250 mg/l and suspended solids of 160 mg/l. The mixed liquor suspended solids (MLSS) in the aeration tank is held at concentration of 4,000 mg/l of suspended solids. Based on data calculate:
- i) BOD loading in kg/ha.m
 - ii) BOD loading as F/M ratio.
 - iii) Aeration period.
 - iv) Sludge age. **10**

- Q.7 a) Discuss the general physic-chemical affects of pollutants in water bodies. Give some prevention measures to control eutrophication. **10**
- b) A city with population of 130000 and a sewage flow of 150 lpcd is located on a stream with rate of flow of $0.75 \text{ m}^3/\text{sec}$. The BOD of sewage is 210 mg/l, the DO and BOD content of the stream above the outfall sewer is 7.7 and 1 mg/l respectively.
- i) How many kg of O_2 per day is available above the outfall?
 - ii) What is the total kg of BOD per day in the stream just below the outfall assuming no oxidation takes place?
 - iii) What will be the total BOD in mg/l? **10**

End Semester Examination, May 2019

M. Tech. (Structural Engineering) - Second Semester

STRUCTURAL DYNAMICS (PC-SE-M-202)

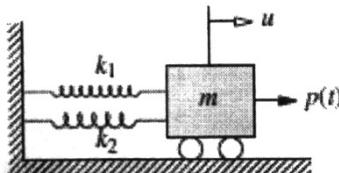
Time: 3 hrs

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1** a) Illustrate two examples of structures modeled as SDOF system.
 b) Starting from the basic definition of stiffness, determine the effective stiffness of the combined spring and write the equation of motion for the spring-mass systems shown below.



- c) Interpret Over Damping, critical Damping and under damping with a figure.
 d) Explain Logarithmic Decrement.
 e) Illustrate with a figure Half Power Bandwidth.
 f) Compute the natural frequency and time period of an SDOF system of mass 2000kg and stiffness of 30kN/m.
 g) Justify with an example the concept of Generalized Single Degree of Freedom System.
 h) Model a 2-storeyed building into a mass-spring-damper system with free body diagrams.
 i) Elaborate conceptually vibrations caused by traffic.
 j) Derive briefly Time history at storey level for a three DOF system.

2x10

PART-A

- Q.2** a) A generator of 1t weight is placed on a concrete plank of width 500 mm and length 2 m and thickness 120 mm. Evaluate the static and dynamic deflection of generator running at 2000 rpm. Use M20. **10**
 b) Develop expression for response of damped SDOF system to free vibration. **10**

- Q.3** a) A water tank is set to vibrate freely. Amplitude of vibration reduces from 0.5m to 0.1m in 4 cycles in 8 seconds. Find the damped natural period and damping. **10**
 b) Discuss briefly Duhamel's Integral. **10**

- Q.4** Explain Central Difference method for finding the response of a non-linear system subjected to Arbitrary Dynamic loading. **20**

PART-B

- Q.5** a) Derive characteristic equation for undamped free vibration in a MDOF system. **10**
 b) A uniform cantilever tower of length L has mass per unit length = m and flexural rigidity EI. Assume $\psi(x) = 1 - \cos\left(\frac{\pi x}{2L}\right)$. Formulate the equation of motion for the generalized SDOF system excited by ground motion and determine its natural frequency. **10**

- Q.6** Perform Eigen value analysis-the Eigen values and Eigen vectors for a two storeyed building 3.5 m X 3.5 m plan area, floor to floor height as 3m, Column Dimension as

230 mm X 230 mm and thickness of slab as 150 mm. Assume mass-less columns and no infill walls. M25 Concrete has been used. **20**

- Q.7 a) Defend Rayleigh's method of finding first natural frequency of MDOF structure. **10**
- b) Elaborate (**any two**) of the following:
- i) Foundations for Industrial Machinery.
 - ii) Base Isolation.
 - iii) Dynamic effects of Wind loading. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DESIGN OF CONCRETE STRUCTURES-I (C-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question. IS 456:2000 code for reinforced concrete and use of calculators is allowed.

Q.1 Answer the following questions:

- a) How do you determine characteristic strength for concrete in the lab?
- b) Define modular ratio. Mention the particular IS code clause.
- c) Draw Stress Strain Blocks of Limit State method.
- d) Why is it undesirable to design over-reinforced sections?
- e) Determine the mean target strength required for the mix design of M30 concrete assuming moderate quality control.
- f) Differentiate the Working Stress method and Limit State method of design of RC sections.
- g) What are the advantages of designing T-beams?
- h) Elaborate the design steps of helical reinforcement in circular columns.
- i) Explain briefly punching shear failure of footings.
- j) What is the maximum and minimum percentage of steel for columns? Mention The IS code clause.

2×10

PART-A

Q.2 Use working stress method for the following:

- a) Find out the moment of resistance of an RCC beam 300mm X 800mm and effective cover=50mm. Calculate moment of resistance of balanced section and area of steel required for the same. Use M25 concrete with Fe415 steel. **10**
- b) Design a reinforced concrete beam subjected to a load of 40kN/m (excluding self wt). The beam is supported over an effective span of 7.5m. Assume width of beam as 400mm and use M25 concrete with Fe 415 steel. **10**

Q.3 a) Using Limit state design principles, determine whether the section 250mm X 500 mm with a cover of 50 mm is under or over-reinforced with $f_{ck} = 30 \text{ N/mm}^2$, $f_y = 415 \text{ N/mm}^2$, and with $A_{st} = 1415 \text{ mm}^2$. **10**
b) Derive expression for M.O.R of a T-Beam when Neutral Axis lies in the Web Portion but depth of flange is less than $3/7x_u$. Use LSM. **10**

Q.4 A rectangular beam of 250mmX500mm (B X d) is provided with 3no 16 mm dia HYSD Fe415 as tension reinforcement. Shear Force=60kN under service load conditions. Use LSM to design shear reinforcement for the beam. **20**

PART-B

Q.5 Design a slab of clear span between walls 4 m X 10 m supported over walls on all four sides of thickness 300 mm. Use M20 concrete and Fe 415 Steel. Live load = 4kN/m, Superimposed dead load = 4kN/m. Floor Finishing is of 60mm thickness C.C. Flooring. **20**

Q.6 Design an axially loaded column pinned at both ends. Unsupported length=3.5m, characteristic load=1500kN, use M20 and Fe 415. **20**

- Q.7** Design a Square Isolated footing of uniform thickness for a R.C. C. Column of size 500mm X 500mm bearing a load of 80 tonnes. The safe bearing capacity of the soil may be taken as 200kN/m². Use M20 concrete and Fe 415 steel. **20**

End Semester Examination, May 2019

M. Tech. — Second Semester

HIGHWAY SUB GRADE AND FOUNDATION ANALYSIS (PE-TE-M-221)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List different categories of soil water.
- b) What is the function of subgrade?
- c) As per IS classification system "SM" stands for?
- d) For what purpose vertical drains are provided?
- e) Write equation of A-line in A-line chart.
- f) Differentiate between consolidation and compaction.
- g) Mention field and laboratory methods to find out dry density of soil.
- h) Why ground water investigation is necessary for a highway project?
- i) Define total stress, neutral stress and effective stress.
- j) What methods are used for reducing settlement?

2×10

PART-A

- Q.2** a) Discuss in detail soil survey procedure for highways? **10**
 b) Why identification of soil characteristics is important in highway engineering, explain in detail? **5**
 c) What is subgrade? Explain its properties and functions. **5**
- Q.3** a) Explain India Standard classification system in detail. **10**
 b) Write short notes on chemical test performed for soil. **10**
- Q.4** Write short notes on the following:
 a) Soil water.
 b) Control of high water table.
 c) Drainage of fine grained soils.
 d) Soil suction. **5×4**

PART-B

- Q.5** a) What are the different methods of compaction adopted in the field? How would you select the type of roller to be used? **10**
 b) The following results were obtained from a standard compaction test on a sample of soil:

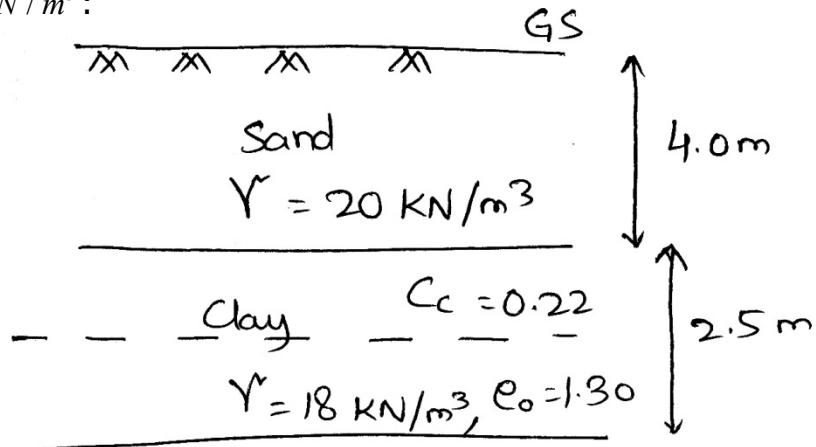
Water content (%)	0.12	0.14	0.16	0.18	0.20	0.22
Mass of wet soil (kg)	1.68	1.85	1.91	1.87	1.87	1.85

The volume of module used was 950 ml. Plot the compaction curve and obtain maximum dry density and optimum moisture content. **10**

- Q.6** a) Explain any one method to construct high embankment over weak foundation. **10**

- b) Calculate the final settlement of the clay layer as shown in figure due to an increase of pressure of 30 KN/m^2 at mid height of the layer:

$$\gamma_w = 10 \text{ kN/m}^3$$



10

- Q.7 Explain design criteria of vertical drains along with its uses.

20

End Semester Examination, May 2019

M. Tech. (Structural Engineering) – Second Semester

DESIGN OF HIGH RISE STRUCTURES (PE-SE-M-223)

Time: 3 hrs.

Max Marks: **100**

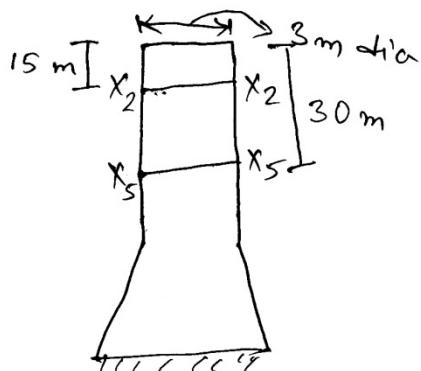
No. of pages: **2**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

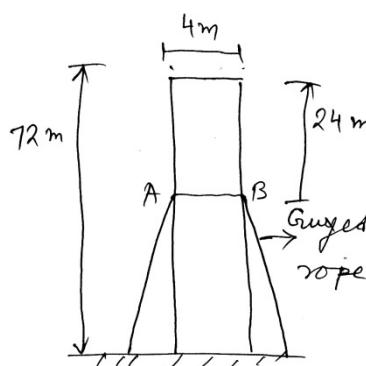
- Q.1**
- a) Illustrate the equation of tower height.
 - b) Define normal span of tower.
 - c) List out min permissible ground clearance of transmission tower in open country.
 - d) Classify transmission tower according to use.
 - e) Fire dampers are provided at the inlet of supply air duct and the return air duct of each compartment on every floor. State true or false.
 - f) How much is the height, for which fire alarm systems are provided for residential building and other all buildings?
 - g) Enlist different building frame system.
 - h) Write the advantage of RCC chimney.
 - i) Enlist types of steel chimneys.
 - j) Short note on Guniting.
- 2×10**

PART-A

- Q.2**
- a) Describe structural form and load mechanism of shear wall provided in tall building with diagram. **10**
 - b) Draw a coupled wall structure and describe each component. **10**
- Q.3**
- a) Explain at least five procedures for clearance from fire service. **15**
 - b) List out five escape terms: **5**
- Q.4** Design the thickness of a self-supporting steel chimney plate at section x_2x_2 and x_5x_5 provided in fig. **20**



- Q.5**
- a) Classify guyed steel chimneys and draw the diagram and describe each. **10**
 - b) Design a guyed steel chimney as shown in figure.



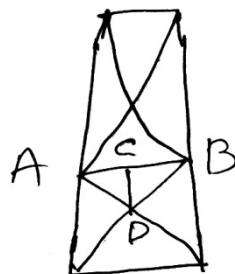
10

- Q.6** a) Describe five types of bracing systems with diagram. **10**
 b) A twin angle bracing system used for horizontal member of length $L = 8\text{m}$. In order to reduce the effective length of member AB, single angle CD has been connected to the system. AB is made of two angles $100 \text{ mm} \times 100 \text{ mm}$ whose properties are given below:

$$r_{xx} = 4.38 \text{ cm}$$

$$r_{yy} = 3.05 \text{ cm}$$

$$\text{Area} = 38.06 \text{ cm}^2$$



Calculate safe compressive load on the strut AB.

10

- Q.7** a) Explain aerodynamic coefficient. **5**
 b) Calculate the design wind speed for a tower 20 m high situated in an area (category 3) and 100 year probable life near an escarpment at Madras, the crest of the escarpment is 10 m effective distance from the tower. The tower is located on the downwind side 5 m from the crest. **10**
 c) Draw the diagram of a transmission tower and show wind span, weight span and normal span. **5**

End Semester Examination, May 2019

M. Tech. (Structural Engineering) - Second Semester

ADVANCED DESIGN OF FOUNDATION (PE-SE-M-226)

Time: 3 hrs

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1** Explain in brief the following:

 - a) The corrections for observed SPT values in cohesion less soils?
 - b) Plate load test.
 - c) Provision of pile cap?
 - d) Different types of Machine foundations?
 - e) Ground anchors and where we used rock anchor?
 - f) Auger Boring.
 - g) Mucking.
 - h) Ditch conduits.
 - i) Rockfill coffer dams.
 - j) Safety against sliding in coffer dams.

2x10

PART-A

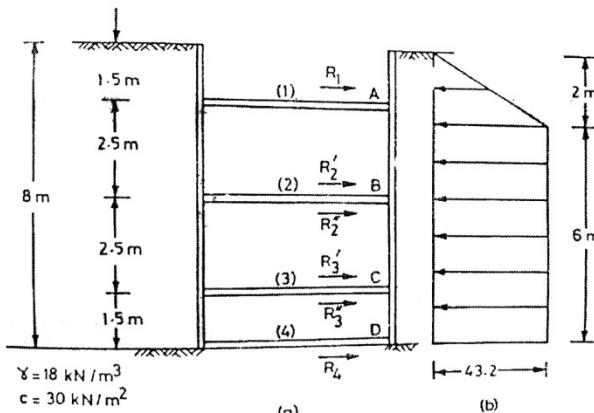
- Q.2 a) Explain the different types of Auger with their diagrams. **10**
b) Discuss on electrical resistivity method with sketch of the arrangement. **10**

Q.3 A strip footing of width 3 meter is founded at a depth of 2 meter below the ground surface in a-c- Φ soil having a cohesion, $C = 30 \text{ kN/m}^2$ and $\Phi = 35^\circ$. The water table is at a depth of 5 meter below ground level the moist weight of soil above water table is 17.75 kN/m^3 . Determine:
a) Ultimate bearing capacity of soil.
b) Net bearing capacity.
c) Net allowable bearing pressure and load per meter run for factor of safety of 3. Use general share failure theory of Terzaghi and compare it with IS code Method. **20**

Q.4 A precast concrete pile 16 inches in diameter are required to be driven for a building foundation. The design load on a single pile is 100kips. Determine the length of the pile

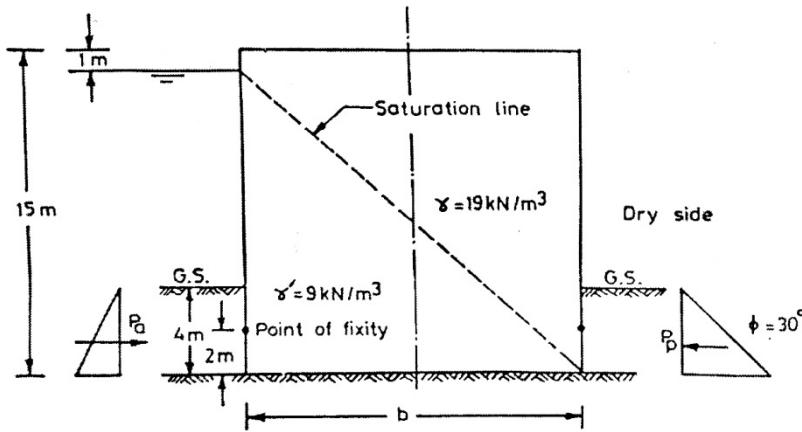
PART-B

- Q.5 Determine the forces in the struts for the bracing system shown in Figure (a) and (b). Assume the hinges at levels B, C and D take $\gamma = 18kN / cub - m$, $c = 30kN / Sq - m$ and $s = 2.0\text{ meter}$.



- Q.6 a) Determine the load on a (positive projection) square box culvert under a 16-meter fill ($\gamma = 19 \text{ kN/m}^3$). Assume that the outside width of the barrel is 2.5 meter. Take Projection ration (p) = 0.5 and settlement ration (r_p) = +0.6. 5
 b) Explain Belgian Method of tunneling in soft soil. 7½
 c) Explain Needle beam Method of tunneling in soft soil. 7½

- Q.7 Design a circular, cellular coffer dam of total height 15 meter resting on rock as show in Fig below (7a). Take allowable interlock tension of 1500 kN/m, $\Phi = 30$ degree, $\delta = 25^\circ$, $K = 0.60$, $f = 0.30$, $\gamma_w = 10 \text{ kN/m}^3$.



End Semester Examination, May 2019

M. Tech. — Second Semester

TRANSPORTATION SAFETY AND ENVIRONMENT (PE-TE-M-225)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain different road user categories.
- b) Interpret various geometrical elements to be considered in highway design.
- c) What are the steps to prevent the road accidents?
- d) Frame 10 survey questions to be asked from a car accident witness.
- e) List various components of advance traffic management system. Explain any one. **4×5**

PART-A

Q.2 Elaborate the engineering and non-engineering measures to mitigate the road accidents. **20**

Q.3 a) Explain the different vehicular safety standards and IT enabled safety features. **10**
b) Briefly explain the characteristics of geometrical road design. **10**

Q.4 Clarify different methods of maintaining road accident records? Explain briefly. **20**

PART-B

Q.5 Interpret road safety audit, its principles, procedures and practice. **20**

Q.6 Explain how traffic flow data is needed for development and management of intelligent transport system. **20**

Q.7 What are the various surveys to be carried out before planning a new highway project? **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ENGINEERING GEOLOGY (C-407)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following question:

- a) The ozone layer is located in which part of atmosphere.
- b) An OXBOW lake is actually:
 - i) Salt lake formed in the coastal areas when sea water gets trapped in an isolated depression.
 - ii) A fresh water lake occurring in the mountainous regions.
 - iii) An isolated, detached loop of a meandering river in lower regions.
 - iv) None of the above.
- c) Give some examples of faults in mountains.
- d) Draw neat sketches for various parts of faults as understood in structural geology.
- e) Define uniaxial and biaxial minerals.
- f) The Moh's scale of hardness comprises ten minerals. Name and arrange the minerals in order of ascending hardness.
- g) Define "artificial recharge".
- h) Differentiate between aquifer and aquiclude.
- i) S-waves do not pass through:
 - i) Sedimentary rocks
 - ii) Ore bodies.
 - iii) Liquids
 - iv) Solidified igneous masses.
- j) Compare the relative merits of road/tunnel alignment which are made inclined to both dip and strike direction.

2×10

PART-A

Q.2 a) Describe briefly the structure of the atmosphere around the earth. Explain its significance on the life systems existing on this planet. **10**
b) Write a critical essay on the origin of the earth. Should we consider the problem completely solved? **10**

Q.3 a) Compare and contrast work of erosion performed by three natural agencies-rivers, groundwater and wind on the surface of the earth, bringing out clearly similarities and dissimilarities. **15**
b) Explain the following briefly:

- i) Intensity of earthquakes
- ii) Assessment of seismic risks.

5

Q.4 a) What is rock forming mineral? **5**
b) Discuss processes of formation of minerals in nature. Which group of minerals is most common in occurrence? Briefly mention its salient features. **15**

PART-B

Q.5 a) Explain with the help of neat sketches, principal types of faults as recognized on the basis of:

- i) apparent movement.

- ii) Mode of occurrence. 10
- b) Explain unconformity, its origin, types with the features to detect unconformity. 10
- Q.6 a) Define briefly the problems of underground water in engineering constructions such as dams and reservoirs, road pavements and water retaining structures. 10
- b) Explain various geological characters that have to be established before a water supply project from an artesian source is approved. 10
- Q.7 a) Give an account of types of 'tunnels' and their usefulness. What are general geological characteristics of the area that must be known before a tunnel project is decided in that area? 10
- b) Explain various types of reservoir's and geological conditions necessary for their proper location. 10

End Semester Examination, May 2019

B. Tech. – Sixth Semester

URBAN PLANNING (C-631)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Write short notes on the following:

- a) Urban Ecology.
- b) Under Employment.
- c) Sources of municipal finance.
- d) Evaluation of a project.
- e) User charges.
- f) Inclusive development.
- g) Land use.
- h) Five year plans.
- i) Urban and Rural development.
- j) Core issues in development.

2x10

PART-A

Q.2 a) Name different urban challenges which hinder the development and discuss any two of them. **10**

b) Why urban ecology should be included in urban development plans for cities? **10**

Q.3 a) Why urban reforms are needed? Discuss in context to robust urbanization of Indian cities. **10**

b) What are the sources of municipal finance? What is the need to enhance them? **10**

Q.4 a) How does evaluation of completed projects help us to formulate better projects in future? **10**

b) What do you understand by "inequalities"? How these can be taken care of in developmental plans? **10**

PART-B

Q.5 a) What are the main factors of rapid urbanization in world? **10**

b) Derive a relationship between skill development and removal of unemployment. **10**

Q.6 a) Discuss advantages and disadvantages of current urban governance model in India. **10**

b) What are the functions and duties of Municipal Corporations? **10**

Q.7 a) What do you understand by Inclusive Development? **10**

b) Define Zoning. How Zoning helps to mitigate problems of development plans? **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester **SOIL MECHANICS (C-406)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is a block diagram?
- b) Which method is used to determine water content of the soil?
- c) What is relation between void ratio, specific gravity, water content and degree of saturation?
- d) List properties of flow net.
- e) What is Darcy's law? State its limitations.
- f) What do you mean by placement water content?
- g) What are the causes of pre consolidation of soils?
- h) Differentiate between primary and secondary consolidation.
- i) What is unconfined compression test?
- j) Define pore water pressure.

2×10

PART-A

Q.2 a) A sample of saturated soil has a water content of 25% and bulk unit weight of 20kN/m³. Determine dry density, void ratio and specific gravity of solid particles. **10**
b) Discuss various methods of determination of density of soil in field. **10**

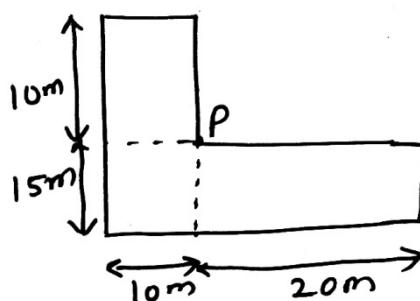
Q.3 a) Define "Permeability". Discuss the factors that influence permeability of soil. **10**
b) Determine the average coefficient of permeability in the horizontal and vertical directions for a deposit consisting of four layers of thickness 3m, 1m, 1.5m, 3m and having coefficient of permeability of 0.2cm/sec, 3×10^{-4} cm/sec, 0.06cm/sec, 5×10^{-7} cm/sec respectively. Assume the layers are isotropic. **10**

Q.4 a) An L-shaped building in plan as shown in figure-1 exerts a pressure of 75 kN/m² on the soil. Determine the vertical stress increment at a depth of 5m below the interior corner P.

Take: $IN_1 = 0.2325$

$IN_2 = 0.2378$

$IN_3 = 0.2450$



10

- b) Define the following:

- i) Influence diagram.
- ii) Isobar.
- iii) Geostatic stresses.
- iv) Contact pressure.
- iv) Line load.

2×5

PART-B

- Q.5 a) What is the effect of compaction on different properties of the soil? **10**
 b) The following are the results of a standard Proctor test on a soil sample:

Water content (%)	7.7	11.5	14.6	17.5	19.7	21.2
Mass of wet soil (Kg)	1.7	1.89	2.03	1.99	1.96	1.92

If the volume of mould was 950cc, plot the water content-dry density curve and obtain maximum dry density and optimum moisture content. **10**

- Q.6 a) Differentiate between consolidation and compaction. **10**
 b) What is coefficient of consolidation? What is its use in settlement analysis? How is it determined? **10**
- Q.7 a) Define slow, quick and consolidated quick triaxial shear test. Explain any one in detail. **10**
 b) What is Mohr's strength theory for soils? Sketch the typical strength envelopes for a clean sand and clayey soil. **10**

End Semester Examination, May 2019
M. Tech. (Construction Management) - Third Semester
ADVANCED CONSTRUCTION TECHNOLOGY(C-MC-301)

Time: 3 hrs

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Explain the use of following:

- a) Tunnel form.
- b) Boom placer.
- c) Shorting.
- d) Slip form
- e) Super plasticizer.

3x5

PART-A

Q.2 a) Write a note on how new technology has affected the economy and efficiency of construction industry. **7½**
b) How do we compare the use of material for being used in form work? **7½**

Q.3 a) Classify different types of form work and also different type of load that comes over it. **7½**
b) Write the step which need to be checked before putting form work for slabs. **7½**

Q.4 a) Why do we use tunnel form work and how is it different from conventional formwork. **7½**
b) How do we use slipform in pavement construction? **7½**

PART-B

Q.5 a) Explain re-shoring, pre-shoring and back shoring in details. **7½**
b) Explain different reasons for the failure of formwork or temporary structure. **7½**

Q.6 a) Explain the method that can be employed for top down technique in high rise construction. **7½**
b) How is bottom up technology different from top down technology? **7½**

Q.7 a) In how many ways segmental construction different from incremental construction? Explain. **7½**
b) How has prefab construction played an important role in efficiency of bridge construction? Explain. **7½**

End Semester Examination, May 2019

M. Tech. – First Semester

PAVEMENT MATERIALS AND CONSTRUCTION TECHNIQUES (PE-CE-M-121 / CMT-103)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Explain classification of aggregates on the basis of size.
b) Write in your own words the advantages of using bitumen mixes.
c) Explain flash point test of bitumen.
d) What do you understand by surface dressing? Write down its functions.
e) State down the uses of dowel bars. **3×5**

PART-A

- Q.2 Classify different types of aggregates. **15**
- Q.3 Illustrate Marshall Method of bituminous mix design with the help of a neat and clear diagram. **15**
- Q.4 What are the different types of road construction and explain the construction of earth roads? **15**

PART-B

- Q.5 List down the different tests used for quality control of bitumen and also explain penetration test. **15**
- Q.6 Discuss any two premix treatments of bituminous construction. **15**
- Q.7 Explain longitudinal joints and show location of different joints with the help of diagram. **15**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

SANITATION SOLID AND LIQUID WASTE MANAGEMENT (C-706)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Which ministry is implementing Swachh Bharat Abhiyaan for rural areas?
- b) How leprosy and tuberculosis spread?
- c) Expand SWM and PRI.
- d) Make a list of any four types of communicable diseases.
- e) After what duration is septage removed from septic tanks?
- f) Define 'sullage'.
- g) Define 'municipal waste'.
- h) Differentiate between hazardous and industrial waste.
- i) List any two components to be included in evaluation phase of IEC.
- j) Describe the role IEC in improving sanitation of an area.

2×10

PART-A

- Q.2** a) Discuss the provisions under SBM for IEC and public awareness. **10**
b) "Sanitation is more important than independence", make supportive justifications. **10**
- Q.3** a) Enlist the symptoms of Dengue fever. **5**
b) What challenges are faced by urban local bodies in urban sanitation? **5**
c) Describe the role of sanitation in eradication of communicable disease. **10**
- Q.4** a) Give an overview of factors to be considered before construction of toilets at a location. **10**
b) Draw a neat sketch of pour flush latrine with circular pit and explain its salient features. **10**

PART-B

- Q.5** a) "The **composition** of and characteristics of municipal solid waste vary throughout the world", make supportive justifications. **12**
b) Describe the working of landfill gas recovery system. **8**
- Q.6** a) Enlist a few factors that act as a potential constraint for reuse of wastewater for irrigation of agricultural crops. **5**
b) Discuss the advantages and disadvantages of reuse of treated wastewater for industrial use. **15**
- Q.7** a) An urban local body looks forward to develop the guidelines for improving sanitation in institutional areas and housing societies. You have been entrusted this job, frame your recommendations. **12**
b) While developing the strategy of IEC what points are to be included. Enlist and explain them. **8**

End Semester Examination, May 2019

B. Tech. – Third Semester

STRENGTH OF MATERIALS (C-306B / C-306C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Differentiate between lateral and longitudinal strain.
b) Write the relationship between elastic modulus and shear modulus and between shear modulus and bulk modulus.
c) Define Hooke's law
d) What do you understand by Principal stresses?
e) Define neutral axis.
f) Define shear centre.
g) Show the variation of shear stress I section and Solid circular section
h) Define core of a section.
i) What is the difference between concentric and eccentric loading?
j) Write down the equation of torsion and explain each term. **2×10**

PART-A

- Q.2 A bar of three length L_1 , L_2 , L_3 in succession has diameters 25mm, 30mm, and 20mm respectively. Given $L_1=250\text{mm}$, $L_2=300\text{mm}$ and $L_3=250\text{mm}$, find the stress in the three parts and the total extension of the bar for an axial pull of 40kN. Take $E=2\times10^5 \text{ N/mm}^2$. **20**

- Q.3 The stresses at a point are: $\sigma_x = 100\text{MPa}$ (tensile) and $\sigma_y = 40\text{MPa}$ (compressive). Find the magnitudes of normal, tangential and the resultant stress on a plane at 30° with $\tau_{xy} = 70\text{MPa}$ stress. Also find the principal stresses. **20**

- Q.4 A 150 mm x 150 mm rolled steel joist of I-section has flanges and web 10 mm thick. Find out the uniformly distributed load that this section can carry over a span of 4 m if the permissible skin stress is limited to 160 N/mm^2 . **20**

PART-B

- Q.5 The cross-section of a joist is a T-section, 150 mm x 300 mm x 15 mm, with 150 mm side horizontal. Find the maximum shear stress if it has to resist a shear force of 400 kN. Also sketch shear stress distribution. **20**

- Q.6 A short column of rectangular section 200 mm x 300 mm carries a compressive load of 900 kN. The load is applied at a point (-50, 100) considering the centroid of the section as the origin. Find the stresses at the four corners of the section. **20**

- Q.7 A solid shaft of 12 cm diameter is used to transmit a required torque. Compute the maximum torque transmitted by the shaft if the maximum shear stress induced in the shaft is 60 N/mm^2 . What would be the torque by the same shaft if a circular bore of 6cm diameter is made centrally throughout the length of the shaft? **20**

End Semester Examination, May 2019
M. Tech. (Construction Management) – Third Semester
ENVIRONMENTAL COMPLIANCE AND MANAGEMENT (C-MC-108)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Name the protocol for controlling Global Warming and Climate Change.
b) Write full form of CDM and COP.
c) What does it mean to reduce your carbon footprint?
d) What is Environmental lapse rate?
e) What are the sources of Noise pollution?
f) Define COD
g) Write the permissible limit of BOD and TSS.
h) What are types of Transfer Stations?
i) What is Stationary Container System?
j) What are the aims of EIA? **1½x10**

PART-A

- Q.2 a) What are the salient features and impacts of Kyoto Protocol? **10**
b) What are the aims of Paris Agreement? **5**
- Q.3 a) Explain the main contributors to carbon footprint. **7½**
b) What are the different ways to reduce your carbon footprint? **7½**
- Q.4 a) Write a note on the status of air pollution in India, and explain as to how it is monitored and controlled? **10**
b) What are the effects of noise pollution on human health? **5**

PART-B

- Q.5 Write short notes on (**any three**) of the following:
a) Waste Water Generation.
b) Types of wastewater treatment.
c) Physical characteristics of wastewater.
d) Total water demand. **5x3**
- Q.6 a) Explain Trash Chute System for high rise building with diagram. **7½**
b) Briefly explain the components of a Landfill? **7½**
- Q.7 a) What is the methodology for preparing Environmental Impact Assessment? **10**
b) Explain the role of General Public in Environmental Clearance. **5**

End Semester Examination, May 2019

M. Tech. — First Semester

ADVANCE STRUCTURE ANALYSIS (PC-SE-M-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

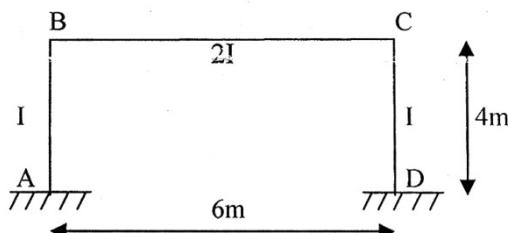
Q.1 Answer the following briefly:

- a) h-diagrams in Influence coefficient method.
- b) Pinned joints.
- c) Degree of freedom.
- d) Flexibility of structures.
- e) Relationship between "d" and "k" matrix
- f) Unit load method.
- g) Governing equations.
- h) History of FEM.
- i) Shape functions.
- j) Galerkin method.

2×10

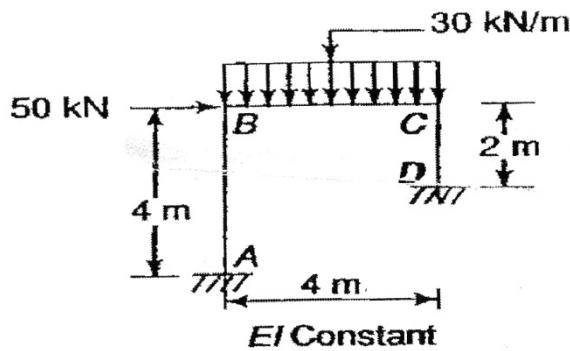
PART-A

Q.2 Determine the flexibility influence coefficients due to the combined effect of bending, shear and thrust deformations in the frame shown in the figure.



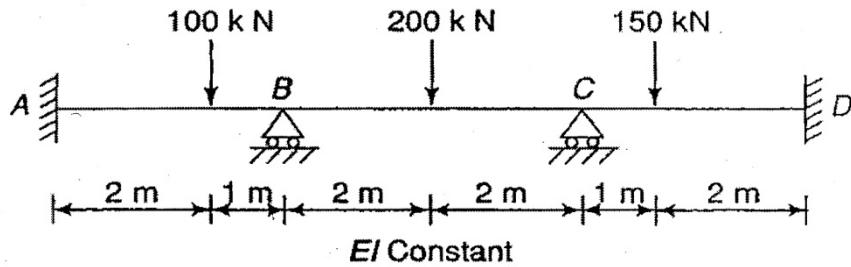
20

Q.3 Analyze the portal frame ABCD shown in the figure, using Displacement method (stiffness method).



20

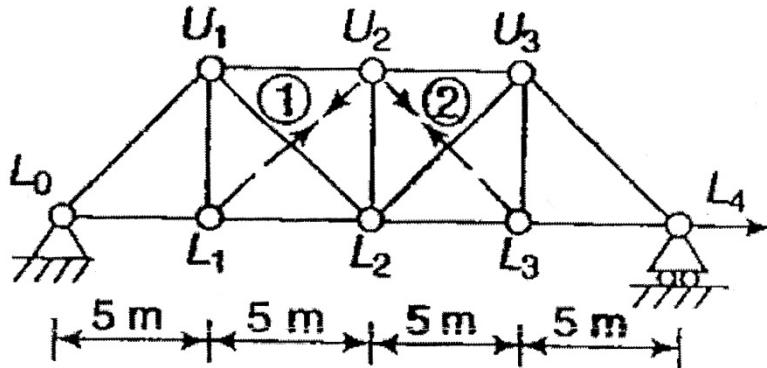
Q.4 Analyse the continuous beam shown in the figure, and find the moment at point A, B, C and D.



20

PART-B

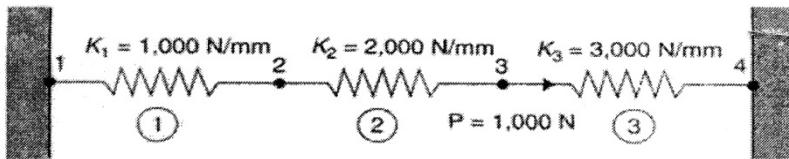
- Q.5 Develop the flexibility matrix for the pin-jointed plane frame with reference to the coordinates 1, 2 and 3 shown in figure-4. The axial flexibility of each member of the frame is 0.02mm/kN.



20

- Q.6 a) Explain the Rayleigh-Ritz method. 5
 b) What are the demerits of FEM? 5
 c) Solve the following differential equation using least square method $\frac{d^2F}{dx^2} - F = x$. 10

- Q.7 a) Explain the Quadratic interpolating function. 5
 b) For the spring assemblage shown in the figure below, obtain the assembled stiffness matrix, the displacement of node 2 and node 3, the reactions forces at nodes 1 and 4, and the forces in each spring.



15

End Semester Examination, May 2019

B. Tech. – Seventh Semester

FOUNDATION ENGINEERING (C-804)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are different types of slope failures?
b) What is the effect of ground water in the stability of slopes?
c) What do you mean by smooth and rough walls?
d) The inclination of failure plane behind a vertical wall in the passive pressure case is inclined to the horizontal at _____.
e) Define sheet piles.
f) What are different types of shallow foundations?
g) What are the assumptions made in derivation of Terzaghi's bearing capacity theory?
h) What is a machine foundation?
i) What are anchored bulkheads?
j) How would you decide the depth of exploration? **2×10**

PART-A

- Q.2 a) Explain Swedish circle method. **10**
b) A long natural slope in an over consolidated clay ($c = 10 \text{ kN/m}^2$, $\phi = 25^\circ$, $\gamma_{\text{sat}} = 20 \text{ kN/m}^2$) is inclined at 10° to the horizontal. The water table is at the surface. If the plane slip has been developed at a depth of 5 m below the surface. Determine the factor of safety. Take $\gamma_w = 10 \text{ kN/m}^3$. **10**
- Q.3 a) Define earth pressure at rest. Derive the expression for active pressure as per Rankine's theory. **10**
b) Discuss Culmann's method for the determination of active earth pressure. **10**
- Q.4 Write short notes on:
a) Different types of sheet piles walls.
b) Anchored bulkhead.
c) Open cut strutting.
d) Arching in tunnels. **5×4**

PART-B

- Q.5 a) How do you differentiate between following:
i) Shallow foundation and deep foundation.
ii) Isolated footing, strip footing and combined footing. **10**
b) How do you classify pile foundations on the basis of:
i) Material
ii) Load transfer. **10**
- Q.6 a) How do you estimate the settlement of a footing on sand using the results of a plate load test? How is depth correction applied? **10**
b) What is effect of rise of water table on bearing capacity and settlement behaviour of a footing on sand? **10**
- Q.7 a) What are the requirements of a foundation subjected to dynamic loads? **5**

- b) Derive an expression for maximum amplitude for free vibration with damping. **10**
c) What are main characteristics of a reciprocating machine, impact machine and a rotatory machine? **5**

End Semester Examination, May 2019

M. Tech. – Third Semester

INTELLIGENT TRANSPORTATION SYSTEMS (C-MT-301)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) Explain the term CVO in brief. **3x5**
b) Write down the components of AVI system.
c) Explain the functioning of Traffic Management Centers (TMC).
d) Write down the use of Advanced Traveler Information System.
e) Write down the different benefits of electronic payment.

PART-A

- Q.2 a) Explain the term ITS in brief and also discuss its uses in modern world. **7½**
b) Discuss the historical development of ITS in detail. **7½**
- Q.3 a) Explain the term video data collection and its importance in detail. **7½**
b) Define the principles of GIS in data collection techniques. **7½**
- Q.4 a) Explain the role of information management in handling traffic congestion. **7½**
b) Write down the benefits of road side communication in detail. **7½**

PART-B

- Q.5 a) Explain the Advanced Public Transportation Systems (APTS) in detail and its benefits to the society. **7½**
b) Write down the importance of Advanced Traffic Management Systems (ATMS) to reduce traffic accidents. **7½**
- Q.6 a) Define the term Automated Highway Systems and write down their benefits also. **7½**
b) Write down the importance of emergency management in managing congestion on roads. **7½**
- Q.7 Differentiate the ITS implementation policies in developed and developing countries and its benefits to the world in detail. **15**

End Semester Examination, May 2019

B. Tech. – Third Semester

CONCRETE TECHNOLOGY (C-305A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Explain sustainability of concrete.
- b) What is the significance of initial and final setting time of cement?
- c) Write indirect methods of finding tensile strength of concrete.
- d) Define bulk density of sand.
- e) What is workability? How is it measured in field?
- f) Write percentage estimation of chemical and mineral admixtures.
- g) Give specific requirements of self-compacting concrete.
- h) Give applications of Ferrocement.
- i) What is nominal mix K design mix?
- j) Give any three types of coarse aggregate used in concrete.

2x10

PART-A

Q.2 a) How concrete as a construction material is better than other construction material?
Compare. **10**

b) What are the physical properties of cement? Explain. **10**

Q.3 a) Write short notes on:

- i) Deleterious materials
- ii) Fineness modulus
- iii) Grading of aggregates
- iv) Soundness

2½x4 □

b) How aggregates can be classified in the basis of particle size, shape and surface texture. Also mention the best suited aggregates for construction. **10**

Q.4 a) What is the difference between Plastic and hardened state of concrete? What are the various properties of concrete in both the stages (plastic and hardened)? **10**

b) Explain any two procedures to measure the workability, with values to decide workability. Can workability of concrete change without changing the water-cement ratio. **10**

PART-B

Q.5 a) Write the differences between chemical admixtures and Mineral admixtures. Mention any two admixtures of both with their applications, effects and disadvantage. **15**

b) Which admixture is better between fly ash and silica fume? Why? **5**

Q.6 Using IS: 10262-2009, design M:25 mix required for RCC works for the following condition:

Type of exposure: Moderate , Cement : sp. Gravity 3.15

Slump : 75-100 mm , Bulk density=1450 kg/m³

Quality control : Standard ,

Sand:-

Grading zone = III , Free water= 1%

Specific gravity = 27 , Bulk density=1695 kg/m³

Coarse aggregate:

Size : 20mm

Water absorption=0.42

Specific gravity = 2.9

Bulk density=1590 kg/m³

fck=20 N/mm²

20

Q.7 a) What are the precautions required during:

- i) Cold weather concreting.
- ii) Under water concreting.

10

b) Write the uses and applications of high density and light weight concrete.

10

End Semester Examination, May 2019

B. Tech. – Seventh Semester

PROJECT PLANNING AND MANAGEMENT (C-826)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Dragline
- b) Ripper
- c) Vibrator
- d) Float
- e) Crash cost
- f) Beta distribution
- g) Gantt chart
- h) Dummy activity
- i) Updating
- j) J.C.B

2×10

PART-A

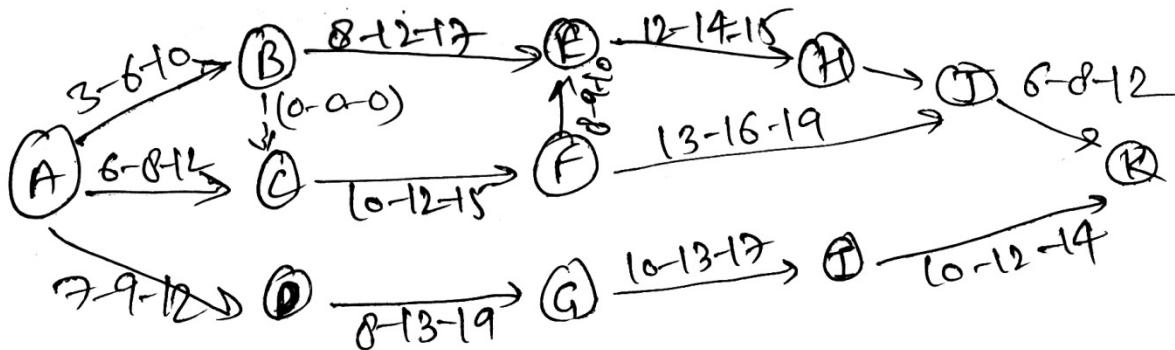
Q.2 a) Compare and control milestone chart and bar chart mentioning limitations of both. **6**
b) Write specification and chart for the casting of a R.C.C. column (250×400 mm) 4 m high where Fe-500, M-40, clear corer 25 mm, pump and needle vibrator are to be used. Framework is to be casted at site. **7**

c) Prepare a bar chart for the following:

- | | |
|--|--------|
| i) Pattern of casting | 4 week |
| ii) Prepare mould | 2 week |
| iii) Casting and cleaning of operation A | 1 week |
| iv) Heat treatment of A | 2 week |
| v) Obtain and install machine M | 7 week |
| vi) Machining part B | 5 week |
| vii) Assembling parts A and B | 3 week |
| viii) Prepare testing | 4 week |
| ix) Test assembly | 2 week |
| x) Packing for dispatch | 1 week |

7

Q.3 Find the critical path for the network shown below: calculate T_E , T_L , slast and show it in tabular form as well.



20

Q.4 a) When do we use CPM method? **5**
b) Determine critical path, event time and activity time for the following network. Also, calculate total float:



'3/5

PART-B

- Q.5 A project consists of 5 activities as detailed below: Determine optimum project completion time assuming indirect cost @ ₹450 per week.

Activity	Time in weeks		Cost in ₹	
	Normal	Crash	Normal	Crash
(1 – 2)	6	4	600	800
(1 – 3)	3	1	400	600
(1 – 4)	8	5	900	1200
(2 – 4)	4	2	600	1200
(3 – 4)	4	3	500	700

20

- Q.6 a) List out equipments needed for compaction of earth. Mentioning advantages and disadvantages of each. **10**
- b) Write briefly about (**any two**): **5×2**
- i) Trailer.
 - ii) Loader.
 - iii) Cranes.
- Q.7 a) Explain the location and working of batching plant. **10**
- b) How many types of mixers are there, explain in detail? **10**

End Semester Examination, May 2019

M. Tech. (Transportation Engineering) – Third Semester

TRANSPORTATION ECONOMICS AND FINANCE (C-MT-205)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1**
- a) Differentiate between rate of interest and social time preference rate of interest.
 - b) Explain the terms:
 - i) Fixed and Variable cost.
 - ii) Maintenance and External cost.
 - c) Explain the procedure to reduce the accident cost and maintenance cost.
 - d) Write down the formula of IRR.
 - e) Define the term "Road Pricing" in brief.
- 3x5**

PART-A

- Q.2** Explain Transportation Demand and supply models in detail with explanation on its curves. **15**
- Q.3** What are the benefits to the road users and to others in the region due to improvement of the highways? **15**
- Q.4** What are the factors to be considered for evaluation of vehicle operation cost? Discuss briefly. **15**

PART-B

- Q.5** What is the principle of discounted cash flow method of economic analysis of highway improvement project? **15**
- Q.6** The cost of improving an existing road, 25km long, is Rs. 4.00 lakhs per km. The (i) road user costs, with and without the improvements, (ii) accident costs, with and without improvements, and (iii) maintenance costs, with and without improvements are given below for a 10-year period after the completion of the improvements. Assuming a discount rate of 10 percent, find out whether the project is economically justifiable. Use the NPV method.

Year (t) (I)	Road User Costs		Accident Costs		Maintenance Cost	
	With Improvement (2)	Without Improvement (3)	With Improvement (4)	Without Improvement (5)	With Improvement (6)	Without Improvement (7)
0	-	-	-	-	-	-
1	105.5	126.5	1.1	3.1	3.5	2.5
2	110.3	132.2	1.1	3.1	3.5	2.5
3	115.8	138.9	1.2	3.5	3.5	2.5
4	121.6	145.8	1.2	3.7	3.5	2.5
5	127.6	153.0	1.3	3.8	3.5	2.5
6	134.0	161.0	1.3	4.0	3.5	2.5
7	140.7	168.9	1.4	4.0	3.5	2.5
8	147.8	177.0	1.5	4.4	3.5	2.5
9	155.1	186.2	1.6	4.7	3.5	2.5
10	162.9	195.2	1.6	4.9	3.5	2.5

15

Q.7 Define the term project financing and also explain the various sources of income to the government from road sector.

15

End Semester Examination, May 2019

M. Tech. — First Semester

ADVANCE SOLID MECHANICS (PC-SE-M-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define "Stress vector". Show it with the free body diagram of a body cut into two parts.
- b) Write assumptions of linear elasticity.
- c) Illustrate boundary conditions with an example.
- d) Develop a Mohr's circle for a biaxial compression slate of stress.
- e) What is cubical dilatation?
- f) Define "Hydrostatic and Deviatoric stress vectors".
- g) What is the state of strain at a point?
- h) Write equations of Cauchy's stress formula.
- i) Draw stress strain diagram for a ductile material and a brittle material.
- j) Write equation of equilibrium for a three dimensional state of stress.

2×10

PART-A

Q.2 With respect to the frame of reference Oxyz, the following state of stress exists. Determine the principal stresses and the associated direction with the max principal stress.

$$t_{ij} = \begin{matrix} 9 & 6 & 3 \\ 6 & 5 & 2 \\ 3 & 2 & 4 \end{matrix}$$

20

Q.3 The following displacement field is imposed on a body $u = \{(xy)i + (3x^2z)j + (4)k\}10^{-2}$. Consider a point P and a neighbouring point Q where PQ has the direction cosines: $n_x = 0.200, n_y = 0.800, n_z = 0.555$, Point P has coordinates (2, 1, 3). If $PQ = D_s$, find the components of $P'Q'$ after deformation. **20**

Q.4 The stress components at a point in a body are given by:

$$\begin{aligned} s_x &= 3xy^2z + 2x, & s_y &= 5xyz + 3y, & s_z &= x^2y + y^2z \\ t_{xy} &= 0, & t_{yz} &= t_{xz} & &= 3xy^2z + 2xy \end{aligned}$$

Determine whether these components of stress satisfy the equilibrium equations or not at the point (1, -1, 2). If not, determine the suitable body force required at this point so that these stress components are under equilibrium. **20**

PART-B

- Q.5**
- a) Develop compatibility conditions for a plane state of stress and strain. **10**
 - b) For a plane strain case, the strains are specified as under state whether they are compatible. $\hat{\epsilon}_x = 3x^2y, \hat{\epsilon}_y = 4y^2x, \hat{\epsilon}_{xy} = yx + x^3$. **10**
- Q.6**
- a) Write the relations between elastic constants in terms of Poisson's ratio and Lame's constants. **5**

- b) Write short notes on the following:
- i) Maximum principal stress theory.
 - ii) Maximum shearing stress theory.
 - iii) Maximum elastic strain theory.

5×3

- Q.7 a) Briefly explain yield surfaces of Tresca and Von Mises. **10**
- b) A cylindrical bar of 7cm dia. is subjected to a torque equal to 3400Nm, and a bending moment M . If the bar is at the point of failing in accordance with the maximum principal stress theory, determine the maximum bending moment it can support in addition to torque. The tensile elastic limit for the material is 207MPa and the factor of safety to be used is 3. **10**

End Semester Examination, May 2019

M. Tech. – First Semester

TRAFFIC ENGINEERING (PC-TE-M-101)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Explain the term 'traffic volume' and 'traffic density'.
 b) Draw a neat sketch of full cloverleaf and show the movement of traffic.
 c) What are the advantages and disadvantages of traffic signals?
 d) Calculate the stopping sight distance for a design speed of 100 kmph. Take the total reaction time of driver as 2.5 second and the coefficient of friction as 0.35.
 e) What are the various types of traffic markings commonly used? What are the uses of each?

3×5

PART-A

- Q.2 a) Explain the fundamental diagram of traffic flow showing the relationship between speed, volume and density. **7½**
 b) Estimate the basic capacity of traffic lane at a speed of 60 kmph. Assume that all the vehicles are of average length of 6.0 m. **7½**
- Q.3 How is the expression for calculating the overtaking sight distance on a highway arrived at? **15**
- Q.4 Outline the road side and home interview method of conducting O&D studies. Mention the advantages and limitations of these methods. **15**

PART-B

- Q.5 With neat sketches shows few typical patterns of un-channelized and channelized intersections. What are the advantages and limitations of both? **15**
- Q.6 Outline the IRC method of traffic signal design. **15**
- Q.7 Traffic flow in an urban area at right angle intersection of two major roads are given as below. Both the roads have a carriage width of 15 m.
 Design and draw a rotary intersection and check for its practical capacity. Making suitable assumption as per IRC guidelines.

Approach Road	Traffic Road (PCU/hr.)		
	L.T.	S.T.	R.T.
North	415	650	300
East	300	550	250
South	350	400	225
West	400	500	300

15

End Semester Examination, May 2019

B. Tech. — Seventh Semester

RAILWAY, AIRPORT AND HARBOUR ENGINEERING (C-837)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What do you mean by creep of rails?
- b) List four functions of ballast.
- c) Name different parts of a turnout.
- d) What is interlocking?
- e) What are the factors that affect site selection of an airport?
- f) Write aircraft characteristics.
- g) What are different types of docks?
- h) List different types of navigational aids.
- i) Define range of tide.
- j) What is importance of planning and layout of harbors?

2x10

PART-A

- Q.2** a) What are the requirements to be satisfied by an ideal material for ballast? **7½**
b) Explain 'coning of wheels'. What are its disadvantages? **5**
c) Why bearing plats provided? Discuss their advantages and disadvantages. **7½**
- Q.3** a) What are different types of crossing? Explain with sketches. **10**
b) What are the objectives of signaling? Explain the engineering principles of signaling. **10**
- Q.4** a) Explain how airport site selection is done? What are the factors affecting them? **10**
b) Write short note on concept of Terminal building. **10**

PART-B

- Q.5** a) Discuss standard and specifications as per IRC for geometric design of runways. **10**
b) What are airport characteristics? How does these influence airport planning and design? **10**
- Q.6** a) What are different types of break waters? Under what conditions will you suggest a vertical breakwater? **10**
b) What is the purpose of Navigational aids? What are various types of aids used on shore and at sea? **10**
- Q.7** a) Explain siltation and erosion. What is littoral drift? Explain its origin and give some examples of littoral drift on the Indian coast. **10**
b) Write short note on site selection and investigation of harbors. **10**

End Semester Examination, May 2019

M. Tech. — Third Semester

ADVANCED BRIDGE ENGINEERING (C-MS-301A)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks..

IS Codes: IRC-21, IRC-06, IRC-83 are allowed.

- Q.1 a) Enlist types of bearings.
b) Write short note on bed block.
c) Enlist forces acting on abutments.
d) Explain sliding plate bearings.
e) Describe kerb and footpath with figure. **3x5**

PART-A

- Q.2 Calculate max BM for a slab culvert for the following data: Effective span 6.4m, width of way 9.5m, wearing coat 80mm, M-25 grade concrete, Fe-415 HYSD bars, loading IRC class-A two lane. **15**
- Q.3 a) Enlist conditions of Courbon's method.
b) Explain Box type wing wall and splayed type wing wall with figure. **5**
10
- Q.4 Design an elastomeric pad bearing to support a bridge using the following data:
D.L = 300 KN, L.L = 900 kN, longitudinal force due to friction = 50 KN. **15**

PART-B

- Q.5 a) Explain pile foundation.
b) Enlist forces acting on piers.
c) Write short note on Caisson foundation. **5**
5
5
- Q.6 a) Describe general aspects of well foundation.
b) Explain fire points of abutment design.
c) Enlist forces acting on abutments. **5**
5
5
- Q.7 Describe all types of IRC class loading. **15**

End Semester Examination, May 2019

B. Tech. — Third Semester

SURVEYING-I (C-304A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

- Q.1** Answer the following questions:

 - a) State the principle of surveying.
 - b) What are the sources of errors?
 - c) Define magnetic declination.
 - d) Differentiate between fore bearing and back bearing.
 - e) Define change point.
 - f) Mention the temporary adjustments of leveling.
 - g) What is meant by traverse and write the types of traverse.
 - h) Define line of sight.
 - i) Define contour gradient.
 - j) What are the accessories used for plane table surveying?

PART-A

- Q.2 a) Explain the functions of various accessories used in chain surveying with neat sketch. **10**
b) What are the different corrections that can be applied to chain or tape? **10**

Q.3 a) Differentiate between prismatic and surveyor compass. **10**
b) The following bearings were observed with a compass. Calculate the included angles.

Line	Fore Bearing
AB	60° 30'
BC	122° 00'
CD	46° 00'
DE	205° 30'
EA	300° 00'

10

- Q.4 a) Write down the uses of contour maps. **10**
b) The following consecutive readings were taken with a level and 5m leveling staff on continuously sloping ground at a common interval of 20m.
0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110 and 4.485m.
The reduced level of the first point was 208.125m. Rule out a page of level book and enter the above readings. Calculate the reduced level of the points **10**

PART-B

- Q.5 Briefly explain Repetition method and Reiteration method with the help of diagram and table. **20**

Q.6 a) Explain intersection method of plane table survey with neat sketch. **10**
b) Explain briefly traversing method of plane table survey with neat sketch. **10**

Q.7 A circular curve has 300m radius and 60° deflection angle. What is its degree by?
a) Arc definition b) Chord definition of standard length 30m.

Also Calculate

- i) Length of curve
- iv) mid-ordinate and

- ii) Tangent length
- v) apex distance

- iii) Length of long chord

20

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ENVIRONMENTAL AIR POLLUTION(C-831 / C-831A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Acid Rain.
- b) What are Green House gases?
- c) Expand CPCB and MOEF.
- d) Who are stakeholders?
- e) What is adiabatic lapse rate?
- f) Expand WHO, PM.
- g) What are Primary pollutants?
- h) Expand SAFAR. How is it useful for environmental engineers?
- i) How is air quality index used by air quality experts?
- j) What is temperature inversion?

2x10

PART-A

- Q.2**
- a) What are the major sources of air pollution? **6**
 - b) Describe the classification system of air pollutants. **6**
 - c) A coal fired 1000 MW power plant is operating around 38% efficiency. The air and sulphur content in the coal used respectively are 35% and 3% and the calorific value of 21MJ per kg of coal. Compute the emission rate of SO₂ from the plant. **8**
- Q.3**
- a) What are the functions of State Pollution Control Board? **6**
 - b) Give the National ambient air quality standards for different pollutants. **6**
 - c) The three major pollutants in a city were particulate matter, SO₂ and CO. The concentration of PM is 84.6 $\mu\text{g}/\text{m}^3$, SO₂ is 5.58 $\mu\text{g}/\text{m}^3$ and CO is 14.2 $\mu\text{g}/\text{m}^3$. Calculate the air quality index and state the level of air pollution. **8**
- Q.4** List various stake holder's for air quality and discuss their roles in air quality monitoring. **20**

PART-B

- Q.5**
- a) What is the principle of NO₂ monitoring and what inferences are encountered in monitoring NO₂? **10**
 - b) A packed filter handling 1.0 m³/s of standard air is packed with fibres of size 100 μm in diameter. Dust laden air passes through the filter with a velocity of 1.5 m/s and the packing density is 0.1. The average diameter of particles in the air is 1.0 μm and the individual fibre efficiency $\eta_f = 0.6$.
 - i) Determine the dimensions of the packed filter if the overall efficiency is 99.5%. Assume W = H. **10**
 - ii) What is the filter length if the $\eta = 99.99\%$?
- Q.6** A thermal power plant burns coal at the rate of 8 tons/hour and discharges flue gasses through a chimney having effective height of 90m. Coal has sulphur content of 4.5%. The wind velocity at the top of the stack is 7.5m/s. The atmospheric conditions are slightly unstable. Compute the concentration at X = 1000m, Y = 100m and Z = 20m. **20**

- Q.7 a) What parameters are considered for monitoring and modeling of Indoor air pollutants? **10**
b) What are the potential effects of ozone depletion on human and animal health? **10**

End Semester Examination, May 2019

M. Tech. — First Semester

ADVANCE RAILWAY ENGINEERING (PC-TE-M-121)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Compare railway transportation with road transport. **4**
- b) What do you mean by loading gauge? **3**
- c) What are the requirements to be satisfied by an ideal material for ballast? **4**
- d) What essential purposes are served by signaling? **4**

PART-A

Q.2 a) Discuss different system of railways that can be provided. **7½**
b) Write short note on revolution for traffic growth on Indian railways. **7½**

Q.3 a) What are the effect of corrosion of rails and how can these be remedied? **5**
b) What are the different types of rails used in Indian railways? Explain with the help of neat sketches. **10**

Q.4 List various types of sleepers used on Indian railways. Which type would you consider to be the best for modern tracks and why? **15**

PART-B

Q.5 What are the points to be considered in the design of a "Turn out"? Describe a method giving calculation of lead, radius and heel divergence. **15**

Q.6 Write short notes on the following:

- a) Track circuits.
- b) CTC systems.
- c) Modern signalling techniques. **5×3**

Q.7 a) Name different forms of urban transport. Discuss the relative advantages and limitations of the same. **7½**
b) Explain cut and cover method of underground railway construction. **7½**

End Semester Examination, May 2019

M. Tech. (Construction Management) – First Semester

HUMAN RESOURCE MANAGEMENT IN CONSTRUCTION (PE-CM-M-125)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define "Strategic Human Resource Management".
b) What are the objectives of HRM?
c) Discuss the role of HR Manager.
d) Define Manpower Planning.
e) How important is HR strategy in construction management? **4×5**

PART-A

- Q.2 a) Write in detail how construction industry plays an important role in development of Indian economy? **10**
b) How is managing people or human resource in construction is a very difficult task? Explain your point with a case study. **10**
- Q.3 a) What are the different Human resource management theories? Explain Universalistic theory in detail. **10**
b) Write a note on Harvard Analytical Framework. **10**
- Q.4 a) What do you understand by employee empowerment? Explain how does it effects in the retention of employees. **10**
b) Explain how diversity at the work place is important in the current scenario? **10**

PART-B

- Q.5 a) What do you understand by Employee Welfare? What are the different employee welfare schemes that are mandatory by central government of India? **10**
b) Write a note on how different welfare policies help in protecting basic human rights? **10**
- Q.6 a) What do you understand by Strategic human resource development? How it is different from conventional human resource development? **10**
b) What are the different risks involved in investing in human Asset? **10**
- Q.7 What are the different legislation on employment. Comment on three? **20**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

DESIGN OF CONCRETE STRUCTURES-II (C-601A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

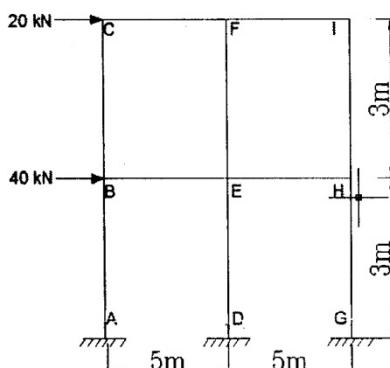
Q.1 Answer the following questions:

- a) Write assumptions of portal method of analysis of multistory structure.
- b) Define point of contra-flexure.
- c) What is the maximum percentage of moment allowed for redistribution in continuous beam as per IS 456:2000?
- d) Draw sketch of flat slab with drop and flat slab without drop and column with column head.
- e) What is the purpose of landing?
- f) Draw and label a neat sketch of cantilever retaining wall.
- g) State the reason of providing a pile cap.
- h) Define contraction joint in water tank
- i) Explain external pre-stressing in short.
- j) Mention two advantages of post tensioning method.

2×10

PART-A

Q.2 Analyze the frame by PORTAL METHOD as shown in the figure:



20

Q.3 Design a rectangular beam, continuous over four column supports of effective spans 6m. The beam is subjected to an imposed load of 10 kN/m and a live load of 15 kN/m. Use M20 and Fe415 grade of concrete and steel respectively. **20**

Q.4 a) Explain the following terms:

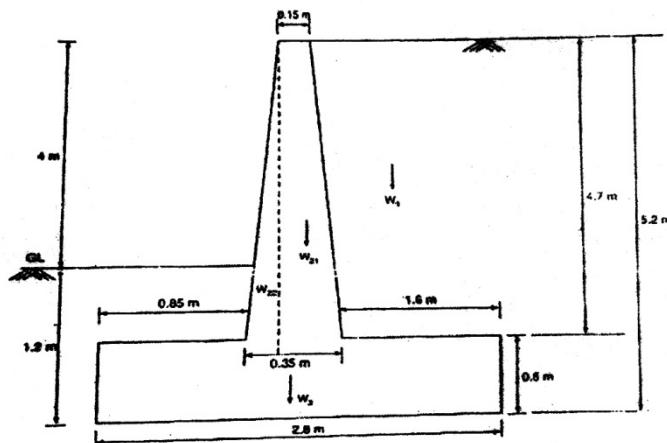
- i) Soffit.
- ii) Staircase spanning horizontally. **2½×2**
- b) Draw a neat sketch of plan of flat slab and label and also explain the following terms:
 - i) Column strip.
 - ii) Middle strip.
 - iii) Panel. **5×3**

PART-B

Q.5 Perform the stability check in overturning and sliding of a cantilever retaining wall to retain horizontal earthen embankment of height 4 meter above the ground level. The earthen backfill is having a density of 18kN/m³ and angle of internal friction as 30 degree. The safe bearing capacity of the soil is 180kN/m³. The coefficient of friction between soil

388/5

and concrete is assumed to be 0.45. Use M20 grade of concrete and Fe-415 grade of steel as shown in the figure.



20

- Q.6 Design a circular tank with a flexible base for a tank of 1,00,000 litre capacity. The depth of water in the tank is 5 meter. Use M25 concrete grade and Fe-415 grade of steel. Take unit weight of water as 9.8 kN/m². **20**
- Q.7 a) What is the principle of prestressed concrete? Explain with the help of neat sketch. **10**
b) Explain different types of losses that occur in prestressed concrete. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

EARTHQUAKE RESISTANT DESIGN OF STRUCTURE (C-829)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.
Use of IS-1893 IS-456 and IS- 13920 is allowed.

Q.1 Explain the following terms in brief:

- a) Rayleigh wave.
- b) Non periodic loading.
- c) Lumped Mass.
- d) Framing system.
- e) Load combination for earthquake.
- f) Buckling of reinforcing bars in RCC.
- g) Ductile detailing for column.
- h) Retrofitting v/s strengthening.
- i) In-plane failure of masonry.
- j) Box action in masonry.

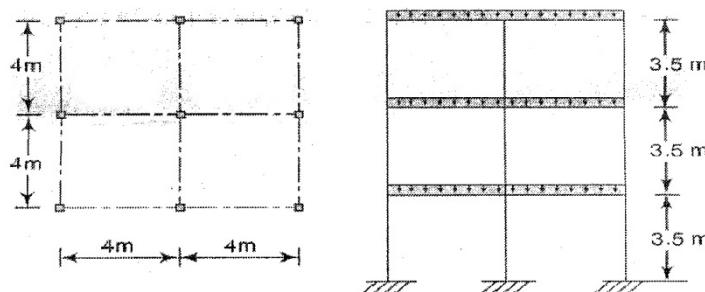
2x10

PART-A

Q.2 a) Explain the response spectrum with graphs. **10**
b) What is the Plate tectonic theory in earthquake? Explain in detail with diagrams. **10**

Q.3 a) An SDOF system consist of a mass with weight of 175 kg and a spring constant $k = 530 \text{ kN/m}$. While testing the system a relative velocity of 30cm/s was observed on application of a force of 450 N. Determine the damping ratio, damped frequency of vibration, logarithmic decrement, and the ratio of two consecutive amplitudes. **10**
b) Explain the forced vibration response with graphs in case of earthquake vibration. **10**

Q.4 The plan and the elevation of a three-storey RCC school building are shown below in the figure. The building is located in seismic zone V. The type of soil encountered in medium stiff and it is proposed to design the building with special moment resisting frame. The intensity of DL is 10 kN/m^2 and the floors are to cater to an IL of 3 kN/m^2 . Determine the dynamic properties (natural periods and mode shapes) for the vibration in both the direction.



a) Plan

b) Elevation

20

PART-B

- Q.5 Design the reinforcement for a column of size 450 mm X 450 mm, subjected to the following forces. The column has an unsupported length of 3.0 meter and is braced against side sway in both the directions. Use M-20 grade of concrete and Fe-415 steel.

	Dead Load	Live Load	Seismic Load
Axial load (kN)	1000	800	550
Moment (kN-m)	50	40	100

20

- Q.6 a) Explain the process of strengthening of steel frame with diagram. Give at least four different methods. **10**
 b) Discuss the design of shear walls with its general requirements and flexural strength. **10**

- Q.7 a) Design an unreinforced 6-m high and 4.9m wide masonry shear wall (centre lines of walls), as shown in the figure, based on the following data:

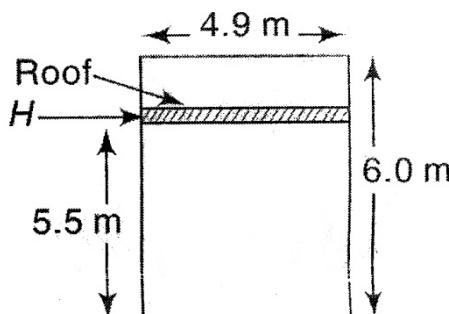
Unit weight of wall = 20,000 N/m³

Prism strength of masonry $f_m = 10 \text{ MPa}$

Seismic force at the roof level $H = 30 \text{ kN}$

Height above the roof level = 0.5m

No superimposed load is applied on the wall.



10

- b) Determine the lateral forces on a two storey unreinforced brick masonry building as shown in the figure, situated near Allahabad (zone III) for the following data:

Plan size = 18 m X 8 m

Total height of the building = 6.2 m

Storey height = 3.1 m

Weight of roof = 2.5 kN/m²

Weight of wall = 5.0 kN/m²

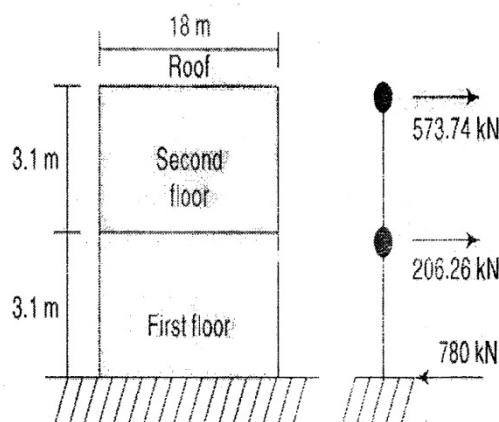
Live load at floor = 1.0 kN/m²

Zone factor = 0.10

Importance factor = 1.0

Response reduction factor = 1.5

Soil: (Type II) medium soil.



10

End Semester Examination, May 2019

B. Tech. — Fifth Semester

TRANSPORTATION ENGINEERING-I (C-501 / C-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain with sketch the star and grid pattern.
- b) Explain the term "PMGSY" and their objectives.
- c) Why we do map study in engineering surveys?
- d) What are the objectives of providing transition curves on horizontal alignment of highway?
- e) Define camber and its importance in transportation engineering.
- f) List the various tests to be performed on bitumen.
- g) What do you understand by "ESWL"?
- h) With a neat sketch show two warning signs and two regulatory signs. Mention their names properly.
- i) A vehicle has a wheel base of 6.5m., what is the off tracking while negotiation a curved path with a mean radius of 32m.
- j) List out the name of various types of joints in rigid pavement.

2×10

PART-A

- Q.2**
- a) Differentiate between the features of Nagpur and Bombay road plan. Highlight the modification made in Bombay road plan. **10**
 - b) Determine the length of different categories of road in a state in India by the year 2001, using the third road development formula and the following data:
Total area of the state = 80,000sq.km,
Total no. of towns as per 981 census=86
Overall road density aimed at=82km per 100sq.km area. **10**

- Q.3**
- a) Explain with sketches the various factors controlling the alignment of roads. **10**
 - b) Explain briefly the various stages of work in a new highway project. **10**

- Q.4**
- a) List out the various types of transition curves used on horizontal curves of highways. What is an ideal transition curve? Explain in detail. **10**
 - b) Explain "Superelevation". What are the factors on which the design of superelevation depends? Also write down the formula to find out the rate of superelevation. **10**

PART-B

- Q.5**
- a) What are the desirable properties of bituminous mixes? What are the steps in bituminous mix design? Discuss briefly. **10**
 - b) What are the various test conducted on aggregate? Briefly mention the principle and uses of each test. **10**
- Q.6**
- a) Explain the term traffic volume, what are the objects of carrying out traffic volume studies? **10**
 - b) Classify the different types of traffic signs and mention the general objective of each type of sign. **10**
- Q.7**
- a) Explain flexible and rigid pavements and bring out the point of differences. **5**
 - b) Using the data given below, calculate the wheel load stresses at:

- i) Interior.
- ii) Edge.
- iii) Corner regions of a cement concrete pavement using Westergaard's stress equations.
Wheel load, $P = 5100\text{kg}$
Modulus of elasticity of cement concrete, $E = 30 \times 10^5 \text{kg/cm}^2$
Pavement thickness, $h = 18\text{cm}$
Poisson's ratio, $\nu = 0.15$
Modulus of sub grade reaction, $k = 6.0\text{kg/cm}^3$
Radius of contact area, $a = 15\text{cm}$

15

End Semester Examination, May 2019

M. Tech. – First Semester

URBAN AND REGIONAL TRANSPORTATION PLANNING (PC-TE-M-102 /CMT-102A / CMT-102)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Distinguish between any FOB and CIF along with examples.
b) Explain the factors governing trip generation and attraction.
c) Draw a flowchart for modal split carried out after trip distribution.
d) Name all the methods of trip distribution.
e) Explain tags on vehicle survey.

3×5

PART-A

- Q.2 Explain in detail sequence of activities involved in transport planning process. **15**
Q.3 Write down the assumptions of multilinear regression analysis and also explain categorization by category analysis. **15**
Q.4 Explain the various factors affecting modal split in detail. **15**

PART-B

- Q.5 The total trip produced in and attracted to the three zones A, B and C of a survey area in the design year are tabulated below:
- | Zone | Trips produced | Trips attracted |
|------|----------------|-----------------|
| A | 2000 | 3000 |
| B | 3000 | 4000 |
| C | 4000 | 2000 |
- It is known that the trips between two zones are inversely proportional to the second power of the travel time between zones, which is uniformly 20 minutes. If the trip interchange between zones B and C is known to be 600, calculate the trip interchange between zones A and B, A and C, B and A, C and B. **15**
- Q.6 In order to relieve congestion on an urban street network a motorway is proposed to be constructed. The travel time one zone centroid to another via the proposed motorway is estimated to be 15 minutes whereas the time for the same travel via the existing street is 25 minutes. The flow between the two zone centroids is 1500 vehicles per hour. Assign the flow between the new motorway and existing streets. **15**
- Q.7 What are the different types of surveys and explain home interview survey and post card questionnaire survey? **15**

End Semester Examination, May 2019

M. Tech. – First Semester

QUALITY CONTROL AND SAFETY IN CONSTRUCTION (PE-CM-M-121 / CMC-102)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Write short notes on the following:

- a) TQM.
- b) Safety requirements for construction equipments.
- c) Need for quality control systems.
- d) Labour welfare.
- e) Health and safety policy.

3×5

PART-A

Q.2 a) What was the need to introduce ISO 9000 and ISO 9001 systems of quality management? **7½**

b) Define quality. Explain the process of improvement of quality of a product. **7½**

Q.3 a) What was the purpose of introducing six sigma? **7½**

b) Why was TGM introduced and how does it help to improve the manufacturing process? **7½**

Q.4 a) How can we assure the quality of construction in a commercial building? Enumerate the steps. **7½**

b) How ISO 9001 is different from ISO 9000? Write down the major differences. **7½**

PART-B

Q.5 a) Who is responsible for health and safety of workers at the construction site? Write his roles and responsibilities. **7½**

b) What measures are required to enforce safety policy at site. **7½**

Q.6 a) Demolishing a building requires certain safety precautions. Write a note on it. **7½**

b) Explain supply chain management in safety. **7½**

Q.7 a) How to measure performance of a unit in health and safety compliance? **7½**

b) What is risk assessment? What are the tools to assess risk in an industry? **7½**

End Semester Examination, May 2019

B. Tech. — Seventh / Eighth Semester

ESTIMATING AND COSTING (C-801A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Write short notes on:

- a) Earnest money.
- b) Request for proposal.
- c) Bid
- d) Book value.
- e) Measurement book.
- f) Advance payment.
- g) Item rate contract.
- h) List any four items of work.
- i) Specifications.
- j) Gross rent.

2×10

PART-A

Q.2 Calculate the quantity of earthwork for the road with following data:

Chain age	0	20	40	60	80	100
R.L. of Ground	202.00	203.2	203.5	204.0	205.4	206.6

Formation level of road – 203.00 m.

The road formation has an upward gradient of 1:20.

Formation width is 10m.

Side slopes in filling – 1 in 2

20

Q.3 Write specifications for the following items of work.

- a) First class bricks.
- b) 2.5 cm thick DPC.
- c) Doors and windows.
- d) Painting.

5x4

Q.4 a) What is analysis of rate? Explain the purpose of rate analysis.

5

b) Prepare rate analysis for the following work:

i) 1:6 cement mortar.

ii) 1:2:4 cement concrete.

7½x2

PART-B

Q.5 a) Prepare a formal tender notice to be published in a newspaper, for a 10 storied commercial building to be constructed at the cost of Rs. 200/- crores in 2 yrs time. (Assume required data suitably).

10

b) Explain four different types of contracts and mention their salient features.

10

Q.6 a) What are the functions and duties of an arbitrator? Why arbitration is preferred over court cases in case of dispute resolution.

10

b) What are the common mistakes in measurement book? The correct process to be followed while filling measurement book.

10

- Q.7 a) Describe the following:
i) Valuation.
ii) Depreciation.
- b) Calculate the standard rent (annual) of a building with the following given data:
i) Cost of land Rs.20,000/-
ii) Cost of construction of building Rs.40,000/-
iii) Property tax Rs.250/- per Annum.
iv) Water tax Rs 500/- Per Annum.
v) Annual repairs 2% of the cost of building.
(Assume suitable data if not given)

5

15

End Semester Examination, May 2019

B. Tech. – Seventh Semester

INTELLECTUAL PROPERTY RIGHTS (C-703A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What do you mean by 'Intellectual property'?
- b) Give four examples of inventions which are patented.
- c) Define invention according to 'Patents Act 1970'.
- d) Name some websites from where you can extract data about patents.
- e) Give the organizational details of Intellectual Property Offices in India.
- f) Name the typical parts of patent application.
- g) How long does copyright last?
- h) Write the full forms of USPTO and EPO
- i) What is trademark?
- j) What are the signs used as trademarks?

2x10

PART-A

- Q.2**
- a) Discuss the significance of Intellectual Property Rights. **10**
 - b) Give an overview about 'Paris convention for the protection **of** Industrial **Property** (1883)'. **5**
 - c) Give an overview about 'Patent Cooperation Treaty (1970)'. **5**

- Q.3**
- a) Discuss the salient features of 'The Patent Act'. **8**
 - b) Discuss the different patent specifications. **7**
 - c) Discuss the conditions of patentability. **5**

- Q.4**
- a) Discuss about the various types of searches using patent documentation. **15**
 - b) Discuss the contents of patent application. **5**
 - c) Discuss the different byers of international patent system. **5**

PART-B

- Q.5**
- a) What works are covered by copyright? **7**
 - b) Differentiate between related rights and copyright. **8**
 - c) Write a short note on the Rights conferred by copyright. **5**
- Q.6**
- a) Discuss the functions of trademark. **5**
 - b) Write a short note on domain names. **5**
 - c) Discuss different types of trademarks. **10**
- Q.7**
- a) Write a short note on the Rights covered under copyright. **7**
 - b) Write a short note on Protection registration of trade mark and Protection of well-known marks. **8**
 - c) Give an overview about 'TRIPS agreement (1994)'. **5**

End Semester Examination, May 2019

B. Tech. – Third Semester

STRUCTURAL ANALYSIS-I (C-301B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

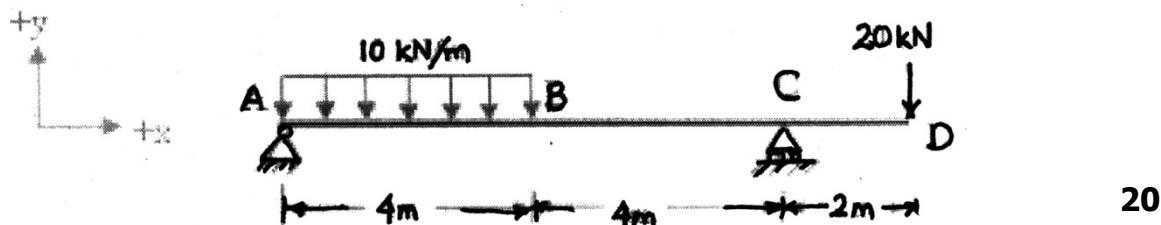
Q.1 Answer all questions:

- a) What do you comprehend by Shear force and Banding Moment?
- b) Discuss briefly point of Contraflexure.
- c) Derive the load position of a shorter than span UDL to give maximum B.M. at a given section.
- d) Illustrate different types of arches.
- e) Solve the rise at Quarter Points of a Parabolic Arch if rise at the central hinge is 'H'?
- f) Draw any two types of Bridge trusses.
- g) A joint of a frame is subjected to three tensile forces "A", "B" and "C" equally inclined to each other. If "A" is equal to 10kN then find the other forces.
- h) What are the limitations of Euler's formula?
- i) What are the various end conditions of columns in Euler's Theory? Illustrate their deformed shapes.
- j) Differentiate real beam and conjugate beam.

2×10

PART-A

Q.2 Develop Shear force and Bending Moment Diagram for the following Beam.



Q.3 Uniformly distributed load of intensity 30kN/m crosses a simply supported beam of span 60m from left to right. The length of the udl is 15m.

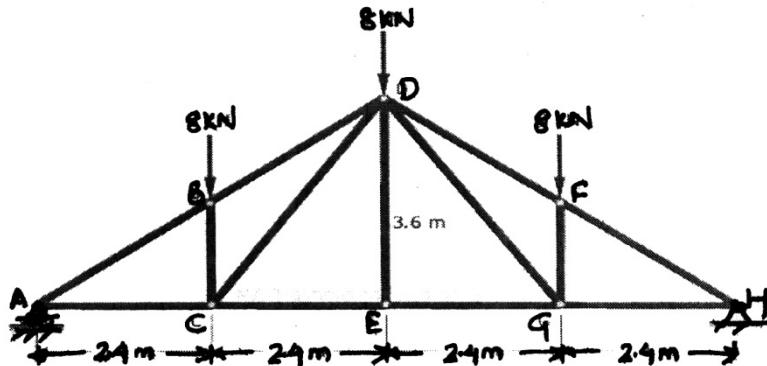
- a) Draw Influence Line Diagrams for shear force and bending moments at a section 20m from left end. **7**
- b) Estimate the value of maximum shear force and bending moment for a section 20m from left end. **7**
- c) Evaluate also the absolute maximum bending moment. **6**

Q.4 A three hinged circular Arch hinged at the crown and springing points has a span of 40m and a central rise of 8m. It carries an udl of 20kN/m over the left half of the span together with a concentrated load of 100kN at the right quarter span point. Calculate

- a) Vertical reactions and horizontal thrust at the supports. **10**
- b) Normal thrust at a section 10m from left support **5**
- c) Radial shear at a section 10m from left support. **5**

PART-B

Q.5 Compute the forces in the members BD, CD and CE of the truss shown using any method.



20

Q.6 a) What do you understand by radius of gyration, effective length and slenderness ratio? 6

b) Compare the crippling load of a solid circular section of 250mm diameter with a hollow circular section of the same area and 40 mm thickness taking end conditions same for both columns. 7

c) Derive an expression for Euler's buckling load in case of one end hinged and other end fixed column. 7

Q.7 a) Write down the Conjugate Beam method's first and second theorem? 6

b) Find out the expression for slope and deflection of a simply supported beam with udl over entire span using moment area method. 7

c) Find out the Max slope and deflection for a cantilever with UDL on entire length using double integration method. 7

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ELEMENT OF EARTHQUAKE ENGINEERING (C-821A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Solve all

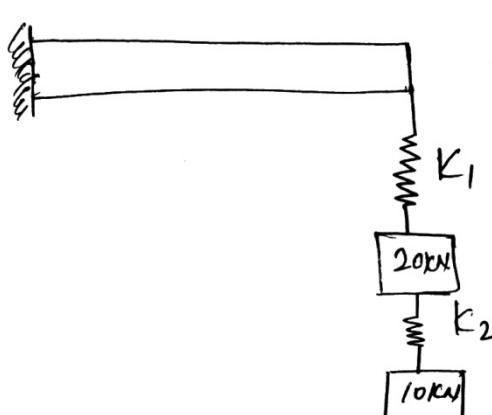
- a) Define an earthquake.
- b) What are seismic waves?
- c) What is resonance?
- d) Define ductility.
- e) Explain response spectrum.
- f) What are dynamic load?
- g) What is ductile failure in RC building?
- h) Define soft storey.
- i) What are dampers?
- j) What is stiffness?

2×10

PART-A

Q.2 a) Write a short note on "Elastic Rebound Theory". **8**
 b) Explain in detail, causes of volcanic earthquake. **5**
 c) Explain how is the epicenter heated? **7**

Q.3 a) Define the following:
 i) D'Alembert's principle.
 ii) Inertial forces.
 iii) Damped frequency.
 iv) Damping ratio. **2½×4**
 b) Determine time period and natural frequency of the system:

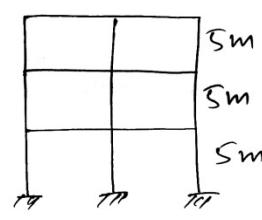
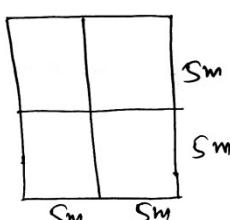


b
d

$$\begin{aligned}b &= 350 \text{ mm} \\ d &= 400 \text{ mm} \\ L &= 2 \text{ mm} \\ K_1 &= 20 \text{ kN/m} \\ K_2 &= 10 \text{ kN/m}\end{aligned}$$

10

Q.4 The plan and elevation of three story school building is shown below. The building is located in Delhi. The soil is hard rock and is purposed to be designed as special moment resisting frame. The intensity of D.L. is 20 kN/m^2 and L.L. is 3 kN/m^2 . Determine the design seismic load on structure by static analysis. Also show design seismic forces at different floor level.



20

PART-B

- Q.5 A fixed beam 5m long supports a mass of 250 kg at mid span. Determine its natural frequency and natural period of vibration $E = 2.8 \times 10^5 \text{ N/mm}^2$.
 $b = 450 \text{ m}$ $d = 450 \text{ mm}$ **20**
- Q.6 a) Explain different techniques of retrofitting of RCC building. **10**
b) What are possible damages to RC building in EQ prone region? **10**
- Q.7 a) What are various methods of restoring an earthquake damaged masonry building? **10**
b) Define bands. At what levels in masonry building should it be provided? Give justification.
IS-456 and IS 1893 is allowed
IS-13920 as well. **10**

End Semester Examination, May 2019

B. Tech. — Third Semester

BUILDING CONSTRUCTION AND MATERIALS (C-302B / C-302C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Write a short note of 'Load bearing wall'.
- b) Describe industrial building.
- c) Enlist purpose of foundation.
- d) Classify bricks according to size.
- e) Define 'cavity wall'.
- f) Write a short note on 'mud flooring'.
- g) Draw king post roof truss.
- h) Classify roofs.
- i) Define 'fly ash'.
- j) Classify foundation.

2×10

PART-A

Q.2 Classify types of building. Explain with respect to their usage and building construction and material considerations. **20**

Q.3

- a) Enlist six advantages of concrete piles. **6**
- b) Enlist four disadvantages of concrete piles. **4**
- c) Draw any five types of coffer dams. **10**

Q.4

- a) Enlist the defects caused by dampness. **8**
- b) Draw an appropriate fig. for D.P.C treatment to foundation on damp soil and ordinary soil. Explain. **12**

PART-B

Q.5

- a) Describe grading of lime concrete with appropriate figure. **10**
- b) Describe grading of lime concrete with tiles with suitable fig. **10**

Q.6

- a) Enlist ten types of flooring. **5**
- b) Describe flag stone flooring and write four merits and two demerits of it. **9**
- c) Enlist six merits of P.V.C tile flooring **6**

Q.7 Explain ten technical terms used in timber pitched roof with fig. **20**

End Semester Examination, May 2019

B. Tech – Seventh Semester

ADVANCE CONCRETE TECHNOLOGY (C-830)

Time: 3 Hours

Max Marks: **100**

No. of pages: **2**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) What is characteristic compressive strength?
- b) Write Bogue's compounds with their brief significance.
- c) Why and what proportion is Gypsum added to cement?
- d) Classify aggregates on the basis of origin, texture and unit weight.
- e) Define fitness modules and give its range of values for coarse and fine aggregates.
- f) Illustrate the use of air entraining admixtures.
- g) Describe any two Pozzolanic materials used in concrete.
- h) Briefly describe bleeding, segregation and laitance.
- i) Write a short note on Modules of Elasticity of concrete.
- j) Under what circumstances do we have alkali aggregate reaction?

2x10

PART-A

Q.2 a) Briefly explain manufacture of cement. **8**
 b) What are Alite, Belite, Celite and Felite? Discuss their role in hydration of cement. **8**
 C) Describe sulphate resisting cement and its applicability. **4**

Q.3 a) What are the factors governing the maximum size of aggregates in reinforced concrete members? **10**
 b) Determine fineness modulus of a sample of aggregate for the following observations of sieve analysis:

IS Sieve size	10m	4.75mm	2.36mm	1.18mm	600 μm	300 μm	150 μm	75 μm
	100	92	74	55	23	12	9	7

10

Q.4 a) What is HVFA? Write its properties? **8**
 b) Discuss heat of hydration, bleeding and setting time with respect to its addition to concrete. **12**

PART-B

Q.5 a) Design a concrete mix taking the following data:
 Stipulation for Proportioning Concrete Ingredients
 i) Characteristic compressive strength required in the field at 28 days grade designation : M 30
 ii) Type of cement : OPC 53 Grade confirming to IS 12269
 iii) Maximum normal size of aggregate: 20 mm
 iv) Shape of CA : Angular
 v) Workability required at site : 100 mm (slump)

vi) Type of exposure (as defined in IS:456)	: Moderate
vii) Method of concrete placing	: Pumpable concrete.
b) Test data of material:	
The following materials were tested in the laboratory and results are to be ascertained for the design mix:	
i) Cement used	: OPC 53 Grade confirming IS-12269
ii) Specific gravity of cement	: 3.15
iii) Chemical Admixture	: Super plasticizer confirming to IS-9403
iv) Specific Gravity (SG):	
a) SG of fine aggregate (sand)	: 2.70
b) Chemical admixture	: 2.80
v) Water absorption:	
a) Coarse aggregate	: 0.4%
b) Fine aggregate	: 1.0%
vi) Free (surface) moisture:	
a) Coarse aggregate	: NIL
b) Fine aggregate	: NIL
vii) Sieve analysis:	
Fine aggregates	: Confirming to Zone I of table 4, IS-383

20

- Q.6 a) Discuss the various factors influencing the strength of concrete. **10**
- b) With the help of a graph, elucidate the importance of W/C ratio towards the compressive strength of concrete at different ages. **10**
- Q.7 a) Explain factors governing creep of concrete. Elaborate the procedure to measure creep. **10**
- b) Write short notes on Autogenous shrinkage, Carbonation shrinkage, Thermal shrinkage, Plastic shrinkage and drying shrinkage. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ADVANCED TRAFFIC ENGINEERING (C-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is the purpose of endoscope?
b) Explain PIEV theory.
c) Define 'road pricing'.
d) What do you understand by PCU and design service volume?
e) Explain street furnitures.
f) Define 'spot speed and time mean speed'.
g) Write down the expressions for calculating kerb parking at angles of 90° and 60° .
h) Write down the demerits of Rotary.
i) Write the expression for webster's check for cycle time.
j) Give examples of Grade separated and at grade intersections. **2×10**

PART-A

- Q.2 a) Draw a flowchart showing organizational set up of traffic engineering department of India. **10**
b) Write in your own words the objectives of traffic engineering. **10**
- Q.3 a) What are the different causes of road accidents and also write down their preventive measures. **10**
b) Derive an equation to determine the velocity of a vehicle that hits a parked vehicle at 45° . **10**
- Q.4 a) Differentiate between the space and time headway along with examples. **10**
b) How can we determine LOS of a road? Explain. **10**

PART-B

- Q.5 a) What are the different types of Intersection? Explain grade separated intersections along with diagram. **10**
b) The average normal flow of traffic on cross roads A and B during period is 500 and 350 PCV/hour; the saturation flow values on these roads are estimated 1450 and 1500 PCU/hr. resp. The all red time required for pedestrian crossing is 10 sec. Design two phase traffic signal by Webster's method. **10**
- Q.6 a) What are the needs of traffic regulations? **5**
b) What are the various organization handling the traffic management in India also writes down the scope of each? **15**
- Q.7 a) Explain all the detrimental effect of traffic. **10**
b) Enumerate the vehicular air pollution situation in India. **10**

End Semester Examination, May 2019

M. Tech. – First Semester

ADVANCED CONCRETE TECHNOLOGY (PC-CE-M-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question. IS 10262:2009 is allowed.

Q.1 Briefly answer:

- a) Explain role of gypsum in cement.
- b) What is low heat cement?
- c) What are deleterious substances?
- d) Write two chemical admixtures.
- e) Name four tests for measuring workability.
- f) What is the relation between compressive strength and modulus of elasticity of concrete?
- g) What is the relationship between static and dynamic modulus of elasticity?
- h) What is efflorescence?
- i) What is sulphate attack?
- j) What is mass concrete?

2×10

PART-A

Q.2 a) What are alite belite, celite and felite? Explain their functions in detail. Draw a neat graph showing the contribution of cement components to strength of cement. **10**
b) Classify aggregates based on shape, size and origin. **10**

Q.3 Write short notes on the following:

- a) Air entraining admixtures.
- b) Retarders.
- c) Flyash
- d) Silica fume.

5×4

Q.4 Design a M40 grade concrete using flyash and OPC-43 grade cement, having maximum size of aggregate as 20 mm, minimum and maximum cement content as 320 kg/m³ and 450 kg/m³ respectively. W/c ratio 0.45 (max.). Workability required is 75 mm (dump). Type of aggregate used is crushed, angular, superplasticizer is used concrete is pumpable and exposure condition is severe; specific gravity of flyash is 2.2; specific gravity of cement is 3.15; specific gravity of coarse and fine aggregate of zone-III is 2.74; specific gravity of superplasticizers is 1.145. Assume any missing data: **20**

PART-B

Q.5 a) Explain stress-strain curve for concrete: using same curve, explain the terms initial tangent modulus, tangent modulus, secant modulus and chord modulus. **10**
b) What is static modulus of elasticity? Explain the factors that affect modulus of elasticity. **10**

Q.6 a) What is creep? Explain the factors that govern the creep. **10**
b) What is durability? What is the significance of durability? What is the impact of water cement ratio on durability? **10**

Q.7 Write short notes on the following:

- a) Fibre reinforced concrete.
- b) Self compacting concrete.

- c) Light weight concrete.
- d) Effects of hot weather on concrete.

5×4

End Semester Examination, May 2019

B. Tech. – Seventh Semester

PRACTICAL ASPECTS OF PROJECT MANAGEMENT (C-705A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Explain the following terms:

- a) Gantt chart
- b) IRR
- c) Bar chart
- d) CPM
- e) GDP
- f) Measurement book
- g) Daily site report
- h) What is the use of "feedback"?
- i) What is meant by "Big picture"?
- j) Write down the importance of pour card.

2x10

PART-A

- Q.2** a) Write down with example the difference between bar chart and PERT. **10**
- b) Kunal and Vishal started their own ventures at the same time. Kunal invested `40/- lakhs and vishal `60/- lakhs. Calculate their income over next 5 years.
- i) NPV of Kunal (Discounting rate @ 18% p.a.)
 - ii) NPV of Vishal (Discounting rate @ 20% p.a.)
- Assume any data suitably. **10**
- Q.3** a) Write a note about real estate sector in India. What is RERA and how is it likely to impact the practice in the real estate sector? **10**
- b) Draw a bill of quantity for manufacturing 100 cum of M20 concrete to be placed in position of a roof slab. Also draw the table for quantity of materials required to manufacture concrete. **10**
- Q.4** A project consists of 12 activities. Their time estimates are given below. Draw time scale network.
- a) Mark Critical Path.
 - b) What is the project duration?

Activity	Items	Time (in week)
0-1	A-1	6
0-3	B-1	4
0-6	D-1	2
1-2	A-2	4
3-4	B-2	3
6-7	D-2	3
3-7	C	3
7-5	Dummy	0
2-5	A-3	1
4-5	E-1	4
5-8	E-2	3
7-8	D-3	8

20

409/5

PART-B

- Q.5 a) Write down the difference between fixed cost and variable cost with examples. **10**
b) Explain the following: i) Estimated cost. ii) Final cost. **10**
- Q.6 Describe the following terms:
a) WBS.
b) Balance sheet.
c) Compound annual growth rate (CAGR).
d) Cash flow statement.
e) Payback period. **4x5**
- Q.7 a) What do you understand by check list? Draw a check-list for concreting work in a building project. **10**
b) Write down the documents to be completed and archived in a real estate project? Support your answer with example. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

FLUID MECHANICS-I (C-303)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Dimensionless numbers.
- b) Model and prototype.
- c) Types of Manometer.
- d) Laminar Sub-Layer.
- e) Meta centric height.
- f) Utility of pitot tube.
- g) Laminar and turbulent flow.
- h) Stream line and streak line.
- i) Surface tension and capillarity.
- j) Real and ideal fluids.

2x10

PART-A

Q.2 a) Calculate the capillary rise in glass of 2.5 mm diameter when immersed vertically in

- i) Water
- ii) Mercury

Take surface tension $\sigma = 0.0725 \text{ N/m}$ for water and $\sigma = 0.52 \text{ N/m}$ for mercury in contact in air. The specific gravity for mercury is 13.6 and angle of contact = 130° . **10**

b) Describe viscosity, write and explain its types what is the Newton's law of viscosity. How does it vary with temperature? **10**

Q.3 a) The velocity potential function (ϕ) is given by:

$$\phi = -xy^3/3 + x^3y/3 - x^2 + y^2$$

- i) Find the velocity components in x and y direction.
- ii) Show that ϕ represents a possible case of flow. **10**

b) Define the equation of continuity. Obtain an expression for continuity equation for a 3rd flow. **10**

Q.4 a) A rectangular pontoon is 5m long, 3m wide and 1.2 m high. The depth of immersion of the pontoon is 0.8m in sea water. If the centre of gravity is 0.6m above the bottom of pontoon, determine the meta centric height. Density of sea water is 1025 kg/m^3 . **8**

b) What do you understand by hydrostatic law? **5**

c) State and prove Pascal's law. **7**

PART-B

Q.5 a) Water flows over a rectangular weir 1m wide at a depth of 150 mm and afterwards passes through a triangular right angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively, find the depth over the triangular weir. **10**

b) State the Bernoulli's theorem for steady flow of an incompressible fluid. Derive an expression for it and state the assumptions made. **10**

Q.6 a) What do you understand by boundary layer preparation? What is the effect of pressure gradient on boundary layer separation? **10**

b) State and Explain Boundary layer theorem after defining boundary layer with neat sketch. Explain the development of boundary layer over a flat plate with neat sketch. **10**

Q.7 a) What do you understand by geometric, Kinematic and dynamic similarities? Give suitable examples of each. **10**

b) State Buckingham's π theory. What is the meaning of repeating variable and how those are selected? Give an example also. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

HYDROLOGY (C-803)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What do you mean by drainage basin?
- b) Rysometric curves.
- c) Penman's equation.
- d) Infiltration Indices.
- e) Run-off.
- f) Hydrograph.
- g) Steady state flow.
- h) Specific yield.
- i) Effective rainfall.
- j) Darcy's law.

2×10

PART-A

Q.2 a) What is rain gauge? Explain different type of rain gauges with their advantage and disadvantages. **10**

b) Explain the following relationships related to the precipitation over a basin.

- i) Intensity duration frequency relationship.
- ii) Depth area relationship.
- iii) Maximum depth-area duration curve.

10

Q.3 a) Define evaporation. What are the various factors on which evaporation depends? **10**

b) Write the following infiltration equation with explanation of parameters used in the equations:

- i) Horton's equation.
- ii) Philip's equation.
- iii) Kostiakov equation.
- iv) Green Ampt equation.

10

Q.4 a) A storm with 10 cm of precipitation produce a direct run-off of 5.8 cm. The duration of the rainfall was 8 hours having the following depth in each hour duration as 0.4, 1.3, 2.8, 5.1, 6.9, 8.5, 9.5 and 10.0 cm. Estimate the average infiltration index (ϕ -index) of the storm. **10**

b) Explain infiltration process, initial loss and infiltration indices. **10**

PART-B

Q.5 An urban catchment has an area of 85 ha. The slope of the catcher is 0.006 and the maximum length of travel of water is 950 m. The maximum depth of rainfall was a 25 years return period is as follows:

Duration (min)	5	10	20	30	40	60
Depth of rainfall (mm)	17	26	40	50	57	62

If a culvert for drainage at the outlet of this area is to be designed for a return period of 25 years, estimate the required flow rate (peak) by assuming the runoff coefficient as 0.3. **20**

- Q.6** a) Explain briefly the factors affecting flood hydrograph. **8**
b) Write short notes on:
i) UH method.
ii) Gumbel's method.
iii) Design flood.
iv) Triangular UH. **12**
- Q.7** a) Explain steady state flow to wells in confined and unconfined aquifers. Derive an expression for same. **10**
b) What is water table? What are the factors effecting the water table? What will be the future effect of fluctuation in water table on environment? **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

WATER SUPPLY AND TREATMENT PLANT (C-502)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following question:

- a) What do you understand by domestic demand?
- b) What are the factors affecting water demand?
- c) What do you understand by total solids?
- d) Define 1 JTU.
- e) Give sequence of treatment for treating hard ground water.
- f) Name methods of Aeration.
- g) What do you understand by Fluoridation?
- h) Define "Single water supply system".
- i) What is sluice valve and air relief valve?
- j) What are the steps for designing of distribution system?

2×10

PART-A

- Q.2** a) Describe how you would calculate total water demand for a city. **10**
b) Compute the fire demand for a city having population of 500000 using various formulas. **10**
- Q.3** a) Enumerate and discuss in brief the various physical, chemical and biological characteristics of raw water supplies. **10**
b) Find out the pH of the mixture of the following two solutions:
 Solution A: volume = 400ml, pH = 4
 Solution B: volume = 600ml, pH = 8 **5**
c) Explain Jar test with diagram? **5**
- Q.4** a) Define "Filtration" and discuss the design features of slow sand filter. **10**
b) Design the dimensions of a set of rapid sand gravity filter for treating water for a population of 50000. The water demand is 180 lpcd and max demand is 1.8 times average daily demand. Assume filtration rate 5000 l/hr/m² and assume one hour is lost in backwashing and 5% of filtered water is required for backwashing. **10**

PART-B

- Q.5** a) Write short notes on (**any three**) of the following:
 i) Lime soda process.
 ii) Zeolite process.
 iii) Methods to remove taste and odour.
 iv) Removal of iron and manganese.
 v) Flouridation and Deflouridation. **3×5**
- b) Determine the quantity of alum required in order to treat 15MLD of water per day at a treatment plant where 15ppm of alum dose is required. Also determine the amount of CO₂ gas generated. **5**
- Q.6** a) Explain types of distribution system with diagram. **10**
b) Design a clear water rising main line from water treatment plant to overhead tank for the following data:
 Capacity of pump = 1 no @ 60000 GPH

Total length of pipeline = 250m
Suction head of pump = 5m
Static head of tank = 25m
Ground level difference = 0.7m

10

Q.7 Explain the following with the help of neat sketch. Also discuss their advantages and disadvantages.

- a) Dead end system.
- b) Grid iron system.
- c) Ring system.
- d) Radial system.

5×4

End Semester Examination, May 2019

B. Tech. — Fifth Semester

IRRIGATION ENGINEERING-I (C-503A / C-503B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Write short notes on the following:

- | | |
|--------------------------|-------------------------|
| a) Border flooding. | b) Bedding. |
| c) Weir and Barrage. | d) Groynes. |
| e) Sarda type fall. | f) Base period. |
| g) Sprinkler irrigation. | h) Contour canal. |
| i) Water allowance. | j) Non-regime channels. |

2×10

PART-A

Q.2 a) Define and differentiate CIR and NIR. **5**

b) Define duty and delta. Establish the relationship between the two. **5**

c) The culturable command area for a distributary is 10000 hectares. The intensity of irrigation for Rabi is 40% and for Kharif is 15%. If the total water requirements of the crops are 37.5cms and 120 cms and their period of growth are 160 days and 140 days respectively.

a) Determine the outlet discharge from average demand consideration.

b) Also determine the peak demand discharge, assuming the kor water depth for two crops are 13.5cms and 19cms and their kor periods are 4 weeks and 2 weeks respectively. **5×2**

Q.3 a) Design a regime channel of a discharge of 40 cumecs and silt factor 1.1. **10**

b) How many types of regimes are there, explain? **5**

c) Explain the steps of designing an irrigation canal. **5**

Q.4 Design a 2.0mts Sarda type fall a canal having a discharge of 12 cumecs with following data: bed level U/S = 103.0m, side slopes of channel = 1:1, bed levels d/s = 101.5m, full supply level U/S = 104.5m, bedwidth U/S and d/s = 1.0m. Soil = good loam, assume Bligh's coeff. = 6. **20**

PART-B

Q.5 a) Describe the different modes of failure of hydraulic structures on permeable foundations as given by Bligh. Also describe the suggestive corrective measures in detail. **10**

b) Differentiate between cross head regulator and distributary head regulator with the help of diagram showing the alignment and location of both. **5**

c) What are cross drainage works? Classify different cross drainage structures according to their relative bed levels. **5**

Q.6 a) Define and differentiate the different types of dams. **5**

b) What are the steps to be used in the design of gravity dams? **5**

c) An earthen dam made of a homogenous material has the following data:
Coefficient of permeability = 4.5×10^{-4} cm/sec.

Level of top dam = 200.0m.

Level of deepest river bed = 178.0m.

HFL of reservoir = 197.5m.
Width of top of dam = 4.5m.
U/S slope = 3:1
D/S slope = 2:1

Determine the phreaticline for this dam section and discharge passing through the dam. **10**

- Q.7 a) Explain Ogee spillway with clear and neat sketch. **5**
b) Design a suitable section for the overflow portion of a concrete gravity dam having the d/s face sloping at a slope of 0.7H:1V. The design discharge for the spillway is 5000 cumecs. The height of spillway crest is kept at R.L. 240m. The average river bed level at the site is 100.0m. The spillway length consists of 6 spans having a clear width of 10m each. Thickness of each pier may be taken as 2.5m. **15**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

GROUND IMPROVEMENT TECHNIQUE (C-836)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Write short notes on following:

- a) Pre compression.
- b) Admixture.
- c) Moisture content relationship.
- d) Open and closed drain.
- e) Preloading and surcharge.
- f) Separation and fluid transmission.
- g) Geotextiles.
- h) Rock bolts.
- i) Grout characteristics.
- j) Chemical grouting.

2×10

PART-A

Q.2 a) Briefly write down the method, principle, most suitable soil condition, maximum effective treatment depth of the following:
i) Pre compression and reinforcement.
ii) Admixture and pre compression.
iii) Reinforcement. **5×3**

b) Write down a brief notes for the grain size ranges for the different method. **5**

Q.3 a) Write down principles and method of compaction. **5**
b) Briefly explain properties of compacted soil. **5**
c) Explain the different method involved in compaction control. **10**

Q.4 a) Write down the principle of pre compression, concept of preloadings surcharge fill, if preloading are made with filling materials, embankment, liquid, storage tank, lowering water table. **5**
b) Explain vertical drains and their principle. Show the comparison between time curves for the vertical drain. **5**
c) Write short notes on drain. Briefly explain open, close and horizontal drain with neat sketches. **10**

PART-B

Q.5 Explain containment and barriers. Describe the following system.
a) Single clay liner system for landfill.
b) Single geomembrane liner system for landfill.
c) Double liner system with the provision of primary and secondary.
d) Double liner system with geotextiles, gronets and secondary composite liner. **5×4**

Q.6 a) What do you understand by soil railing? Define construction sequence of soil railing. **5**
b) Write down concept of improving rock stability and treatment of rock mass using rock bolts. **5**

c) Explain with neat sketches solid ground anchors and hollow core grouted rock bolts. **10**

- Q.7 a) Explain grout injection and its monitoring. **5**
- b) Write down cement stabilization:
- i) Natural and synthetic polymer.
 - ii) Lignin. **5**
- c) Explain with neat sketches of self-expanding packer used in injection method. **5**
- d) Explain the term grouting materials and suspension grout, different additives used for grouting to impart specific properties. **5**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

DESIGN OF STEEL STRUCTURE-II (C-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question. Use of IS 800:2007, IS-875 (Part-3); IS 804-1958 is allowed.

Q.1 Answer the following questions:

- Evaluate shape factor of rectangular section bxd.
- Define "ductility of steel".
- Neatly sketch purlins and show loading on purlin.
- Define "knee bracing."
- Conforming to which code of Indian practice the gravity water tank is designed.
- What is the minimum thickness of steel plate used in water tank?
- Define "guyed steel stack with sketch".
- Write a short note on "K-bracing lattice tower".
- Define "web crippling".
- What is the value of maximum deflection permitted in cold formed beam section?

2×10

PART-A

Q.2 Find the collapse load over a simple supported beam subjected to concentrated load at the centre by static method as well as kinematic method. **20**

Q.3 An industrial building is to be built in Indore near a small hill 180 m high with a slope of 1 vertical to 3 horizontal. The building is planned to be provided at a height of 140 m above the base of the hill. The terrain may be considered as on open terrain with scattered obstruction, the height of obstruction being in the range of 1.5 m to 10 m above the ground level. The height of building is 18 m. find the design wind pressure. Assume that the building size is in the range of 20 m to 50 m and its life period is 50 years. Use basic wind speed=47 m/sec, risk coefficient $k_1 = 1$ for 50 years life. **20**

Q.4 a) Enumerate the forces acting over the circular tank. Also explain them in detail. **10**
b) How are pressed steel tank different from normal rectangular steel tank? Neatly sketch and label a pressed steel tank over staging in elevation. **10**

PART-B

Q.5 A self-supporting steel stack is 80 meters high and its diameter is 3 m at top. Find the design wind pressure at intervals of 10 m from base as per IS: 875 (part 3). The location of place is such that the intensity of wind pressure upto 30 m height is 1.50 kN/m². Also give the diagrammatic representation. **20**

Q.6 a) List down the points to check for feasibility of construction of tower. **10**
b) Explain the following:
i) Lattice type structure.
ii) Pole type structure. **5×2**

Q.7 a) What are the advantages of cold formed steel sections? **10**
b) Draw atleast four types of individual structural framing members. **10**

End Semester Examination, May 2019

B. Sc. (Interior Design) – Sixth Semester

PRACTICAL ASPECTS OF PROJECT MANAGEMENT (C-705)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 a) Write short notes on **(any five)**:

- i) Project management.
- ii) WBS development.
- iii) PERT
- iv) CPM
- v) Project estimation
- vi) Time estimation of project.
- vii) BOQ

2×5

b) Pert planning involves five steps. State all the step and explain their description elaborately. **10**

PART-A

Q.2 State the comparison between PERT and CPM. The comparison should be in at least ten points, and all the points should be clear and specific. **20**

Q.3 Explain progress evaluation and review in PERT. The explanation should be in detail and with reference to one example. **20**

Q.4 What is resource scheduling? Explain the major problems which any project manager face while doing the resource scheduling. **20**

PART-B

Q.5 Write the steps to determine the critical path. Describe the importance of PERT and CPM in the effective completion of any project in given time. **20**

Q.6 What is project management? What does it entail? What are the advantages of using project management techniques? **20**

Q.7 What is project scope definition in WBS? Explain WBS in detail and also make a diagram of WBS. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

STRUCTURAL ANALYSIS-II (C-401B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **3**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1

<p>1. Write short notes on the following:</p> <ul style="list-style-type: none"> (a) Static Indeterminacy. (b) Sign Convention for Rotation in slope deflection Method (c) Carry over Moment (d) Principle of virtual work (e) Castiglione's theorem. (f) Normal thrust (g) Forces on anchor cables and towers. (h) Cable subjected to concentrated load. (i) Properties of column (j) Properties of load diagram 	2x10
---	-------------

PART-A

Q.2

<p>2. Analyse the continuous beam A B C D as shown in figure by slope deflection method & draw bending Moment diagram.</p>	20
--	-----------

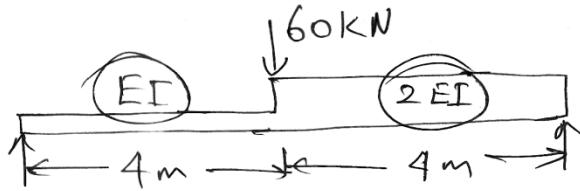
Q.3

<p>3. Analyse the rigid jointed frame as shown in figure by Moment distribution Method and draw bending moment diagram.</p>	20
---	-----------

Q.4

4.

- (a) Determine deflection under 60 kN load in beam using strain energy method.

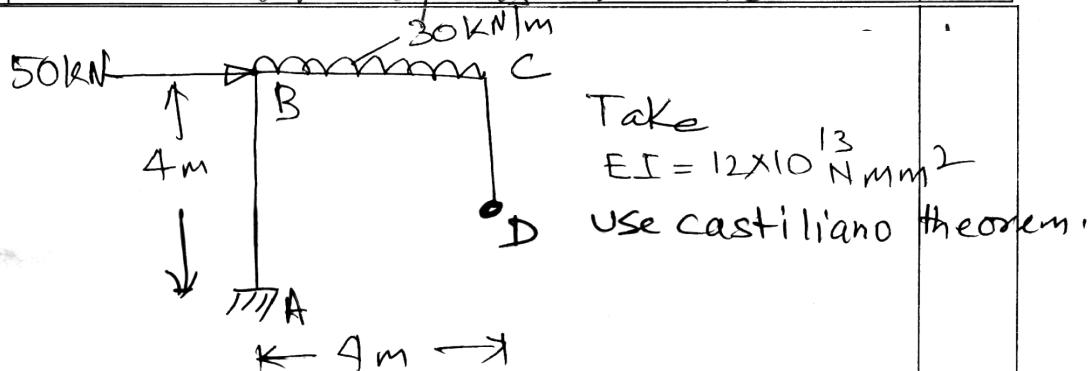


10

b)

- Determine the vertical displacement at the free end D in the frame as shown in figure by Castigliano theorem.

10



$$EI = 12 \times 10^{13} \text{ N mm}^2$$

use castigliano theorem.

PART-B

Q.5

5.

- A two hinged parabolic arch of span 50m & rise 5m is subjected to a central concentrated load of 60 kN to a central concentrated load of 60 kN. It has an elastic support which yields by 0.0001 mm/kN. Taking

20

$$E = 200 \text{ kN/mm}^2, I = 5 \times 10^9 \text{ mm}^4$$

$$\text{Average area } A_m = 10000 \text{ mm}^2$$

$\delta = 10 \times 10^{-6} / 0.0001$ assuming secant variation, calculate horizontal thrust when temperature rises by 20° (i) neglecting rib shortening (ii) considering rib shortening.

6.

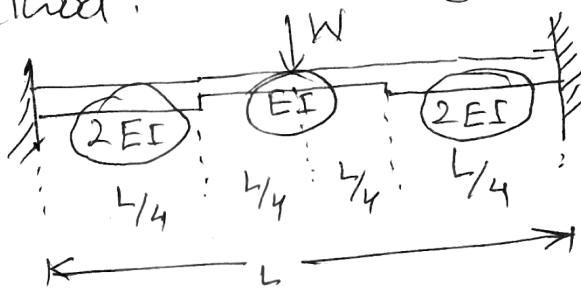
- Determine the end moments in the beam using Column Analogy Method. The flexural rigidity of beam as shown is same throughout (EI).

10

Q.6



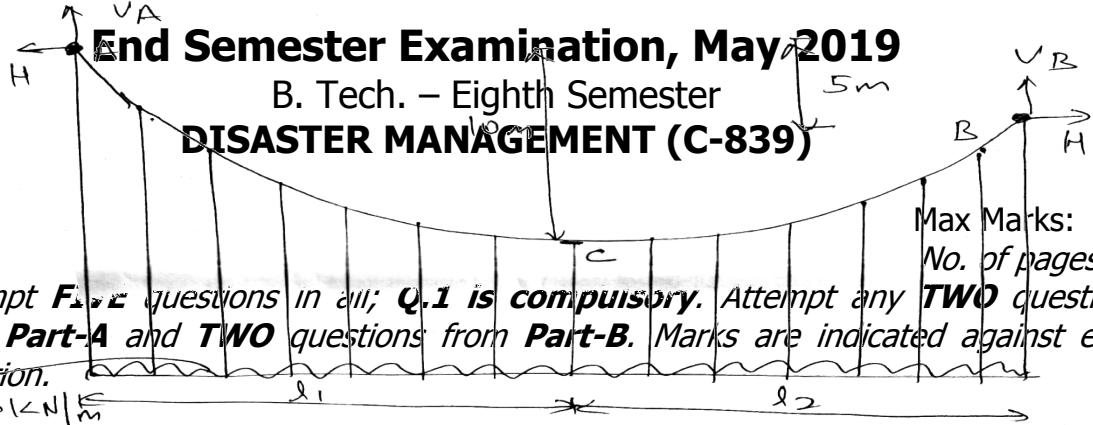
6. (b) Determine the end Moment developed in the beam using column analogy Method.



Q.7

7) A cable is suspended from the Point A & B which are 80m apart horizontally and are at different levels, the point A being 0.5 m vertically higher than the point B and the lowest point in the cable is 10 m below A. The cable is subjected to a uniformly distributed load of 30 kN/m over the horizontal span

(20)



Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **Five** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1** Briefly answer the following: $\lambda = 80 \text{ m}$
- What is disaster? Differentiate between natural and manmade disasters.
 - What is meant by "Environmental Hazard"?
 - What are hailstorms?
 - Define the term vulnerability.
 - Discuss the cause of Tsunami.
 - Which of the Ministry in Indian Government is nodal ministry for disaster management?
 - Write the full form of:

i) NDMA	ii) SDMA
iii) NIDM	iv) NDRF
 - What is the meaning of disaster mitigation?
 - Explain the term "capacity building".
 - Comment on the role of early warning system for disaster management in India. **2x10**

PART-A

- Q.2** a) Discuss in detail different types of natural disasters. **10**
 b) Write a short note on various types of man-made disasters. **10**
- Q.3** a) Discuss the salient features of national disaster policy of India. **10**
 b) Write the role played by armed forces, NDRF police and civil defence to prevent man-made disasters. **10**
- Q.4** a) Write a short note on 'disaster management Act, 2005'. **10**
 b) Describe the importance of vulnerability and risk assessment studies for disaster management. **10**

PART-B

- Q.5** a) What do you mean by structural and non-structural mitigation for disaster management. **10**
 b) What are the components of disaster mitigation? **10**
- Q.6** a) Briefly explain the impact of disasters on poverty. **10**
 b) What is remote sensing and how is it useful in disaster management? **10**
- Q.7** a) Discuss the role of education and training in disaster prevention. **10**
 b) What is the role of non-government agencies in disaster management? **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

GROUND WATER ENGINEERING (C-823)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Write notes on:

- a) Permeability and specific capacity.
- b) Aquitard and aquiclude.
- c) Void ratio and specific retention.
- d) Dupuit's assumption.
- e) Pheretic line.
- f) Efficiency of pump.
- g) Tubewell capacity.
- h) Specific characteristics of pump.
- i) Drawdown.
- j) Strainer.

2x10

PART-A

Q.2 Derive an equation of motion for steady and unsteady ground water flow in isotropic, homogenous aquifer. **20**

Q.3 a) Derive the Theim's equilibrium formula for in confined and confined aquifer. **10**
b) Write notes on determination of hydraulic properties of aquifer. **10**

Q.4 a) An artesian aquifer 20 m thick has a porosity of 20% and bulk modulus of compression $10^8 N/m^2$. Estimate the storage coefficient of the aquifer. What fraction of this is attributable to the expansibility of water? **10**
b) A 30 cm well penetrates 50 m below the static water table. After a long period of pumping at a rate of 1800 lpm, the draw downs in the wells at 15 and 45 m from the pumped well were 1.7 and 0.8 m respectively. Determine the transmissibility of the aquifer. What is the drawdown in the pumped well? **10**

PART-B

Q.5 a) Why gravel packing is essential and where natural gravel packed wells forms? **10**
b) What is well screen? Discuss various types of well screen. Why slot size is important and how it is fixed? **10**

Q.6 Describe Rain Water Harvesting methods suitable along drain line and discuss committed and non-committed runoff. **20**

Q.7 Discuss various types of pumping equipments used in water well. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

TENDERING AND VALUATION (C-802)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B.** Each question carries equal marks.

- Q.1 a) How many corrigendums can be issued against a tender?
b) Who can participate in a closed tender?
c) Define costing of a tender.
d) What is a Lump-Sum tender?
e) What do you understand by a award of work without call of tenders?
f) Define probity plan.
g) Define numbering in open tender.
h) What do you understand by attestation of rates?
i) Define contingent contract.
j) Define arbitration. **2x10**

PART-A

- Q.2 a) What are the various types of tenders and why these are published in the newspapers? **10**
b) What is the importance of tender writing? Also write down the instructions given to the tenderers. **10**
- Q.3 a) What is specification? What are the different steps involve in descriptive specification? What is advantage and disadvantage of descriptive specification? **10**
b) Draw a tender drawing with third angle project, If the plinth area of a housing project is 10 m x 10 m, and ceiling height of 3.5 m. Draw plan, section, front elevation, symbol, line, scale. **10**
- Q.4 a) Define earnest money. Also explain in details about refund of earnest money. **10**
b) Explain in details the tendering process. Also draw a flow chart for the same. **10**

PART-B

- Q.5 a) Explain critical analysis of tender with an example. **10**
b) Explain briefly tender evaluation and recommendation report. **10**
- Q.6 Explain the following with respect to the Indian Contract Act:
a) Essential elements of the wagers and their contingencies. **10**
b) Discharge of a contract and its types. **10**
- Q.7 a) What do you understand by arbitration? List the causes under which it becomes necessary. **10**
b) Explain the following terms:
i) Arbitrator. ii) Prior to arbitration.
iii) Pre hearing conference. iv) Selecting an arbitrator.
v) Joint exhibits. **2x5**

End Semester Examination, May 2019
 B. Tech. – Seventh Semester
PROJECT PLANNING AND MANAGEMENT (C-826)

Time: 3 hrs.

Max Marks: **100**
 No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1

- Q.1 a) What is slack?
- b) Dummy activity
 - c) Bar chart
 - d) Normal distribution
 - e) Back hoe
 - f) Ripper
 - g) Vibrator
 - h) Float
 - i) Overrun cost
 - j) Crash

(2x10)

2x10

PART-A

Q.2

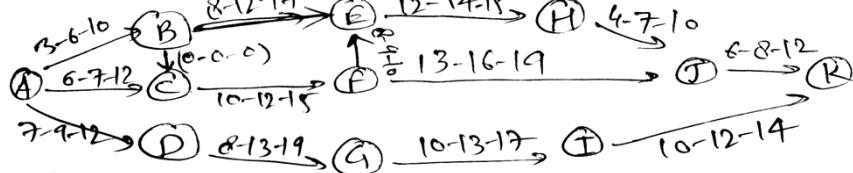
- Q.2 a) Explain the use of milestone charts & bar charts & describe the limitations & advantages of both. (6)
- b) Draw a planning chart for the construction of a R.C.C. column (250x500mm) 5m. high. Fe-500 is to be used, M40 is to be used with 25mm clear cover. Use of pump is there & needle vibrators are to be used. Formwork is to be casted at site. (7)
- c) Prepare a bar chart for following activities (7)
- | | | |
|---|---|---------|
| (i) Pattern for casting - | — | 4 weeks |
| (ii) Prepare mould - | — | 2 weeks |
| (iii) Casting & cleaning of operation A - | — | 1 week |
| (iv) Heat treatment of A - | — | 2 weeks |
| (v) Obtain & install machine M - | — | 7 weeks |
| (vi) Machining Part B - | — | 5 weeks |
| (vii) Assembling parts A & B - | — | 3 weeks |
| (viii) Prepare test rig - | — | 4 weeks |
| (ix) Test assembly - | — | 2 weeks |
| (x) Packing for dispatch - | — | 1 week |

20

Q.3

429/5

Q.3 ~~a~~ find the critical path for the following diagram & calculate TE, TL, slack & show it in tabular form as well. (20)

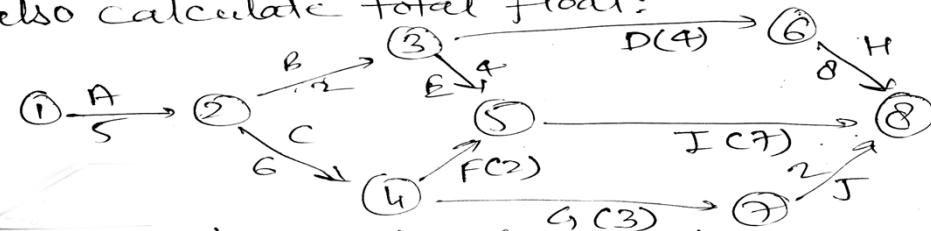


20

Q.4

Q.4 a) Compare & contrast CPM & PERT. (5)

b) Determine critical path, event time & activity time for the following network also calculate total float:



20

PART-B

Q.5

Q.5 a) A project consists of 5 activities as detailed below: Determine optimum ~~cost~~ project completion time assuming indirect cost @ Rs 450/- per week. (20)

Activity	Time in weeks		Cost in Rs.	
	Normal	Crash	Normal	Crash
(1-2)	5	4	600	800
(1-3)	3	2	400	600
(1-4)	2	5	900	1200
(2-4)	4	2	600	1200
(3-4)	4	3	500	700

20

Q.6

Q.6 a) List out the equipments needed for excavation in hard soil. discuss advantages & disadvantages of equipments suggested. (10)

b) Write briefly about two: (2x5)

- a) Bull-dozers
- b) Semi-booster crane
- c) Excavator

20

Q.7

Q.7 a) Explain the working of ready mix plant. What are its advantages & disadvantages over conventional method. (10)

b) Explain the working of bitumen plants. (10)

20

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DESIGN OF STEEL STRUCTURES-I (C-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write the full form of 1S.I B.
 b) Differentiate pitch and gauge with figure.
 c) Draw the diagram of fillet weld.
 d) Explain gross section yielding.
 e) Enlist types of bulking of column.
 f) A large beam supporting a number of joists is called _____.
 g) Describe web crippling.
 h) Explain tension stiffeners.
 i) Crane girder is used in _____ girder.
 j) The bearing strength of concrete is determined by _____. **2×10**

PART-A

- Q.2 a) Write any five assumptions of riveted joints. **5**
 b) Write any four disadvantages of welded joints. **4**
 c) A 16 mm thick plate is joined by double cover butt joint using a 10 mm thick cover plate. The steel of main and cover plate having permissible tensile stress of 150 MPa, bearing stress 300 MPa, shearing stress 100 MPa. Determine the strength and efficiency of the joint per pitch of 90 mm if 20 mm dia power driven shop rivets are used. **6**
 d) Two flats (Fe 410 Grade steel), each 210x8 mm, are to be jointed using 20 mm dia, 4.6 grade bolts and Fe 410 grade of steel, to form a lap joint. The joint is supposed to transfer a factored load of 250 kN. Design the joint and determine suitable pitch for the bolts. **5**

- Q.3 Design a built up column 10 m long to carry factored axial load of 1080 kN. The column is restrained in position but not in direction at both the ends. Provide single lacing system with bolted connections. Assume steel of grade Fe 410 and bolts of grade 4.6, design upto compressive strength of lacing flat if channels are placed back to back. **20**

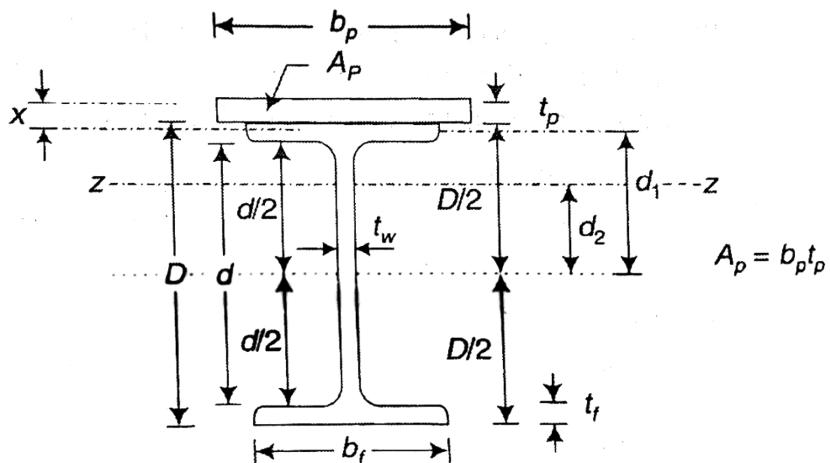
- Q.4 A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1700 kN. Design a suitable bolted gusset base. The base rests on M15 grade concrete pedestal. Use 24 mm dia bolts of grade 4.6 for making the connections. **20**

PART-B

- Q.5 A simply supported steel joist of 4 m effective span is laterally supported throughout. It carries an uniformly distributed load of 10 kN/m² (inclusive of self weight). Design an appropriate section using steel of grade Fe 410. **20**

- Q.6 Calculate max wheel load on each wheel of crane, max bending moment, max shear force, lateral forces and gross moment of inertia of the built up section for a gantry girder carrying a manually operated overhead travelling crane, for the following data:
 Crane capacity = 200 kN, self weight of crane girder excluding trolley = 200 kN, self weight of the trolley, electric motor, hook : 40 kN, approximate min approach of the crane hook to the gantry girder = 1.2 m, Wheel base = 3.5 m, c/c distance of gantry rails = 16 m, c/c distance between columns = 8 m, self weight of rail section = 300 N/m. dia of crane wheels = 150 mm, steel of grade Fe 410. **20**

Q.7 a) Determine the plastic section modulus of the section of the section.



10

b) Write design procedure of plate girder.

10

End Semester Examination, May 2019

B. Tech – Fourth Semester FLUID MECHANICS-II (C-408A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) How do you draw a hydraulic line?
- b) State the expression for surface tension in a droplet.
- c) Differentiate between subcritical and super critical flow.
- d) Differentiate between streakline and streamline.
- e) Explain Mach's number and its importance.
- f) How do we draw HGL and TEL?
- g) What does velocity potential functions suggests?
- h) Based on Reynold's number, how many types of flow are there.
- i) Why was specific speed of pump made significant?
- j) Justify the use of pilot tube.

2×10

PART-A

Q.2 a) Emulate Newton's law of viscosity. What is the effect of temperature on viscosity of water and that of air? **5**
b) Derive the relation between units of viscosity in different systems of measurement. **5**
c) Two large plane surfaces are 3.0m apart the space between the surface is filled with glycerin. What force is required to drag a very thin plate of surface area 0.5 meter between two large plane surfaces at a speed of 0.6 m/s if:
i) Thin plate is in the middle of two plane surfaces.
ii) The thin plate is at a distance of 1.2 m from one of the plane surfaces? Dynamic viscosity of glycerine is $8.10 \times 10^{-1} \text{ NS/m}^2$. **10**

Q.3 a) A rectangular plane surface 2 m wide and 3 m deep lies in water in such a way that its plane makes an angle of 30° with free surface of water. Determine total pressure and position of centre of pressure. When upper edge is 1.5m below the free water surface. **10**
b) A solid cylinder of 4 m dia has a height of 4 m. Find the metacentric height if specific gravity of material is 0.6 and it is floating in water with its axis vertical. State the condition of equilibrium and metacentric height. **10**

Q.4 a) Define the equation of continuity. Obtain an expression for continuity equation for a 3-D flow. **10**
b) For a 2-D flow the velocity potential is $\phi = x(2y - 1)$. Find the velocity at P(4, 5) and stream function at same point. **10**

PART-B

Q.5 a) State Bernoulli's equation for steady flow and derive the equation. Justify the assumptions made. **10**
b) A horizontal venturimeter with inlet dia 30 cm and throat dia 15 cm is used to measure the flow of oil of specific gravity 0.8. The discharge of it through the

ventarimeter is 50 lit/sec. Find the readings of oil-mercury differential manometer. The co-efficient of discharge is 0.98. 10

- Q.6 a) The resistance and experienced by a partially submerged body depends upon the velocity V, length of body L, viscosity of fluid d, density of fluid P gravitational acceleration g. Find the expression of R by bucking tam π – method. 10
- b) Explain displacement thickners, momentum thickners, with formula and give an account of factors affecting boundary layer thickness. 10
- Q.7 a) Make suitable diagram of reciprocating pump and centrifugal pumps, explaining difference of working of both. 10
- b) Derive an expression to measure the rate of flow through an open channel by Chezy's formula.

End Semester Examination, May 2019

B. Tech. — Fifth Semester

DESIGN OF CONCRETE STRUCTURES-II (C-601 / C-601A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

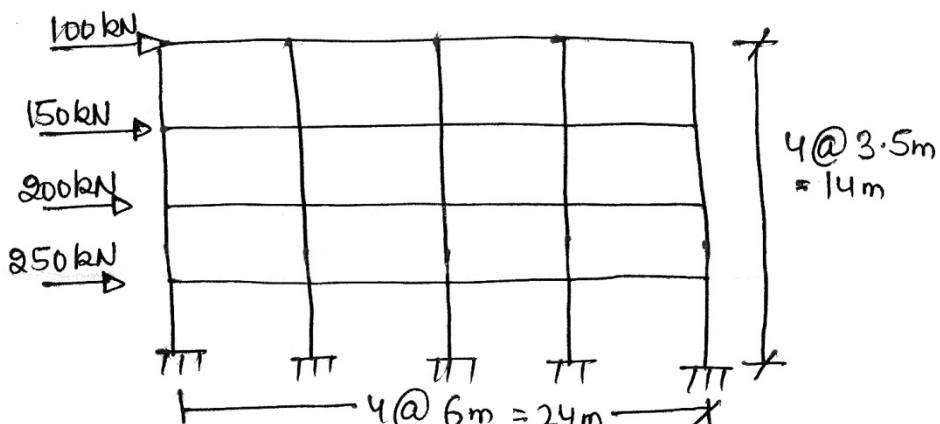
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the grade of concrete required for post tensioning work?
- b) Assumptions of cantilever method.
- c) Give advantages of a flat slab.
- d) Define bundled tube structure.
- e) What is redistribution of moments?
- f) Mention the code used for design of a water tank.
- g) What is the purpose of constructing retaining wall?
- h) Draw the labeled cross-section of a flat slab.
- i) Briefly describe substitution method of analysis.
- j) Which failure is predominant in raft footing, one way shear or two way shear? **2×10**

PART-A

Q.2 Analyze the frame using portal method:



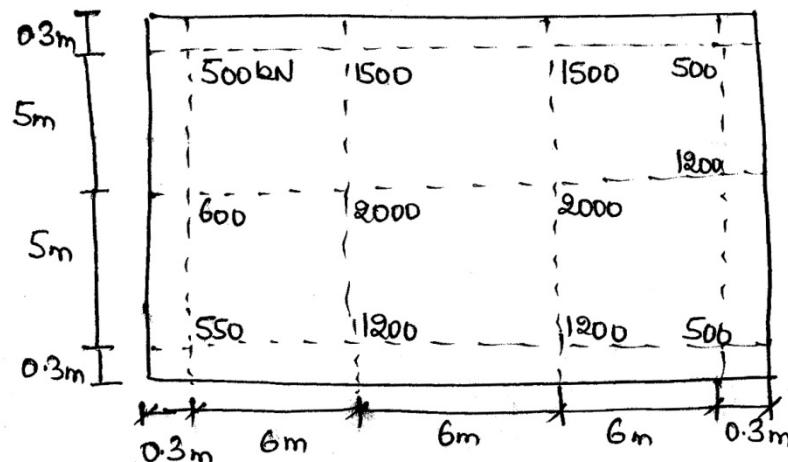
20

Q.3 a) Design a rectangular beam, continuous over four column supports of effective span 4 m. The beam is subjected to an imposed load of 5 kN/m and live load 10 kN/m. Use M20 concrete and Fe415 steel. **15**
b) Redistribute the bending moment by 20% and draw BM Envelope. **5**

Q.4 Design a dog legged staircase for a commercial space in a room measuring 3 m. and 6 m (clear din). The floor to floor height is 3.5 m. Stairs are supported on brick wall 230 mm thick at the end of landing. Use M20 concrete and Fe415 steel. **20**

PART-B

- Q.5 Design a raft foundation for a layout shown in figure below. Net bearing capacity of soil is 80 kN/m² and column size is 25 cm × 25 cm. Use M30 concrete and Fe500 grade steel.



20

- Q.6 Design a circular water tank with flexible base for a tank capacity of 1,00,000 liter capacity. The depth of water in tank is 5 m. Use M25 concrete and Fe415 steel. Take unit weight of water as 9.8 kN/m².

20

- Q.7 Write short notes on the following:

- a) Losses of pre-stress.
- b) Advantages and disadvantages of post tensioning system.
- c) Pre-tensioning method.
- d) Principle of pre-stressed concrete.

5×4

End Semester Examination, May 2019

B. Tech. – Eighth Semester

HYDROLOGY (C-803)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Define mass curve of rainfall.
 b) What is an isohyet?
 c) State Penman's equation.
 d) Define specific retention.
 e) Name any three factors that affect evaporation losses in a reservoir.
 f) What is base flow?
 g) Define aquitard and aquifuge.
 h) Define evapotranspiration.
 i) What do you mean by ϕ -index?
 j) List out the various forms of precipitation. **2x10**

PART-A

- Q.2 a) Describe in detail the various ways of presenting the rainfall data. **10**
 b) Recording of rain is very important aspect in study of hydrology. Describe any two non-recording type rain gauges with help of a neat sketch. **10**
- Q.3 a) What do you mean by the term evapotranspiration? Explain the method of measuring evapotranspiration. **10**
 b) A reservoir with a surface area of 250 hectares had the following average values of parameters during a week: Water temperature=20°C, relative humidity=40%, wind velocity at 1.0 m above the ground=16 km/h. Estimate the average daily evaporation from the lake and the volume of water evaporated from the lake during that one week. **10**
- Q.4 a) Explain briefly the infiltration process and how the measurement of infiltration takes place. **10**
 b) A 12-hour storm rainfall with the following depth in cm occurred over a basin; 2.0, 2.5, 7.5, 3.7, 10.4, 4.8, 7.2, 10.0, 6.0, 4.0, 1.5 and 1.5. The surface runoff resulting from the above storm is equivalent to 25.5 cm of depth over the basin. Determine the average infiltration index (Φ – index) for the basin. **10**

PART-B

- Q.5 a) Explain the various methods of measurement of stage of a river in detail. **10**
 b) What do you mean by runoff? Explain the various factors that affect the runoff. **10**
- Q.6 a) Explain in detail the components of a hydrograph. Also, discuss the various factors that affect a runoff hydrograph. **10**
 b) Given the ordinates of a 4-h unit hydrograph derive the ordinates of a 12-h unit hydrograph for the same catchment by using S-curve method.

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4-h UH	0	20	80	130	150	130	90	52	27	15	5	0

10

- Q.7 a) A 30cm diameter well completely penetrates a confined aquifer of permeability 45 m/day. The length of the strainer is 20m. Under steady state of pumping, the

drawdown at the well was found to be 3.0m and the radius of influence was 300m.
Calculate the discharge. **10**

- b) Derive an expression for the steady state flow into a well under unconfined aquifer conditions. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DESIGN OF CONCRETE STRUCTURES -I (C-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer all the parts:

- a) Draw stress strain blocks of working stress method.
- b) How are doubly reinforced beams and T-beams advantageous over singly reinforced beams?
- c) Tabulate the various limit states.
- d) Discuss briefly different types of shear stirrups.
- e) Develop expression for development length?
- f) Illustrate two examples of structures where torsional moment is induced?
- g) What all conditions warrant a one way slab design?
- h) Differentiate column and pedestal.
- i) What is the maximum and minimum percentage of steel for columns? Why is it generally kept much below the specified percentage?
- j) What are the advantages of raft foundations?

2×10

PART-A

Q.2 Use working stress method for the following:

- a) An RCC beam is of size 300mm × 600mm and effective cover = 40mm. Calculate moment of resistance of balanced section and area of steel required for the same. M20 concrete and Fe 415 steel is used. **10**
- b) Design a singly reinforced beam section subjected to a max B.M of 80 kNm. The width of the beam may be made two third the effective depth. Use M20 and Fe 415. **10**

Q.3 Use Limit State Design Principles:

- a) Determine whether the section having the dimensions as given can withstand a factored applied bending moment of 310 kNm: b = 230 mm, D = 600 mm, effective cover = 40 mm, $A_{st} = 3 \# 25$ dia = 1473 mm², $f_y = 500$ MPa and $f_{ck} = 35$ MPa. **10**
- b) Design a RCC beam of effective S.S. span of 6 m. The beam has to support a Live Load = 14 kN/m and Superimposed Dead Load = 9.5 kN/m, Use M20 and HYSDofFc415. **10**

Q.4 A rectangular beam of size 300 mm × 600 mm is subjected to a load of 60 kN/m over a simply supported span of 6.5 m. Design the beam for shear if % tension reinforcement is 1.2%. Use M20, Fe415 and LSM. **20**

PART-B

Q.5 Use Indian standard code method for design of a slab of size 4.2 m × 5.5 m clear span supported over walls of 300 mm thickness. The slab is discontinuous over two adjacent edges. Use M25 concrete and Fe 415 Steel. Live load = 5 kN/m², floor finish = 50 mm thick C. C flooring. **20**

Q.6 Design a short axially loaded circular column with helical reinforcement - diameter of column = 700 mm factored load over column = 2500 kN M20 Concrete and Fe 415 Steel have to be used. **20**

Q.7 Design a square isolated footing of uniform thickness for a R. C. C. column of size 450 mm × 450 mm reinforced with 8nos 25 mm dia bars and bearing a load of

2300 kN. The safe Bearing pressure is 300 kN/m at a depth of 1.5 m below the ground level. Use M20 Concrete and Fe 415 steel.

20

End Semester Examination, May 2019

B. Tech – Seventh / Eighth Semester

FOUNDATION ENGINEERING (C-804)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

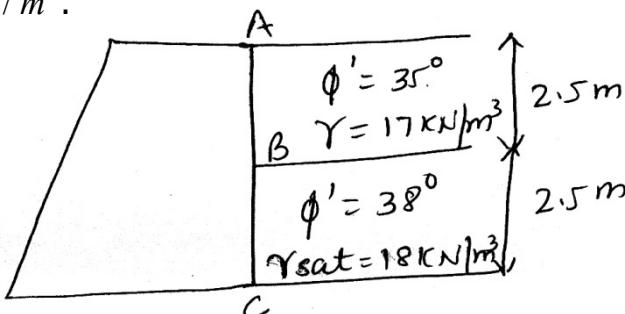
Q.1 Answer the following questions:

- List different factor of safety used in stability of slopes.
 - What is active earth pressure?
 - What are different modes of failure of retaining walls?
 - Differentiate between shallow foundation and deep foundations.
 - Define the term magnification.
 - Write Indian standard code equation used to calculate net ultimate bearing capacity of soil.
 - Mention the corrections applied for SPT'N' value.
 - What is the maximum settlement allowed for isolated foundations on plastic clay?
 - What do you mean by sheet pile?
 - If the circular frequency (w) is 30π radians per second, the time period is _____?
- 2x10**

PART-A

Q.2 a) Derive an expression for the factor of safety of an infinite slope in a cohesion less soil. **10**
b) Explain Friction circle method in detail. **10**

Q.3 a) Determine the active pressure on the retaining wall as shown in fig. Take $\gamma_w = 10 \text{ kN/m}^3$.



10

- What are different types of earth pressure? Give examples.
 - Compare Rankine's and Coulomb's theory.
- 5** **5**

Q.4 a) Write short notes on:

- Design of anchored bulk heads.
 - Cantilever short piles in cohesive soil.
- b) What are different types of short pile walls? Draw the sketches showing the pressure distribution. **5x2**
- 10**

PART-B

Q.5 a) What do you mean by site investigation? What are the different purposes for which site investigations are done? **5**
b) Discuss different types of shallow foundations and their suitability. **10**

- c) What are the factors affecting depth of shallow foundation? **5**
- Q.6 a) Discuss standard penetration test. What are the various correction? What is the importance of the test in geotechnical engineering? **10**
b) Explain Indian Standard method of finding bearing capacity of the soil. **10**
- Q.7 Write short notes on:
a) Natural frequency of block foundation system.
b) Reinforced earth base.
c) General criteria for design of foundation.
d) Types of machine foundation. **5x4**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

FOUNDATION ENGINEERING(C-804)

Time: 3 hrs.

Max Marks: **100**

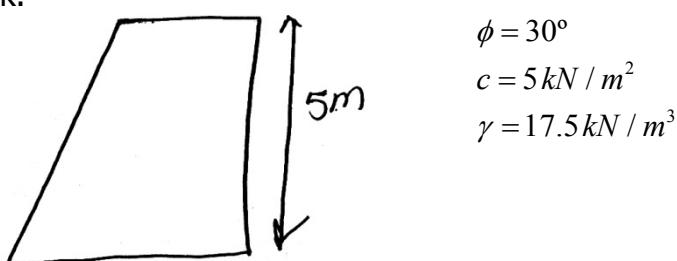
No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) What are different types of slope failure?
 b) Write expression for coefficient of active earth pressure.
 c) Give example of man-made slopes.
 d) List functions of bulkheads.
 e) What are different methods of soil exploration?
 f) If the circular frequency (ω) is 20π radians per second, the time period is _____.
 g) Differentiate between shallow and deep foundations.
 h) What are advantages of combined footings?
 i) Write the assumptions of coulomb's theory.
 j) When does strap footing preferred? **2x10**

PART-A

- Q.2 a) Derive an expression for the factor of safety of an infinite slope in a cohesion less soil. **10**
 b) A long natural slope in an over consolidated clay ($c = 10 \text{ kN/m}^2$, $\phi = 25^\circ$, $\gamma_{sat} = 20 \text{ kN/m}^2$) is inclined at 10° to the horizontal. The water table is at the surface. If depth is 5m below the surface, determine the F.O.S. Take $\gamma\omega = 10 \text{ kN/m}^2$. **10**
- Q.3 a) A 5m high retaining wall is shown in the figure below. Determine the Rankine active earth pressure on the wall i) Before the formation of the crack. ii) After the formation of the crack. **10**



- b) What are different types of earth pressure? Give examples. **5**
 c) Write steps to determine active earth pressure using Culmann's method. **5**
- Q.4 a) Explain types of sheet piles along with neat sketch. **10**
 b) Discuss the procedure of checking stability of cantilever sheet piles. **10**

PART-B

- Q.5 a) Classify the pile foundation based upon:
 i) Material.
 ii) Load transmission.
 iii) Method of installation. **10**
 b) What are different types of shallow foundation? Explain their suitability. **10**

- Q.6 a) Determine the ultimate bearing capacity of a square footing 2m x 2m in a soil with unit weight of $18kN / m^3$, $\phi^l = 20^\circ$, $c = 20kN / m^2$. Take depth of foundation of 1.5m. Use $N_c = 14.83$, $N_q = 6.40$ and $N_\gamma = 3.54$. **10**
b) Explain standard penetration test in detail. **10**
- Q.7 a) Discuss the general criteria for design of machine foundations. **10**
b) Discuss criteria for design of foundation for free vibration without damping. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ESTIMATION AND COSTING (C-801A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

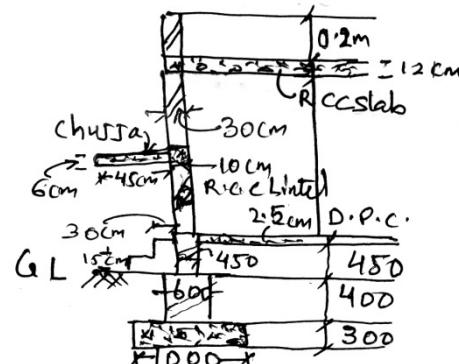
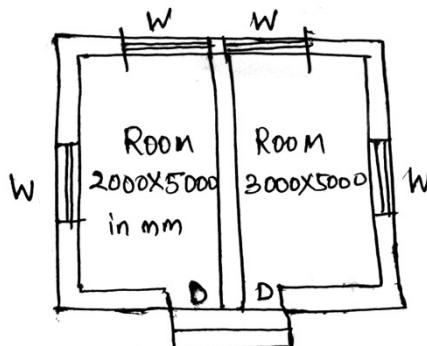
Q.1 Write short notes on:

- Purpose of estimation?
- Plinth area method.
- Necessity of specification.
- Specification of brick.
- Over-head cost.
- Materials and labour.
- Measurement book.
- Rules for preparation of muster roll.
- Valuation based on profit.
- Salvage value.

2×10

PART-A

- Q.2**
- List the factors to be considered while preparing detailed estimate and explain briefly. **3**
 - Calculate the quantity of earth work for 200m length for a portion of a road in an uniform ground. The height of the banks at the two ends are 1.0m and 1.6m. The formation width of road is 10m and side slope are 2:1. Assume that there is no transverse slope. **5**
 - Estimate the following work of double room building (load bearing type of structure) by long wall and short wall method or centreline method.



Reference D door 1000×2000

W window 1000×1200

- Earth work in excavation.
- C.C. bed in foundation (1:5:10)
- R.R Masonry in foundation and plinth (1:10)
- D.P.C. 2.5 cm (1:1½:3)
- Brick work in superstructure.

12

- Q.3**
- Write down detail specification of earth work in excavation of foundation. **10**
 - Explain detailed specification of cement concrete (1:2:4). **10**
- Q.4**
- Calculate rate per m^3 of lime concrete in foundation or floor with 40mm gauge stone ballast, while lime and sand proportion (1:2:4). Allow $1\frac{1}{2}\%$ of water charge and

- 10% contractor's profit. 10
- b) Estimate rate per m² of 12mm plastering (1:6), allow 1½% of water charge and 10% contractor's profit. 10

PART-B

- Q.5 a) Define tender. Explain types of tender and its preparation. 10
- b) Write short notes on the following:
 i) Earnest money.
 ii) Security money.
 iii) Retention money. 10
- Q.6 a) Briefly explain the following:
 i) Secured advance payment.
 ii) Interim payment.
 iii) First and final payment.
 iv) Advance payment. 2½×4
- b) Notes on following technical term:
 i) Preparation of bill.
 ii) Checking of measurement.
 iii) Percentage checking by executive engineer.
 iv) Standard Measurement Books (SMB). 2½×4
- Q.7 a) A colonizer intends to purchase a land of 100,000 sqm area located in the area suburb of a big city to develop it into plots of 700 sqm each after providing necessary roads and parks and other activities. The current sale price of small plots in the neighbourhood is ₹30.00 per/m². The colonizer wants a net profit of 20% work out the maximum price of land at which the colonizer may purchase the land. 10
- b) Briefly explain item rate contract and lump sum contract. 10

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADVANCED TRAFFIC ENGINEERING (C-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) State rolling resistance.
 b) Discuss the application of Echoscope.
 c) Categorize off street car parking facilities.
 d) Describe the location and height of route marker signs.
 e) Mention the specifications of stop lines.
 f) Describe signal face in brief.
 g) Write the importance of off-set.
 h) State priority rules at intersections.
 i) What are the educational uses of accidental data?
 j) Write the standard way to define auto-rickshaw. **2×10**

PART-A

- Q.2 a) Illustrate the difference of air resistance, rolling resistance and grade resistance. **10**
 b) State the importance of braking system, acceleration and deceleration in vehicles with formula. **10**
- Q.3 a) Compare and contrast moving observer method and registration number method for running speed measurement. **10**
 b) The following data were obtained from spot speed studies carried out on a city road during a certain period of time. Suggest:
 i) Speed limit for regulation
 ii) Speed to check geometric design elements
 iii) Lower speed group causing congestion.

Speed group (kmph)	No. of vehicles	Speed group (kmph)	No. of Vehicles
< 5	45	30 – 35	430
5 – 10	230	35 – 40	290
10 – 15	375	40 – 45	110
15 – 20	500	45 – 50	25
20 – 25	680	50 – 55	8
25 – 30	525	> 55	2

- Q.4 a) Differentiate the level of service in determining highway capacity. **10**
 b) Appraise the U.K practice of determining capacity of rotary intersection. **10**

PART-B

- Q.5 a) Elaborate informative signs and indication signs specifying the direction signs with diagram. **10**
 b) Discuss the types of coordinated signal system. **10**
- Q.6 a) Describe IRC made general rules concerning traffic. What are those rules specify? **10**
 b) What is the necessity of one way street? Mention advantages and disadvantages. **10**

- Q.7 a) Specify the noise limits prescribed by federal highway administration and Wilson committee recommendations. **10**
b) Write the factors affecting efficiency of transport mode. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ENVIRONMENTAL IMPACT ASSESSMENT (C-834)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Expand SPCB, EIA, EMP, IAA?
- b) Differentiate between SEA and EIA?
- c) List different type of checklists used in EIA.
- d) How is geomorphology useful in EIA?
- e) Differentiate between positive and negative impacts?
- f) What aspects are considered for determining appropriate alternatives of a project?
- g) Briefly explain the role of alternatives in strategic environmental assessment.
- h) List various uses of mathematical models in EIS study.
- i) Give the constitution of expert appraisal committee.
- j) List any two project categories which are exempted from public hearing? **2×10**

PART-A

- Q.2** a) Give an overview of EIA process. **10**
b) Write short notes on following in context of EIA:
 - i) Cumulative impacts.
 - ii) Short term impacts.
 - iii) Negligible impacts.
 - iv) Minor significance.
 - v) Consideration of alternatives. **2×5**

- Q.3** a) Construct a flowchart illustrating use of network method for air quality management. **10**
b) Discuss location alternatives and process alternatives. **10**

- Q.4** a) Tabulate various parameters and associated issues to be considered for socioeconomic analysis of a project. **15**
b) Prepare a list of components you will include as a consultant to understand the water environment of an upcoming project. **5**

PART-B

- Q.5** a) Compute the rainwater harvesting potential of an area with the following given data: roof-top area (4500 m^2), circulation area (3800 m^2) and open greens (3700 m^2). The annual rainfall data may be taken as 1041 mm. Assume any other data as required suitably. **8**
b) Develop a plan for water pollution management during construction phase and operation phase of a project. **12**

- Q.6** a) Describe the procedure of appraisal conducted in EIA process. **10**
b) Give an over-view of generic structure of EIA report. **10**

- Q.7** Compute the capacity of STP proposed for an upcoming township with the following master plan components:
Residential Units : 7500
Staff members : 3500
Visitors : 625
Green areas : 4800 m^2

4 DG cooling sets : 3000 KVA operating 8 hours/day
Develop the water balance diagram for judicious use of groundwater for rainy season
and non-rainy season. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

PRESTRESSED CONCRETE (C-827 / C-827A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

PART-A

- Q.2**

 - a) Explain advantages of pre-stressed concrete. 5
 - b) Enlist four methods used for high strength concrete mines. 4
 - c) Describe shrinkage of pre-stressed concrete with equation. 3
 - d) "Early attempts in pre-stressing using ordinary mild steel fail", describe it's reasons. 3
 - e) Distinguish between the terms:
 - i) Uniaxial
 - ii) Biaxial
 - iii) Triaxial pre-stressing.5

Q.3

 - a) Enlist any five methods by which pre-compression is imparted to concrete. 5
 - b) Draw and explain pre-tensioning systems for beam with straight tendon and eccentric tendon. 10
 - c) Explain principles of post-tensioning. 5

Q.4

 - a) A concrete beam is pre-stressed by a cable carrying an initial pre-stressing force of 300 kN. The cross-sectional area of the wire in the cable is 300 mm². Calculate the percentage loss of stress in the cable only due to shrinkage of concrete using IS:1343 recommendations assuming the beam to be i) Pre-tensioned and ii) Post-tensioned. Assume E_s = 210 kN/mm² and age of concrete at transfer = 8 days. 10
 - b) A post-tensioned cable of beam 10m long initially tensioned to a stress of 1000 N/mm² at one end. If the tendons are curved so that the slope is 1 in 24 at each end, with an area of 600 mm², calculate the loss pre-stress due to friction given the following data: coefficient of friction between duct and cable = 0.55, friction coefficient for wave effect = 0.0015 per m. During anchoring, if there is a slip of 3mm at the jacking end, calculate the final force in the cable and the percentage loss of pre-stress due to friction and slip. E_s = 210 kN/mm². 10

PART-B

- Q.5 A pre-tensioned beam, 200 mm wide 300 mm deep, is pre-stressed by 10 wires of 7 mm dia initially stressed to 1200 N/mm², with their centroids located 100 mm from the sofit. Find the max stress in concrete immediately after transfer, allowing only for elastic shortening of concrete.

If the concrete undergoes a further shortening due to creep and shrinkage while there is a relaxation of five percent of steel stress, estimate the final percentage loss of stress in the wires using the Indian standard code IS:IB43 regulations, and the following data:

$$E_s = 210 \text{ kN / mm}^2, E_c = 5700\sqrt{fcu}, f_{cu} = 42 \text{ N / mm}^2, \phi = 1.6$$

Total residual shrinkage strain = 3×10^{-4} .

20

- Q.6 A pre-stressed girder has to be designed to cover a span of 12 m, to support an use of 15 kN/m. M-45 grade concrete is used for casting the girder. The permissible stress in compression may be assumed as 14 N/mm² and 1.4 N/mm² in tension. Assume 15% losses in pre-tress during service load conditions. The preliminary section proposed for the girder consists of a symmetrical I-section with flanges 300 mm wide and 150 mm thick. The web is 120 mm wide by 450 mm deep.

- Check the adequacy of the section provided to resist the service load.
- Design the min pre-stressing force and the corresponding eccentricity for the section.

10×2

- Q.7 a) Design a suitable longitudinal and transverse pre-stressing system for a two lane highway, 7.5 m wide 100 m long. The thickness of the slab is 150 mm. The coefficient of friction between the slab and sub-grade is estimated to be 1.5. Freyssinet cables of 12.5 mm are available for use at site. A min longitudinal pre-stress of 2 N/mm² should be ensured.

10

- Describe about the methods of pre-stressing pavements with diagram.

10

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DESIGN OF STEEL STRUCTURES -I (C-405A)

Time: 3 hrs.

Max Marks: **100**

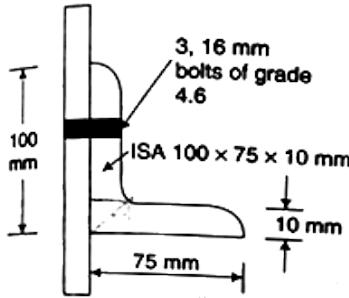
No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write the full form of ISLB.
b) Differentiate lap joint and butt joint by figure.
c) Draw the diagram of tension failure of plate.
d) Differentiate edge and end distance by figure.
e) Explain gross section yielding.
f) Describe web buckling.
g) Draw the cross section of diagram of built up beams.
h) Enlist types of columns base.
i) Explain stiffeners.
j) Describe web crippling.
- 2×10**

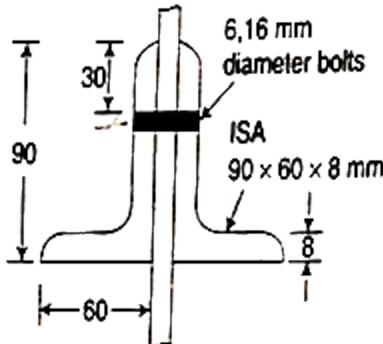
PART-A

- Q.2 a) Explain any four failure of riveted joints. **4**
b) Write any four advantages of welded joints. **4**
c) A 16 mm thick plate is joined by double cover butt joint using a 10 mm thick cover plate. The steel of main and cover plate having permissible tensile stress of 150 MPa, bearing stress 300 MPa, shearing stress 100 MPa. Determine the strength and efficiency of the joint per pitch of 90 mm if 20 mm dia power driven shop rivets are used. **4**
d) Calculate the strength of a 20 mm dia bolt of grade 4.6 and grade of steel Fe 410 for the lap joint. The main plates are 12 mm thick. **8**
- Q.3 a) Determine the effective net area for the section. The angles are connected as shown in the figure. The steel is of grade Fe 410.



5

- b) Determine the tensile capacity of the sections in fig.



15

- Q.4 A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1700 kN.

Design a suitable bolted gusset base. The base rests on M15 grade concrete pedestal.
Use 24 mm dia bolts of grade 4.6 for making the connections. 20

PART-B

- Q.5 A simply supported steel joist of 4 m effective span is laterally supported throughout. It carries an uniformly distributed load of 10 kN/m² (inclusive of self-weight). Design an appropriate section using steel of grade Fe 410. 20
- Q.6 a) Write the specification of gantry girder. 5
b) Describe design procedure of gantry girder. 15
- Q.7 Design a welded plate girder 24 m in span and laterally restrained throughout. It has to support a udl of 100 kN/m throughout the span exclusive of self-weight design the girder without intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe 410. Yield stress of steel may be assumed to be 250 MPa irrespective of the thickness of plates used. Design upto shear force corresponding to web buckling. 20

End Semester Examination, May 2019

B. Tech. — Sixth Semester

HAZARDOUS WASTE MANAGEMENT (C-838)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Name different type of hazardous waste material.
- b) Differentiate between handling and segregation of waste material.
- c) Define "Municipal solid waste".
- d) How TSDF concept is applicable to hazardous waste?
- e) How would we decide whether waste materials require incineration or pyrolysis method of treatment?
- f) Define "E-waste' and their sources.
- g) How long can hazardous waste be stored?
- h) Is paint and used paint both considered hazardous material?
- i) How can we prevent hazardous materials?
- j) Which agencies regulate the rules and norms for hazardous waste?

2×10

PART-A

Q.2 What are the sources, characteristics of hazardous waste? Write health impacts of hazardous waste. **20**

Q.3 Explain proximate and survey analysis methods. What is the other analytical approach for hazardous waste characterization? **20**

Q.4 What are the different processes involved in hazardous waste management? Mention hazardous wastes (Management and Handling) Amendment Rules 2000. **20**

PART-B

Q.5 Explain "Hazardous waste treatment technologies". What are the regulatory aspects? **20**

Q.6 What are the sources of biomedical waste? Is biomedical waste treatment process different from hazardous waste treatment; if yes then write the differences? **20**

Q.7 Define "E-Waste" with their characteristics, sources, collection, transport and disposal methods. **20**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

IRRIGATION ENGINEERING-II (C-603A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A**. and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Write short notes on:

- Failure and weir and their remedies.
- Necessity of weir.
- Distinguish between high and low water training.
- Object of training a river.
- USBR basin.
- Ogee spillway.
- Type of energy dissipating device.
- Sloping glacis fall.
- Distinguish between low and high gravity dam.
- Various modes of failure of a gravity dam.

2x10

PART-A

Q.2 a) Describe in brief 5c of weir. Distinguish clearly between a weir well and impervious apron **10**

- b) Explain Khosala's method of independent variables. How do you apply correction for:
- Thickness of floor
 - Inclination of floor
 - Interference of piles.

10

Q.3 a) List out various types of river training works. Sketch a suitable cross section of a guide banks as used in river training work and their design steps. **10**

- b) Write down different type of groynes & their purpose. Draw a section of a groyne. **10**

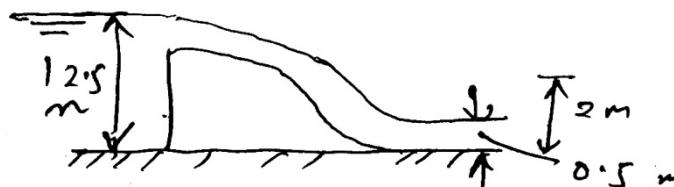
Q.4 a) Describe with the help of sketches various types of cross drainage works. **10**

- b) Differentiate between:
- Syphon aqueduct and canal siphon
 - Aqueduct & super passage.

10

PART-B

Q.5 a) An over fall spillway shown in the figure passes a discharge of 7-83 M³/second/metre width with a fall of 12.5 m. Depth of water available on the downstream is 2.0 m. Calculate the leading dimensions of hydraulic jump stilling basin on the basis of Froude number.



10

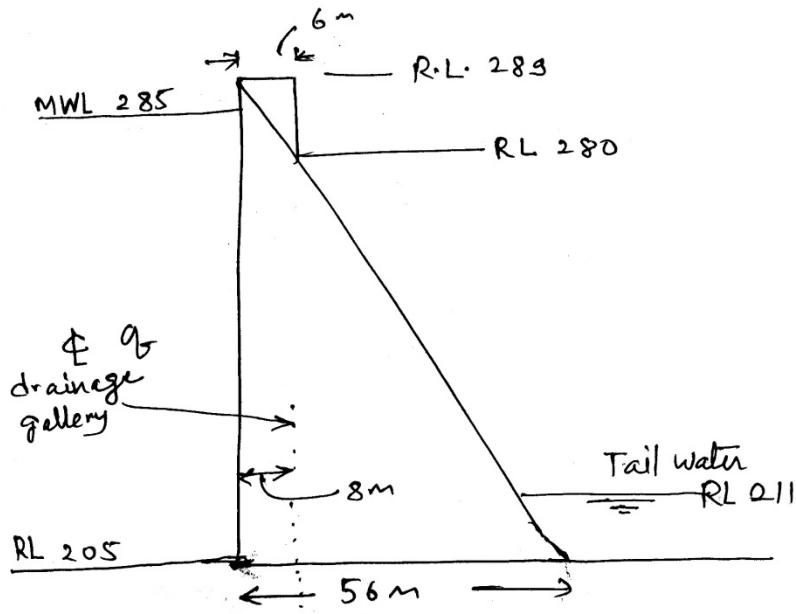
- b) At an energy dissipater structure below an over fall spillway, the discharge is 19 m³/s and the energy loss is 1 m at hydraulic jump forming there in. determine the depth

Q.6 Design a Sarda type fall for the following data:

- a) Full supply discharge: $\frac{U/s}{D/s} = 41 \text{ m}^3/\text{sec}$
- b) Full Supply level: $\frac{U/s}{D/s} = \frac{218.30\text{m}}{216.80\text{m}}$
- c) Full supply depth: $\frac{U/s}{D/s} = \frac{1.8\text{m}}{1.8\text{m}}$
- d) Bed width: $\frac{U/s}{D/s} = \frac{26\text{m}}{26\text{m}}$
- e) Drop: 1.5m

Design the floor on Bligh's theory taking coefficient of creep = 8. Check the design by Khosla's theory and make changes if necessary. Safe exit gradient may be taken equal to 1/5. 20

Q.7 Figure shows the section of a gravity dam (non-overflow portion) built of concrete calculate the maximum vertical stress at the level of heel and toe of the dam. Assume weight of concrete as 23.5 KN/m³ Neglect earth quake effects.



End Semester Examination, May 2019

B. Tech. – Sixth Semester

BRIDGE ENGINEERING (C-504A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1** is compulsory. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Explain the following terms in brief:

- a) Impact factor.
- b) Aesthetics of bridge design.
- c) Pigeaud's method.
- d) Longitudinal forces
- e) Method to determine hood discharge.
- f) Secure depth.
- g) Forces on abutments.
- h) Box culvert.
- i) Carriage way.
- j) Rocker bearing.

2×10

PART-A

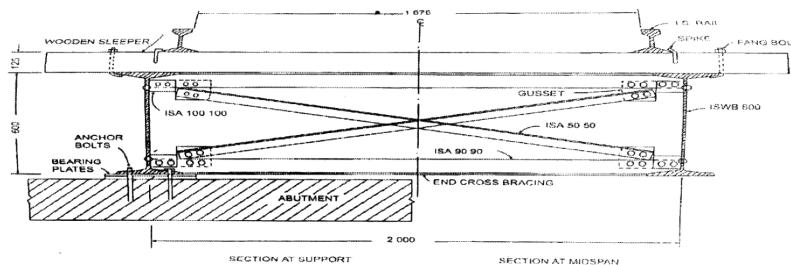
Q.2 a) Discuss in details various maps and information to be included in preliminary drawings for investigation for bridges. **10**
b) Explain topographic details to be considered in the investigations in details. **10**

Q.3 a) Explain the IRC class AA loading with the help of a sketch. **10**
b) Write a short note on evaluation of standard loadings for design of bridges. **10**

Q.4 Design deck slab for a state highway bridge with following data for class AA tracked vehicles. Check for shear.
a) Width of bridge 12 meter.
b) No footpath provided.
c) M25 and Fe415 grade of concrete and steel.
d) Clear span 5 meter.
e) Depth of foundation 1.35 meter.
f) Waering course 56 mm thick asphaltic concrete.
g) $T_c = 0.28 \text{ MPa}$. **20**

PART-B

Q.5 a) To design a steel beam culvert with a clear span of 5 meter to carry a broad gauge single tacked on main line, as show in fig. with the following given data:
i) Assume two R. S. joists.
ii) Dead load as 7.5 KN/meter.
iii) CDA as 0.87.
iv) Impact factor as 1.87.



10

- b) Explain the design steps, types and components of truss bridges.

10

- Q.6** a) What are the various types of piers? What are the various forces which are considered in the design of piers?

10

- b) Design a reinforced concrete abutment using following data.

Dimensions: shown in fig.

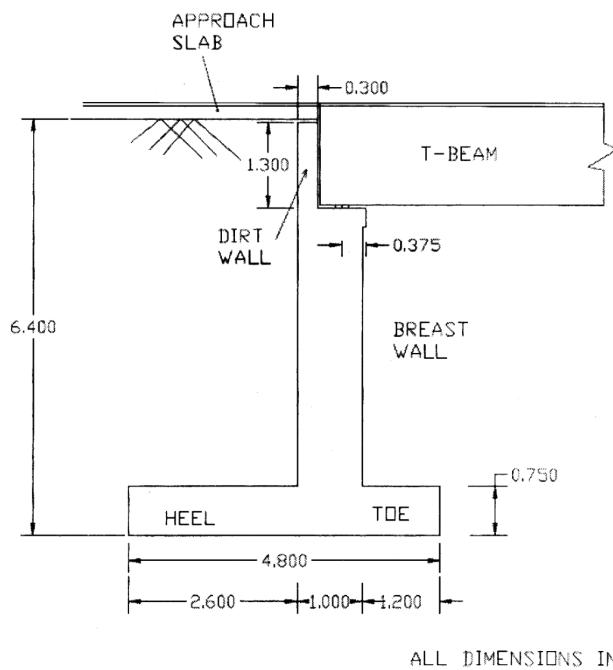
Superstructure: T-beam two-lane bridge of effective span 16.1m.

Overall length: 17.26.

Loading: As for national highway.

Back fill: Gravel with angle of repose $\phi = 35^\circ$.

Unit weight of back fill $w = 18\text{kN/m}^2$.



10

- Q.7** a) What is the function of wing wall and how can you classify wing walls?

10

- b) Explain the procedure to find out the capacity of pile and pile group.

10

End Semester Examination, May 2019

B. Tech. – Sixth Semester

BRIDGE ENGINEERING (C-504 / C-504A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Explain the following terms in brief:

- a) Impact factor.
- b) Aesthetics of bridge design.
- c) Pigeaud's method.
- d) Longitudinal forces
- e) Method to determine flood discharge.
- f) Secure depth.
- g) Forces on abutments.
- h) Box culvert.
- i) Carriage way.
- j) Rocker bearing.

2×10

PART-A

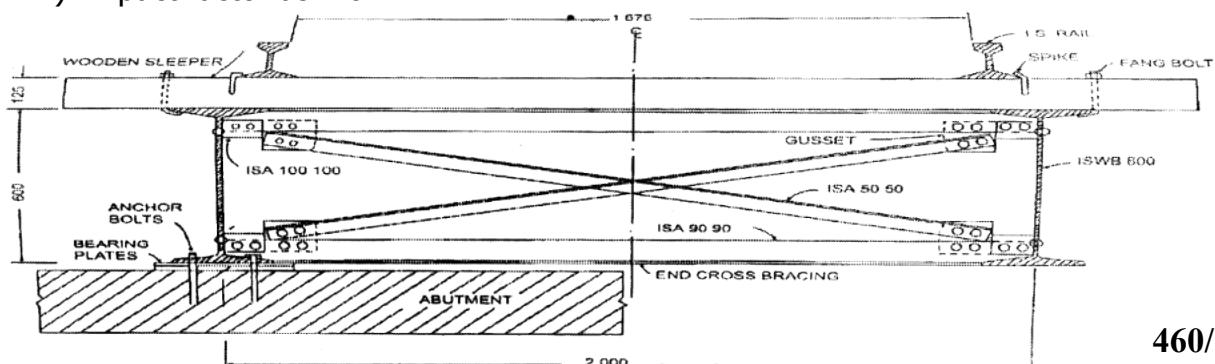
Q.2 a) Discuss in details various maps and information to be included in preliminary drawings for investigation for bridges. **10**
b) Explain topographic details to be considered in the investigations in details. **10**

Q.3 a) Explain the IRC class AA loading with the help of a sketch. **10**
b) Write a short note on evaluation of standard loadings for design of bridges. **10**

Q.4 Design deck slab for a state highway bridge with following data for class AA tracked vehicles. Check for shear.
a) Width of bridge 12 meter.
b) No footpath provided.
c) M25 and Fe415 grade of concrete and steel.
d) Clear span 5 meter.
e) Depth of foundation 1.35 meter.
f) Waering course 56 mm thick asphaltic concrete.
g) $T_c = 0.28 \text{ MPa}$. **20**

PART-B

Q.5 a) To design a steel beam culvert with a clear span of 5 meter to carry a broad gauge single tacked on main line, as show in fig. with the following given data:
i) Assume two R. S. joists.
ii) Dead load as 7.5 KN/meter.
iii) CDA as 0.87.
iv) Impact factor as 1.87.



10

- b) Explain the design steps, types and components of truss bridges.

10

- Q.6** a) What are the various types of piers? What are the various forces which are considered in the design of piers?

10

- b) Design a reinforced concrete abutment using following data.

Dimensions: shown in fig.

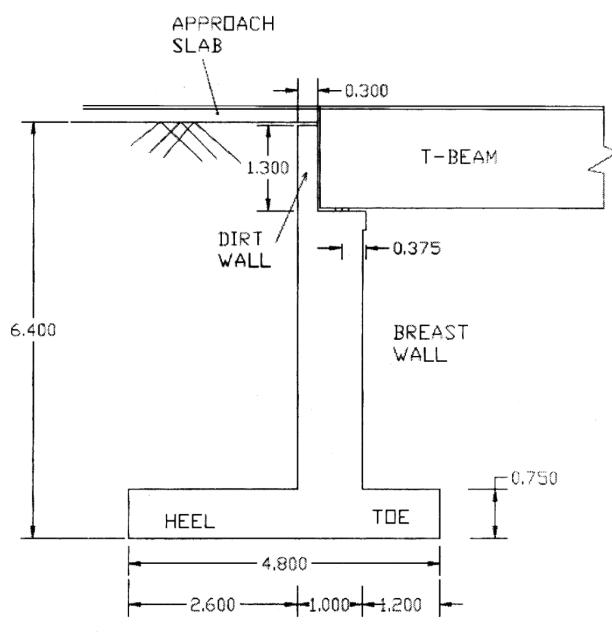
Superstructure: T-beam two-lane bridge of effective span 16.1m.

Overall length: 17.26.

Loading: As for national highway.

Back fill: Gravel with angle of repose $\phi = 35^\circ$.

Unit weight of back fill $w = 18\text{kN/m}^2$.



10

ALL DIMENSIONS IN m

- Q.7** a) What is the function of wing wall and how can you classify wing walls?

10

- b) Explain the procedure to find out the capacity of pile and pile group.

10

End Semester Examination, May 2019

B. Tech. – Sixth Semester

SOLID WASTE MANAGEMENT (C-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- Define 'putrescible materials'.
- Per capita domestic waste generation can be taken as _____.
- Define bio-medical waste.
- Vermi composting is suitable for quantities less than _____ TPD generation of MSW.
- Use of closed landfill site after _____ years can be considered for human settlements.
- What types of waste are to be accepted at landfill site?
- Enlist any four categories of waste suitable for landfilling.
- What environmental hazards are expected from improper waste management?
- What % of volume is occupied by covering material in a landfill?
- No untreated biomedical waste shall be stored beyond _____ hours. **2×10**

PART-A

- Q.2**
- Enlist a few factors on which solid waste generation depends. **4**
 - Write short notes on the following:
 - Residential waste.
 - Commercial waste.
 - Construction and demolition waste.
 - Institutional waste.**4×4**

- Q.3**
- A residential area consisting of 2500 houses has an average of four residents per house. For estimating the quantity of solid waste generated, the following observations were made at disposal site for a week:

S. No. of Vehicle	Number of Trips	Volume (m ²)	Specific weight (kg/m ³)
I	12	15	300
II	9	3	150
III	20	0.5	100
IV	12	6	175
V	10	4	200

Determine the unit rate of solid waste generation. **12**

- Discuss the characteristics of hazardous waste. **8**
- Q.4**
- Discuss the consequences of improper waste management. **10**
 - Discuss various factors which effect present as well as future waste generation. **10**

PART-B

- Q.5**
- Discuss the process of bio-methanation in context of MSW. **10**
 - Construct a flowchart of RDP process and explain various components. **10**
- Q.6**
- You have to select a potential site as landfill from a list of 3-4 site. On what parameters will you base your selection? **10**
 - Discuss the infrastructure to be provided at a sanitary landfill site. **10**

- Q.7** a) How can local communities participate in segregation of MSW? **10**
 b) What is the role of municipal authorities in implementing waste management schemes? **10**

End Semester Examination, May 2019

B. Tech. – Second Semester
CONSTRUCTION MATERIALS (C-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Write short notes on:

- a) Igneous rocks.
- b) Compressive strength of bricks.
- c) Conventional bricks.
- d) Fat lime.
- e) Rind gall in timber.
- f) Surkhi.
- g) Types of mortar.
- h) Mild steel.
- i) Bitumen.
- j) Reinforced cement concrete.

2×10

PART-A

- Q.2 a) Write a note on quarrying of stones. **10**
b) Make a clear diagram of Bull's trench kiln and explain the working of it. **10**
- Q.3 a) What are the various types of lime used in construction work? **10**
b) Explain briefly the following about cement:
i) Consistency test.
ii) Soundness test. **5x2**
- Q.4 a) Write the effects of fly-ash on cement concrete briefly. **10**
b) How many types of shales are there, explain with neat and clear figures? **10**

PART-B

- Q.5 a) i) Explain different types of sands. **5**
ii) What are the properties of good sand? **5**
b) What are the ingredients of paint and respective functions of them? **10**
- Q.6 a) Explain the functions of basic ingredients of cement concrete. **10**
b) Explain importance of water cement ratio in cement concrete. **10**
- Q.7 a) Explain briefly the utility of glass in civil engineering construction. **10**
b) List the properties of bitumen and tar which render them useful in construction works. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ADVANCED CONCRETE TECHNOLOGY (C-830)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Attempt all parts:

- a) Define bulking of sand.
- b) Write two chemical admixtures.
- c) What is slump?
- d) Define secant modulus.
- e) What is the relation between flexural and compressive strength of concrete?
- f) What is corrosion of steel rebar?
- g) Define mass concreting.
- h) What is Poisson's ratio?
- i) What is creep?
- j) How do size of aggregate affects the strength of concrete?

2x10

PART-A

Q.2 a) What are alite, belite, celite, felite? Discuss their role in hydration of cement in brief.

8

- b) Explain rapid hardening and quick setting cement. Appreciate the differences between the two.
- c) Classify aggregates based on shape, size and origin.

6

6

Q.3 Write short notes on:

- a) Air entraining admixture.
- b) Mineral admixtures and their type.
- c) Plasticizers.
- d) Accelerators.

5x4

Q.4 Design a M 40 grade concrete using flyash and OPC 43 grade cement, having maximum size of aggregate as 20 mm, minimum and maximum cement content as 320 kg/m³ and 450 kg/m³ respectively w/c ratio is 0.45 (max.). Workability required is 50 mm (slump). Type of aggregate used is crushed angular, no chemical super plasticizer is used and degree of supervision is good.

Specific gravity of cement is 3.15, specific gravity of flyash is 2.2, specific gravity of coarse and fine aggregate is 2.74 and confirms to grading zone I.

20

PART-B

Q.5 a) What is shrinkage of concrete? What are the factors that affect the shrinkage of concrete?

10

- b) Explain the different types of shrinkages of concrete.

10

Q.6 Briefly explain the hardened properties of concrete.

20

Q.7 Write the short notes on:

- a) Fibre reinforced concrete.
- b) Light weight concrete.
- c) Sulphate attack.

d) Under water concreting.

5x4

End Semester Examination, May 2019

B. Tech. – Fourth Semester

SOIL MECHANICS (C-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What do you mean by degree of saturation? **2×10**
 b) What is the relationship between moist unit weight and dry unit weight? Write the relevant equation and describe the variables.
 c) What is discharge velocity and seepage velocity?
 d) State the applications of flow-net.
 e) What are the assumptions of theory of elasticity given by Boussinesq?
 f) What do you mean by coefficient of compressibility?
 g) Vibratory roller is best suited for compacting _____.
 h) Mention differences between compaction and consolidation.
 i) Write mohr columb's equation.
 j) What are merits of Triaxial shear test?

PART-A

- Q.2 a) Discuss Indian standard classification system. **10**
 b) The bulk unit weight of a soil is 19.2 kN/m^3 , specific gravity of soil solids (G_s) is 2.68 and the water content (w) of the soil is 14%. Calculate the dry unit weight, saturated unit weight and submerged unit weight of the soil. Assume unit weight of the water as 9.81 kN/m^3 . Use phase diagram. **10**
- Q.3 a) What will be the ratio of average permeability in the horizontal direction to that in the vertical direction for a soil deposit consisting of three horizontal layers, if the thickness and permeability of the second layer is twice of those of the first and those of the third layer twice that of second? **10**
 b) What are the different methods to determine the permeability of a soil sample? Describe its merits and demerits. **10**

- Q.4 a) Explain vertical pressure distribution on horizontal and vertical plane given by Boussinesq's stress distribution theory. **10**
 b) What is an Influence diagram? What is its use in practice? **5**
 c) What do you understand by Contact pressure? What are the factors effect contact pressure distributions? **5**

PART-B

- Q.5 a) What are the factors that affect compaction? Discuss in brief. **10**
 b) The following data were recorded while performing the compaction test:

Water content (%):	5	10	14	20	25
Bulk density (kN/m^3):	17.7	19.8	21.0	21.8	21.6

Plot the MDD/OMC curve and obtain the optimum water content and maximum dry density. Calculate the water content necessary to completely saturate the sample at its maximum dry density, assuming no change in the volume. Also plot zero air voids curve. Take $G = 2.68$ **10**

- Q.6 a) Distinguish between consolidated, normally consolidated and over consolidated soils. How would you determine over consolidation pressure? **10**
- b) A sand fill compacted to a bulk density of 18.84 kN/m^3 is to be placed on a compressible saturated marsh deposit 3.5m thick. The height of the sand fill is to be 3m. If the volume compressibility = $7 \times 10^{-4} \text{ m}^2/\text{kN}$, estimate the final settlement of the fill. **10**
- Q.7 Write short notes on the following:
a) Quick sand condition.
b) Drainage conditions in shear strength tests.
c) Direct shear test.
d) Mohr Columb's theory. **5x4**

End Semester Examination, May 2019

B.Tech. – Fourth Semester
SURVEYING-II (C-403)

Time: 3 hrs.

Max Marks:**100**
No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1** is **compulsory**. Attempt any **TWO** questions from **PART-A**. and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) What is mean by curvature and refraction?
- b) Classify the triangulation system.
- c) State the concept of axis signal correction.
- d) Explain independent quantity.
- e) Define weight of an observation.
- f) Recall the concept of spherical triangle.
- g) What is mean by hour angle?
- h) How to identify the filled photograph.
- i) Compare aerial and terrestrial photographs.
- j) Name the types of remote sensing.

2x10

PART-A

- Q.2**
- a) Illustrate with neat sketch drive the formula for base of the object inaccessible condition in trigonometrically leveling. **10**
 - b) To determine the elevation of the top of a tower, the following observations were made: **10**

Inst. station	Reading on B.M	Angle of Elevation	Remarks
A	1.266	10° 48'	R.L af BN = 248.362 m.
B	1.086	7° 12'	

Stations A and B and the top of the tower are in the same vertical plane. Find the elevation of the top of the tower if the distance between A and B is 50 m.

- Q.3**
- a) i) What are the criteria's for selection of triangulation stations? **5**
ii) List out the types and field applications of EDM survey. **5**
 - b) Compute the value of D-C / D for the triangulation nets shown in (**fig...1**) below. The directions observed are shown by arrows. **10**

Fig.....1

- Q.4**
- a) Explain in detail the various laws of weight. **10**
 - b) The angles of a triangle ABC recorded were as follows:

Inst.Stn.	Weight	Angle
A	77' 14' 20"	4
B	49' 40' 35"	3
C	53' 04' 53"	2

Give the corrected values of the angles.

10

PART-B

- Q.5 State the concept of the following terms: **10**
- a) i) Zenith and Nadir
 - ii) Meridian
 - iii) Latitude and Co-latitude
 - iv) Horizon
 - v) Longitude
- b) Explain in detail about the various times in astronomy. **10**
- Q.6 a) Summarize the concept of flight planning and reasons for overlap in aerial survey. **10**
- b) Explain radial line method for plotting the details also the applications of photogrammetry survey. **10**
- Q.7 a) List out the applications of remote sensing and GIS in detail. **10**
- b) Explain the process of data collection in remote sensing survey. List out the components. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ENVIRONMENTAL ENGINEERING (C-605)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Interpret sewer and sewerage. **2×10**
 b) Differentiate between B.O.D. and C.O.D.
 c) Define mixing height of air.
 d) Explain the use of a depressed sewer.
 b) How oil and grease is separated from sewage?
 c) What do you mean by the term DWF?
 d) Write the BOD and TSS standard values for treated sewage discharge as per CPCB-India.
 h) What do you mean by 1st stage BOD and 2nd stage BOD?
 i) What are the different methods of aeration?
 j) Classify the characteristics of sludge.

PART-A

- Q.2 a) What are air pollution control methods? Describe them in detail. **6**
 b) Discuss the sources of pollution. **4**
 c) Calculate the effective height of stack when following data is given:
 i) Physical stack is 210 m tall with 1.30 m inside diameter.
 ii) Wind velocity is 4.5 m/s.
 iii) Air temperature is 20°C.
 iv) Biometric pressure is 1000 millibar.
 v) Stack gas velocity is 10.5 m/s.
 vi) Stack gas temperature is 152°C. **10**

- Q.3 a) Discuss in details with a hand sketch about the plume behaviour in various conditions. **10**
 b) In a solid waste management system, per capita solid waste under community bin collection system is 300 gm/day. Given that the density of solid waste is 500 kg/m³ and the population of that municipality ward is 300000. Design the size and number of community bins required for that ward. Consider 5 persons per family and 1 bin is to be provided for 25 families. **10**

- Q.4 a) What is water carriage system? Give its classification? Which system is adopted in India and List the situations for adoption of separate system? **10**
 b) Calculate the velocity and discharge through a rectangular concrete lined smooth channel 2 m wide and 1 m deep built to a slope of 1 in 200, when running completely full. Use Bazin's coefficient in Chezy's formula as $C = \frac{157.6}{1.81 + \frac{K}{\sqrt{R}}}$ where, **10**
 $K = 0.3$ for smooth concrete lined surface.

PART-B

- Q.5 a) Interpret sewage disposal? What are the objectives of sewage disposal? What are the different methods of sewage disposal? Explain 'Dilution Method' of sewage disposal after treatment. **10**
- b) The 5-day BOD at 20°C of waste water is found to be 200 mg/l. Taking $k_1 = 0.15 \text{ days}^{-1}$, estimate the ultimate BOD. Also determine the 8-day BOD value at 15°C. **10**
- Q.6 a) Explain attached growth system and suspended growth system? Differentiate between trickling filter and activated sludge process. **10**
- b) A high rate activated sludge plant with an aeration tank volume of 175 m³ has an applied load of 1.5 mld with an average BOD of 250 mg/l and suspended solids of 160 mg/l. The Mixed Liquor Suspended Solids (MLSS) in the aeration tank is held at concentration of 4,000 mg/l of suspended solids. Based on data calculate:
- BOD loading in kg/ha.m.
 - BOD loading as F/M ratio.
 - Aeration period.
 - Sludge age. **10**
- Q.7 a) Define the Eutrophication of lakes. What are major problems associated with eutrophication? Discuss the prevention measures of eutrophication. **10**
- b) A city with population of 130000 and a sewage flow of 150 lpcd is located on a stream with rate of flow of 0.75 m³/sec. The BOD of sewage is 210 mg/l, the DO and BOD content of the stream above the outfall sewer is 7.7 and 1 mg/l respectively.
- How many kg of O₂ per day is available above the outfall?
 - What is the total kg of BOD per day in the stream just below the outfall assuming no oxidation takes place?
 - What will be the total BOD in mg/l? **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

SURVEYING-II (C-403)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer briefly:

- What is mean by curvature and refraction?
- Classify the triangulation system.
- State the concept of axis signal correction.
- Explain independent quantity.
- Define weight of an observation.
- Recall the concept of spherical triangle.
- What is meant by hour angle?
- How to identify the tilted photograph.
- Compare aerial and terrestrial photographs.
- Name the types of remote sensing.

2x10

PART-A

Q.2 a) Illustrate with neat sketch and drive the formula for base of the object inaccessible condition in trigonometrically leveling. **10**
 b) To determine the elevation of the top of a tower, the following observations were made:

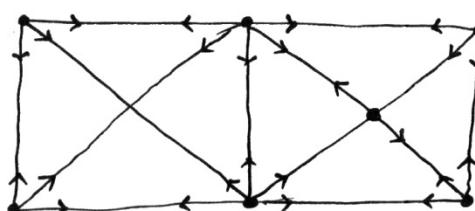
Inst. station	Reading on B.M	Angle of Elevation	Remarks
A	1.266	10° 48'	R.L af
B	1.086	7° 12'	BM = 248.362 m.

Stations A and B and the top of the tower are in the same vertical plane. Find the elevation of the top of the tower if the distance between A and B is 50 m. **10**

Q.3 a) i) What are the criteria's for selection of triangulation stations? **5**
 ii) List out the types and field applications of EDM survey. **5**
 b) Compute the value of $\frac{D-C}{D}$ for the triangulation nets shown in the figure below.

The directions observed are shown by arrows.

(i)



(ii)



10

Q.4 a) Explain in detail the various laws of weight. **10**
 b) The angles of a triangle ABC recorded were as follows:

Inst. Station.	Angle	Weight
A	77° 14' 20"	4
B	49° 40' 35"	3
C	53° 04' 53"	2

Give the corrected values of the angles. **10**

PART-B

- Q.5** State the concept of the following terms: **10**
- a) i) Zenith and Nadir.
 - ii) Meridian.
 - iii) Latitude and Co-latitude.
 - iv) Horizon.
 - v) Longitude. **10**
- b) Explain in detail about the various times in astronomy. **10**
- Q.6** a) Summarize the concept of flight planning and reasons for overlap in aerial survey. **10**
- b) Explain radial line method for plotting the details also the applications of photogrammetry survey. **10**
- Q.7** a) List out the applications of remote sensing and GIS in detail. **10**
- b) Explain the process of data collection in remote sensing survey. List out the components. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

CLOUD PERFORMING TUNING (CS-747)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is loaded latency?
- b) Describe the term virtual provisioning.
- c) Define I-Quick path interconnect.
- d) Explain the difference between hardware and software zoning.
- e) Give the limitations of shared memory controller design.
- f) Define the term multi queue scheduling.
- g) Differentiate between preemptive scheduling and non-preemptive scheduling.
- h) Describe the factors that affect CPU performance.
- i) Define Transition look aside buffer.
- j) What is the role of ballooning in memory tuning?

2×10

PART-A

Q.2 a) Explain "Storage virtualization". What are the main reactions of implementing storage virtualization? **7**

- b) How FC-AL eliminates expensive fiber channel switches? **6**
- c) What are the various performance monitoring tools? **7**

Q.3 a) Explain the configuration of L1, L2 and L3 cache in six core processor. **7**

- b) Describe the following features in terms of Intel core micro architecture:
 - i) Intel smart advance cache.
 - ii) Intel smart memory access.**5×2**
- c) "Large cache results in improved performance". Comment on it. **3**

Q.4 a) Calculate bandwidth for the given scenario:

If a processor is able to support upto 400MHZ (DDR-400) registered ECC memory and has two 8-bytes channels from the memory controller to access the memory then the memory bandwidth of the system will be 8 bytes * 2 channels * 400MHZ or 6.4GBps. **10**

- b) Explain SMP and NUMA architecture and discuss the limitations of shared memory design. **10**

PART-B

Q.5 a) Describe various types of latencies that effect performance of real time systems. **7**

- b) What are the conditions when scheduling decisions take place? **6**
- c) Define page replacement algorithm. Also give the example page fault calculation. **7**

Q.6 a) Write short notes on the following:

- i) Disk Mirroring.
- ii) De duplication.
- iii) Thick and thin provisioning. **5×3**

- b) Discuss architecture of VMware ESxi with diagram. **5**

- Q.7 a) Explain tuning the indexes tuning the conceptual schema and tuning the queries in detail. **15**
b) What is the need of tuning the database? **5**

Summer Semester Examination, May 2019

B. Tech. — Seventh Semester
SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term non-repudiation with the help of example.
- b) What do you mean by public key cryptography?
- c) What is PGP? Why it is used?
- d) Differentiate between authentication and authorization.
- e) Discuss the role of AAA for addressing the security risks in cloud.
- f) Define OTP. Discuss its significance as a security feature.
- g) Differentiate between system and process virtual machine.
- h) Why there is a requirement to secure a multi-tenant environment?
- i) Discuss the significance of multi-factor authentication.
- j) Define TCB.

2×10

PART-A

- Q.2**
- a) Discuss port scanning as a system threat in detail with the help of example. **6**
 - b) In an organization is planning to move its data to cloud. What are the challenges and security issues need to be considered. **6**
 - c) Discuss the components of security framework for cloud security. Also discuss the architecture security principles for cloud computing. **8**
- Q.3**
- a) Discuss the vulnerabilities prevailing in the characteristics of cloud computing. **6**
 - b) Discuss defense in depth to secure cloud environment. **8**
 - c) Discuss the security concerns and their solutions at compute storage and network levels in virtualized data centre and cloud. **6**
- Q.4**
- a) How would you assess the security requirements of the cloud? **8**
 - b) Discuss the role of AAA system when a client is attempting to gain access to the network. **12**

PART-B

- Q.5**
- a) Discuss IAM life cycle in detail. **10**
 - b) To keep pace with coming it trends and changing business needs, you decided to transform your IAM program:
 - i) What are the major key factors that need to be transformed?
 - ii) With respect to each phase of IAM life cycle, which products or tools will be used for transformation? **5×2**
- Q.6**
- a) Discuss the PGP protocol in detail. Also discuss certificate format. **10**
 - b) Discuss key management using public key certificates (digital certificates). **10**
- Q.7**
- a) What is secure socket layer? What happens when a browser encounters SSL. Discuss SSL transaction procedure in detail. **10**
 - b) Discuss mutual SSL authentication in detail. **10**

Summer Semester Examination, May 2019

B. Tech. — Seventh Semester

MANAGING THE CLOUD (CS-746)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between self provisioning and dynamic provisioning.
- b) Define "Resource Agent".
- c) What is the benefit of using cloud monitoring feature?
- d) Define "Preventive control".
- e) What is service traffic hijacking?
- f) What is cross site scripting (XSS) attacks?
- g) Define "Pure hosting model".
- h) What is data cluttering?
- i) Why manual patching is mandatory in enterprise framework?
- j) What are the chief critical success factors for the service catalog management process?

2×10

PART-A

Q.2 a) Discuss the general architecture of cloud workflow management. **8**

- b) Briefly explain the following:
 - i) IAAS billing and metering services.
 - ii) PAAS billing and metering services.

6×2

Q.3 a) Discuss how cloud computing affects the job roles in the infrastructure sport team. **6**

- b) Write a short note on DevOps. **6**
- c) What is patch management? Discuss the method of patch management briefly. **8**

Q.4 a) Comment on the objective of ITIL in service catalog management. **5**

- b) What is configuration management? Also, discuss the role of configuration management in cloud. **10**
- c) Write a short note on chef server. **5**

PART-B

Q.5 a) Discuss the importance of cloud computing to the service ecosystem. **10**

- b) Explain the following terms:
 - i) Service orchestration.
 - ii) Service arbitrage.
 - iii) Service intermediation.
 - iv) Service aggregation.

2½×4

Q.6 a) Explain the process of service development and on boarding for cloud service developers. **10**

- b) Write short notes on storefront. **5**
- c) Differentiate between brown field and green field. **5**

Q.7 a) Briefly discuss the best practices that can reduce the risks associated with public cloud. **10**

- b) Explain the security issues associated with the cloud. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

TECHNOLOGY AND TOOLS FOR INFRASTRUCTURE MANAGEMENT (CS-729)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is hyper conveyed infrastructure?
 - b) List the phases of incident management lifecycle.
 - c) Define the term "Enterprise Mobility Management".
 - d) Name any four important tools used for IT infrastructure management.
 - e) How HEAT software provides voice-enabled "ZERO-TOUCH" support?
 - f) Define the role of IP host N/W monitor.
 - g) What kind of information is gathered for requirement fulfillment?
 - h) Define "CMDB".
 - i) State the purpose of event management.
 - j) What are the benefits of RPA (Robotic Process Automation)?
- 2×10**

PART-A

- Q.2 a) What are the emerging trends in IT Ingra structure management (IOT)? **10**
- b) Explain Omni-channel IT support approach. Also discuss the kind of changes that it has bought in IT infrastructure. **10**
- Q.3 a) Explain release request life cycle with diagram. **10**
- b) State the functionalities of atrium service level management. **10**
- Q.4 a) What services are offered by ITIL service catalog? **5**
- b) State the advantages of BMC remedy. **5**
- c) Discuss Cherwell's ITIL incident management process with diagram. **10**

PART-B

- Q.5 a) How to monitor IT infrastructure? State differences between IT infrastructure mapping and IT infrastructure monitoring. **10**
- b) Discuss Cherwell's service desk software used for modern enterprise. Also mention its benefits. **10**
- Q.6 a) What are the IT operational challenges faced by an organization? **5**
- b) Define the roles and responsibilities in line with various ITSM processes. **5**
- c) Discuss the features of IPHost network monitoring tool. **10**
- Q.7 Write short notes on the following:
- a) Workflow management. **8**
 - b) Requirement gathering process. **5**
 - c) End-User experiences (EUX). **7**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

TECHNOLOGY AND TOOLS FOR INFRASTRUCTURE MANAGEMENT (CS-729)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is hyper conveyed infrastructure?
- b) List the phases of incident management lifecycle.
- c) Define the term "Enterprise Mobility Management".
- d) Name any four important tools used for IT infrastructure management.
- e) How HEAT software provides voice-enabled "ZERO-TOUCH" support?
- f) Define the role of IP host N/W monitor.
- g) What kind of information is gathered for requirement fulfillment?
- h) Define "CMDB".
- i) State the purpose of event management.
- j) What are the benefits of RPA (Robotic Process Automation)? **2×10**

PART-A

- Q.2 a) What are the emerging trends in IT Ingra structure management (IOT)? **10**
- b) Explain Omni-channel IT support approach. Also discuss the kind of changes that it has bought in IT infrastructure. **10**
- Q.3 a) Explain release request life cycle with diagram. **10**
- b) State the functionalities of atrium service level management. **10**
- Q.4 a) What services are offered by ITIL service catalog? **5**
- b) State the advantages of BMC remedy. **5**
- c) Discuss Cherwell's ITIL incident management process with diagram. **10**

PART-B

- Q.5 a) How to monitor IT infrastructure? State differences between IT infrastructure mapping and IT infrastructure monitoring. **10**
- b) Discuss Cherwell's service desk software used for modern enterprise. Also mention its benefits. **10**
- Q.6 a) What are the IT operational challenges faced by an organization? **5**
- b) Define the roles and responsibilities in line with various ITSM processes. **5**
- c) Discuss the features of IPHost network monitoring tool. **10**
- Q.7 Write short notes on the following:
- a) Workflow management. **8**
 - b) Requirement gathering process. **5**
 - c) End-User experiences (EUX). **7**

Summer Semester Examination, May 2019

B. Tech. — Seventh Semester

IT DATA CENTRE TRANSFORMATION (CS-728)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Discuss the types of cloud services.
- b) How will you manage the airflow in a data centre?
- c) Explain Proxmox.
- d) What is power usage effectiveness?
- e) Describe HVDC.

4×5

PART-A

- Q.2 a) Explain the electrical infrastructure related to data centre. **10**
b) How data centre works to meet business priorities associated with IoT? **10**
- Q.3 a) Explain how power management in a data centre can be optimized. **10**
b) How will you optimize site-end facility for data centre optimization? **10**
- Q.4 a) Explain the procedure to design a liquid cooled server. **10**
b) Why hot-aisle and cold-aisle configuration is required? **10**

PART-B

- Q.5 a) Explain liquid cooling techniques used for cooling in data centre. **10**
b) What do you mean by data centre infrastructure management? Explain the primary components of data centre infrastructure management model. **10**
- Q.6 a) Explain five power challenges. **10**
b) Explain the key element of optimization strategy for data centre transformation. **10**
- Q.7 a) Explain new future technologies used for green data centre. **10**
b) Explain the strategies of any leading company towards green data centre. **10**

End Semester Examination, May 2019

B. Sc. (Data Science) – First Semester

MATHEMATICAL TECHNIQUES (DS-102)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Expand $\cos x$ in powers of x . **2**
- b) If $x = r \cos \theta$ and $y = r \sin \theta$, show that $\frac{\partial(x, y)}{\partial(r, \theta)} = r$ **3½**
- c) Evaluate $\Gamma\left(-\frac{1}{2}\right)$ **2**
- d) Evaluate: $\int_0^{\pi} \cos^4 x dx$ **2**
- e) Give the negation of the following statement.
i) $p : 2 + 3 > 1$ ii) $q : \text{It is cold}$ **2**
- f) The truth value of given statement is
'4 + 3 = 7 or 5 is not prime'.
i) False ii) True **2**
- g) If $A = \{a, e, i, o, u\}$ and $B = \{i, a, o, e, u\}$. Is $A \subseteq B$ or $B \subseteq A$ or both? **2**
- h) Let $A = \{3, -6\}$ and $B = \{x : x^2 + 3x - 18 = 0\}$. Is $A = B$? **2**

PART-A

- Q.2 a) Find the graph that has the following adjacency matrix:

$$\begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 0 & 2 & 0 \\ 2 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{bmatrix}$$
 10
- b) Find the complement of the graph shown below:
Fig. **5**
- Q.3 Find the shortest path from s to t and its length for the given below:
Fig. **15**
- Q.4 a) Show that the argument

$$\begin{array}{c} p \\ p \rightarrow q \\ \therefore q \end{array}$$
 7½
- b) Form the disjunction of p and q for each of the following:
i) $p : 2$ is a positive integer $q : \sqrt{2}$ is a rational number
ii) $p : 2 + 3 = 5$ $q : \text{London is Capital of France}$ **7½**
- Q.5 Find truth value of each proposition if and only if p and r true and q is false.
a) $p \vee q \vee r$ **7½**
b) $p \wedge (\neg q \vee \neg r)$ **7½**

PART-B

- Q.6 a) Test the function $f(x, y) = x^3y^2(6 - x - y)$ for maximum and minimum for points not at origin. 10
- b) If $x^y + y^x = a^b$ find $\frac{dy}{dx}$. 5
- Q.7 a) Expand $f(x, y) = \tan^{-1}\left(\frac{y}{x}\right)$ in the neighborhood of $(1, 1)$ upto third degree terms. Hence compute $f(1.1, 0.9)$ approximately. 10
- b) If $u = xyz, v = xy + yz + zx, w = x + y + z$ compute $\frac{\partial(u, v, w)}{\partial(x, y, z)}$. 5
- Q.8 a) Evaluate $\iint x^2y^2 dxdy$ over the circle $x^2 + y^2 \leq 1$. 10
- b) Change the order of integration $\int_0^{1/\sqrt{y}} \int_x^{\sqrt{y}} dxdy$. 5
- Q.9 a) Find the volume of the sphere $x^2 + y^2 + z^2 = 1$ by double integration. 10
- b) Prove that $\beta(m, n) = 2 \int_0^{\frac{\pi}{2}} \sin^{2m-1} \theta \cos^{2n-1} \theta d\theta$. 5

End Semester Examination, May 2019

M. Tech. – First Semester

Research Methodology and IPR (CO-M-100)

Time: 3 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Marks are indicated against each question.

- | | | |
|-----|--|------------|
| Q.1 | a) Write short note on secondary data.
b) Enlist types of research design.
c) Enlist demerits of mailed questionnaire method.
d) Enlist research process.
e) Define dependent variables. | 5×2 |
| Q.2 | Describe significance of research and research problem. | 10 |
| Q.3 | Explain how to write a report? Write the format of research proposal. | 10 |
| Q.4 | Define trademark. Explain benefits of trademark. | 10 |
| Q.5 | Describe copyrights. Explain drafting of a patent application. | 10 |
| Q.6 | Explain filling of patent application in India. Describe scope of patents right. | 10 |

End Semester Examination, May 2019

B. Tech. – Third Semester

DISCRETE STRUCTURES (CS-301A)

Time: 3 hrs.

MaxMarks:**100**

No. of pages:**2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Determine the power set of set $A = \{\phi, \{\phi\}\}$.
 b) Define Multi-graph.
 c) Determine the cardinality of set $\theta = \{1, 1, m, m, m, n, n\}$
 d) Define Universal Quantifier with example.
 e) How many committees of three can be formed from eight people?
 f) What do you understand by Degree of the difference equation? Give example.
 g) Define Automorphism.
 h) What do you understand by a Coset? Give example.
 i) True or False "The spanning tree of a graph is unique". Justify your answer.
 j) Define Integral Domain with an example. **2×10**

PART-A

- Q.2 a) Write warshall's algorithm to find transitive closure.
 Let $A = \{1, 2, 3, 4\}$ and $R = \{(2, 1), (2, 3), (3, 2), (4, 3)\}$
 Find the transitive closure of R using warshall's algo. **10**
 b) Among first 500 positive integers.
 i) Determine the integers which are not divisible by 2, nor by 3, nor by 5.
 ii) Determine the integers which are exactly divisible by one of them. **10**
- Q.3 a) Construct the truth table for:
 i) $(p \rightarrow q \rightarrow r) \rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$
 ii) $(h \rightarrow i \wedge j) \rightarrow \neg (h \rightarrow i)$ **10**
 b) Using truth table, verify the proposition
 $(p \wedge q) \wedge \neg (p \vee q)$ **5**
 c) Prove that the statement $(p \rightarrow q) \rightarrow (p \wedge q)$ is a contingency. **5**

- Q.4 a) Prove by Mathematical Induction:
 $1(1!) + 2(2!) + 3(3!) + \dots + n(n!) = (n+1)! - 1$ **10**
 b) A box 'A' contains 2 white and 4 Black balls. Another box 'B' contains 5 white and 7 black balls. A ball is transferred from 'A' to 'B'. Then a ball is transferred from 'B' to 'A'. Find the probability that it will be a white ball. **10**

PART-B

- Q.5 a) Find the homogenous and particular solution:
 $a_r + 4a_{r-1} + 4a_{r-2} = r^2 - 3r + 5$ **10**
 b) Obtain the recurrence relation corresponding to the generating function:

$$A(x) = \frac{3 - 10x}{(1 - 4x)(1 - 2x)}$$
 10
- Q.6 a) Consider an algebraic system $(Q, *)$, where Q is the set of rational numbers and $*$ is a binary operation defined by:

$$a * b = a + b - ab, \forall a, b \in Q.$$

Determine whether $(Q, *)$ is a group.

10

b) Define the following terms with example:

i) Field

ii) Ring

iii) Normal Subgroup

iv) Semigroup

10

Q.7 a) Draw binary tree when the inorder and preorder traversal is given as follows: **10**

Inorder	Q	B	C	A	G	P	E	D	R
Preorder	G	B	Q	A	C	P	D	E	R

b) Discuss the following and give examples:

i) Bipartite graph

ii) Planar graph

iii) Hamiltonian Graph

iv) Isomorphic Graph

10

End Semester Examination, May 2019

M. Tech. — Third Semester

ARTIFICIAL INTELLIGENCE (CS-M-204)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ANY FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Write a prolog program for medical diagnoses system. **10**
b) Differentiate LISP and prolog programming language. **5**
- Q.2 a) Apply A* algorithm for the graph given below from A to G and draw the static space tree for the same and Heuristic value of each node is given in table which is also represented by the table of node.
Fig. **10**
b) Explain various problems associated with hill climbing algorithm and how these problems can be resolved? **5**
- Q.3 a) Explain all weak and strong slot and filler structure used in artificial intelligence to represent the knowledge. **10**
b) Describe resolution algorithm for problem solving in predicate logic. **5**
- Q.4 a) Write a note on Fuzzy logic. How do it uses probabilistic reasoning? Define a fuzzy set to define an old person. **10**
b) Describe Bay's theorem for uncertainty. **5**
- Q.5 a) A problem solving search can proceed either in forward or in backward. What factor determines the choice of direction for a particular problem? Determine whether the search should proceed in forward or backward if search program is to be written for water-Jug-Problem. **10**
b) Define the term uncertainty. Discuss in brief the logical frameworks for handling problems posed by uncertainty. **5**
- Q.6 a) Define in your own words:
Agent, Reflex agent, model based agent and learning agent. **10**
b) Explain the application of AI for gaming, speech recognition and computer vision. **5**
- Q.7 a) Explain the architecture of expert system in detail with diagram. **7½**
b) Discuss why separate search technique is required for game playing. Explain Min-Max algorithm for game playing. **7½**

End Semester Examination, May 2019

M. Tech. — Third Semester

INTRUSION DETECTION SYSTEM (CS-M-302)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ANY FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|--|----------------------------------|
| Q.1 | a) What is intrusion detection system? Which is more powerful IDS or IPS?
b) What are virus and worms? Are they both same and capable to harm victims?
c) Differentiate between NIDS and HIDS. | 6
5
4 |
| Q.2 | a) Explain the centralized architecture of IDS. Also discuss what is distributed IDS?
b) What are association rules?
c) Discuss artificial neural network for IDS. | 8
3
4 |
| Q.3 | a) What is network based IDPS? Also discuss various possibilities where sensor can be deployed for NIDPS.
b) Give model for intrusion analysis. Also discuss profit based detection.
c) What is benefit of manual response in IPS? | 8
5
2 |
| Q.4 | a) Give step by step procedure to compile and install SNORT.
b) Discuss pre processor in IDS.
c) What are various rule options in SNORT? | 8
3
4 |
| Q.5 | a) Describe architecture model of IPS in detail.
b) Explain agent development for intrusion detection. | 7
8 |
| Q.6 | a) What do you understand by threat briefly?
b) Discuss standard of due care.
c) Give evidentiary issues related to IDS. | 5
5
5 |
| Q.7 | a) What are various internal and external threats to data?
b) Discuss the need of IDS.
c) What are various types of IDS? | 5
5
5 |
| Q.8 | Write short notes on:
a) SYN floods.
b) Bayes theorem.
c) Fuzzy logic. | 5×3 |

End Semester Examination, May 2019

B. Tech. — Third Semester

DATA STRUCTURES USING JAVA (CS-306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **Any TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define "Abstract Data Type".
- b) What is a string? Mention possible operations on a string.
- c) Define object using suitable example.
- d) Define the concept of method overloading.
- e) Define "Queue".
- f) What do you understand by collision?
- g) What is the use of keyword super?
- h) What is polymorphism?
- i) Define "Recursion".
- j) What does "big Oh" denote?

2×10

PART-A

- Q.2 a) Explain various object-oriented data types. **10**
b) What is a string? How to concatenate one string at the end of another string? **10**
- Q.3 a) What is a stack? Write an algorithm to insert an element in a stack. **12**
b) How to implement various operations on a queue? **8**
- Q.4 a) Define "Exception" and how it is handled? Explain using suitable example. **10**
b) What is a constructor? Write its properties and explain its usage. **10**

PART-B

- Q.5 a) What is a priority queue? What are its properties? **10**
b) Explain polymorphism and abstraction using suitable examples. **10**
- Q.6 a) Write a program to sort data using bubble sort. **10**
b) What is a function? Explain its use using suitable example. **10**
- Q.7 a) What is a binary search tree? Explain its advantages. **10**
b) Define "Binary Heap". How it is implemented? **10**

End Semester Examination, May 2019

B. Tech. — Third Semester

MULTIMEDIA AND ANIMATION (IT-301)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain different file formats briefly.
- b) Define "Multimedia" and explain GIF.
- c) What is director X? Explain.
- d) What is the role of multimedia in animation? Explain.
- e) What do you understand by term virtual reality? Explain.

4×5

PART-A

Q.2 a) Explain the various multimedia devices with the help of examples. **10**

- b) What is the role of ATM and ADSL in multimedia distributed network? Discuss in detail. **10**

Q.3 a) Write short notes on the following:

- i) JPEG-DCT encoding.
- i) JPEG statistical encoding.

5×2

- b) Compare and contrast between different images of a file formats. **10**

Q.4 Write short notes on the following:

- a) Desktop virtual reality.
- b) VR operating system.
- c) Intelligent VR software systems.
- d) Virtual environment display. **5×4**

PART-B

Q.5 a) Explain different methods of encoding the analog signals. **10**

- b) Explain the significance of brief survey of speech recognition in audio representation. **10**

Q.6 a) Explain different principles of animation and also discuss the advantages of animation in multimedia technology. **10**

- b) Write a short note on DVI technology. **10**

Q.7 Write short notes on the following:

- a) Animation file formats.
- b) Flash tool box.
- c) Acrobat Photoshop.
- d) Publishing flash movies. **5×4**

End Semester Examination, May 2019

B. Tech. — Third Semester

MULTIMEDIA AND ANIMATION (IT-301)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain different file formats briefly.
- b) Define “Multimedia” and explain GIF.
- c) What is director X? Explain.
- d) What is the role of multimedia in animation? Explain.
- e) What do you understand by term virtual reality? Explain.

4×5

PART-A

Q.2 a) Explain the various multimedia devices with the help of examples. **10**

- b) What is the role of ATM and ADSL in multimedia distributed network? Discuss in detail. **10**

Q.3 a) Write short notes on the following:

- i) JPEG-DCT encoding.
- i) JPEG statistical encoding.

5×2

- b) Compare and contrast between different images of a file formats. **10**

Q.4 Write short notes on the following:

- a) Desktop virtual reality.
- b) VR operating system.
- c) Intelligent VR software systems.
- d) Virtual environment display.

5×4

PART-B

Q.5 a) Explain different methods of encoding the analog signals. **10**

- b) Explain the significance of brief survey of speech recognition in audio representation. **10**

Q.6 a) Explain different principles of animation and also discuss the advantages of animation in multimedia technology. **10**

- b) Write a short note on DVI technology. **10**

Q.7 Write short notes on the following:

- a) Animation file formats.
- b) Flash tool box.
- c) Acrobat Photoshop.
- d) Publishing flash movies.

5×4

End Semester Examination, May 2019

B. Tech. — Third Semester

SOFTWARE ENGINEERING (IT-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is prototyping?
- b) Why feasibility study is beneficial for software project development?
- c) Define "Testing".
- d) What is software re-engineering?
- e) Classify "Risk".
- f) Define "SQA Plan".
- g) Explain "Structural Partition".
- h) What is CASE repository?
- i) How a software product different from other products?
- j) Explain information hiding with example.

2×10

PART-A

- Q.2 a) Discuss different phases of SDLA. Also explain and differentiate between waterfall model and spiral model. **12**
- b) What is computer software? Discuss applications of software in real world. **8**
- Q.3 a) What is the difference between SRS document and design documentation? What are the contents of SRS document and design document? **10**
- b) Draw and explain ER diagram of a hospital management system. **10**
- Q.4 a) Discuss the COCOMO heuristic estimation techniques in detail. **12**
- b) How to analyze and manage risks? **8**

PART-B

- Q.5 a) Explain system design concepts in detail and also state principles of system design. **10**
- b) What is coupling? What are the various types of coupling? Why coupling is required for effective system design. **10**
- Q.6 a) Discuss different software testing strategies used in software engineering. **10**
- b) How to design a test case? Explain with valid examples. **10**
- Q.7 a) Write short notes on the following:
i) Quality concepts. **7**
ii) Formal technical reviews and reports. **8**
iii) Integrated CASE environment. **5**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

SOFTWARE ENGINEERING (IT-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Write the significance of designing test cases.
b) What is the role of a software project manager?
c) What are function points?
d) Define data dictionary.
e) What is coupling?
f) What are CASE tools?
g) Which SDLC model is best? Write the deciding parameters in support of your answer?
h) Differentiate between process and product.
i) What is a database?
j) Mention the formula to calculate cyclomatic complexity of a program. **2x10**

PART-A

- Q.2 a) What do you mean by software development life cycle? Discuss any two SDLC models with their advantages and limitations. **12**
b) What is computer software? Write down applications of a computer software. **8**
- Q.3 a) How do functional modelling and behavioural modelling differ from each other? **8**
b) Draw and explain E-R diagram of hospital billing system. **12**
- Q.4 a) What is software project management? Discuss software process and project metrics. **10**
b) What is the role of staffing and team structure in software project management? **10**

PART-B

- Q.5 a) What is functional independence? Explain with example. **10**
b) Explain cohesion and coupling with example. **10**
- Q.6 a) Discuss different software testing strategies used in software engineering. **12**
b) Differentiate between alpha testing and beta testing. **8**
- Q.7 a) Discuss CASE with its building blocks and architecture. **10**
b) What do you mean by quality cost? **5**
c) Discuss the review guidelines followed for software quality assurance. **5**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

SOFTWARE TESTING (CS-723A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain 'Bug Life cycle' in detail.
- b) How testing can be defined in Levels.
- c) What are the various quality factors used in SQM.
- d) Explain term 'visible state transitions'.
- e) Define 'Cause-Effect' with suitable example.

4×5

PART-A

Q.2 a) Explain 'Software Testing Principles'. **5**
b) How a reproducible bug can be analyzed. Explain some Tactics. **5**
c) Explain 'Testing life Cycle' with suitable example. **10**

Q.3 a) Differentiate "Quality Control" and "Quality Assurance" **10**
b) Define terms:
i) CMM
ii) Six Sigma
iii) ISO
How the above terms can be useful in various SQA models. Explain. **10**

Q.4 a) Design test cases by using BVC and Robust and Worst Case Testing.
Given Conditions: $a^b \rightarrow$ where a lies in the range [1,10] and b within [1,5]. **10**
b) Explain Decision – Table Bases testing. **10**

PART-B

Q.5 a) Explain the need of white-box-testing with suitable example. **10**
b) Define the following:
i) Code-Functional testing
ii) DD-Path testing. **10**

Q.6 a) Differentiate Regression testing of manual testing. Explain with suitable example. **10**
b) Explain the need of 'Automation'. How Automation tools can be useful in various testing process. **10**

Q.7 a) What are the various challenges in web-based software testing? **10**
b) What kind of strategies used in testing. Also Explain various Issues in object-oriented-testing. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

INFORMATION SECURITY INTELLIGENCE AND SYSTEM COMPLIANCE ANALYTICS(CS-705)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are factors affecting by data nuances.
- b) Examine various growing sources of big data.
- c) Describe the steps for building big data platform.
- d) Recall how public information is important for organization.
- e) List down the challenges faced by intellectual property used in business.

4x5

PART-A

- Q.2** a) Assess various big data open source tools. **5**
b) Analyze the factors influencing the creation of complex data structure used by data analysis. Also appraise the future of big data. **15**
- Q.3** Explain the roles and responsibilities of all members who make big data team. **20**
- Q.4** a) Interpret the factors affecting big data acquisition. **10**
b) Describe major difference between structured and unstructured data in big data environment. **10**

PART-B

- Q.5** a) How will you classify big data? Explain properly with help of neat diagram. **10**
b) Explain various features of big data security analytics in detail. **10**
- Q.6** a) State the key technologies that enable handling of big data and add meaning to business. What is the need of handling big data? **10**
b) "Companies that use big data tend to shine" Comment on this statement. Also explain how technology helps in meeting business demands. **10**
- Q.7** a) Which tool requires present information to derive big data sources that were rapidly identified by security analyst? Explain in detail. **10**
b) What do you understand by term big data privacy? Define various encryption techniques that helps in achieving data security. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-O306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Part-A is compulsory**. Attempt any **FOUR** questions from **Part-B**. Marks are indicated against each question.

PART-A

- Q.1 a) Explain adoption process for a new product in the market.
b) What is main difference between partnership and LLP?
c) What are various kind of business plans?
d) Explain the characteristics of venture capitalist.
e) Explain the steps involved in planning.

4×5

PART-B

- Q.2 What are the distribution alternatives available to an entrepreneur? **20**
- Q.3 What are the risks involved in business environment? Explain any three in detail. **20**
- Q.4 What are 5C's to a team work? **20**
- Q.5 What are the alternate sources of equity funding? What are its advantages and disadvantages? **20**
- Q.6 While discussing the management team what information should be included in the business plan. **20**

Summer Semester Examination, May 2019

B. Tech. — Seventh Semester

SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term non-repudiation with the help of example.
- b) What do you mean by public key cryptography?
- c) What is PGP? Why it is used?
- d) Differentiate between authentication and authorization.
- e) Discuss the role of AAA for addressing the security risks in cloud.
- f) Define OTP. Discuss its significance as a security feature.
- g) Differentiate between system and process virtual machine.
- h) Why there is a requirement to secure a multi-tenant environment?
- i) Discuss the significance of multi-factor authentication.
- j) Define TCB.

2×10

PART-A

- Q.2**
- a) Discuss port scanning as a system threat in detail with the help of example. **6**
 - b) In an organization is planning to move its data to cloud. What are the challenges and security issues need to be considered. **6**
 - c) Discuss the components of security framework for cloud security. Also discuss the architecture security principles for cloud computing. **8**
- Q.3**
- a) Discuss the vulnerabilities prevailing in the characteristics of cloud computing. **6**
 - b) Discuss defense in depth to secure cloud environment. **8**
 - c) Discuss the security concerns and their solutions at compute storage and network levels in virtualized data centre and cloud. **6**
- Q.4**
- a) How would you assess the security requirements of the cloud? **8**
 - b) Discuss the role of AAA system when a client is attempting to gain access to the network. **12**

PART-B

- Q.5**
- a) Discuss IAM life cycle in detail. **10**
 - b) To keep pace with coming IT trends and changing business needs, you decided to transform your IAM program:
 - i) What are the major key factors that need to be transformed?
 - ii) With respect to each phase of IAM life cycle, which products or tools will be used for transformation? **5×2**
- Q.6**
- a) Discuss the PGP protocol in detail. Also discuss certificate format. **10**
 - b) Discuss key management using public key certificates (digital certificates). **10**
- Q.7**
- a) What is secure socket layer? What happens when a browser encounters SSL. Discuss SSL transaction procedure in detail. **10**
 - b) Discuss mutual SSL authentication in detail. **10**

End Semester Examination, May 2019

B. Tech – Eighth Semester

ADHOC AND WIRELESS SENSOR NETWORKS (CS-827)

Time: 3Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain how does a wired network different from a wireless network.
- b) Outline the process of node scheduling in content based MAC protocols with scheduling mechanisms.
- c) Differentiate between adhoc networks and sensor networks.
- d) Illustrate the need for energy management in adhoc wireless networks.
- e) Enlist the characteristics of an ideal routing protocol for adhoc networks.
- f) Discuss the role of localization in wireless sensor network routing.
- g) Describe various hardware and software components of a sensor node.
- h) Compare the features of hybrid TDMA/FDMA and CSMA based medium access control protocols.
- i) Enlist various QoS parameters in adhoc wireless sensor networks.
- j) Summarize various challenges that are faced while maintaining adhoc networks. **2x10**

PART-A

- Q.2** a) Compare cellular networks with adhoc wireless sensor networks. **10**
b) Discuss various application areas of adhoc wireless sensor networks. **10**
- Q.3** a) Give classification of different MAC protocols for adhoc wireless networks. Analyze their performance on the basis of bandwidth utilization, collision probability, throughput, control overhead, synchronization, packet delivery and complexity. **10**
b) Illustrate various issues to be considered to design a successful multichannel MAC protocol. **10**
- Q.4** a) Explain adhoc on demand distance vector routing protocol for adhoc wireless networks. **8**
b) List advantages and disadvantages of AODV protocol. **2**
c) Write a note on 'designing an efficient transport layer protocol for adhoc wireless networks'. **10**

PART-B

- Q.5** a) Briefly discuss the major issues and challenges in providing QoS in adhoc wireless networks. **8**
b) Explain the transmission power management scheme using a remotely activated switch. **6**
c) What do you understand by Greedy forwarding techniques? **6**
- Q.6** a) How does hybrid TDMA/FDMA medium access control protocol for wireless sensor networks work? Explain with an example. **10**
b) Outline the functions performed by a node in adhoc wireless sensor network. **5**
c) Give architectural details including hardware and software components of a sensor node. **5**
- Q.7** a) What do you understand by range-based localization? **4**
b) How does triangulation work in wireless sensor networks? Explain with an example. **8**
c) Elaborate the need of an energy efficient design of wireless sensor networks. Discuss with the help of an example. **8**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

DISTRIBUTED OPERATING SYSTEM (CS-825)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- | | |
|-----|--|
| Q.1 | a) How is workstation server model better than the workstation model? 3 |
| | b) Explain logical and physical clocks. 3 |
| | c) How is the accessing and storing of a file done? Explain via diagram. 3 |
| | d) What is an object and object based space? State advantage and disadvantage of object based DSM. 4 |
| | e) What is a release consistency? Differentiate between eager release and lazy release consistency. 4 |
| | f) Explain different goals of MACH. 3 |

PART-A

- | | |
|-----|---|
| Q.2 | a) Why do we need distributed operating system? Explain hardware and software of DOS in detail. 10 |
| | b) What is asynchronous transfer mode? Elaborate ATM reference model with functions of each layer. 10 |
| Q.3 | a) What do you mean by clock synchronization? Give different clock synchronization algorithms. 10 |
| | b) Why do we need atomic transactions? Explain primitives and properties of atomic transactions. 10 |
| Q.4 | a) What are different models which are used to organize different processors in a distributed system? 10 |
| | b) What do you mean by fault tolerance? Explain different types of system failure. 10 |

PART-B

- | | |
|-----|--|
| Q.5 | a) What are different considerations in directory service interface in a distributed file system design? 10 |
| | b) Differentiate between a file service using the upload/download model and one using the remote access model? 10 |
| Q.6 | a) Explain different consistency models which use synchronization operations in detail with example. 10 |
| | b) What do you mean by page based distributed shared memory? Explain the methods which can improve the performance of shared memory. 10 |
| Q.7 | a) Explain memory management in MACH. 10 |
| | b) Explain communication in MACH in detail. 10 |

End Semester Examination, May 2019

B. Tech. – Eighth Semester

IT BUSINESS CONTINUITY AND DISASTER RECOVERY PLANNING (CS-704)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) How is an alternate site different from fully mirrored and reciprocal site?
- b) Analyze the process of gathering data for the BIA.
- c) Elaborate the elements contributing to project success.
- d) Elaborate the terms event logs and appendices.
- e) Cost of planning vs cost of failure. Explain.

4x5

PART-A

- Q.2 a) Define and explain each phase of BCM life cycle. **8**
- b) Elaborate different types of disasters. What are the different phases of disasters? Elaborate each. **12**
- Q.3 a) Analyze and explain the fundamentals of designing a project life cycle. **10**
- b) Project success is achieved with certain prime components. What are those, elaborate. **10**
- Q.4 a) Explain the terms: RTO, RPO, WRT and MTD in detail. **10**
- b) What are the different components of IT risk mitigation? **10**

PART-B

- Q.5 Analyze the measures taken while performing backup and recovery. Explain each in detail. **20**
- Q.6 a) Why communication plans are considered are included in BCM and DRP? **10**
- b) How emergency management is carried out? Explain with respect to business continuity plan. **10**
- Q.7 Explain the following terms in detail.
- a) Disaster recovery. **8**
 - b) BIA. **6**
 - c) Project close out. **6**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADVANCED COMPUTING (CS-806)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Discuss the types of computing environments and their relative features.
- b) Highlight the advancement in technologies for network-based applications.
- c) Differentiate between public and private cloud.
- d) List out the various characteristics of Cloud Computing.
- e) Explain the motivation behind the Grid computing.
- f) Compare and Present an analogy between Cloud and Grid.
- g) Define the logic behind Quantum Computing.
- h) How sensors and actuators play a vital role in pervasive computing?
- i) State various real world applications of ubiquitous computing.
- j) How a distributed process scheduling is different from conventional process scheduling?
- k) Differentiate between quantum computer and conventional digital computer. **2x10**

PART-A

- Q.2**
- a) Specify the advantages and limitations of Cloud Computing. Discuss the NIST Cloud Computing Reference Architecture with neat diagram. Explain in the role, activities and functions of each actor involved. **10**
 - b) Discuss in details the activities, functions and roles of various Actors involved in Cloud Ecosystem. **10**
- Q.3**
- a) List the various characteristics of Grid Computing. Explain the Grid architecture with the help of Hourglass Model, detailing functionalities of each component layer. **10**
 - b) Present an analogy between the term autonomic and nervous system of human beings. The autonomic computing belongs to which generation of Grid Computing? Explain the four basic characteristics behind the autonomic computing. How is it related to Grid? **10**

- Q.4**
- a) Explain different types of Gates in Quantum computers with truth tables of each. How these are different from classical gates? Explain the concept of reversible computing, considering input and output states. **8**
 - b) Explain the following:
 - i) Differences between conventional and Quantum computing.
 - ii) Quantum phenomena- Superposition and Entanglement.
 - iii) Quantum Teleportation with example. **12**

PART-B

- Q.5**
- a) Specify the aim of a Pervasive computing. List out its Principles and characteristics. Explain the architecture of pervasive computing with neat diagram, detailing role of each component. **12**
 - b) How does a context communication take place in pervasive computing? Explain context awareness and management by taking an example scenario. **8**
- Q.6**
- a) Give detailed framework for ubicomp systems with a neat diagram and explain the role of each component. **10**

b) Highlight the features of various interfaces, as per ubiquitous computing environment. **5**

c) Discuss the various challenges or constraints in implementation of the ubiquitous computing environment. **5**

Q.7 Explain the following **(any four):**

- a) Distributed process scheduling.
- b) Dynamic load balancing and sharing.
- c) Distributed shared memory.
- d) Necessity of the Distributed Computing environment.
- e) Parallel I/O

5x4

End Semester Examination, May 2019

B. Tech. — Eighth Semester

SIMULATION AND MODELLING (CS-805)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following question:

- a) Define the terms i) system ii) delay iii) simulation iv) model.
- b) Explain the properties of random numbers.
- c) Explain covariance.
- d) Explain any of the following discrete distributions.
 - i) bionomial distribution
 - ii) poission distribution
- e) Explain chi-square goodness of fit test for exponential distribution.
- f) Write the names of atleast four commercially available simulation packages and their areas of application.
- g) Explain the difference between monte-carlo simulation and stochastic simulation.
- h) Explain correlation.
- i) Write briefly about continuous distributions (any one)
 - a) Uniform b) Exponentials.
- j) What the difference between verification and validation in simulation and modelling? **2×10**

PART-A

Q.2 What is simulation? List and explain the various steps involved in simulation study. **20**

Q.3 Differentiate between event scheduling/time advance algorithms. Using these algorithms, generate the snap shot for the following situations for a single server queuing system:

Inter arrival time	3	2	6	2	4	5
Service time	2	5	5	8	4	5

Stop the simulation, when the clock reaches 20.

20

Q.4 Explain the procedure for generating the samples from i) Erlang distribution ii) Exponential distribution. **20**

PART-B

Q.5 What do you mean by multivariate analysis? Explain atleast two methods in detail. **20**

Q.6 Discuss the output analysis for terminating simulation. Explain with the help of an example. **20**

Q.7 Explain the various terms/processes involved in simulation of a reservoir system with the help of an example. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

NATURAL LANGUAGE PROCESSING (CS-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define natural language processing.
b) Why passing is needed for processing natural language?
c) Define lexicon.
d) What are frames and scripts?
e) What do you understand by natural language querying?
f) Define TyPeo Grammar. Give an example.
g) Define example based machine translation network.
h) Define graph model.
i) Give an example of a system that shows the application of speech recognition.
j) What do you understand by knowledge base? **2×10**

PART-A

- Q.2 a) Explain the phases of natural language processing in detail. **10**
b) Write all various the possible meanings of the following sentences by giving a paraphrase of each interpretation. For each sentence identify whether the different meaning arise from structural ambiguity, semantic ambiguity or pragmatic ambiguity:
i) Time flies like an arrow.
ii) He drew one card.
iii) Mr. spock was charged with illegal recruitment. **10**

- Q.3 a) Explain Chomsky hierarchy in detail. **10**
b) How can we find whether a given grammar is ambiguous or not. Explain with the help of an example. **10**

- Q.4 a) Write the early and Tomita algorithm in detail. **10**
b) What do you understand by ATN and RTN? Explain the applications of both in detail. **10**

PART-B

- Q.5 a) Differentiate between logic and inference pragmatics. **10**
b) Define semantic network. Draw the semantic network of following:
Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is ginger in color. Cats like cream. The cat sat on mat. A bird is an animal. All mammals are animals. Mammals have fur. **10**

- Q.6 a) Explain semantic based machine translation system in detail with the help of an example. **10**
b) How can similarity measure be computed between two given text using machine translation. **10**

- Q.7 a) Explain tutoring and authoring system in detail. **10**
b) Write short notes on:
i) Intelligence work processor.

ii) Machine translation process.

5x2

End Semester Examination, May2019

B. Tech. – Eighth Semester

NEURAL NETWORKS (CS-743)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) List out various application areas of artificial neural networks.
- b) What do you mean by gradient descent?
- c) How learning rate helps in learning rules?
- d) State the advantages of associative memory.
- e) Discuss the stability issues in associative memory.
- f) How classification is different from clustering in neural network?
- g) What is a self-organization neural network?
- h) What is non-linear separability?
- i) Differentiate between single layer perception and multi layer perception.
- j) Why artificial neural network use a Bias?

2x10

PART-A

- Q.2**
- a) Draw a simple model of an artificial neural network. Describe mathematically the concept of McCulloch Pitt's neural networks for an OR gate. **10**
 - b) Discuss the important characteristics of the following learning rules:
 - i) Hebbian learning rule.
 - ii) Correlation learning rule.
 - iii) Perceptron learning rule
 - iv) Delta learning rule
 - v) Widrow-hoff learning rule. **10**
- Q.3**
- a) Outline the entire process used during single layer discrete perceptron training and classification. **10**
 - b) Discuss the basic principle used for single layer perceptron training and classification for continuous perception. **10**
- Q.4**
- a) Brief out the working principle of multilayer perceptron. Also, give the reason behind error to propagate back. **10**
 - b) Comment upon the choice of learning factors in the back propagation learning. **10**

PART-B

- Q.5**
- a) With the help of an example, explain the training and testing concept of Hopfield neural network. **10**
 - b) Differentiate between feed forward and feedback neural network. Also, list out different types of neural networks. **10**
- Q.6**
- a) Discuss the basic principle of bidirectional associative memory. Also, discuss its storage and retrieval mechanism. **10**
 - b) Differentiate between auto-associative and heteroassociative memories. Describe their training and testing algorithms. **10**
- Q.7**
- a) What is the significant of clustering? Explain its salient features? **5**
 - b) Write a short note on 'Winner-Take-All' learning. **5**

- c) State and explain the architecture as well as training and recall mode of a self-organising neural network. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

MACHINE LEARNING TECHNIQUES (CS-808)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Attempt (**any ten**) question:

- a) Differentiate between supervised and unsupervised learning techniques.
- b) Explain feature extraction.
- c) Compare PCA and ICA.
- d) Explain with reason the application scenario where classification is preferred.
- e) List the steps used in stochastic gradient descent algorithm.
- f) What are random variables? List features of discrete variable?
- g) Why is dimensionality reduction process required?
- h) Differentiate between generative and discriminative model.
- i) Explain unsupervised learning.
- j) Discuss three application areas of machine learning.

2×10

PART-A

Q.2

- a) Define probability, conditional probability, random variable, expectation with suitable examples. **12**
- b) State Bayes theorem. **4**
- c) Following dataset describes weather condition for playing some game:

Outlook	Temp	Humidity	Windy	Play
S	H	H'	F	N
S	H	H'	T	N
O	H	H'	F	Y
R	M	H'	F	Y
R	C	N	F	Y
R	C	N	T	N
O	C	N	T	Y
S	M	H'	F	N
S	C	N	F	Y
R	M	N	F	Y
S	M	N	T	Y
O	M	H'	F	Y
O	H	N	F	Y
R	M	H'	T	N

O-Overcast	H-Hot	S-Sunny	N-No	F-False
M-Mild	C-Cool	R-Rainy	Y-Yes	T-True
H'-High				

Classify if following instance will play/Not:

Outlook	Temp	Humidity	Windy	Play
S	C	H'	T	?

4

Q.3 a) Define clustering. Discuss the measures of performance for clustering algorithms. **10**

5085

b) Explain dimensionality reduction? Discuss the steps of PCA algorithm.

6

c)

Object	X(Weight)	Y(pH)
A	1	1
B	2	1
C	4	3
D	5	4

Apply k-means clustering to group the objects in 2 clusters.

4

- Q.4 a) Explain reinforcement learning and role of Bellman equations in reinforcement learning. **12**
- b) Discuss Q-learning concept in detail. **8**

PART-B

- Q.5 a) What is deep learning? Compare and contrast deep learning with machine learning. **5**
- b) Can reinforcement learning be used for classification? Explain with example. **5**
- c) What is reinforcement learning? Different reinforcement compares techniques. **10**

- Q.6 a) Explain feed forward neural network with back propagation learning with suitable example. **10**
- b) What is neural network used for? What makes a neural network deep? Explain. **10**

- Q.7 Write notes on:
- a) Inductive learning.
- b) Graph-based learning.
- c) Discuss human cognitive learning. **20**

End Semester Examination, May 2019

M. Tech. — Second Semester

VIRTUALIZATION AND CLOUD SECURITY (CS-M-205)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ANY FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|--|-----------------------|
| Q.1 | Discuss advantages and features of at Iass, Paas and Saas levels. Also discuss service providers associated with it. | 15 |
| Q.2 | a) Compare block level and file level virtualization.
b) How isolation of Virtual machine takes place? | 10
5 |
| Q.3 | a) Discuss the encryption and decryption procedure used in CFB block chaining mode.
b) What do you mean by hyperjacking? | 10
5 |
| Q.4 | a) Discuss the detail ESX and ESXi security.
b) Discuss various Multi Tenancy Security Issues and Virtualization System Vulnerabilities. | 5
10 |
| Q.5 | Elaborate the following terms:
a) Thin Provisioning.
b) Full Virtualization.
c) Para Virtualization. | 5x3 |
| Q.6 | a) What are the basic technologies that led to the development of cloud computing?
b) What do you mean by energy aware datacenters? Justify. | 10
5 |
| Q.7 | a) How traffic isolation help in virtual network configuration and Securing VLAN settings.
b) What do you understand by Hypervisor? | 10
5 |
| Q.8 | a) State virtual network security architecture.
b) Discuss Harhing and Stream ciphers. | 8
7 |

End Semester Examination, May 2019

M. Tech – Second Semester

MOBILE AND WIRELESS COMMUNICATION (CS-M-221)

Time: 3 Hrs.

Max Marks: **75**

No. of pages: 1

Note: Attempt any **FIVE** questions in all; Marks are indicated against each question.

- | | | |
|-----|---|------------|
| Q.1 | a) Discuss in details the reference model of mobile communication. | 10 |
| | b) What do you understand by multiplexing? | 5 |
| Q.2 | Elaborate the technique and compare the performance of pure and slotted ALOHA. | 15 |
| Q.3 | a) Discuss in details the Radio Interface of GSM services. | 10 |
| | b) Why is handover required? Comment. | 5 |
| Q.4 | a) Differentiate between GEU, LFO and MFU satellite systems. What is a foot print of a satellite? | 10 |
| | b) Explain briefly the structure of a piconet. | 5 |
| Q.5 | a) Explain how mobility is supported in Mobile Communication systems? | 10 |
| | b) What do you mean by Agent discovery? | 5 |
| Q.6 | a) Explain why snooping TCP has better performance as compared to Traditional TCP. | 10 |
| | b) What is the significance of fast retransmission? | 5 |
| Q.7 | Write short notes on: | |
| | a) Wireless Datagram. | |
| | b) HTML. | |
| | c) Telephone application. | 5x3 |

End Semester Examination, May 2019

B. Tech. – Eighth Semester

DATA WAREHOUSE AND DATA MINING (IT-822)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any two from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Explain the similarities and dissimilarities between database and data warehouse.
- b) What are the major challenges of mining and huge amount of data in comparison with mining small amount of data?
- c) What do you mean by indexing OLAP dates? Discuss.
- d) Why concept hierarchy is useful in data mining? Support your answer with relevant example.

5x4

PART-A

- Q.2 a) Briefly compare the following concepts. You may use an example to explain your points.
i) Snowflake schema ii) Fact constellations. **12**
b) With the help of an example explain various operations in OLAP. **8**
- Q.3 a) Explain different steps for the design and construction of a three-tier-data warehouse architecture. **12**
b) Differentiate between ROLAP, MOLAP and HOLAP. **8**
- Q.4 a) Briefly compare the following concepts.
i) Data cleaning ii) Data transformation iii) Refresh.
You may use an example to explain your point(s). **12**
b) Discuss different types of OLAP servers. **8**

PART-B

- Q.5 a) Explain the architecture of data mining system. **10**
b) Discuss the significance of DMQL in data mining and data warehousing. **10**
- Q.6 Write short notes on:
a) Clustering techniques.
b) Partition method. **10x2**
- Q.7 Design a spatial data warehouse that stores the highway traffic information so that people can easily see the average and peak time traffic flow by highway, by time of day and by weekdays, and the traffic situation when a major accident occurs. What information can we mine from such a spatial data warehouse to help city planners? **20**

End Semester Examination, May 2019

M. Tech. – Second Semester

ROUTING ALGORITHMS AND PROTOCOLS (CS-M-206)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Given the IP address of a host and netmask, explain how the network address is determined.
b) Identify the key differences between the differentiated service architecture and the integrated service architecture.
c) Why is it necessary to reserve some addresses from an address space rather than making all of them available? **5×3**
- Q.2 a) How is split horizon with poisoned reverse different from split horizon?
b) What are sub-protocols of link state protocol?
c) List three differences between a distance vector protocol and a link state protocol. **5×3**
- Q.3 a) What are the main difference between RIPv₁ and RIPv₂? **7**
b) What are the three timers in RIPv₁? **8**
- Q.4 a) Why do some routing protocols message identification at above the transport layer while some other do so directly over the IP layer? **7**
b) Explore route redistribution between OSPF and EIGRP. **8**
- Q.5 a) What are the different OSPF packet types?
b) What is the range of allowable metric values in OSPF and IS-IS?
c) What is a database description packet? **5×3**
- Q.6 a) What are the different BGP timers?
b) What are the different states in the BGP finite machine?
c) What are the different BGP message types? **5×3**
- Q.7 a) Define packet classification problem.
b) Explain disadvantage of cross production scheme.
c) What are the different type of matches allowed in packet classification rules? **5×3**

End Semester Examination, May 2019

M. Tech. – Second Semester

NUMERICAL METHODS IN CIVIL ENGINEERING (PC-EC-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Explain the following:

- a) Gauss Jordan method.
- b) Gauss Seidel method.
- c) Newton-Raphson method.
- d) Secant method.
- e) Newton forward interpolation method.
- f) Simpson's 1/3 rule.
- g) Trapezoidal rule.
- h) Euler's method.
- i) Runge-kutta method.
- j) Linear programming graphical method.

2×10

PART-A

Q.2 Use Gauss Seidel method to obtain the solution:

$$3x_1 - 0.1x_2 - 0.2x_3 = 7.85$$

$$0.1x_1 - 7x_2 - 0.3x_3 = -19.3$$

$$0.3x_1 - 0.2x_2 - 10x_3 = 71.4$$

20

Q.3 Find the positive root of $x^4 - x - 10$ correct to three decimal places, using Newton-Raphson method. **20**

Q.4 Find the cubic polynomial which takes the following values:

$$x : 0 \ 1 \ 2 \ 3$$

$$f(x) : 1 \ 2 \ 1 \ 10$$

Hence evaluate $f(u)$.

20

PART-B

Q.5 Evaluate: $I = \int_0^1 \frac{1}{1+x} dx$

Correct up to three decimal places. Solve by Trapezoidal and Simpson's rule having $h = 0.5, 0.25, 0.125$ respectively. **20**

Q.6 a) Approximate $y(0.4)$, $\frac{dy}{dx} = x + 2$.

$y(0) = 0$, step size $h = 0.1$ by Euler's Method.

10

b) Approximate $y(0.2)$, $\frac{dy}{dx} = x + 2y$

$y(0) = 0$, step size $h = 0.1$

By modified Euler's Method.

10

Q.7 Using simplex method.

$$\text{Maximize } z = 5x_1 + 3x_2$$

$$\text{Subject to } x_1 + x_2 \leq 2,$$

$$5x_1 + 2x_2 \leq 10,$$

$$3x_1 + 8x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

10

End Semester Examination, May 2019

B. Tech. — Seventh Semester

SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term non-repudiation with the help of example.
- b) What do you mean by public key cryptography?
- c) What is PGP? Why it is used?
- d) Differentiate between authentication and authorization.
- e) Discuss the role of AAA for addressing the security risks in cloud.
- f) Define OTP. Discuss its significance as a security feature.
- g) Differentiate between system and process virtual machine.
- h) Why there is a requirement to secure a multi-tenant environment?
- i) Discuss the significance of multi-factor authentication.
- j) Define TCB.

2×10

PART-A

- Q.2**
- a) Discuss port scanning as a system threat in detail with the help of example. **6**
 - b) In an organization is planning to move its data to cloud. What are the challenges and security issues need to be considered. **6**
 - c) Discuss the components of security framework for cloud security. Also discuss the architecture security principles for cloud computing. **8**
- Q.3**
- a) Discuss the vulnerabilities prevailing in the characteristics of cloud computing. **6**
 - b) Discuss defense in depth to secure cloud environment. **8**
 - c) Discuss the security concerns and their solutions at compute storage and network levels in virtualized data centre and cloud. **6**
- Q.4**
- a) How would you assess the security requirements of the cloud? **8**
 - b) Discuss the role of AAA system when a client is attempting to gain access to the network. **12**

PART-B

- Q.5**
- a) Discuss IAM life cycle in detail. **10**
 - b) To keep pace with coming it trends and changing business needs, you decided to transform your IAM program:
 - i) What are the major key factors that need to be transformed?
 - ii) With respect to each phase of IAM life cycle, which products or tools will be used for transformation? **5×2**
- Q.6**
- a) Discuss the PGP protocol in detail. Also discuss certificate format. **10**
 - b) Discuss key management using public key certificates (digital certificates). **10**
- Q.7**
- a) What is secure socket layer? What happens when a browser encounters SSL. Discuss SSL transaction procedure in detail. **10**
 - b) Discuss mutual SSL authentication in detail. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term non-repudiation with the help of example.
- b) What do you mean by public key cryptography?
- c) What is PGP? Why it is used?
- d) Differentiate between authentication and authorization.
- e) Discuss the role of AAA for addressing the security risks in cloud.
- f) Define OTP. Discuss its significance as a security feature.
- g) Differentiate between system and process virtual machine.
- h) Why there is a requirement to secure a multi-tenant environment?
- i) Discuss the significance of multi-factor authentication.
- j) Define TCB.

2×10

PART-A

- Q.2**
- a) Discuss port scanning as a system threat in detail with the help of example. **6**
 - b) In an organization is planning to move its data to cloud. What are the challenges and security issues need to be considered. **6**
 - c) Discuss the components of security framework for cloud security. Also discuss the architecture security principles for cloud computing. **8**
- Q.3**
- a) Discuss the vulnerabilities prevailing in the characteristics of cloud computing. **6**
 - b) Discuss defense in depth to secure cloud environment. **8**
 - c) Discuss the security concerns and their solutions at compute storage and network levels in virtualized data centre and cloud. **6**
- Q.4**
- a) How would you assess the security requirements of the cloud? **8**
 - b) Discuss the role of AAA system when a client is attempting to gain access to the network. **12**

PART-B

- Q.5**
- a) Discuss IAM life cycle in detail. **10**
 - b) To keep pace with coming it trends and changing business needs, you decided to transform your IAM program:
 - i) What are the major key factors that need to be transformed?
 - ii) With respect to each phase of IAM life cycle, which products or tools will be used for transformation? **5×2**
- Q.6**
- a) Discuss the PGP protocol in detail. Also discuss certificate format. **10**
 - b) Discuss key management using public key certificates (digital certificates). **10**
- Q.7**
- a) What is secure socket layer? What happens when a browser encounters SSL. Discuss SSL transaction procedure in detail. **10**
 - b) Discuss mutual SSL authentication in detail. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

IT DATA CENTRE TRANSFORMATION (CS-728)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Discuss the types of cloud services.
- b) How will you manage the airflow in a data centre?
- c) Explain Proxmox.
- d) What is power usage effectiveness?
- e) Describe HVDC.

4×5

PART-A

- Q.2 a) Explain the electrical infrastructure related to data centre. **10**
b) How data centre works to meet business priorities associated with IoT? **10**
- Q.3 a) Explain how power management in a data centre can be optimized. **10**
b) How will you optimize site-end facility for data centre optimization? **10**
- Q.4 a) Explain the procedure to design a liquid cooled server. **10**
b) Why hot-aisle and cold-aisle configuration is required? **10**

PART-B

- Q.5 a) Explain liquid cooling techniques used for cooling in data centre. **10**
b) What do you mean by data centre infrastructure management? Explain the primary components of data centre infrastructure management model. **10**
- Q.6 a) Explain five power challenges. **10**
b) Explain the key element of optimization strategy for data centre transformation. **10**
- Q.7 a) Explain new future technologies used for green data centre. **10**
b) Explain the strategies of any leading company towards green data centre. **10**

End Semester Examination, May 2019

B. Tech. — Sixth / Seventh Semester

MANAGING THE CLOUD (CS-746)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between brownfield and Greenfield.
- b) Define SLA.
- c) What is the purpose of WINSAT tool?
- d) Define deterrent control.
- e) Name the key components of smart metering.
- f) Define pricing rules.
- g) State the role of system administration.
- h) What does the term 'Devop's mean?
- i) Define data cluttering.
- j) Differentiate between polling agent and resource agent.

2×10

PART-A

- Q.2** a) Write an algorithm to calculate the score of machine with a flowchart. **7**
b) Define cloud provisioning. State the four dimensions of cloud provisioning. **8**
c) How cloud provisioning works? Explain with suitable diagram. **5**
- Q.3** a) State why manual patching is mandatory in enterprise framework. **6**
b) Briefly discuss why maintenance and outages are necessary to keep our IT system well maintained. **10**
c) Write any four tools for patch management. **4**
- Q.4** a) What is the service level management? State the objectives of the same. **10**
b) What does the term: 'troubleshooting' mean? **4**
c) What are the steps that a user can follow, to identify a problem and direct in finding the resolution to a problem? **6**

PART-B

- Q.5** a) Briefly describe the shared system capabilities in cloud computing architecture. **10**
b) Draw and explain the structure of operational view for cloud service usage. **10**
- Q.6** a) Write the two scenarios of cloud service provider deployment with suitable diagrams. **15**
b) What are the challenges of IT function in cloud transformation? **5**
- Q.7** a) What are the four basic mechanisms for implementing resource management policies? **10**
b) Discuss the cloud security threats in detail **10**

End Semester Examination, May 2019

B. Tech. – Sixth / Seventh Semester

SOFTWARE PROJECT MANAGEMENT (IT-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain why keeping all members of a group informed about progress and technical decisions in a project can improve group cohesiveness?
- b) Explain the importance of COCOMO model.
- c) Define software project.
- d) What are the various factors associated with cost estimation of a project?
- e) Define ISO9000 quality standard.
- f) Mention the characteristics of good software project.
- g) Define milestones in project management.
- h) Who are the project stakeholders?
- i) Differentiate between “known risks” and “predictable risks”.
- j) What is the difference between a macroscopic schedule and a detailed schedule? **2×10**

PART-A

Q.2 a) What do you mean by software process and explain the fundamental process activities that are common to all software process? And state the difference between software engineering and SPM in detail. **10**

b) Explain software project management life cycle in detail with the help of suitable diagram and examples. **10**

Q.3 a) What is SDLC and what are the various SDLC models, explain any two of them with the help of proper diagram. **10**

b) Explain all the phases involve in developing models. Explain it with the help of suitable example and diagram. **10**

Q.4 a) Explain the COCOMO model a heuristic project estimation technique in detail with the help of suitable examples and diagram. **10**

b) Explain why the process of project planning is an iterative one and why a plan must be continually reviewed during a software project. **10**

PART-B

Q.5 a) What are the principles of risk management and how risks would be identified? Also, describe the difference between error and fault. **10**

b) Explain quality management planning. Also, explain quality control and assurance in detail. **10**

Q.6 a) Explain the role of project crashing and fast tracking in SPM. **10**

b) Explain the importance of schedule management and scope management in developing a project. **10**

Q.7 a) What is DFD? Explain DFD in detail and draw a DFD for result preparation automation system of B. Tech courses of any university. Clearly describe the working of the system. Also, mention all assumptions made by you. **10**

b) How closure analysis and reports are prepared? What is the role of review plan in SPM? **10**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

BUSINESS PROCESS MANAGEMENT (CS-605)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is process modeling?
- b) What is process choreographics?
- c) What is the role of administration and staple holders in BPM?
- d) Explain the role of activity in BPM.
- e) What is decision gateway?
- f) How you can define a private variable while creating BPD? Explain with suitable example.
- g) Explain the role of process designer.
- h) What are default components in BPD?
- i) Define degree of structuring.
- j) What are the various tools used in business process modeling?

2×10

PART-A

Q.2 a) Explain the role of abstraction in business process management. How vertical and horizontal abstractions are different from each other? Explain with suitable examples. **10**
b) Explain the following:

- i) Classification of business process.
- ii) Organizational versus operational process.

10

Q.3 Explain business process management lifecycle in detail, with suitable block diagram. **20**

Q.4 a) How data can be mapped and bound while creating a BPD? Explain with suitable example.
b) Design a BPD to check whether a person is eligible for vote or ineligible. **10**

10

PART-B

Q.5 How business object (BO) can be useful in BPM? Design a BPD to calculate the simple interest and total amount of any growing organization by using BO. Also, explain the step to create business object in process designer. **20**

Q.6 a) What is the role of script in process designer? Explain with suitable example by creating any BPD.
b) Design a BPD to calculate electricity bill of a house using decision-service. **10**

10

Q.7 a) Create a process model for taking admission process in a college.
b) Create a process model for online booking of movie ticket. **10**

End Semester Examination, May 2019

B. Sc. (Interior Design) – Fifth Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-0306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 Write short notes on the following:
- a) Seed money.
 - b) Entrepreneurship.
 - c) Market research.
 - d) PEST.
 - e) Strong value proposition.

4×5

PART-A

- Q.2 What is business organization? Enlist and explain four different types of business organization. **20**

- Q.3 Explain the stages involved in the development of a new product. **20**

- Q.4 Explain the five forces model of competition, used in industry analysis. **20**

PART-B

- Q.5 What are contracts? What are the various classes of a contract which a business organization should be aware of? **20**

- Q.6 What are the various types of business plans? Explain the guidelines used in writing an effective business plan. **20**

- Q.7 What are the various sources of finance available to a venture? Explain in detail. **20**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

COMPUTER ANIMATION ALGORITHM AND TECHNIQUES (CS-642)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer (**any five**) of the following:

- a) Define animation. Name the two concepts that are used as explanations for the illusions of motion.
- b) Explain different methods of interpolation in detail.
- c) Define visualization. Explain scalar visualization technique.
- d) Explain three different approaches to construct facial models.
- e) Why it is difficult to model human being? Explain reasons.
- f) Explain any two principles of animation.
- g) What causes motion blur in camera picture?

4x5

PART-A

Q.2 a) Define 'animation production'. Explain various principles of animation in detail. **10**
b) Explain in detail various principles of film making. **10**

Q.3 a) Define user interface. Explain various characteristics that make a good user interface. **10**
b) Define interpolation. What is the difference between interpolation and approximation? **10**

Q.4 a) Describe various data representation techniques. Explain the best way to represent such data. **10**
b) Define surface and volume rendering. How data are represented for surface objects? **10**

PART-B

Q.5 a) What do you understand by keyframe animation? Define facial animation. Explain various methods by which the facial movements are done. **10**
b) Define motion capture. Explain different methods for the instrumentation and capture of motion data. **10**

Q.6 Explain in detail all the techniques used in virtual human representation. **20**

Q.7 Explain in brief:

- a) Physical based animation.
- b) Flocking.
- c) Tensor visualization.
- d) Vector visualization.

5x4

End Semester Examination, May 2019

B. Tech. – Sixth / Seventh / Eighth Semester

ARTIFICIAL INTELLIGENCE (CS-801)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Differentiate prolog with C, C++ and Java.
b) Discuss the issues of knowledge representation.
c) What factors determine the choice of direction (forward reasoning /backward reasoning) for particular problem.
d) Discuss the characteristics and advantages of expert system.
e) What do you understand by monotonic reasoning? Discuss the limitations of monotonic reasoning. **4x5**

PART-A

- Q.2 a) Explain the limitations of Hill climbing algorithm. How these can be resolved by best first search? Explain best first search algorithm in detail. **10**
b) Explain the constraint satisfaction procedure to solve the cryptarithmetic problem.
- CROSS
+ROADS
DANGER **10**

- Q.3 a) Write prolog program for quicksort. **10**
b) Write prolog program for finding the intersection of two lists. **10**

- Q.4 a) Explain frame knowledge representation technique in detail and draw frame KR for computer lab using frame knowledge representation technique. **10**
b) Write the steps to convert the predicate logic statement into clause form with an example. **10**

PART-B

- Q.5 a) Define the concept of Non monotonic reasoning system. Explain various methods to implement non monotonic reasoning. **10**
b) Explain the following:
i) Fuzzy logic for uncertainty.
ii) Baye's theorem. **10**
- Q.6 a) Explain various agents in detail with diagram. **10**
b) Explain expert system in detail. **10**
- Q.7 a) Discuss the need of game playing algorithm. Explain min-max algorithm for game playing with an example. **10**
b) Explain the application of AI for following:
i) Natural language processing.
ii) Robotics. **5x2**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

XML PROGRAMMING (CS-425)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Marks are indicated against each question.

- Q.1 a) Explain XML. Describe the structure of XML.
b) How XML is declared? Explain its different parameters?
c) Explain internal DTD and external DTD with an example.
d) Explain the difference between CSS and HTML.

5x4

PART-A

- Q.2 a) Explain SGML and HTML. Explain advantages and disadvantages of HTML, compared to SGML and XML. **10**
b) Using XML to exchange data between applications gives lot of advantages. Justify your answer. **10**
- Q.3 a) Explain the different structure of XML document with suitable example. **10**
b) What are the different tags used in XML? **10**
- Q.4 a) In how many ways data can be accessed from XML element. Give an example to explain the concept of XPATH. **10**
b) Define DTD. What is the purpose of DTD in XML? In how many ways XML file can be linked with the content of XML. Explain in detail. **10**

PART-B

- Q.5 a) Explain XML schema structure with a suitable example. Describe each attribute of schema. **10**
b) Define restrictions in XML schema. Explain different restrictions used in XML schema. **10**
- Q.6 a) Why CSS is better than HTML? Write a program for student database using XML and CSS. **10**
b) Explain the purpose of using XML web services in the era of distributed computing. Give some examples of web services. **10**
- Q.7 a) Explain the working function of AJAX application.
b) Explain AJAX based solution with proper diagram. **10x2**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

INTRODUCTION TO VIRTUALIZATION AND CLOUD COMPUTING (CS-421)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) Explain application of virtualization.
b) What are the classification of impact of virtualization?
c) What is hardware assisted virtualization?
d) Differentiate between two types of hypervisor.
e) What is host based mirroring?
f) Define 'VLAN'.
g) What are the advantages of cloud?
h) What is cloud bursting?
i) Define resource pooling.
j) Explain mission critical production workloads. **2×10**

PART-A

- Q.2 a) Define 'virtualization'. Give different needs of virtualization. **10**
b) Differentiate between full emulation and full nature virtualization. **10**
- Q.3 a) Explain in detail various types of server virtualization. **10**
b) What is desktop virtualization? Explain different types of desktop virtualization. **10**
- Q.4 a) Define VPN. Explain the working of VPN. **10**
b) Describe application virtualization in detail. Give various benefits of application virtualization. **10**

PART-B

- Q.5 a) Define cloud computing and explain its benefits. **10**
b) Differentiate between virtualization and cloud. **10**
- Q.6 a) Explain various decision factors of cloud deployment. **10**
b) Explain with the help of diagram various delivery models of cloud. **10**
- Q.7 a) Explain different transition tools for virtualization. **10**
b) Explain in detail various triggers of virtualization. **10**

End Semester Examination, May 2019

M. Com. – Fourth Semester

BUSINESS PROCESSES (CS-610)

Time: 3 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Name seven industries for which SAP provides solution.
- b) How many sessions can be opened at a time on a SAP system?
- c) Status bar on a SAP system has what all information.
- d) What does document flow show?
- e) List all functions available in SAP ERP financials.
- f) What is transaction code?
- g) Which applications are part of a production process?
- h) Give full form of GAAP and IAS.
- i) What is OLTP?
- j) Write any four services offered by SAP.

1×10

PART-A

Q.2 Discuss SAP business suite and its various applications in detail. **10**

Q.3 Describe the layout of the SAP easy access screen. **10**

Q.4 Explain how SAP ERP supports key process in sales order management. **10**

PART-B

Q.5 Explains how SAP ERP supports key processes in supply chain management. **10**

Q.6 Explain various tasks in financial accounting in SAP with the help of a diagram. **10**

Q.7 Differentiate between OLTP and OLAP environment. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

IMAGE PROCESSING (CS-643A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define digital image.
- b) Differentiate between lossy and lossless compression techniques.
- c) Define contrast. Differentiate between contrast and brightness.
- d) What is run-length coding?
- e) Explain quad-tree based coding.
- f) What is the importance of image compression?
- g) How Fourier descriptor helps in object recognition?
- h) What is smoothing? Explain averaging filter.
- i) Explain Gaussian noise with PDF (probability distribution function).
- j) What is region growing?

2×10

PART-A

- Q.2 a) Explain the components of IP systems. **10**
b) What is the role of image histogram in digital image processing? Explain with example. **10**
- Q.3 a) What is the need of smoothing in image processing? Explain different image smoothing filters. **10**
b) Explain canny edge detection algorithm discuss its advantages and disadvantages. **10**
- Q.4 a) Explain edge detection techniques using first order derivatives. **10**
b) Explain the terms: Erosion and dilation. **5**
c) What is Laplacian operator? Explain. **5**

PART-B

- Q.5 a) Explain chain-code in detail with an suitable example. **10**
b) Discuss the following region descriptors:
 - i) Euler numbers
 - ii) Eccentricity
 - iii) Elongatedness
 - iv) Rectangularity**10**
- Q.6 a) Discuss various image compression techniques. **10**
b) Explain the concept of LZW compression and decompression techniques. **10**
- Q.7 Write short notes on:
 - a) Noise Models
 - b) Image Restoration
 - c) Denoising filters
 - d) Inverse filtering**5×4**

End Semester Examination, May 2019

B. Tech. — Fifth / Sixth Semester

INFORMATION STORAGE AND MANAGEMENT (CS-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are the five pillars of technologies?
- b) List and explain core elements of a data center infrastructure.
- c) List physical and logical components of hosts.
- d) Explain iSCSI, FCIP and iFCP.
- e) Differentiate between block level virtualization and file level virtualization.
- f) Define business continuity and information availability.
- g) Define storage security.
- h) Explain industry management standards.
- i) Discuss storage virtualization challenges.
- j) What is SAN?

2x10

PART-A

- Q.2 a) Explain various phases of information life cycle management with the help of examples. **10**
- b) Discuss briefly the evaluation of various storage technologies. **10**
- Q.3 a) Explain the components of an intelligent storage system. **10**
- b) Compare the RAID level (3, 4, 5) in terms of storage efficiency, cost, read and write performance, write penalty and protection. **10**
- Q.4 a) What is CAS? Describe architecture of CAS with diagram? Write the steps to process of data retrieval from CAS. **10**
- b) What is Direct Attached Storage (DAS)? Write down its security, limitations, advantages and disadvantages in detail. **10**

PART-B

- Q.5 a) What is disaster recovery? Explain the importance of disaster recovery planning in detail. **10**
- b) Define business continuity measurements and terminologies. **10**
- Q.6 a) Discuss storage security framework. **10**
- b) Explain key management metrics in detail. **10**
- Q.7 a) Discuss different virtualization technologies in detail. **10**
- b) Explain storage security model in detail. **10**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

IT SYSTEM SECURITY (CS-628A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the significance of hybrid key cryptography?
- b) Differentiate between virus and worms with examples.
- c) What is the importance of sandboxing in operating system security?
- d) What is the role of mod-OSSO in oracle application server?

5×4

PART-A

Q.2 a) Is the following statement true?

"There is no definitive protocol that can determine if a host is alive". To support your answer describe different techniques for port scanning. Also, discuss the defense against them.

12

- b) How rootkits are harmful to our system?

8

Q.3 a) What are the different threats in mobile operating system?

- b) Differentiate between the security of windows and unix OS

20

Q.4 a) What is the importance of Gartner's magic quadrant in end-point security?

10

- b) What is the concept of BYOD? How end point security becomes critical in BYOD?

10

PART-B

Q.5 a) Enlist and explain top 10 OWASP vulnerabilities to application security.

10

- b) Discuss the security threats and counter measures of application server in detail.

10

Q.6 a) Describe the architecture for database security systems.

10

- b) What are the various steps for securing as database server?

10

Q.7 a) Write short notes on the following:

Vendor strengths and limitations for:

→ IBM

→ Intel security

→ Kaspersky

10

- b) Internal and external access control.

10

End Semester Examination, May 2019

B. Tech. — Sixth / Seventh Semester

SYSTEM PROGRAMMING AND SYSTEM ADMINISTRATION (CS-703)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define a macro processor. **2×10**
b) What are translators? Define different types of translators.
c) What are overlays? How binding in overlays takes place?
d) Compare and contrast loader and linker.
e) What is UNIX vi editor? Write navigation commands for vi editor.
f) What do you mean by i-node? Write different entries in i-nodes.
g) How can you compare two files in UNIX?
h) What do you mean by booting? What are the steps of booting?
i) How to stop background processes?
j) Write different types of drivers.

- PART-A**
- Q.2 a) What do you mean by software tools? Explain various software tools with examples. **7**
b) Explain macro call within macro definition with suitable example. **6**
c) What do you mean by system programming? Explain the components of system programming. **7**
- Q.3 a) What are the data structures required for a two-pass assembler? Also, explain the design of a two-pass assembler. **12**
b) Explain different functions of a loader. How can a direct linking loader overcome the limitations of a relocating loaders? **8**
- Q.4 a) Explain the architecture of UNIX operating system with a labeled diagram. **5**
b) Explain memory management in UNIX operating system. **10**
c) Explain the directory structure of UNIX OS. What are different blocks associated with file system? **5**

PART-B

- Q.5 a) Write a shell script to implement five general purpose commands in UNIX. **6**
b) When using cat>foo, what happens if foo already contains something? Explain briefly. **7**
c) What are wildcards? Explain the use of wild cards with help of examples. **7**
- Q.6 a) What are file access permission? How can you change the file access permission? **6**
b) What is system administration? Discuss the role and functions of system administration. How can a simple user attain administrative privileges? **8**
c) What are filters and pipelines? Explain with examples. **6**
- Q.7 a) How a virus can be monitored and controlled in UNIX? **6**
b) Explain in brief the maintenance process of an operating system. **8**
c) Differentiate between system software and application software. **6**

End Semester Examination, May 2019

M. Tech. – Second Semester

ADVANCED ALGORITHMS (PC-CS-M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1** a) Differentiate between depth first search and breadth first search algorithms with the help of suitable examples. **5**
b) A web crawler is a software, which pickups a web page from a website, extracts the information and hyperlinks from the submitted page? The information is used in building the indexes for the web site (for page ranking and other applications). The extracted links/pages are traversed one after another picking the information and the hyperlinks. Propose an algorithm to visit all pages starting from the first page up to a particular depth. **10**
c) Discuss various asymptotic notations with the help of examples. **5**
- Q.2** a) Explain the Edmond's blossom algorithm with the help of a suitable example. **10**
b) Write steps for creating a minimum spanning tree using kruskal's algorithm. **5**
c) What do you mean by augmenting the path in graph matching algorithm? Discuss. **5**
- Q.3** a) Write and explain the Rabin-Karp string matching algorithm. Working modulo $q = 11$, how many spurious hits does the Rabin-Karp matcher encounters for the text $T = 3\ 1\ 4\ 1\ 5\ 9\ 2\ 6\ 5\ 3\ 5\ 8\ 9\ 7\ 9\ 3$ when looking for the pattern 26? **10**
b) Write an algorithm to multiply a chain of matrices in an optimal manner with the help of a suitable example. **10**
- Q.4** a) Convert the following to frequency domain using DIT FFT (0,1, 2, 3). **6**
b) Write a short note on floyd warshall's algorithm. **6**
c) A group of friends visit a restraint on regular basis, buy different items and end up paying different amounts. First time they buy 3 coffee, 2 beers with total bill amount of 102; the second time they buy 2 coffee, 1 beer and pay 150; the third time they buy 4 coffee, 1 beer and pay 190. Find out the price of each item using an appropriate method. **8**
- Q.5** a) Solve the following linear program using simplex method. Maximize $5x+3y$. Subjected to the condition, $x + y \leq 2$, $5x + 2y \leq 10$, $3x + 8y \leq 12$, $x, y \geq 0$. **10**
b) Write the Chinese remainder theorem. Also find all integers that leave remainders 1, 2, 3 when divided by 9, 8, 7 respectively using Chinese remainder theorem. **10**
- Q.6** a) The document oriented databases like node.js use JSON data structure. How it is different from a relational database? **6**
b) The solution to the convex hull can be used to avoid the obstacles for a driverless car. Comment. **6**
c) Explain 0/1 and fractional knapsack problems with the help of suitable examples. **8**
- Q.7** a) Give the list of all the metrics to explain the complexity of any algorithm. Explain each one of them. **6**
b) Randomized algorithms is a way of life now a days. Comment. **6**
c) Explain the terms, NP, NP complete and NP-Hard, with the help of examples for each. **8**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

INTRODUCTION TO GAME PROGRAMMING (CS-641A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are different argument passing Techniques in OOPS?
- b) Differentiate between Movies and Gaming.
- c) Write the steps to down load unity.
- d) Discuss the term Co-routine. How it can allow us to execute code over multiple frames?
- e) Write the steps to create new Tag in Unity.

4x5

PART-A

- Q.2**
- a) What is polymorphism? Explain its types with examples. **10**
 - b) Write a program in C++ to overload pre increment and post increment operators using friend function. **10**
- Q.3**
- a) Explain the following in detail:
 - i) Game characters.
 - ii) Victory Condition Mechanism.**5x2**
 - b) Discuss the Game Engine in detail with diagram. **10**
- Q.4**
- a) Discuss various components in Game Objects. **10**
 - b) Differentiate between 2D and 3D projects and explain various ways to create game in Unity. **10**

PART-B

- Q.5**
- a) Write the steps to move an object using Unity. Discuss various component of game object. **10**
 - b) Write the steps to access components from the script using Unity. **10**
- Q.6**
- a) Explain in use of static and dynamic Collider in detail unity. **10**
 - b) Write the steps for counting, displaying and ending the game in unity. **10**
- Q.7**
- a) Discuss the Scripting Lifecycle Flow chart in detail. **10**
 - b) Explain the following rigid body class methods in detail.
 - i) AddTorque()
 - ii) GetPointVelocity()**10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

JAVA PROGRAMMING (IT-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is meaning of Byte code in Java?
- b) Which class is the super class of all awt-event classes?
- c) Can a java program be executed without Main method? Give a brief explanation of your answer.
- d) What is the difference between finally and finalize in java?
- e) What is the importance of setting environment variables such as path and class path?
- f) What is the difference between instance variables and class variables?
- g) What will happen if the following line is present in a program?
Interface X extends interface Y { }
- h) What are the advantages of adapter class over listener interface?
- i) What method is used to change the layout of a container?
- j) What is scrollable result set?

2x10

PART-A

- Q.2**
- a) What is the difference between method overloading and method overriding? Explain with the help of an example. **10**
 - b) Write a program to create a package named as Square Root having class to calculate Square Root of a given number. Import it to another class to perform Square Root operation. **10**
- Q.3**
- a) Write an output to play an audio clip. **5**
 - b) Explain the life cycle of an applet. **5**
 - c) Create a user-defined exception named check-argument to check the number of arguments passed through command line. If the number of arguments is less than five, throw the check argument exception, else print the addition of all the five numbers. **10**
- Q.4**
- a) Create an applet to identify the key pressed in the window and display the character associated with the key in the status window. **10**
 - b) Create a list of vegetables. If you click on one of the items of the list, the item should be displayed in a text box. **10**

PART-B

- Q.5**
- a) What is remote method invocation? Write steps to set up remote method invocation. **10**
 - b) Write short notes on following:
 - i) CORBA.
 - ii) SOAP. **10**
- Q.6**
- a) Write a program to concatenate two files and display the output in new file. **10**
 - b) What is multithreading? Explain complete life cycle of a thread. Write a program to show the concept of multithreading. **10**
- Q.7**
- a) Discuss the JDBC drivers. **5**

- b) What is the difference between statement, prepared statement, and callable statement? **5**
- c) Write a program to connect to a database and retrieve the data. **10**

End Semester Examination, May 2019

M. Tech. – Second Semester

NUMERICAL METHODS IN CIVIL ENGINEERING (PC-CE-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Explain the following:

- a) Gauss Jordan method.
- b) Gauss Seidel method.
- c) Newton-Raphson method.
- d) Secant method.
- e) Newton forward interpolation method.
- f) Simpson's 1/3 rule.
- g) Trapezoidal rule.
- h) Euler's method.
- i) Runge-kutta method.
- j) Linear programming graphical method.

2×10

PART-A

Q.2 Use Gauss Seidel method to obtain the solution:

$$3x_1 - 0.1x_2 - 0.2x_3 = 7.85$$

$$0.1x_1 - 7x_2 - 0.3x_3 = -19.3$$

$$0.3x_1 - 0.2x_2 - 10x_3 = 71.4$$

20

Q.3 Find the positive root of $x^4 - x - 10$ correct to three decimal places, using Newton-Raphson method.

20

Q.4 Find the cubic polynomial which takes the following values:

$$x : 0 \ 1 \ 2 \ 3$$

$$f(x) : 1 \ 2 \ 1 \ 10$$

Hence evaluate $f(u)$.

20

PART-B

Q.5 Evaluate: $I = \int_0^1 \frac{1}{1+x} dx$

Correct up to three decimal places. Solve by Trapezoidal and Simpson's rule having $h = 0.5, 0.25, 0.125$ respectively.

20

Q.6 a) Approximate $y(0.4)$, $\frac{dy}{dx} = x + 2$.

$y(0) = 0$, step size $h = 0.1$ by Euler's Method.

10

b) Approximate $y(0.2)$, $\frac{dy}{dx} = x + 2y$

$y(0) = 0$, step size $h = 0.1$

By modified Euler's Method.

10

Q.7 Using simplex method.

Maximize $z = 5x_1 + 3x_2$

Subject to $x_1 + x_2 \leq 2$,
 $5x_1 + 2x_2 \leq 10$,
 $3x_1 + 8x_2 \leq 12$
 $x_1, x_2 \geq 0$

20

End Semester Examination, May 2019

M. Tech. – Second Semester

ADVANCED ALGORITHMS (PC-CS-M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Differentiate between depth first search and breadth first search algorithms with the help of suitable examples. **5**
- b) A web crawler is a software, which pickups a web page from a website, extracts the information and hyperlinks from the submitted page? The information is used in building the indexes for the web site (for page ranking and other applications). The extracted links/pages are traversed one after another picking the information and the hyperlinks. Propose an algorithm to visit all pages starting from the first page up to a particular depth. **10**
- c) Discuss asymptotic notations with the help of examples. **5**
- Q.2 a) Explain the Edmond's blossom algorithm with the help of a suitable example. **10**
- b) Write steps for creating a minimum spanning tree using kruskal's algorithm. **5**
- c) What do you mean by augmenting the path in graph matching algorithm? Discuss. **5**
- Q.3 a) Write and explain the Rabin-Karp string matching algorithm. Working modulo $q = 11$, how many spurious hits does the Rabin-Karp matcher encounters for the text $T = 3\ 1\ 4\ 1\ 5\ 9\ 2\ 6\ 5\ 3\ 5\ 8\ 9\ 7\ 9\ 3$ when looking for the pattern 26? **10**
- b) Write an algorithm to multiply a chain of matrices in an optimal manner with the help of a suitable example. **10**
- Q.4 a) Convert the following to frequency domain using DIT FFT (0,1, 2, 3). **6**
- b) Write a short note on floyd warshall's algorithm. **6**
- c) A group of friends visit a restraint on regular basis, buy different items and end up paying different amounts. First time they buy 3 coffee, 2 beers with total bill amount of 102; the second time they buy 2 coffee, 1 beer and pay 150; the third time they buy 4 coffee, 1 beer and pay 190. Find out the price of each item using an appropriate method. **8**
- Q.5 a) Solve the following linear program using simplex method. Maximize $5x+3y$. Subjected to the condition, $x + y \leq 2$, $5x + 2y \leq 10$, $3x + 8y \leq 12$, $x, y \geq 0$. **10**
- b) Write the Chinese remainder theorem. Also find all integers that leave remainders 1, 2, 3 when divided by 9, 8, 7 respectively using Chinese remainder theorem. **10**
- Q.6 a) The document oriented databases like node.js use JSON data structure. How it is different from a relational database? **6**
- b) The solution to the convex hull can be used to avoid the obstacles for a driverless car. Comment. **6**
- c) Explain 0/1 and fractional knapsack problems with the help of suitable examples. **8**
- Q.7 a) Give the list of all the metrics to explain the complexity of any algorithm. Explain each one of them. **6**
- b) Randomized algorithms is a way of life now a days. Comment. **6**
- c) Explain the terms, NP, NP complete and NP-Hard, with the help of examples for each. **8**

End Semester Examination, May 2019

B. Sc. (Data Science) — Second Semester

DATABASE MANAGEMENT SYSTEM (DS-201)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ALL** questions. Only internal choice is given. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What in a table represents a relationship among a set of values?
- b) Which term is used to refer to a row in relational database? Define terminology used in relational database.
- c) What are various kinds of interactions carried by DBMS?
- d) Enlist the advantages of normalizing database.
- e) Define functions of DBMS.

3x5

Q.2 a) Differentiate between various database management systems. **8**
b) How DBMS can overcome drawbacks of file processing system? **7**

OR

- a) Discuss various components of DBMS environment. **10**
- b) Elaborate role of database administrator in DBMS. **5**

Q.3 a) Explain the following relational algebra operations with example:

- i) Outer join.
- ii) Self join.
- iii) Natural join.

3x3

b) Explain various binary operations:

- i) Union.
- ii) Intersection.

3x2

OR

a) Consider the following relation schema:

Student (*s_id*, *Sname*, *dept*)

Account (*Acc_id*, *S_id*, *Jee*)

Answer the following question in regards to SQL query and relational algebra query:

Find the fees and name of students having fee greater than 50,000. **8**

b) Elaborate six inference rules for functional dependency. **7**

Q.4 a) Compare *2NF* and *3NF* with examples. **8**

b) Consider a schema *R(A,B,C,D)* and functional dependencies *A → B* and *C → D*.
Discuss the decomposition of *R* into *R1(A,B)* and *R2(C,D)*, whether it supports lossless join or not. **7**

OR

a) Explain in detail about the key constraints used in database system. **8**

b) Suppose a relation *R(A,B,C,D,E)* with functional dependency *BD → E*, *A → C*.
Show that the decomposition into *R1(A,B,C)* and *R2(D,E)* is lossy. **7**

Q.5 a) Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. **8**

b) Differentiate between primary key, candidate key and super key. **7**

OR

- a) Construct an ER diagram for Bank Management system and later reduce into database tables. **10**
- b) Discuss mapping and domain constraints. **5**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DATA COMMUNICATION AND COMPUTER NETWORKS (IT-401A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1** Answer the following questions:

 - a) What is the difference between baseband and broadband?
 - b) Define digital signal.
 - c) What is MAC address?
 - d) Define the term frame relay.
 - e) Differentiate among the static and dynamic routing.
 - f) Differentiate between path and route in term of virtual circuit approach.
 - g) How quality of service is important during network communication?
 - h) Write two disadvantages of twisted pair cables.
 - i) Define "Shannon's limit".
 - j) What is the mechanism of ENQ/ACK?

PART-A

- | | | |
|-----|--|-------------|
| Q.2 | a) What is network? What are its goals and applications?
b) Define the term amplitude, frequency and phase of a signal.
c) What are the various transmission modes? Explain in detail. | 6
8
6 |
| Q.3 | a) Name three types of transmission impairments.
b) How does NRZ-L differ from NRZ-I?
c) Why coaxial cable superior to twisted pair cables? | 8
6
6 |
| Q.4 | a) What is the purpose of hamming code? Explain with the help of example.
b) Which is more efficient circuit switching or virtual switching and why? Explain in detail. | 10
10 |

PART-B

- Q.5** a) Write short notes on the following: **2×4**
 i) RARP. ii) TELNET.
 iii) DNS. iv) Ethernet.

 b) How layers of TCP/IP protocol suit correlate to the layers of OSI model? Explain in detail. **12**

Q.6 a) Why is adaptive routing superior to non-adaptive routing? **10**
 b) How to prevent congestion in a network? Also discuss congestion control techniques. **10**

Q.7 Write short notes on **(any two)** of the following:
 a) Security management.
 b) Firewall and its types.
 c) Remote monitoring techniques. **10×2**

End Semester Examination, May 2019

B. Tech. – Sixth / Seventh / Eighth Semester

ARTIFICIAL INTELLIGENCE (CS-801)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Differentiate prolog with C, C++ and Java.
b) Discuss the issues of knowledge representation.
c) What factors determine the choice of direction (forward reasoning /backward reasoning) for a particular problem.
d) Discuss the characteristics and advantages of expert system.
e) What you understand by monotonic reasoning? Discuss the limitations of monotonic reasoning. **4x5**

PART-A

- Q.2 a) Explain the limitations of Hill climbing algorithm. How these can be resolved by best first search? Explain best first search algorithm in detail. **10**
b) Explain the constraint satisfaction procedure to solve the cryptarithmetic problem.
CROSS
+ROADS
DANGER **10**

- Q.3 a) Write prolog program for quicksort. **10**
b) Write prolog program for finding the intersection of two lists. **10**

- Q.4 a) Explain frame knowledge representation technique in detail and draw frame KR for computer lab using frame knowledge representation technique. **10**
b) Write the steps to convert the predicate logic statement into clause form with an example. **10**

PART-B

- Q.5 a) Define the concept of Non monotonic reasoning system. Explain various methods to implement non monotonic reasoning. **10**
b) Explain the following:
i) Fuzzy logic for uncertainty.
ii) Bayes theorem. **10**
- Q.6 a) Explain various agents in detail with diagram. **10**
b) Explain expert system in detail. **10**
- Q.7 a) Discuss the need of game playing algorithm. Explain min-max algorithm for game playing with an example. **10**
b) Explain the application of AI for following:
i) Natural language processing.
ii) Robotics. **5x2**

End Semester Examination, May 2019

M. Tech. - Second Semester

AD HOC NETWORKS (PE-CS-M-227)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carry equal marks.

- | | | |
|-----|--|----------------------------------|
| Q.1 | a) What are the characteristics of wireless channels?
b) What are various Multiple Access Techniques? Explain. | 10 |
| Q.2 | a) What are different handoff issues in wireless ATM?
b) Explain Mobile IP in detail.
c) Explain how optimization of web is performed over wireless? | 7
6
7 |
| Q.3 | a) What are the various issues related to ad-hoc wireless network? Explain.
b) Compare the pros and cons of using scheduling based MAC Protocols over reservation-based MAC Protocols.
c) List the major advantages of the ad hoc wireless internet. | 7
8
5 |
| Q.4 | a) Discuss the parameters on which routing protocols are classified.
b) Discuss the zone based Hierarchical link, state routing protocol in detail. Also state its advantages and disadvantages. | 8
12 |
| Q.5 | a) Explain any one Mesh based multicast routing protocols.
b) Comment on the scaling properties of source initiated and receiver initiated multicast protocols with respect to the number of sources and receivers in the group which of them would be suitable for:
i) A teacher multicasting his lectures to a set of students (assume the students do not interact with each other)
ii) A distributed file sharing system. | 12
8 |
| Q.6 | a) Explain how some of the inherent properties of the wireless ad-hoc networks introduce difficulties while implementing security in routing protocols.
b) Why does standard TCP not perform well in Ad hoc wireless networks? Explain. | 10
10 |
| Q.7 | Discuss Energy efficient multicasting protocols in ad hoc wireless networks. | 20 |
| Q.8 | Write short note on following:
a) Network Security attacks.
b) Classification on MAC Protocols.
c) HIPERACCESSS.
d) HIPERLAN Standard. | 5x4 |

End Semester Examination, May, 2019

M.Tech (Computer Science)–Second Semester

NETWORK ADMINISTRATION AND SECURITY (CS-M-202)

Time: 3 Hours

Max Marks: **75**

No.of pages:1

Note: Attempt **FIVE** questions in all. **PART-B** is **compulsory**. Attempt any **FOUR** questions from **PART-A**. Marks are indicated against each question.

- Q.1 a) Elaborate anatomy of secure network threats. **7**
b) What is the difference between asymmetric and symmetric encryption and which one is better? **8**

PART-A

- Q.2 a) How one can mitigate XSS attack? **4**
b) Explain CIA trngle. **4**
c) Which one is better from HIDS and NIDS?. Explain the two briefly. **7**
- Q.3 a) What are the objects that should be included in a good penetration testing report? **7**
b) Elaborate mitigation of DDOS? **8**
- Q.4 a) What Security vulnerability address by VPN? What security vulnerabilities are unique door hightened by VPN? **7**
b) What kind of policies and procedures need to be developed for VPN? What are unreasonable expectations for VPN? **8**

PART-B

- Q.5 a) What can be the impact of computer network attack?
b) What is the objective of network security management tools within an organization.
c) Discuss any case study of secure network management. **5x3**
- Q.6 a) Elaborate JCMP Design consideration. **7**
b) How Rogue device detection can be done? **4**
c) What are JP addressing security considerations? **3**
- Q.7 a) How a fake e-mail can be tracked? **7**
b) How a hacker can be tracked? Discuss style of writing foreusee reports **8**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

BAJMC – Fourth Semester

ENTREPRENEURSHIP DEVELOPMENT (COM-0306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Write short notes on the following:

- a) Seed money.
- b) Entrepreneurship.
- c) Market research.
- d) PEST.
- e) Strong value proposition.

4×5

PART-A

Q.2 What is business organization? Enlist and explain four different types of business organizations. **20**

Q.3 Explain the stages involved in the development of a new product. **20**

Q.4 Explain the five forces model of competition used in industry analysis. **20**

PART-B

Q.5 What are contracts? What are the various classes of a contract which a business organization should be aware of? **20**

Q.6 What are the various types of business plans? Explain the guidelines used in writing an effective business plan. **20**

Q.7 What are the various sources of finance available to a venture? Explain in detail. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

PRINCIPLES OF OPERATING SYSTEMS (CS-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Differentiate internal fragmentation and external fragmentation.
 b) Write two advantages of virtual memory concept.
 c) What is the purpose of paging and page tables?
 d) List the difference between process and a program.
 e) What is a system program? How it works?
 f) Define the term distributed operating system.
 g) State reader writer problem and also explain how it can be solved?
 h) Write about resource-allocation graph.
 i) "Priority inversion is a condition that occurs in real time systems where a low priority process is starved because higher priority processes have gained hold of CPO". Comment on this statement.
 j) Write the application of thread. **2×10**

PART-A

- Q.2 a) List and explain the functions and services of an operating system. **10**
 b) Differentiate multiprogramming, multiprocessing and multitasking systems. **5**
 c) What system calls needs to be executed by a command interpreter or shell in order to start a new process? **5**
- Q.3 a) Explain process states with state transition diagram? Also explain PCB (Process Control Block) with neat diagram. **10**
 b) Consider the following set of processes, arrival time and burst time. A larger priority number has a higher priority.

Process	Arrival time	Burst time	Priority
P ₁	0	6	4
P ₂	3	5	2
P ₃	3	3	6
P ₄	5	5	3

Draw the Gantt chart and find out average waiting time and turnaround time using:

- i) FCFS
 ii) Priority scheduling **10**

- Q.4 a) Explain the term deadlock. Also explain various necessary conditions for a deadlock to occur. Explain in brief about deadlock prevention. **10**
 b) What is synchronization? Explain how semaphores can be used to deal with n-process critical section problem. **10**

PART-B

- Q.5 a) Consider the following page reference string:
 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6
 Find the number of page faults with
 i) FIFO
 ii) Optimal page replacement

- iii) LRU page replacement algorithms where four free frames are available initially.
Which algorithm gives minimum no of page faults? 12
- b) How demand paging works? Explain in detail. 8
- Q.6**
- a) Explain the indexed allocation of disk space. 8
 - b) Suppose that a disk drive has 5000 cylinders (0 to 4999) the drive is currently serving a request at cylinder 143 and previous request was at 125 the queue of pending request in FIFO order is:
86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130
Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for the following disk-scheduling algorithms?
i) FCFS
ii) SCAN
iii) C-Look 12
- Q.7**
- a) Explain process scheduling kernel system in detail. 10
 - b) Compare security of windows operating system with UNIX operating system. 10

End Semester Examination, May 2019

B. Sc. Data Science – Second Semester

OBJECT ORIENTED PROGRAMMING SYSTEM (DS-203)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define access specifiers. Explain its types with examples.
- b) Discuss the data types used in C++.
- c) Define reference variable. Give its syntax.
- d) List the differences between constructor and destructors.
- e) Explain virtual functions with the help of a suitable example.

3×5

Q.2 Differentiate between procedural languages and object oriented languages. Discuss the basic concepts of OOPS. **15**

OR

List the OOPs concepts and discuss each in detail by taking suitable examples. Also, list the applications of OOP. **15**

Q.3 Write a class to represent a vector (a series of float values). Include member functions to perform the basic tasks:

- a) To create a vector.
- b) To modify the value of a given element.
- c) To multiply by a scalar value.
- d) To display the vector in the form (10, 20, 30, ...)

15

OR

Explain the special properties of the constructor functions. How the dynamic initialization of objects is achieved? **15**

Q.4 Create a class FLOAT that contains one float data member. Overload all the 4 arithmetic operators so that they operate on the objects of class float. **15**

OR

List the operators that cannot be overloaded. Write a program to overload '==' operator to compare two strings. **15**

Q.5 What are the different forms of inheritance? Give an example of each and write a program to show how a derived class inherits traits of a base class (or several base classes)? **15**

OR

Consider a class master that derives information from both account and admin classes which in turn derive information from the person class? Define all the 4 classes and write a program to create, update and display the information contained in master objects. **15**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

OPERATIONS RESEARCH AND OPTIMIZATION (CS-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- Define the terms “redundant constraint” and “infeasibility” in terms of linear Programming (LP) model. m,
- The objective function for a LP model is $3x_1+2x_2$, if $x_1=20$ and $x_2=30$, what is the value of the objective function?
- When is the use of Integer Linear Programming (ILP) done in practice?
- What do you mean by Assignment Problem? Is it a type of Net Work flow problem? Justify.
- Differentiate between Linear Programming Problem (LPP) and Dynamic Programming Problem (DPP).
- What is meant by queue Discipline and what is the goal of many waiting line systems?
- Formally write and explain the Kendall's notation.
- What is a random variable?
- What is Inventory Management? Which model is used by Proctor and gamble company?
- What is drawback of EOQ Model and what costs are considered in the basic EOQ model?

2×10

PART-A

Q.2 Dakota Furniture makes desks, tables, and chairs. Each product needs the limited resources of lumber, carpentry and finishing; as described in the table. At most five tables can be sold per week.

Resource	Desk	Table	Chair	Max Avail.
Lumber (board ft.)	8	6	1	48
Finishing hours	4	2	1.5	20
Carpentry hours	2	1.5	.5	8
Max Demand	unlimited	5	unlimited	
Price (\$)	60	30	20	

- Formulate an LP model.
- Convert the LP to the standard form and write starting tableau with initial BFS.

10

10

Q.3 Solve the following LP using Gomory's cut for Integer Linear Programming (ILP):

$$\text{Max } Z: 2X + 3Y$$

Subject to:

$$2X + 2Y \leq 7; X \leq 2; Y \leq 2; X, Y \geq 0.$$

- Convert the given LP to standard form.
- Consider the last iteration of Phase -I as below and proceed for Phase -II:

5

C_b	Basis	X_b	X	Y	S₁	S₂	S₃	
2	X	3/2	1	0	1/2	0	-1	
0	S ₂	1/2	0	0	-1/2	1	1	
3	Y	2	0	1	0	0	1	

- i) Find Gomory's cut equation.
ii) Solve for integer solutions.

7
8

- Q.4** Consider the given scenario, formulate into a Goal Programming (GP) Model:
A small paint company manufactures two types of paint, latex and enamel.
In production, the company uses 10 hours of labor to produce 100 gallons of latex and 15 hours of labor to produce 100 gallons of enamel.
Without hiring outside help or requiring overtime, the company has 40 hours of labor available each week. Furthermore, each paint generates a profit at the rate of \$1.00 per gallon.
The company has the following objectives listed in decreasing priority:
- P1: avoid the use of overtime
 - P2: achieve a weekly profit of \$1000
 - P3: produce at least 700 gallons of enamel paint each week.

20

PART-B

- Q.5** Consider a balanced transportation problem that has three supply sources (silos) and four demand sources (mills). Solve using Vogel's Approximation Method (VAM).

		MILL				
		1	2	3	5	
SILo	1	10		20	11	15
	2	12	7	9	20	25
	3	4	14	16	18	10
		5	15	15	15	

20

- Q.6** Calculate using graphical method to minimize the time needed to process the following jobs on the machines shown below

	<i>Sequence</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
<i>Job1</i>	<i>Time</i>	2	3	4	6	2
	<i>Sequence</i>	<i>C</i>	<i>A</i>	<i>D</i>	<i>E</i>	<i>B</i>
<i>Job2</i>	<i>Time</i>	4	5	3	2	6

20

- Q.7** a) What costs are considered in the basic EOQ model? Suppose that your company sells a product for which the annual demand is 10,000 units. Holding costs are \$1.00 per unit per year, and setup costs are \$200 per order.
i) What is the economic order quantity (EOQ) for your product?
ii) What is the total annual cost of ordering and holding?

10

- b) A bakery keeps stock of popular brand of cake. Previous experience shows the daily demand pattern for the item with associated probabilities, as given below:

Daily demand(number)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days.

Random Numbers	40	19	87	83	73	84	29	09	02	20
----------------	----	----	----	----	----	----	----	----	----	----

- i) Conduct the simulation experiment for demand and show in a tabular form.
ii) Estimate the daily average demand for the cakes on the basis of simulated data.

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ANALYSIS AND DESIGN OF ALGORITHM (CS-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Write and explain big O on asymptotic notations with graph.
- b) How dynamic programming is different from greedy method?
- c) How task scheduling problem can be solved using greedy approach?
- d) How minimum spanning tree is different from spanning tree?
- e) What are NP problems?
- f) How recursion is different from iteration?
- g) What is merge sort and what is its worst case complexity?
- h) What will be the time complexity in case of "for loop"?
- i) Compare the performance of matrix chain multiplication as compared to normal matrix multiplication.
- j) What is a four queen problem? **2×10**

PART-A

Q.2 a) Explain insertion sort algorithm. Analyze its time complexity. Also sort the following list of numbers using insertion sort.
 5, 2, 7, 8, 1, 4, 9, 6, 0, 3 **10**

- b) Solve the following by using recurrences tree:

$$T(n) = T\left(\frac{n}{3}\right) + T\left(\frac{2n}{3}\right) + n \text{ and}$$

$$T(n) = 2T\left(\frac{n}{2}\right) + n^2$$
10

Q.3 a) Explain KMP algorithm and apply to following string:

TEXT = A A B A A C A A D A A B A A B A

P A T T E R N = A A B A

10

- b) Explain Rabin Karp algorithm and apply to following string:

T = 3141592653589793, P = 26, Q = 11

10

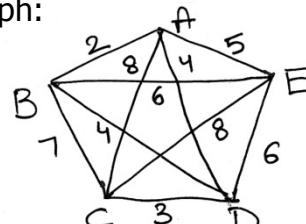
Q.4 a) Analyze the time complexity of binary search in best, average, worst case. **10**

- b) Explain Strassen's matrix multiplication algorithm and apply the same to multiply the following two matrices:

$$A = \begin{vmatrix} 5 & 6 \\ -4 & 3 \end{vmatrix} B = \begin{vmatrix} -7 & 6 \\ 5 & 9 \end{vmatrix}$$
10

PART-B

Q.5 a) Explain Kruskal's algorithm and find the minimum spanning tree using Kruskal's algorithm for the following graph:



10

- b) Write the algorithm for Job sequencing with deadline and find the optimal scheduling for the following task with the given wts deadline.
 $(J, P, D) = \{(1, 70, 4), (2, 60, 2), (3, 50, 4), (4, 40, 3), (5, 30, 1), (6, 20, 4), (7, 10, 6)\}$ **10**

- Q.6 a) Solve the following Knapsack with Dynamic approach:

$$n = 4, W_i = (15, 10, 9, 5), P = (1, 5, 3, 4), m = 8.$$

Where n is number of objects and m is Knapsack capacity. **10**

- b) Explain LCS algorithm and its complexity and find LCS of following using dynamic methods $X = A, B, C, B, D, A, B$ $Y = B, D, C, A, B, A$ **10**

- Q.7 a) Explain backtracking write algorithm to find sum of subset. Explain with the help of examples. **10**

- b) What is the relationship among P, NP and NP complete problem? Show it with the help of diagram. **10**

End Semester Examination, May 2019

M. Tech. – Second Semester

DATA PREPARATION AND ANALYSIS (PE-CS-M-221A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Explain role of clustering in data science and its types with the help of a relevant example. **10**
b) Using K means clustering, cluster the following data into two(2) clusters and show each step.

$$\{2, 4, 10, 12, 3, 20, 30, 11, 25\}$$

10

PART-A

- Q.2 a) "K-NN algorithm does more computation during testing rather than training". Justify this statement. **10**
b) If using random sampling only once and supposing we know a good K value to use for the original data, how should 'K' be adjusted in accordance to a change in the input size? **10**
- Q.3 a) What is a type-1 error? **10**
b) What are the different statistical testing techniques? What are the steps of hypothesis testing? **10**
- Q.4 a) Can logistic regression be used for classification? Where is logistic regression used? **10**
b) Consider the following set of points $\{(-2, -1), (1, 1), (3, 2)\}$
i) Find the least square regression line for the given data points.
ii) Plot the given points and the regression line in the same rectangular system of axis. **10**

PART-B

- Q.5 a) Calculate the product moment correlation coefficient for the mentioned dataset

x	1	1	3	5	5
y	5	1	3	1	5

10

- b) In a purely correlational study, one does not need to distinguish between independent and dependent variables. Why? **10**

- Q.6 Write short notes on the following:

- a) Data formats
b) Designing visualizations
c) Decision tree from data
d) Descriptive and comparative statistics.

5x4

- Q.7 a) Explain the typical data analysis process. **10**
b) What is the difference between data mining and data profiling? **10**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

DIGITAL FORENSICS (CS-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is Exit?
- b) How steganography is different from cryptography?
- c) What is purpose of sandbox?
- d) Give the function of process explorer.
- e) What is file slack?
- f) Define Network Forensics.
- g) Discuss the working of IDS.
- h) Differentiate freezing and Honey Potting.
- i) What are artifacts?
- j) Name the tools that can be used for data recovery.

2x10

PART-A

Q.2 a) What is disk imaging? Why it is important to take disk image? Give steps to create disk image on FTK Imager. **10**
b) Discuss step by step procedure for computer forensics. **10**

Q.3 a) Discuss different models for live acquisition of network traffic. **10**
b) Give commands for domain name ownership investigation. **10**

Q.4 a) What are possible ways for acquisition of evidence? **5**
b) Discuss Authentication and analysis of evidence. **10**
c) What are the uses of forensics report? Is testimony similar to forensics report? **5**

PART-B

Q.5 a) What type of evidence could be found on mobile? Discuss different ways for mobile forensics. **10**
b) What is steganalysis? Discuss with its types. **10**

Q.6 a) Discuss different analysis techniques to acquire and analyze volatile memory. **10**
b) Is data collection and examination of volatile memory important? What type of data can be found there? **10**

Q.7 a) What are Rootkits? How they can be detected? **5**
b) How to analyze physical and process memory dumps for malware? **5**
c) Discuss analysis steps for finding malware in live windows. **10**

End Semester Examination, May 2019

M. Tech. – Second Semester

CONSTRUCTION ECONOMICS AND FINANCE (PC-CM-M-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Explain cash flow diagram.
 b) Differentiate between Nominal and effective interest rates.
 c) Explain rate of return.
 d) What is mortgage financing? **5x4**

PART-A

- Q.2 Explain time value of money in detail. **20**
- Q.3 Two pumps can be used for pumping corrosive liquid. Calculate which one is cheaper by present value method. **20**

	Pump A	Pump B
Cost	40000	95000
Valid life	3 years	5 years
Over handling cost	Rs. 15000 after 2000 hrs	Rs. 35000 after 9000 hrs
Operational Cost	Rs 25/hr	Rs 25/hr

- Q.4 What do you understand by working capital? Draw a typical diagram of operating cycle of working capital. **20**

PART-B

- Q.5 Discuss various sources of finance available to a construction company. **20**
- Q.6 Discuss all four types of ratios, and their relevance to the financial health of a construction company. **20**
- Q.7 A firm is planning to invest Rs. 80,000/- for procurement of an equipment which will generate a profit of Rs 1,40,000/- per year useful life is 10 years and salvage value is Rs 2,00,000/- at the end of 10 years. Calculate rate of return by using trial and error method. (Assume any missing data suitably). **20**

End Semester Examination, May 2019

B. Tech – Fourth Semester

DATA MINING AND PREDICTIVE MODELING (CS-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain KDD and mention the various phases of KDD process model.
- b) List down any four classification techniques.
- c) What is the advantage of sampling?
- d) Name any four major areas in which data mining can be applied.
- e) Introduce segmentation.
- f) Name the components in which dataset can be partitioned.
- g) What are outliers?
- h) Define the term: support in association.
- i) Briefly describe 'confusion matrix'.
- j) List down any four evaluation charts for model comparison.

2×10

PART-A

- Q.2** a) Industry follows a general standard for building data mining model. Identify the model and explain its phases. **10**
- b) Illustrate the major challenges in data mining. **10**
- Q.3** a) What are the various kinds of processes applied on data during data preparation? **10**
- b) Consider the minimum and maximum values for an attribute income in a dataset to be 12,000 and 98,000, respectively.
i) Use min-max normalization to transform a value 73,600 into range [0.0, 1.0].
ii) Use z-score normalization to transform a value 73,600. **5**
- c) Consider the values for attribute age"
4, 8, 15, 21, 21, 24, 25, 28, 34.
i) Use smoothing by bin means to smooth above data using bin depth of 3.
ii) Use smoothing by bin boundaries to smooth the given data taking bin depth of 3. **5**
- Q.4** a) Write a note on 'automated data preparation'. **6**
- b) Show how duplicacy can be removed from data. **5**
- c) Explain the term: data partitioning. What is its purpose? Explain in detail how various partitions are used in data mining. **9**

PART-B

- Q.5** a) Show diagrammatically a multi-layer feed forward neural network. Explain all the steps involved in its development. **10**
- b) What do you mean by classification by decision tree? Write an algorithm to generate a decision tree with the help of an example. **10**
- Q.6** A database has four transactions:

Tid	Items bought
-----	--------------

T100	{K, A, D, B}
T200	{D, A, C, E, B}
T300	{C, A, B, E}
T400	{B, A, D}

- a) Find all frequent itemsets using aprior algorithm. Consider minimum support=60% and minimum confidence=80%.
 b) List the strong association rules generated from the largest frequent itemset. **20**

- Q.7 a) Differentiate between “Gain Chart” and “Lift Chart” used for model evaluation. **10**
 b) Explain K-fold cross validation and boot strap method for estimating prediction error. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

IT SERVICE MANAGEMENT (CS-409)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) Define ITSM.
- b) What is the prime objective of ITSM?
- c) Discuss the relationship of capacity management with other process.
- d) What are the issues that are covered under PPO (Planning protection and optimization)?
- e) Differentiate between communities and collaboration.
- f) What are the stages of SLM process?
- g) What does financial management includes?
- h) What is usability testing?
- i) Discuss key activities of change evaluation.
- j) Discuss incident management briefly.

2×10

PART-A

- Q.2 a) Discuss the various goals of ITSM. **10**
- b) What are the four pillars of ITSM implementation also give the steps for ITSM implementation? **10**
- Q.3 a) What is demand management? Explain and discuss its key activities. **10**
- b) Define capacity management. How it is different from availability management? **5**
- c) Explain the availability management terminologies. **5**
- Q.4 a) What do you understand by information security management? Discuss ISM policy in detail. **10**
- b) Discuss roles and responsibilities of the following under PPO.
i) Availability Manager.
ii) IT service continuity manager. **10**

PART-B

- Q.5 a) Explain service offering and agreements. **5**
- b) What is service portfolio management? Give its processes. **5**
- c) Discuss business relation management and its classification. **10**
- Q.6 a) Explain change management and its classification. **5**
- b) Discuss the classification of service testing. **5**
- c) Define and explain change evaluation. Also discuss its classification. **10**
- Q.7 Write short notes on:
a) Event Management.
b) Request fulfillment.
c) Access Management.
d) Service desk. **5×4**

End Semester Examination, May 2019

M. Tech. – Second Semester

SOFT COMPUTING (PC-CS-M-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Briefly answer:

- Define Machine Learning and mention different Algorithm techniques in Machine Learning.
- How is K-NN different from K-means clustering?
- What is the difference between Manhattan distance and Euclidean distance? Which one is better for high dimensional plane?
- Implement for one Epoch a single layer Perceptron (SLP) N/W to train 'XOR' function with Binary inputs and targets. {Assume initial weights = 0 and bias b = 0}
- Justify perceptron as a nonlinear classification by drawing in the X-Y plane for the above in(d).

4x5

PART-A

Q.2 Given the fuzzy sets:-

$$\begin{aligned} \text{Tall}(X) = & \{0 \text{ if } X < 1.6m \\ & (X - 1.6m)/0.2, \text{ if } 1.6m \leq X < 1.8m \\ & 1, \text{ if } X \geq 1.8m\} \end{aligned}$$

$$\begin{aligned} \text{Short}(X) = & \{1 \text{ if } X < 1.6m \\ & (1.8m - X)/0.2, \text{ if } 1.6m \leq X < 1.8m \\ & 0, \text{ if } X \geq 1.8m\} \end{aligned}$$

- Sketch the graphs of Tall(X) and Short(X).
- i) Calculate the Union of the fuzzy sets Tall(X) and Short(X).
- ii) Calculate the Intersection of the fuzzy sets Tall(X) and Short(X).

20

Q.3 We have data from the primary survey and objective testing with two attributes (Acid Durability and Strength) to classify whether a special paper tissue is good or not. Here the four training samples are as:

X_1 = (Acid Durability) (Seconds)	X_2 = (Strength) (Kg/sq meter)	Y = Classification
7	7	Bad
7	4	Bad
3	4	Good
1	4	Good

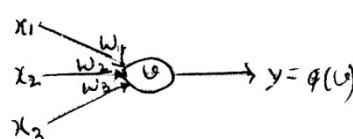
Now the factory produces a new paper tissue that pass lab test with $X_1 = 3$, $X_2 = 7$. Can we guess what the class (Good or Bad) of this new tissue is without going through another survey? (Assume K =3). **20**

Q.4 Consider the unit shown on Fig1. Suppose that the weights corresponding to the three inputs have the following values:

$$w_1 = 2$$

$$w_2 = -4$$

$$w_3 = 1$$



And the activation function is given by binary step function:

$$\phi(v) = \begin{cases} 1 & \text{if } v > 0 \\ 0 & \text{otherwise} \end{cases}$$

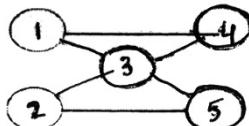
Calculate what will be the output value y of the unit for each of the following inputs patterns:

Pattern	P_1	P_2	P_3	P_4
X_1	1	0	1	1
X_2	0	1	0	1
X_3	0	1	1	1

20

PART-B

Q.5 Consider a simple Neural Network as shown:



Generate a population of genes by considering; if there is a connection of one neuron with other neuron, it will be represented by 1, otherwise 0.

Let the fitness f <bit string> be the integer represented by the binary number x (e.g. $f(00011) = 3$)

- Create an initial population containing five neurons.
- Discard the 2 least-fit ones (break ties randomly).
- Do a cross-over using the 2 most fit. Assuming the numbering goes from left to right and that $\xi_1 = 3$ for a one-point crossover.
- The 2 children that result and their parents constituted the next generation.
- Randomly mutate 1 bit in 1 string in the population.
- Go to step (b).

20

Q.6 a) Mention any five key features of Python and elaborate. Cite a fuzzy logic Python package that works with numpy arrays. **10**

b) What is dictionary in Python?

i) Specify a dictionary, which contains some keys as Country, Capital and PM with their corresponding values as India, Delhi and Modi, respectively.

ii) Looking at the below code, write down the final values of A0:

`A0 = dict(zip(('a','b','c','d','e'), (1,2,3,4,5)))`

10

Q.7 a) What are recent trends in Deep Learning and mention some classifiers. **10**

b) Write six application areas of Genetic algorithms and discuss on any one. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

THEORY OF AUTOMATA AND COMPUTATION (CS-404A)

Time: 3 hrs.

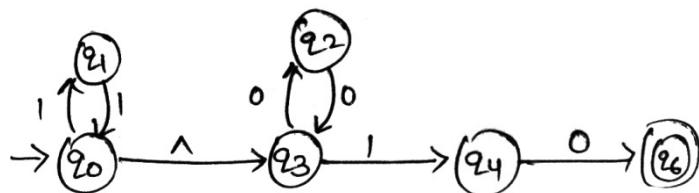
Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- Draw block diagram of finite automata and explain each component.
- Differentiate DFA and PDA.
- Write all tuples of turing machine.
- Give regular expression for the language on $\Sigma = \{a, b\}$.
- State conditions satisfied by derivation tree.
- State Arden's theorem for regular set.
- What is the difference between a recursive language and recursively enumerable language?
- Prove that if $\delta(q, x) = \delta(q, y)$ then prove $\delta(q, xz) = \delta(q, yz)$ for all strings z in Σ^* .
- Give applications of pushdown automata.
- Remove null productions from the following automata.



2×10

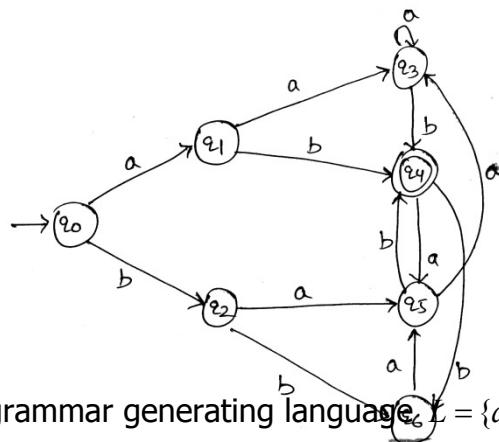
PART-A

Q.2 a) How NDFA is different from DFA? Also, specify which is better amongst two? **4**
 b) Construct a Moore machine equivalent to the Mealy machine:

Present State	a=0		a=1	
	Next State	Output	Next state	Output
→ q ₁	q ₁	1	q ₂	0
q ₂	q ₄	1	q ₄	1
q ₃	q ₂	1	q ₃	1
q ₄	q ₃	0	q ₁	1

6

- c) Construct a minimum state automata equivalent to the DFA describe by diagram.



10

Q.3 a) Construct a grammar generating language $L = \{a^n b^n c^i / n \geq 1, i \geq 0\}$.

8

- b) Classify different languages according to Chomsky classification and give example of each type. 8
- c) If G is $s \rightarrow as|bs|a|b$, Find $L(G)$. 4
- Q.4 a) Design a DFA corresponding to regular expression $(0+1)^*010(0+1)^*$. 7
- b) Show that $L = \{ww \mid w \in \{a,b\}^*\}$ is not regular. 6
- c) Find the set of strings over $\Sigma = \{a,b\}$ recognized by the transition system shown in the figure. 7
-
- PART-B**
- Q.5 a) Show that the grammar $\begin{array}{l} S \rightarrow a|absb / aAb \\ A \rightarrow bs|aAAb \end{array}$ is ambiguous. 5
- b) Reduce the grammar into GNF:
 $S \rightarrow 0S0|1S1|A$
 $A \rightarrow 2B3$
 $B \rightarrow 2B3|3$ 10
- $S \rightarrow 0B|1A$
- c) Find the reduced grammar equivalent to the following grammar $\begin{array}{l} A \rightarrow 0S|1AA|0 \\ B \rightarrow 1S|0BB|1 \end{array}$. 5
- Q.6 a) Construct a PDA accepting $\{a^n b^m a^n \mid m, n \geq 1\}$ by Null store. Construct the corresponding context free grammar accepting the same set. 14
- b) Construct a pushdown automata equivalent to the following:
 $CFG: S \rightarrow AB|BC$
 $B \rightarrow CA$
 $A \rightarrow a$
 $C \rightarrow AB|b$ 6
- Q.7 a) Design a Turing machine that accepts $\{1^n 2^n \mid n \geq 1\}$ and show the processing of string "1126". 10
- b) Does the PCP with two lists $x = (b, bab^3, ba)$ and $y = (b^3, ba, a)$ have a solution? 5
- c) Show that $f(x, y) = x^y$ is a primitive recursive function. 5

End Semester Examination, May 2019

B. Tech. – Second Semester

PROGRAMMING FOR PROBLEM SOLVING (ESC-CS-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

a) What do you understand by keywords in C language? Name any five.

b) How assignment operator is different from comparison operator?

c) Draw flowchart for printing odd numbers in the range 1-100.

d) Is the following code valid? Justify your answers:

```

main ( )
{
    int choice, a, b, c;
    Switch (choice)
    {
        Case '1':
            Print f (" hello");
            break;
        default:
            print f (" error message");
    }
}

```

e) What is cache memory? Why it is used in systems?

f) How character array is different from string?

g) Differentiate between getch () and gets () functions.

h) Differentiate between formal parameters and actual parameters.

i) What will be the output of following code?

```

Main ( )
{
    int x = 5;
    If (!x)
        print f (" hello world");
    else
        print f (" nice day");
}

```

j) What are the characteristics of 'C' language? **2x10**

PART-A

Q.2 a) What are the different components in a computer architecture? State their working principles also. **10**

b) Differentiate between algorithm and flowchart? **5**

c) Write is the algorithm to calculate reverse of a number? **5**

Q.3 a) What are the data types in 'C' language? Also provide the memory space required, format specifier and syntax to input and output their values. **7**

b) Write the flowchart and algorithm to print the pattern.

```

      1
     2  2
    3  3  3
   4  4  4  4.

```

13

- Q.4 a) Write a program to enter inventory details for a shop having multiple items. How memory is allocated to each item? **10**
b) If a two dimensional array is entered. Write a program to find transpose of it and check the position of elements in transposed array which is similar to original array. **10**

PART-B

- Q.5 a) Write a program to search an element in an array using linear search. **10**
b) Write a pseudo code for bubble sort. Explain its working and complexity. **10**
- Q.6 a) Write a recursive function to calculate factorial of a number. **8**
b) Write a program to add all elements of an array, using function call. **8**
c) What is callee function and called function? Give a syntax to justify your answer. **4**
- Q.7 a) Write a program to read characters from a file and display it. **10**
b) What are the indirection operator '*' in C language? How variable values can be accessed of secondary data type using indirection operator? **10**

End Semester Examination, May 2019
 B. Sc. (Data Science) – Second Semester
LINEAR ALGEBRA FOR DATA SCIENCE (DS-202)

Time: 3 hrs.

Max Marks: **75**
 No. of pages: **2**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Find the rank of matrix $A = \begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 4 \\ 1 & 2 & 3 & 4 \\ -1 & -2 & 6 & 7 \end{bmatrix}$
- b) Find the diagonal and trace of the matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 3 & 1 \end{bmatrix}$
- c) For what value of λ , the vectors $(1, -2, \lambda), (2, 1, 5), (3, -5, 7\lambda)$ are linearly dependent.
- d) If $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$, find all the Eigen values of A^{-1} .
- e) If $A = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$ is any orthogonal matrix, then find A^{-1} .
- f) Find the sum and the product of eigen values of the matrix: $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$

2½x6

PART-A

- Q.2 a) Write a matrix A into the sum of symmetric and skew-symmetric matrix, where **5**
 $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$
- b) Find the inverse of the matrix A , where $A = \begin{bmatrix} 2 & 1 & 2 & 1 \\ 6 & -6 & 6 & 12 \\ 4 & 3 & 3 & -3 \\ 2 & 2 & -1 & 1 \end{bmatrix}$ **10**

OR

- a) Find the rank of matrix $A = \begin{bmatrix} 1 & 1 & 2 & 3 \\ 1 & 3 & 0 & 3 \\ 1 & -2 & -3 & -3 \\ 1 & 1 & 2 & 3 \end{bmatrix}$ by reducing to its normal form. **5**
- b) Write the co-factor matrix of $A = \begin{bmatrix} 0 & 2 & 1 & 3 \\ 1 & 1 & -1 & -2 \\ 1 & 2 & 0 & 1 \\ -1 & 1 & 2 & 6 \end{bmatrix}$ **10**

- Q.3 Investigate for what values of λ and μ do the systems of equations $x + y + z = 6, x + 2y + 3z = 10, x + 2y + \lambda z = \mu$ have:
 i) No solution ii) unique solution iii) infinite solution.

OR

Find the value of λ such that the following equations:
 $\lambda x + 2y - 2z = 1$, $4x + 2\lambda y - 3z = 2$, $6x + 6y + \lambda z = 3$ have:
 i) unique solution, ii) infinite solution. 15

- Q.4 a) Are the following vectors are linearly dependent? If yes, find the relation between them, where $X = \{(2, 5, 2, -3), (3, 6, 5, 2), (4, 5, 14, 14), (5, 10, 8, 4)\}$. 10
 b) Let $T: R^2 \rightarrow R^2$ is defined by $F(x, y) = (x + y, x)$. Show that $F(x, y)$ is Linear. 5

OR

Let $T_1: R^3 \rightarrow R^2$ and $T_2: R^3 \rightarrow R^2$ be two linear transformations defined as
 $T_1(x, y, z) = (3x, y+z)$, $T_2(x, y, z) = (2x-3z, y)$.
 Compute $T_1 + T_2$, $5T_1$, $4T_1 - 5T_2$, T_1T_2 , T_2T_1 . 15

- Q.5 Find the Eigen values and Eigen vectors of the matrix: $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ 15

OR

$$A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$$

Find the characteristic equation of the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and use it to find the matrix represented by $A^5 + 5A^4 - 6A^3 + 2A^2 - 4A + 7I$. Further, express $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as a linear polynomial in A. 15

End Semester Examination, May 2019

B. Tech. – Sixth Semester

BACKUP AND DISASTER RECOVERY (CS-623)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) What are the objectives of backup process?
b) Explain hot swap and hot plug.
c) Describe the components of virtual machines.
d) Draw DR technology tree.
e) Explain multi target topology of disaster deployment. **4×5**

PART-A

- Q.2 a) What do you understand by disk storage and tape storage based on their structures. **10**
b) Differentiate between access centric and capacity centric devices. **10**
- Q.3 a) As per your opinion, what is the best architecture for data backup? Compare the various architectures. **12**
b) How many types of backup can be there? Explain. **8**
- Q.4 a) Are uptime and availability both refer to same terms? If not differentiate as per your understanding. **10**
b) In today's scenario, what components affect the availability? Also explain the levels of high availability. **10**

PART-B

- Q.5 a) How high availability (HA) can be achieved? Explain in detail. **10**
b) What is the importance of high availability clustering? **10**
- Q.6 a) In context with DR, what is the importance of risk analysis and business impact analysis? **10**
b) Differentiate and explain:
i) Hot site.
ii) WARM site.
iii) COLD site. **10**
- Q.7 a) Explain in detail the complete disaster recovery planning. **10**
b) Differentiate between local replication and remote replication. **10**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

INFORMATION SECURITY AUDIT AND MONITORING (CS-627)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Who is CGO? Discuss the responsibilities of CGO in brief.
- b) What is BISA and discuss the use of scorecards in BISA.
- c) How information security can be thought of as a business enabler? Discuss.
- d) Explain briefly why security is needed in insurance sector?
- e) Elaborate "mobile device policy".

4×5

PART-A

Q.2 a) List the best practices in BISA, followed in an industry. **10**
b) Describe UASL agreement in security in telecom sector. **10**

Q.3 a) Draw information security framework. Why it is needed in information security?
Discuss. **10**
b) How can the data of a cardholder be protected? Discuss. **10**

Q.4 a) Discuss in detail the requirement of identify and authenticate access to system
components. **10**
b) Discuss SOX (IT control testing) Global IS standards in detail. **10**

PART-B

Q.5 Write short notes on the following:

- a) IT Act of India.
- b) Statement of applicability. **10x2**

Q.6 List the business skills, communication skills and interpersonal skills for auditors.
Discuss each in detail with the help of example. **20**

Q.7 Describe the following concepts of auditing and security:

- a) Auditing tools.
- b) Role of an auditor. **10x2**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

BA AS SERVICE (CLOUD) (CS-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) "Explain benefits of Virtualization in terms of utility, security and manageability.
- b) Outline the differences between Type-I and Type-II Hypervisor.
- c) In the information age, as more and more information is generated, there is a need to share and distribute information. Explain how this can be solved with Network Virtualization.
- d) What does cloud computing change for the Cloud User.
- e) Explain when on premise Private Cloud is needed.
- f) Comment on proximity while preparing for Virtualization.
- g) What are new technologies that drive for business change?
- h) An organization may choose to build a Cloud within their datacenter. Identify the type of cloud a major factor contributing to the decision to set up a cloud in-house.
- i) Elaborate "Zero downtime maintenance" in cloud computing?
- j) Discuss the use of analytics in market complexity.

2×10

PART-A

Q.2 a) Compare traditional IT infrastructures with virtualized infrastructures in terms of provisioning sizing and utilization. **10**
b) Discuss impact of virtualization in detail. **10**

Q.3 There are shortcomings of conventional storage system, new protocols and implementation mechanisms were required to build more flexibility, manageability and interoperability into the storage systems. Justify how these new protocols and implementation have overcome conventional storage system. **20**

Q.4 a) "VPN does not require any dedicated leased lines to maintain confidentiality". Compare it with traditional LAN. **10**
b) If an application is made independent of the underlying platform, it is possible to do away with most of the difficulties and complexity of application lifecycle. Explain in terms of Java Virtual Machine. **10**

PART-B

Q.5 Virtualization and Cloud are two distinct technologies. However, in certain aspects these are related to each other. Discuss overlapping of Virtualization and Cloud in detail. **20**

Q.6 Cloud is set up to handle a fraction of the workload on Private Cloud and a fraction of the workload on the Public Cloud. Identify Cloud Deployment Model with its Pros and Cons. **20**

Q.7 a) How cloud computing can help to address key analytics challenges? **10**
b) Discuss the workload which is most suitable for a hybrid cloud. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DATA WAREHOUSING AND MULTI-DIMENSIONAL MODELING (CS-407)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is cleansing in data warehouse?
- b) How you can improve the performance of MOLAP?
- c) Write a note on 'data warehousing modeling'.
- d) Mention four descriptions on Snow Flake Schema.

5×4

PART-A

- | | | |
|-----|--|-----------|
| Q.2 | a) List out the different challenges while designing ROLAP. | 10 |
| | b) Write a note on the different architectures of a typical data warehouse system. | 10 |
| Q.3 | a) How the data mart is different from a data warehouse? | 8 |
| | b) What are the general characteristics and benefits of an ODS? | 12 |
| Q.4 | a) How requirement analysis phase is important in modelling? | 10 |
| | b) Write a note on 'multi-dimensional model structure'. | 10 |

PART-B

- | | | |
|-----|--|-----------|
| Q.5 | a) Briefly describe the validation techniques. | 8 |
| | b) What are the advantages of cubing services? | 12 |
| Q.6 | a) How can you improve the service of OLAP and M-OLAP? | 10 |
| | b) What are the usages of MOLAP, ROLAP system? | 10 |
| Q.7 | a) What is IBM Cognos Architecture? | 10 |
| | b) What is the fact-oriented design technique? | 10 |

End Semester Examination, May 2019

B. Tech. – Fourth Semester

INTRODUCTION TO VIRTUALIZATION AND CLOUD COMPUTING (CS-421)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Name the components of physical server.
b) List the benefits of virtualization.
c) Define logical volume manager.
d) List examples of application virtualization.
e) Define orchestration.
f) What are the advantages of hybrid cloud?
g) Define utility computing.
h) List the pros and cons of private cloud.
i) Differentiate between CAPEX and OPEX.
j) Define workloads.

2×10

PART-A

- Q.2 a) Compare traditional IT infrastructure with virtualized infrastructure. **10**
b) Describe the cost impact of virtualization. **5**
c) Write short note on time sharing systems. **5**
- Q.3 a) Classify the type of desktop virtualization based on the back end VDI technology. **10**
b) Explain the shortcoming of the conventional storage system. **5**
c) Differentiate between emulation and simulation. **5**
- Q.4 a) What is application virtualization? Discuss the steps involved in application lifecycle. **10**
b) Explain the working of VPN. Also, list the advantages of VLAN. **10**

PART-B

- Q.5 a) Briefly explain the anatomy of a cloud. **12**
b) Explain the relationship between grid and cloud computing. **8**
- Q.6 a) Explain the factor matrix of public cloud, private cloud and hybrid cloud. **10**
b) Write short notes on the following:
i) Cloud-brushing
ii) Multi-tenancy
iii) Resource-pooling. **10**
- Q.7 a) Discuss the workloads not suitable for private cloud. **5**
b) List five examples of Industry specific cloud workloads. **5**
c) List the various triggers for displaying virtualization in an organization. **10**

End Semester Examination, May 2019

B. Tech. — Fourth Semester
IT DATA SECURITY (CS-423)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List the various importance of data security.
- b) Explain “Adware”.
- c) What is packet sniffing?
- d) Explain shell shock and heart bleed threats.
- e) Define “Spoofing”.
- f) Explain “Session hijacking”.
- g) Explain the different types of firewall.
- h) Explain the term “Repudiation”.
- i) Explain the term “Tailgating”.
- j) Explain the “PASS” method of fire suppression.

2×10

PART-A

Q.2 Explain the following terms:

- a) Bot Net threat.
- b) Trojan horses.
- c) Passive capturing threat.
- d) Blue jacking.

5×4

Q.3 a) Define “Malware Threats”. Explain the various types of viruses in the data security. **10**
b) What is SQL injection? Explain in detail the process of SQL injection with the help of example. **10**

Q.4 a) Explain in detail the various steps in phishing and prephising. **10**
b) Define “Physical security threats”. Explain the different types of physical security threats. **10**

PART-B

Q.5 a) Write short notes on the following:

- i) Intrusion detection system.
- ii) Honeypot.

5×2

b) Explain the various banking Frauds counter measures in the security. **10**

Q.6 a) Explain the various DM2 protocol attack counter measures. **10**
b) Explain the various web application counter measures. **10**

Q.7 Discuss in detail any database activity monitoring tool used in data security. **20**

End Semester Examination, May 2019

M. Tech – Second Semester

RESOURCE MANAGEMENT ON CONTROL IN CONSTRUCTION (PC-CM-M-201)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Explain the following:

- a) Stakeholders of a construction project
- b) Different stages of a project
- c) Tender
- d) Expression of Interest
- e) Earnest Money Deposit
- f) Inspection and Quality Control
- g) Unsafe Acts in a construction project
- h) Labour Laws
- i) Total Quality Management
- j) Quality Control

2x10

PART-A

Q.2 Give organizational structure for a construction project and explain role of each level.

20

Q.3 How are bids evaluated for a tender? Give the process with examples. **20**

Q.4 What is the necessity of Labour Laws? List any three Laws and explain. **20**

PART-B

Q.5 Discuss the concept of quality in construction industry. How do you define construction quality? **20**

Q.6 a) What is safety? How safety is ensured at construction sites? **10**
b) What are different causes of Accidents? **10**

Q.7 Write down the stages of a construction project from start till completion. **20**

End Semester Examination, May 2019

B. Tech – Fourth Semester

CYBER SECURITY (CS-405)

Time: 3 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the difference between LAN and WAN?
- b) What are the various topologies in network?
- c) Who are phreakers?
- d) Define white hat and black hat hackers.
- e) What is denial of service attack?

2×5

PART-A

Q.2 a) Explain network architecture with the help of layered structure in open system interconnections. **7**

b) What are basic network utilities? **3**

Q.3 Write short notes on the following:

- a) Session hijacking. **3**
- b) Web attacks. **3**
- c) Viruses, worms and malware. **4**

Q.4 a) What do you understand by investment fraud? Also explain the technique of phishing? **6**

b) Write short notes on the following:

- i) Cyber stalking.
- ii) Identity theft. **2×2**

PART-B

Q.5 a) Explain the following terms in detail:

- i) Active scanning techniques.
- ii) Passive scanning techniques. **5×2**

Q.6 a) Explain the procedure to recover system logs to find evidence. **4**

b) Write short notes on the following:

- i) Secure the evidence.
- ii) Document trail. **3×2**

Q.7 a) What is the need of protection from cyber-crime? **5**

b) What is the scope and coverage of cyber laws? **5**

End Semester Examination, May 2019

B. Tech. — Sixth / Seventh Semester
SOFTWARE ENGINEERING (IT-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

- Q.1 a) State the drawbacks of waterfall model.
b) What is the basic difference between verification and validation process?
c) Who is software engineer? Specify roles of a software engineer.
d) Define modularity.
e) What is the significance of designing test cases?
f) Why record keeping is important for quality assurance?
g) What do you mean by term 'refinement'?
h) What is security testing?
i) How to find the size of a software product?
j) What is meant by level-O data flow diagram? **2x10**

PART-A

- Q.2 a) Explain the need of software engineering in software development. **5**
b) What is SDLC? Why do we need SDLC? **7**
c) Explain evolutionary prototyping model with diagram. **8**
- Q.3 a) What do you mean by requirement engineering? Explain various steps involved in requirement engineering. **10**
b) Why software requirement specification is important to create? **5**
c) What is functional modeling? **5**
- Q.4 a) Explain is COCOMO and mention the heuristic estimation techniques. **15**
b) What is the role of staffing and team structure in software project management? **5**

PART-B

- Q.5 a) Explain different system design concepts:
Abstraction, Refinement, Control Hierarchy, Data structure and Information Hiding. **14**
b) What do you mean by structural partitioning? **6**
- Q.6 a) State software testing objectives and principles. **10**
b) Create test cases for a scientific calculator. **10**
- Q.7 Explain the following terms:
a) CASE. **7**
b) Alpha testing vs Beta testing. **7**
c) Formal technical reviews. **6**

End Semester Examination, May 2019

B. Tech. — Sixth Semester
COMPILER DESIGN (CS-701)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List the phase that construct the front end of a compiler.
- b) What are tokens? How they are identified in lexical phase?
- c) Write the steps to find follow of the grammer.
- d) Define ambiguity of a grammer with example.
- e) What are the importance of compiler during execution of a process?
- f) List the various error recovery techniques.
- g) What is the meaning of left factoring and right factoring?
- h) Differentiate between handles and handle pruning.
- i) Define syntax analysis.
- j) What is meant by cross compiler?

2×10

PART-A

Q.2 a) What are elementary data types? How they are implemented? **10**
b) What is recursion? What are the various parameter transmission scheme? Explain in detail with example. **10**

Q.3 a) What are the specification of tokens in compiler? Explain with example. **10**
b) What are the importance of code optimization and code generation phase of compiler? **10**

Q.4 a) What is Parsing? How it is categorized apply the bottom-up parsing for the following grammer.

$$e \rightarrow e + t / t$$

$$t \rightarrow t^* f / t$$

$$f \rightarrow (e) / x$$

String is $(e + (e^* t))$

10

b) Compute the "first" set for following LL(1) grammer:

$$S \rightarrow Aa, A - BD, B \rightarrow b / \in, D \rightarrow d / \in .$$

10

PART-B

Q.5 a) Consider the expression $a = b^* - c + b^* - c$ write the three address code for the expression and write the quadruple representation for above. **12**
b) Explain the conceptual view of syntax directed translation. What is the purpose of syntax tree in the passing? **8**

Q.6 a) Discuss different types of errors and error recovery techniques with diagram. **15**
b) Discuss in brief Hash table and linked list as data structure for symbol table. **5**

Q7 Write short notes on the following:

- a) Code optimization. **6**
- b) Register allocation for temporary variable. **7**
- c) Forms of object code. **7**

End Semester Examination, May 2019

B. Tech.–Seventh Semester

DATA WAREHOUSE AND DATA MINING (IT-822)

Time: 3Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any two questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is KDD? What are the steps involved in KDD process?
- b) What are different Data Mining Tools?
- c) Explain how fact constellation schema is used for multidimensional database?
- d) How Graphs and networks are mined? Explain the process.
- e) Explain the process of Bit-mapped indexing.

4x5

PART-A

- Q.2 a) List the different operations of OLAP. Explain each with an example. **10**
b) Differentiate between DBMS and Data warehouse. **7**
c) Define metadata. Explain briefly with an example. **3**
- Q.3 a) Define Data Warehouse. Explain the implementation of Data warehouse, using Data warehouse architecture. **10**
b) What are the responsibilities of Data Warehouse manager? **8**
- Q.4 a) How data cubes can be efficiently computed? Explain in detail. **8**
b) How OLAP queries can be efficiently processed? **6**
c) Explain the process of indexing the OLAP queries. **6**

PART-B

- Q.5 a) Explain the concept to Market Basket Analysis? How is it implemented? **10**
b) How is association rule mining different from clustering? **10**
- Q.6 a) What is Partitioning? Explain different partition algorithms. **10**
b) Explain the concept of Apriori Algorithm Sort give an example for the same. **10**
- Q.7 Write short notes on the following:
a) Hierarchical Clustering. **7**
b) Density Based Partitioning. **7**
c) Grid Based Method. **6**

End Semester Examination, May 2019

M. Tech. (CSE) -Third Semester

BUSINESS INTELLIGENCE (CS-M-331)

Time: 3 hrs

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- | | | |
|-----|---|-----------|
| Q.1 | a) Describe the Business Intelligence Framework. | 10 |
| | b) Discuss different types of decisions supported by Business Intelligence. | 5 |
| Q.2 | a) What is Semi-structured data? Explain characteristics of semi structured data. List sources of semi structured data. | 10 |
| | b) Discuss different solutions to store unstructured data. | 5 |
| Q.3 | a) Explain the difference between roll-up and drill-down operations using an example. | 6 |
| | b) Differentiate between OLAP and OLTP. | 6 |
| | c) List the applications where you feel data of an OLTP should be warehoused. Justify your answer. | 3 |
| Q.4 | a) Compare data warehouse database and OLTP database. | 10 |
| | b) What is data mode? List various data models. | 5 |
| Q.5 | a) Explain the ETL process in detail. | 10 |
| | b) Differentiate between Schema Integration and Instance Integration with a suitable example. | 5 |
| Q.6 | a) Explain the requirements of dimensional modeling with an example. | 5 |
| | b) What are the various types of facts? Explain in detail. | 5 |
| | c) Explain role changing dimension with examples. | 5 |
| Q.7 | a) What is a dashboard? Explain importance of a dashboard for an enterprise. | 10 |
| | b) Discuss balanced scorecard as a strategy map. | 5 |
| Q.8 | a) Explain four components of a metric data. | 5 |
| | b) Discuss the salient attributes of good metric. | 5 |
| | c) What are KPIs? | 5 |

End Semester Examination, May 2019

B. Tech. – Third Semester

DISCRETE STRUCTURES (CS-301A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Determine the power set of set $A = \{\phi, \{\phi\}\}$.
 b) Define Multi-graph.
 c) Determine the cardinality of set $\theta = \{1, 1, m, m, m, n, n\}$
 d) Define Universal Quantifier with example.
 e) How many committees of three can be formed from eight people?
 f) What do you understand by Degree of the difference equation? Give example.
 g) Define Automorphism.
 h) What do you understand by a Coset? Give example.
 i) True or False "The spanning tree of a graph is unique". Justify your answer.
 j) Define Integral Domain with an example. **2×10**

PART-A

- Q.2 a) Write warshall's algorithm to find transitive closure.
 Let $A = \{1, 2, 3, 4\}$ and $R = \{(2, 1), (2, 3), (3, 2), (4, 3)\}$
 Find the transitive closure of R using warshall's algo. **10**
 b) Among first 500 positive integers.
 i) Determine the integers which are not divisible by 2, nor by 3, nor by 5.
 ii) Determine the integers which are exactly divisible by one of them. **10**
- Q.3 a) Construct the truth table for:
 i) $(p \rightarrow q \rightarrow r) \rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$
 ii) $(h \rightarrow i \wedge j) \rightarrow \neg (h \rightarrow i)$ **10**
 b) Using truth table, verify that the proposition is a contradiction.
 $(p \wedge q) \wedge \neg (p \vee q)$ **5**
 c) Prove that the statement $(p \rightarrow q) \rightarrow (p \wedge q)$ is a contingency. **5**

- Q.4 a) Prove by Mathematical Induction:
 $1(1!) + 2(2!) + 3(3!) + \dots + n(n!) = (n+1)! - 1$ **10**
 b) A box 'A' contains 2 white and 4 Black balls. Another box 'B' contains 5 white and 7 black balls. A ball is transferred from 'A' to 'B'. Then a ball is transferred from 'B' to 'A'. Find the probability that it will be a white ball. **10**

PART-B

- Q.5 a) Find the homogenous and particular solution:
 $a_r + 4a_{r-1} + 4a_{r-2} = r^2 - 3r + 5$ **10**
 b) Obtain the recurrence relation corresponding to the generating function:

$$A(x) = \frac{3 - 10x}{(1 - 4x)(1 - 2x)}$$
 10
- Q.6 a) Consider an algebraic system $(Q, *)$, where Q is the set of rational numbers and $*$ is a binary operation defined by:

$$a * b = a + b - ab, \forall a, b \in Q .$$

Determine whether $(Q, *)$ is a group.

10

b) Define the following terms with example:

i) Field

ii) Ring

iii) Normal Subgroup

iv) Semigroup

10

Q.7 a) Draw binary tree when the inorder and preorder traversal is given as follows: **10**

Inorder	Q	B	C	A	G	P	E	D	R
Preorder	G	B	Q	A	C	P	D	E	R

b) Discuss the following and give examples:

i) Bipartite graph

ii) Planar graph

iii) Hamiltonian Graph

iv) Isomorphic Graph

10

End Semester Examination, May 2019

B. Tech. – Fifth Semester

WEB TECHNOLOGY AND CYBER SECURITY (CS-504)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) Differentiate between internet and extranet.
- b) Differentiate between XML and DHTML.
- c) Write disadvantages of e-mail system.
- d) Define 'MIME'.
- e) What is the importance of a web-serves in JavaScripting?
- f) Give one example of ordered list and un-ordered list.
- g) What is Meta-search engine?
- h) What do you understand by URL?
- i) Discuss any one way to find evidence in computer system.
- j) List any five tags of HTML.

2×10

PART-A

Q.2 Explain the different connecting modes of internet with the help of example. **20**

Q.3 a) Create XML schema for displaying detail of seven books. **7**
b) Write a code to create a table for five students with detail like Roll No., Name, Class, Marks. **7**
c) Write a program to create frame. **6**

Q.4 a) Explain the significance of DOM model in JavaScript. **10**
b) What is the use of alert() and prompt() methods explain. **10**

PART-B

Q.5 a) Discuss PWS. Discuss the concept of server side scripting. **10**
b) Write a program to implement confirm box in JavaScript. **10**

Q.6 a) What are the methods of protecting yourself against cyber-crime? **10**
b) Discuss the concept of cyber laws and their scope. **10**

Q.7 a) What is cyber security? What is the purpose of cyber forensics? **10**
b) Write short notes on:
i) Identity theft.
ii) Cyber-crime. **5×2**

End Semester Examination, May 2019

M. Tech. (CSE) - First Semester

WIRELESS SENSOR NETWORK (PE-CS-M-122)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- Q.1 a) Explain the data acquisition process in case of Wireless Sensor Network. **10**
b) Discuss why SPIN protocol has better performance than the traditional Wireless Sensor Network protocols. **10**
- Q.2 a) Briefly discuss the design issues and the routing challenges faced in Wireless Sensor Network. **10**
b) Discuss the various network architecture schemes followed in Wireless Sensor Network. **10**
- Q.3 Discuss the key management processes of wireless sensor network in details. Also differentiate between the static and dynamic key management schemes. **20**
- Q.4 a) What are the key application areas of Wireless Sensor Network? **10**
b) Differentiate between the Proactive and Reactive mechanisms in MANET. **10**
- Q.5 Explain in details the various TCP protocols used for Wireless Sensor Network. **20**
- Q.6 a) Explain how NS-2 simulator is different from other traditional simulators. Explain the simulation process of NS-2 using any sample protocol. **10**
b) Explain the utility of following files w.r.t NS-2 simulator. **10**
1. NAM
2. TCL
3. AWK
4. X Graph
5. Cbrgen
- Q.7 Explain the different types of security vulnerabilities in wireless sensor networks. **20**
- Q.8 a) Differentiate between synchronized and duty-cycled protocols in Wireless Sensor Network. **10**
b) Differentiate between fixed access and random access MAC protocol design in Wireless Sensor Network. **10**

End Semester Examination, May 2019

B. Tech. — Third Semester

SOFTWARE ENGINEERING (IT-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Comment on the statement “software doesn’t wear out”.
- b) What are the fundamental activities of a software process?
- c) Mention the goal of software requirement.
- d) What do you understand by traceability of requirement?
- e) What is KLOC?
- f) What is the purpose of timeline chart?
- g) What is vertical partitioning?
- h) Name commonly used architectural styles.
- i) What is a test case?
- j) Define repository in software quality.

2x10

PART-A

- Q.2 a) Compare and contrast various SDLC models. **10**
b) What is software engineering? Why do we need software engineering? **10**
- Q.3 a) What is the difference between SRS document and design document? What are the contents we should contain in the SRS document and design document? **10**
b) List out requirement elicitation techniques. Which one is most popular and why? **10**
- Q.4 a) Explain in detail how scheduling of a project is done? **10**
b) What are the various types of risks that can be occurred in software project management? **10**

PART-B

- Q.5 a) Explain the control hierarchy, structure partitioning and information hiding design concepts. **10**
b) Explain the design guidelines that can be used to produce a good quality system design. **10**
- Q.6 a) Write the program to find largest of three numbers. Draw its flow diagram, compute cyclomatic complexity. Also design test cases for loop testing. **10**
b) Write short notes on:
 - i) Recovery Testing.
 - ii) Stress Testing.
 - iii) Performance Testing.
 - iv) Security Testing.**10**
- Q.7 a) Explain SQA activities in detail. **10**
b) What is CASE? How it supports software life cycle? **10**

End Semester Examination, May 2019

B. Tech.—Third Semester

DATABASE MANAGEMENT SYSTEMS (CS-305A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is DBA and specify the role of DBA in DBMA.
- b) Differentiate between strong entity and weak entity along with notation and example.
- c) Write the difference between DDL and DML.
- d) What do you mean by collision resolution? Further, various collision resolving techniques.
- e) Differentiate between union compatible and non-union compatible relations. **4×5**

PART-A

Q.2 a) What are the limitations of file based systems? **10**
b) Explain the components of DBMS environment. **10**

Q.3 a) Draw the E-R diagram of employee management system including:
i) Strong entity, weak entity.
ii) Composite and multivalued attribute.
iii) Total and partial participation. **4×3**
b) Write the reduction algorithm of E-R diagrams into database tables. **8**

Q.4 a) Explain the following with example:
i) Super key, candidate key, primary key and foreign key.
ii) 3NF and BCNF. **5×2**
b) What are various informal design guidelines of database? **10**

PART-B

Q.5 Consider the following relations:

EMPLOYEE (FName, LName, SSN, B.date, Gender, Salary, SuperSSN, Dno)

DEPARTMENT (Dname, Dnumber, MgrSSN, Mgr_Startdate)

WORKS_ON (EENO, PNO, Hours)

DEPENDENT (EENO, Dependent, Name, Relationship)

Project (Pname, Pnumber, Plocation, Dnum)

Write the queries to:

- a) Retrieve a list of name of dependents of all female employees.
- b) Retrieve Fname, Lname and salary of all employees who work in department no-10 and salary is greater than 10,000.
- c) Retrieve all employee names and name of department they manage (if they happen to manage a department).
- d) Retrieve the names of employees who works on all the projects that "John Li" works on. **5×4**

Q.6 a) Explain sequential file organization along with its operation. **10**
b) What is hashing? Explain various hashing techniques. **10**

Q.7 a) Define "Transaction". What are the ACID properties of transaction? Draw the state diagram of transaction. **10**
b) Define "Deadlock". Mention the mechanism for deadlock detection and recovery. **10**

End Semester Examination, May 2019

B. Tech. — Third Semester

MULTIMEDIA AND ANIMATION (IT-301)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Briefly explain different file formats.
- b) Define "Multimedia" and explain GIF.
- c) What is director X? Explain.
- d) Explain the role of multimedia in animation?
- e) What do you understand by term virtual reality? Elaborate.

4×5

PART-A

Q.2 a) Explain the various multimedia devices with the help of examples. **10**

- b) What is the role of ATM and ADSL in multimedia distributed network? Discuss in detail. **10**

Q.3 a) Write short notes on the following:

- i) JPEG-DCT encoding.
- i) JPEG statistical encoding.

5×2

- b) Compare and contrast between different images of a file formats. **10**

Q.4 Write short notes on the following:

- a) Desktop virtual reality.
- b) VR operating system.
- c) Intelligent VR software systems.
- d) Virtual environment display.

5×4

PART-B

Q.5 a) Explain different methods of encoding the analog signals. **10**

- b) Explain the significance of brief survey of speech recognition in audio representation. **10**

Q.6 a) Explain different principles of animation and also discuss the advantages of animation in multimedia technology. **10**

- b) Write a short note on DVI technology. **10**

Q.7 Write short notes on the following:

- a) Animation file formats.
- b) Flash tool box.
- c) Acrobat Photoshop.
- d) Publishing flash movies.

5×4

End Semester Examination, May 2019

M. Tech. (CSE) - Third Semester

INTRUSION DETECTION SYSTEM (CS-M-302)

Time: 3 hrs

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- | | | |
|-----|---|----------------------|
| Q.1 | a) Discuss the taxonomy of anomaly detection. Also discuss ANN in detail.
b) Elaborate tiered architecture of IDS what are the advantages of multilayer IDS. | 8
7 |
| Q.2 | a) Differentiate between HIDS and NIDS.
b) Discuss anatomy of IDS analysis schemes. | 8
7 |
| Q.3 | a) Is the false positive same as false negative? Can they both affect IDS performance?
How they can be reduced?
b) Give the key functions of IDPS. | 8
7 |
| Q.4 | a) Discuss step by step procedure to compile and install snort.
b) What are preprocessors? Discuss their advantages. | 8
7 |
| Q.5 | a) What are agents? Discuss the need of agents. Where can they be deployed?
b) Discuss architecture model of IDS. | 8
7 |
| Q.6 | a) State return of Investment (ROI) law enforcement.
b) How IDS can be secured? Does their deployment affect their security also? | 8
7 |
| Q.7 | Write short notes on:
a) Threat briefing.
b) Bayes theorem.
c) Clustering. | 5x3 |

End Semester Examination, May 2019

B. Tech. — Sixth / Seventh Semester

NETWORK SECURITY AND MANAGEMENT (CS-721A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the difference between a monoalphabetic cipher and polyalphabetic cipher?
- b) Explain the avalanche effect.
- c) Recall the concept of triple encryption.
- d) Differentiate between worm and virus.
- e) What characteristics are needed in secure hash function? **4×5**

PART-A

- Q.2 a) What are the key principle of security, explain with example. **10**
- b) Explain the concept of playfair cipher. What is the output of plain text "Hellow" if key used is "keyword" to encode it? **10**
- Q.3 a) Differentiate between stream cipher and blocks cipher. Also, explain the encryption and decryption of ECB mode. **10**
- b) How can the same key be used in triple DES? **5**
- c) Compare CBC mode with CFB mode. Also, explain which one is better. **5**
- Q.4 a) Explain password management scheme in detail. What are the basic things needed to be considered while creating a non-guessable password. **10**
- b) What are the different types of viruses? Also, explain the lifecycle of virus. **10**

PART-B

- Q.5 a) What two levels of functionality comprise a message authentication or digital signature mechanism? **10**
- b) Distinguish between MD5 and SHA algorithm. **4**
- c) Is it necessary to recover the secret key in order to attach a MAC algorithm? **6**
- Q.6 a) Discuss the purpose of SSL alert protocol. **5**
- b) Consider the given threat:
Password sniffing: passwords in HTTP or other application traffic are eavesdropped.
Describe how this can be countered by a particular feature of SSL. **5**
- c) Explain the different data compression techniques in detail. **10**
- Q.7 Write short notes on:
a) Broad network management.
b) RMON. **10×2**

End Semester Examination, May 2019

B. Tech. – First Semester

PROGRAMMING IN C (CS-103)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define data types in C.
b) Give any two differences between while loop and do-while loop.
c) Give any two uses of pointers.
d) Define array. Write the syntax for declaring 1D array.
e) What are the advantages of using unions in C?
f) Define recursion.
g) Define relational operator in C.
h) Write the syntax of switch statement.
i) What is file in C?
j) Explain function prototyping. **2×10**

PART-A

- Q.2 a) What are the types of operators used in C? Explain briefly with the help of examples. **10**
b) Write a C program to swap two numbers.
i) Using temporary variable.
ii) Without using temporary variable. **5×2**
- Q.3 a) Explain five string handling functions along with syntax. **10**
b) Write a C program to multiply two matrices. **10**
- Q.4 a) Define structure. Write a C program to store the information like name, roll number, marks of student and display it on the screen using structure. **12**
b) Explain array of structure with the help of an example. **8**

PART-B

- Q.5 a) Explain call-by-value and call-by-reference with the help of a program. **10**
b) Define pointers in C. How to access variable using pointers? Explain it with the help of a program. **10**
- Q.6 a) Write a C program to generate Fibonacci series using recursion. **10**
b) Explain functions and its parts with the help of a program. **10**
- Q.7 a) Explain error handling during file operations with the help of a program. **10**
b) Write a C program to copy the contents of one file to another. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

IT APPLICATION SECURITY (CS-542)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What do you understand by NYN flood attack?
b) Explain reflected cross site scripting attack with a demonstration using sample script.
c) Differentiate between encryption, encoding and hashing.
d) Why is word “password” a bad password?
e) How would you perform a security test on a web application in a scenario like “unauthenticated tests on login page”? **4×5**

PART-A

- Q.2 a) What is cross-site scripting? Differentiate between stored and reflected XSS? **7**
b) How can you defend from sql injection and XSS attack? **7**
c) Describe canonicalization and sensitivity of information in detail. **6**
- Q.3 a) How to prevent a cookie replay attack? **7**
b) How to defend again brute force login attack? **7**
c) How to prevent Network sniffing and eavesdropping? **6**
- Q.4 a) How administration interfaces are prove to unauthorized access? **7**
b) Explain session hijacking and Man-in-the-middle attack. **7**
c) What are configuration stores? How they can be prevented? **6**

PART-B

- Q.5 a) Differentiate between public key cryptography and private key cryptography with examples of algorithms in detail. **10**
b) How poor key generation can affect the security of system? **5**
c) Explain form field manipulation. **5**
- Q.6 a) How to prevent DOS attack against slow hashing functions?
b) How does captcha mitigate DDoS attack?
c) Write a note on logging.
d) Why “Penetration testing” is important. **5×4**
- Q.7 a) What is more secure? An open project or a proprietary project.
b) Is input validation sufficient to prevent XSS? What other measure should be taken?
c) List the attributes of security testing and describe in detail.
d) Explain session hijacking. **5×4**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

COMPUTER GRAPHICS (CS-502A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the difference between refresh buffer and frame buffer?
- b) Which concept is more used in graphics 4 connected or 8 connected and why?
- c) Give the reflection of a point about a line $x = 2$ in terms of transformation matrix.
- d) What do you mean by projection foreshortening?
- e) Explain plane geometry projection?
- f) Differentiate between image precision and object precision?
- g) Discuss the applications in which cavalier and cabinet projections are used.
- h) What you mean by boundary representation and space partitioning representation?
- i) Explain the purpose of image manipulation.
- j) What is control point?

2×10

PART-A

- Q.2 a) Discuss and drive expression for mid-point circle algorithm. Why we need polar coordinates to represent a circle? **10**
- b) Indicate which raster locations would be chosen by Bresenham's line drawing algorithm, when scan converting a line from pixel coordinate (1, 1) to pixel coordinate (8, 5). **10**
- Q.3 a) Transform a triangle with vertices A(0, 0), B(1, 1) and C(5, 2) such that (x, y) becomes $(2x+4, 3y+3)$, keeping c fixed in terms of transformation matrices. **12**
- b) Discuss scanline polygon fill algorithm in detail. **8**
- Q.4 a) Discuss "Window to Viewport Mapping". Find the normalized transformation for window to viewport such that window having left lower corner (2, 2) and right upper corner (6, 4) and viewport has lower left corner at (-1, -1) and right upper corner at (3, 3). **12**
- b) Discuss "Liang Bersky algorithm" for a line AB (20, 10) and (30, 40) and CD (-10, -10) and (-10, 30) and upper right corner at (60, 60). **8**

PART-B

- Q.5 a) A cube is projected onto xy plane. A(0, 0, 0), B(3, 0, 0), C(3, 3, 0), D(0, 3, 0), E(0, 3, 3), F(0, 0, 3), G(3, 0, 3) and H(3, 3, 3). Find transformation matrix for standard oblique projection at 60° angle. **10**
- b) Discuss 3D transformation for scaling, rotation and reflection in detail. **10**
- Q.6 a) What are Bezier curves and surfaces? Discuss the properties of Bezier curve. **10**
- b) Differentiate Bezier and B Spline curves. **5**
- c) Explain the properties of control points in detail. **5**
- Q.7 a) Discuss the Warnock's area subdivision algorithm for visible surface determination with the help of an example. **8**
- b) Discuss "Gouraud and Phong shading models". **8**
- c) What are image space and object space models? **4**

End Semester Examination, May 2019

B. Tech. — First Semester

PROGRAMMING FOR PROBLEM SOLVING (ESC-CS-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Is the following statement valid? Justify your answer:

$C = 5 / 9 (f - 32);$

- b) Write the syntax of a for loop? How it works?

- c) Write an algorithm to swap two numbers.

- d) What is the purpose of output device in computer and name any five output devices.

- e) What will be the output of the following code?

```
void main ( )
```

```
{
```

```
int x = 5
```

```
if (x > 10);
```

```
print("Hello");
```

```
print("Bye");
```

```
}
```

- f) What are different inbuilt string functions available in "C" language?

- g) Differentiate gets () and scan f() functions available in "C" language.

- h) What does compilation do? Explain your answer.

- i) Define "Pointer" with an example.

- j) Why do we need file in "C" language?

2×10

PART-A

- Q.2 a) What is an operating system? Explain its functions. **8**
- b) What is computer system? Explain with the suitable block diagram. **8**
- c) What are the various criteria to evaluate memory? **4**
- Q.3 a) What are the various data types supported by "C" language? Give memory requirement for each. **5**
- b) If a four digit number is input through the computer then write a program to swap first and fourth digit of that number. **10**
- c) Differentiate post increment and pre-increment operators in "C". **5**
- Q.4 a) What is an array? How memory is allocated to different types of arrays. **7**
- b) Create a structure named "Student" having fields "name", "age", "branch", "course" and input these fields for 15 students and extract student details which are from "CSE" branch. **10**
- c) Define "Union" with example. **3**

PART-B

- Q.5 a) Write a program to search an element from an array using linear algorithm. **10**
- b) How bubble sort works? Explain its working with an example and calculate its complexity. **10**

- Q.6 a) Write a program to calculate factorial of a number using recursion and use that function in the main () function to calculate $\frac{1}{1!} + \frac{2}{2!} + \frac{3}{3!} + \dots + \frac{5}{5!}$. **10**
- b) Differentiate “Call by value” and “Call by reference” in functions. **5**
- c) Why do we need functions? Explain in detail. **5**
- Q.7 a) How an array can be accessed through pointers? Explain with example. **7**
- b) Write a program to copy content of one file to another. **8**
- c) Explain different file opening modes in “C”. **5**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

SOFTWARE ENGINEERING AND DEVELOPMENT PROCESSES (CS-522)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is the need of visual modeling?
b) Explain “Include” relationship.
c) Explain “Naming Relationship” with the help of example.
d) How you can create attribute and operations in designing a class?
e) What are the benefits of iteration planning process? **4×5**

PART-A

- Q.2 a) What are the characteristics of software? **5**
b) Draw and explain waterfall software development model. **15**
- Q.3 Read the problem statement carefully and draw the use-case diagram for the given problem.
The online shopping system facilitates the customer to view the products, inquire about the product details, and product availability. It allows the customer to get register in order to purchase products. The customer can search products by browsing different product categories. Customer can place order and pay online. The systems allow the administrator to manage the products. He can modify the existing products categories to add new product categories. **20**
- Q.4 Draw and explain the class diagram of online shopping (consider problem statement as stated in Q.3). **20**

PART-B

- Q.5 a) Draw and explain the sequence diagram of ATM system. **10**
b) Draw and explain the collaboration diagram of ATM system. **10**
- Q.6 a) How will you make the model homogeneous? **10**
b) Explain 4+1 architecture in detail. **10**
- Q.7 Write short notes on:
a) Goals of iteration planning process.
b) Adding design class.
c) Designing attributes and operations.
d) Coding, Testing and documenting the iteration. **5×4**

End Semester Examination, May 2019

B. Tech. – Third Semester

WEB PROGRAMMING THROUGH PHP AND HTML (CS-205)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are events? Explain different types of event used in JavaScript.
b) What are variables? How are variables managed in PHP? Explain with an example.
c) What are superglobals? Why are they needed? Explain each with an example.
d) Write the code to validate that a radio button and a check box is mandatorily marked while submitting the form. **5×4**

PART-A

- Q.2 a) Write a PHP script and link it with an HTML form. **8**
b) Why PHP has become the most commonly used language for web development? Explain with an example. **12**
- Q.3 a) Write a program in PHP to implement swapping of two numbers by using call by reference method. **8**
b) Write a program in PHP to check the length of a string and replace each vowel with "\$". Print the final string. **12**
- Q.4 a) Create an array and implement all type of sorting function on this array. **10**
b) Explain the mechanism of file handling in PHP. Write a code to search and manipulate the records. **10**

PART-B

- Q.5 a) What do you mean by exception propagation? Give an example to create custom exception. **10**
b) Explain the concept of break and continue statement by giving a suitable example. **10**
- Q.6 a) What are cookies? Create an HTML form and apply validations on various fields using JavaScript. **10**
b) What is DOM passer? Give an example to read an XML file. **10**
- Q.7 a) Write down the features of SQL. Create a table in SQL and apply all the aggregation functions on it. **12**
b) Explain the various views of PHP. **8**

End Semester Examination, May 2019

B. Tech. – Seventh / Eighth Semester

BIG DATA ANALYTICS (CS-828 / CS-828A /CS-828B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Differentiate between SQL and NoSQL.
 b) Discuss any three Vs of Big data.
 c) Define the term deduplication
 d) What is Stream Processing Language (SPL)?
 e) Explain advantages of HBase.
 f) Discuss the role of flume.
 g) Write down the goals of big data access technologies for reporting and analysis.
 h) Explain the architecture of Big R.
 i) Discuss the differences between Hadoop and RDBMS.
 j) Explain concept of array in Jaql. **2×10**

PART-A

- Q.2 a) Briefly discuss the technologies and tools used in Big Data. **5**
 b) Explain how Big data analytics environment is different from others. **5**
 c) Define at least two case studies of big data with proper explanation. **10**
- Q.3 a) Draw the Framework for Hadoop. Also list out all the components with their functionalities. **8**
 b) Explain atleast five commands of HDFS. **5**
 c) Brief out the working of map reduce with an example called “word count”. **7**
- Q.4 a) What is JSON? Explain its features. **3**
 b) Write the concept of lazy evaluation with suitable examples. How is it different from normal assignment in Jaql? **5**
 c) Explain following operators of Jaql.
 i) Joining ii) Filtering. iii) Union iv) Group v) Top **12**

PART-B

- Q.5 a) Provide the syntax for the following commands with brief explanation.
 i) Hive : Create, Delete, Alter, Drop, LOAD SELECT, GROUP BY, ORDER BY, JOIN.
 ii) Pig : LOAD, STORE, DUMP, JOIN **12**
 b) Discuss the approaches used in Big data reporting and analysis. **8**
- Q.6 a) Explain with diagram how stream analysis works. **4**
 b) Discuss the following stream operators with example:
 i) Punctor ii) Aggregate iii) Join iv) Sort v) Barrier
 vi) pair vii) Delay viii) Throttle **16**
- Q.7 a) Explain the windowing technique. Also discuss its types and properties. **10**
 b) Write short notes on following terms:
 i) Debugging in stream processing language.
 ii) Edge adaptor in stream processing language. **5**
 c) Differentiate between list, sets and maps. **5**

End Semester Examination, May 2019

B. Tech. – Fifth / Seventh Semester

DISTRIBUTED OPERATING SYSTEM (CS-825)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Discuss co-scheduling for distributed operating system.
b) Name two useful properties that immutable files have.
c) Explain clock synchronization.
d) Briefly explain NUMA multiprocessor.
e) Does time stamping for concurrency control ensure serializability? Discuss. **4×5**

PART-A

- Q.2 a) What are peer groups and hierarchical groups? **5**
b) Discuss in detail the layered architecture of distributed systems. Discuss issues addressed at each layer. **10**
c) Tabulate advantages and disadvantages of client server model. **5**
- Q.3 a) What are the key design issues in a group communication? How these can be overcome? **10**
b) Define the concept of concurrency control. Explain efficient locking techniques to overcome the problem of concurrency with the help of an example. **10**
- Q.4 a) How critical regions and mutual exclusion can be implemented effectively in distributed system? **10**
b) How the threads are organized in a process? Also discuss various attributes needed to track while thread execution. **10**

PART-B

- Q.5 a) Discuss various design issues in distributed file system. **10**
b) Give reasons for offering file replication as a service. What are explicit and lazy file replications? **10**
- Q.6 a) Explain the page based distributed shared memory in detail. **10**
b) Explain any five consistency models in brief related to distributed shared memory. **10**
- Q.7 a) How process management works in MACH? **10**
b) Explain UNIX emulation in MACH. **10**

End Semester Examination, May 2019

B. Tech. — Third Semester

DATABASE MANAGEMENT SYSTEMS (CS-305A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What do you understand by terms database and DBMS?
- b) Define "Primary key" with example.
- c) What do you mean by domain constraints?
- d) Define "3NF".
- e) What is data independence?
- f) List any four applications of DBMS.
- g) Explain any two DML commands with example.
- h) Describe super key with example.
- i) What are shared locks?
- j) Explain what is concurrency control?

2×10

PART-A

- Q.2** a) Differentiate between traditional file processing system and DBMS. **10**
b) Discuss three tier DBMS architecture in detail. **10**
- Q.3** a) Draw an ER diagram for online shopping system. **10**
b) Differentiate between hierarchical model, network model and relational model. **10**
- Q.4** a) What do you mean by dependency preservation? **5**
b) Differentiate between lossy and lossless join decomposition. **5**
c) Student (stud_ID, stud_name, course, instructor_name, feespaid). Discuss the various anomalies present in the above database design. **10**

PART-B

- Q.5** a) Consider the following schema:
Student (RNo., Name, DOB, Percentage, DNo., Courses) department (DNo, DName, Head)
Write relational algebra expressions and tuple calculus expressions for the following:
i) Find student's name and course from CSE department.
ii) Get the student's name who has achieved percentage greater than 70. **10**
b) Discuss the relational algebra operation in detail with the help of examples. **10**
- Q.6** a) Explain how files are indexed in databases using index sequential file organization. **10**
b) What are hash functions? How can we resolve the collisions produced by these hash functions while indexing our files? **10**
- Q.7** a) Discuss about conflict serializability with an example. **10**
b) Explain 2-phase locking protocol. What benefits does strict two-phase locking protocol provides? Discuss its disadvantages. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

ITIM SERVICE MODULES AND BENEFITS (CS-508)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Which model can yield a one-time cost saving of 40% in an organization?
b) Why 24 × 7 supports services is preferred?
c) What is Dedicated hosting?
d) Why bridge is used?
e) What does UCC stands for?
f) “Cloud” in cloud computing represents what?
g) Which model provides end-to-end IT practices?
h) How many stages are for service improvement?
i) What is the operation of managed hosting?
j) What does MADP stand for? **2×10**

PART-A

- Q.2 a) What is FMS (Facility management System) Model? Explain its advantages and disadvantages. **10**
b) Draw and explain the RIMS model with the help of diagram. **10**
- Q.3 a) Explain the contribution of ITSM processes in 24 × 7 services. **10**
b) Explain the cost saving model. **10**
- Q.4 a) What the managed hosting? Explain the different types of managed hosting. **10**
b) Draw the architecture of stand hosting server. **10**

PART-B

- Q.5 a) Give a detailed structure of three multi-tiered approach in technical support system. **10**
b) Explain the different types of server. **10**
- Q.6 a) Draw a framework of mobile enterprise services. **10**
b) Explain the different need for managed mobility services. **10**
- Q.7 a) What are the different key features of cloud infrastructure services? **10**
b) Draw and explain the architecture of cloud computing. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

MANAGING THE CLOUD (CS-746)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between self-provisioning and dynamic provisioning.
 - b) Define "Resource Agent".
 - c) What is the benefit of using cloud monitoring feature?
 - d) Define "Preventive control".
 - e) What is service traffic hijacking?
 - f) What is cross site scripting (XSS) attacks?
 - g) Define "Pure hosting model".
 - h) What is data cluttering?
 - i) Why manual patching is mandatory in enterprise framework?
 - j) What are the chief critical success factors for the service catalog management process?
- 2×10**

PART-A

Q.2 a) Discuss the general architecture of cloud workflow management. **8**

- b) Briefly explain the following:
 - i) IAAS billing and metering services.
 - ii) PAAS billing and metering services.
- 6×2**

Q.3 a) Discuss how cloud computing affects the job roles in the infrastructure support team. **6**

- b) Write a short note on DevOps. **6**
- c) What is patch management? Discuss the method of patch management briefly. **8**

Q.4 a) Comment on the objective of ITIL in service catalog management. **5**

- b) What is configuration management? Also, discuss the role of configuration management in cloud. **10**

- c) Write a short note on chef server. **5**

PART-B

Q.5 a) Discuss the importance of cloud computing to the service ecosystem. **10**

- b) Explain the following terms:
 - i) Service orchestration.
 - ii) Service arbitrage.
 - iii) Service intermediation.
 - iv) Service aggregation.
- 2½×4**

Q.6 a) Explain the process of service development and on boarding for cloud service developers. **10**

- b) Write short notes on storefront. **5**
- c) Differentiate between brown field and green field. **5**

- Q.7 a) Briefly discuss the best practices that can reduce the risks associated with public cloud. **10**
b) Explain the security issues associated with the cloud. **10**

End Semester Examination, May 2019

B. Tech.–Seventh Semester

BIG DATA ANALYTICS (CS-828A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Oozie.
- b) Mention different activities performed in Map phase.
- c) Discuss different application areas where Machine learning techniques are used.
- d) Define Sqoop.
- e) What are different advantages associated with Big Data?
- f) Describe three major capabilities of spark that are used for data analytics.
- g) Differentiate between supervised and unsupervised learning.
- h) Write short note on 'Pig'.
- i) What are advantage of NOSQL databases?
- j) Discuss key advantages of Hadoop.

2x10

PART-A

- Q.2**
- a) Discuss with examples need of Big Data. Compare Big Data and Conventional Data. **5**
 - b) Discuss the risks associated with big data analytics. **5**
 - c) Discuss major technological challenges in managing Big Data and solutions for addressing those challenges. **10**
- Q.3**
- a) Explain Regression technique. Discuss logistic regression model in detail with an example. **8**
 - b) What is clustering technique for analysis? Discuss any clustering algorithm. Discuss various performance measures to evaluate clustering algorithms. **12**
- Q.4**
- a) Explain architecture of Apache HIVE with help of diagram. **8**
 - b) What is Hadoop cluster? Discuss different components of Hadoop cluster with help of suitable diagram. **12**

PART-B

- Q.5**
- a) Discuss the need of secondary NameNode in Hadoop cluster. **5**
 - b) Explain steps of how to load data into HDFS. **5**
 - c) Discuss functions of Job Tracker and Task Tracker in Map Reduce framework. **10**
- Q.6**
- a) How is Reporting performed on Big Data? **8**
 - b) How Indirect Batch Analysis is performed by Hadoop? Discuss different technologies used for Indirect Batch Analysis. **12**
- Q.7**
- a) Write short notes on:
 - i) Azure ML
 - ii) H₂O**10**
 - b) What are different types of Machine learning algorithms? Explain any one Machine learning algorithm in detail. **10**

End Semester Examination, May 2019

B. Tech – Fourth/Seventh Semester

COMPUTER NETWORKS (CS-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is data transmission? Differentiate between serial and parallel transmission.
- b) Discuss the types of guided and unguided medium.
- c) Compare and contrast LAN, WAN and MAN.
- d) Differentiate between point to point and multipoint connection.

5×4

PART-A

Q.2 a) Define "Multiplexing". Explain different types of multiplexing in computer networks. **10**
b) Explain TCP/IP reference model in detail. **10**

Q.3 a) Explain the layered protocol architecture, if IEEE 802.11 standard giving functionalities of MAC sub layer. **10**
b) What is ATM cell? Discuss the layered architecture of ATM with other functionalities. **10**

Q.4 Write short notes on the following:

- a) ISDN and B-ISDN. **7**
- b) Frame relay. **7**
- c) ATM signaling. **6**

PART-B

Q.5 a) Discuss in detail about RIP, BGP and OSPF protocols. **12**
b) Differentiate between TCP and UDP. **8**

Q.6 a) Write short notes on the following:

- i) DNS.
 - ii) IMAP.
 - iii) FTP. **4×3**
- b) What is MIME? Explain MIME with header format. **8**

Q.7 a) What is the significance of firewall? Explain the types of firewall in detail. **10**
b) Explain the security protocols defined by IP sec. (IPSec) with frame format. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

BIG DATA ANALYTICS (CS-828B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the function of expand operator in JAQL.
- b) Discuss the function of partitioner in Map Reduce.
- c) List the feature of JAQL Language.
- d) Discuss the need of arrow operator in JAQL.
- e) How to perform record subsetting in JAQL?
- f) Discuss need of core operators in JAQL.
- g) Explain difference between Parallel and Distributed Systems.
- h) Mention any two differences between Business Intelligence and Business Analytics.
- i) Explain import command of Sqoop.
- j) What is NOSQL? Is Hive a NOSQL, Justify.

2x10

PART-A

- Q.2** a) Discuss any two Big Data Technologies used in industry nowadays. **10**
b) What are major sources of big data? Discuss and describe sources of each type. **10**
- Q.3** a) Discuss key aspects of Hadoop. Explain main components of Hadoop with help of example. **10**
b) Explain any two architecture of big data adopted in industry. **5**
c) Explain need of Apache Flume. **5**
- Q.4** a) Mention three core operator of JAQL; group, top and sort by explaining their working with one example each at command line interface mode. **12**
b) Discuss features of HIVE Language. Write query to create table in HIVE and insert data in the table. **8**

PART-B

- Q.5** a) Discuss Pigstorage in Pig. What is Grunt in Pig? Does Pig use Map Reduce? **5**
b) Compare Hive and HBase. **5**
c) Discuss how direct reporting is performed for Big Data? Mention different techniques used for performing reporting for Big Data. **10**
- Q.6** a) How the applications are monitored, tracked in Infosphere streams? **5**
b) Explain Runtime view and development view of Infosphere stream objects. **5**
c) Write notes on:
i) Primitive operators of Stream Processing Language.
ii) Compare operators of Stream Processing Language. **10**
- Q.7** a) Write short notes on:
i) Throttle Operator
ii) Delay operator. **10**
b) What is a toolkit? Discuss any one toolkit used by Infosphere streams. Discuss concept of Toolkit versioning as well as its need. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

DATA COMMUNICATION AND COMPUTER NETWORKS (IT-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the different components of data communication?
- b) What do you understand by distributed processing in data communication?
- c) Give the formula for finding the data rates of the communication channels.
- d) Explain "Physical Layer Interfaces".
- e) What are the two approaches used for controlling transmission errors?
- f) Explain "RARP".
- g) Convert the address 1100000010101000000010100000001 in dot-decimal notation.
- h) Differentiate between 'static' and 'dynamic' routing methods.
- i) What is polling?
- j) Explain "firewall".

2×10

PART-A

Q.2 a) Explain different topologies used in data communication. Also explain their advantages and disadvantages in detail. **10**
b) Explain "asynchronous and synchronous transmission modes" with the help of diagrams. **10**

Q.3 a) Explain different transmission Medias used in data communication and networking. **10**
b) Explain different transmission impairments in detail (attenuation, limited bandwidth of the channels, delay distortion, noise). **10**

Q.4 a) Explain the following:

- i) Frequency division multiplexing. **3½**
 - ii) Time multiplexing. **3**
 - iii) Wave division multiplexing. **3½**
- b) Explain the following in detail:
- i) Secret Key cryptography.
 - ii) Public Key cryptography. **5×2**

PART-B

Q.5 a) Explain the functions of each layer of OSI reference model with the help of diagram. **10**
b) Explain different channel access methods. **10**

Q.6 a) Explain "Distributed Queue Dual Bus (DQDB)" in detail. **10**
b) Explain "Asynchronous Transfer Mode (ATM)" in detail. **10**

Q.7 a) Explain "VLANs" with the help of diagram. **10**
b) Explain "proxy servers" with the help of a diagram. **10**

End Semester Examination, May 2019

B. Tech – Fifth Semester

CYBER SECURITY (CS-405)

Time: 2 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) How spoofing is different from hacking?
- b) Why DNS poisoning is harmful?
- c) Explain trace route and IP config commands.
- d) Differentiate between bid shielding and shill bidding.

2×5

PART-A

Q.2 a) Define IP addressing and its various types. Convert 192.12.16.17 into binary and also define its class. **8**
b) Differentiate between mesh and star topology. **2**

Q.3 a) Is virus different from worm? Explain your answer briefly. **4**
b) Explain the following:
i) Web attack.
ii) Session hijacking. **3×2**

Q.4 a) What is auction, explain its types? Give the example of any website, used for auctions. Also explain the measures should be taken for protection from auction fraud. **8**
b) How visiting is different from spear phishing? **2**

PART-B

Q.5 a) Why SQL script injection and cross site scripting is different? Explain your reasons. **5**
b) What are actual attacks that occurs to your system? **3**

Q.6 a) What are the general guidelines of FBI forensics examination? **4**
b) Explain the process of finding evidence on computer system and web browser. **6**

Q.7 a) What is cyber security, how it is important and what is the future of cyber security in India. **6**
b) Explain laws against cyber-crime in India. **4**

End Semester Examination, May 2019

M. Tech. — Second Semester

SOFTWARE ENGINEERING AND TESTING (CS-M-301)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|--|------------|
| Q.1 | a) State the difference between coupling and cohesion with example. | 5 |
| | b) What is the software development life cycle? Explain in detail. | 5 |
| | c) State the different types of feasibility analysis. | 5 |
| Q.2 | a) Discuss 3 sigma and 6 sigma models for quality assurance. | 7 |
| | b) Explain the different quality assurance metrics. | 8 |
| Q.3 | a) Discuss the life cycle of a bug. | 7 |
| | b) What is the difference between failure, bug, error and incident? | 4 |
| | c) "Destructive approach for constructive testing". Comment on the statement with example. | 4 |
| Q.4 | a) What is the difference between inspection and walk through? | 5 |
| | b) What is the role of stub and driver in unit testing? Explain in detail. | 5 |
| | c) Explain the different types of integration testing in detail. | 5 |
| Q.5 | a) A program takes an angle as input within the range [0, 360] and determines in which quadrant the angle lies. Design test cases using equivalence class partitioning method. | 10 |
| | b) What is boundary value analysis? Explain with example. | 5 |
| Q.6 | a) Explain class testing and interclass testing. | 5 |
| | b) What are the integration testing levels in object oriented software? Explain in detail. | 10 |
| Q.7 | Write short notes on (any three) of the following: | |
| | a) Advantages of static testing. | |
| | b) Testing life cycle model. | |
| | c) Validation testing. | |
| | d) CMM. | 5×3 |

End Semester Examination, May 2019

M. Tech. (CSE) – Third Semester

ARTIFICIAL INTELLIGENCE (CS-M-204)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|--|------------|
| Q.1 | a) Differentiate between LISP and PROLOG. | 5 |
| | b) Explain in details:
i) Goal-driven agents.
ii) Simple-Reflex agents. | 10 |
| Q.2 | a) Discuss the concept of Iterative deepning search. | 5 |
| | b) Solve the following cryptarithmic problem using constraint satisfaction technique

SEND
+ MORE
<hr/> <u>MONEY</u> | 10 |
| Q.3 | a) What are the various approaches for knowledge representation? | 5 |
| | b) Demonstrate how forward reasoning is performed using a suitable example. | 10 |
| Q.4 | a) Prove the following using Resolution:
a) All hounds howl at night.
b) Anyone who has any cats will not have any mice.
c) Light sleepers do not have anything which howls at night.
d) John has either a cat or a hound.

Conclusion – If John is a light sleeper, then John does not have any mice. | 15 |
| Q.5 | a) Explain the following terms:
a) Non-monotonic reasoning.
b) Default Reasoning.
c) Bayesian Network. | 5x3 |
| Q.6 | a) Differentiate between supervised and unsupervised learning using suitable example. | 8 |
| | b) What is the utility of a Decision Tree? Explain. | 7 |
| Q.7 | a) Explain min-max algorithm for Game Playing. | 10 |
| | b) How does Alpha-beta pruning help in reducing search space? | 5 |

End Semester Examination, May 2019

B. Tech. – Seventh Semester

SOFTWARE PROJECT MANAGEMENT (IT-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define process planning?
- b) What are the activities covered by software project management?
- c) What are the importance of software development life cycle?
- d) Discuss in brief “principles at change management”.
- e) Discuss Risk Exposure and its type.
- f) Write short note on the Top-down estimation approach.
- g) Discuss scope Management.
- h) State the uses of cause and effect diagram.
- i) Define the term of process tailoring.
- j) What is the role of KPA's in CMM model?

2x10

PART-A

- Q.2 a) What are the requirements for change management? **10**
b) Define risk planning and risk avoidance. **5**
c) Discuss in brief the software project management life cycle in brief. **5**
- Q.3 a) What is the purpose of RAD model? Explain the working of prototype model. **10**
b) Explain the various stages of software development the cycle. **10**
- Q.4 a) How the software requirement specification document is created? What are the importance of SRS document in the project development. **10**
b) Explain the Delphi Cost Estimation Technique in detail. **10**

PART-B

- Q.5 a) Explain Defect prevention approach and what are the responsibilities for testers during defect prevention? **10**
b) Explain in detail the process of configuration management. **10**
- Q.6 a) What is pereto principle and its causes? Why we should focus on pereto principle? **10**
b) Explain the methodology for Risk assessment and how it can be controlled? **10**
- Q.7 Write short notes on the following:
a) Review Plan.
b) Project closer analysis.
c) Project closer Report.
d) Run Chart. **5x4**

End Semester Examination, May 2019

B. Tech. – First Semester

ELEMENTS OF COMPUTER AND PROGRAMMING (CS-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is EBCDIC code?
 b) Write the difference between ROM and PROM.
 c) Define ternary operator.
 d) Give the difference between union and structure.
 e) Convert $(643)_8 \rightarrow (\quad)_2$.
 f) Define actual and formal parameters.
 g) What is the difference between while and do-while?
 h) Explain size of operator in C.
 i) Write the difference between linker and loader.
 j) Define user defined header files. **2×10**

PART-A

- Q.2 a) Explain different types of memory and its function in detail. **10**
 b) Convert:
 i) $(721)_8 \square (\quad)_{10}$
 ii) $(3AF \cdot BC)_{16} = (\quad)_2$
 iii) $(\cdot 1101)_2 = (\quad)_{10}$
 iv) $(101010001110)_2 \square (\quad)_8$
 v) Find 2's complement of 22. **2×5**

- Q.3 a) Explain in detail machine language, assembly language and high level language. **10**
 b) Define algorithm. Write an algorithm to find highest of three numbers. **10**

- Q.4 a) Write a program to print all even numbers from 2 to 20. **5**
 b) Explain switch case statement. Write a program that determines in which quadrant an angle lies? **10**
 c) Differentiate between 1D and 2D array with example. **5**

PART-B

- Q.5 a) Define recursion. Write a program that computes x^y using recursion. **10**
 b) Write a program to print data of 100 books that includes (name, pages, price, edition) using structure. **10**
- Q.6 a) Explain call by value and call by reference by writing a program of swapping of two numbers. **10**
 b) Explain following suturing handling functions with program:
 i) Strcmp()
 ii) Strrev()
 iii) Strcat() **10**
- Q.7 a) Explain all file handling functions with the help of suitable example. **10**
 b) Explain: i) Pre-processor directives. ii) Header files. **5×2**

End Semester Examination, May 2019

M. Tech. - First Semester

ADVANCED DATA STRUCTURES (PC-CS-M-102)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- Q.1 a) What is Hashing? How it is useful? **8**
b) How to resolve collision using separate chaining? Explain its implemantal detail. **12**
- Q.2 a) What do you understand by rehashing? How it is advantageous over other techniques? **10**
b) What is extendible hashing? Explain its strategy. **10**
- Q.3 a) What is a skip list? Write and explain the procedure to update its element. **12**
b) Discuss probabilistic analysis of skip list. **8**
- Q.4 a) Write and explain the recursive procedure to insert a element in a BST **8**
b) Write the properties of a red-black tree, which properties are violated when an element is inserted? How to resolve the violated properties? **12**
- Q.5 a) Define LCS problem. Write and explain dynamic solution to LCS problem. **12**
b) Explain left and right rotations of an AVL tree. **8**
- Q.6 a) What is pattern matching? Explain its solution using Brute-Force method. **10**
b) Explain the algorithm to generate the Huffman code for the following characters:

Character	a	b	c	d	e	f
Frequency	45	13	12	16	9	5

(Length of the text is 100 characters) **10**
- Q.7 a) Explain the procedure to perform search operation on Priority search tree. **10**
b) Discuss Quad trees and k.D Trees. **10**
- Q.8 a) Discuss current trends in the field of Hashing. **10**
b) How new evolving problems can be solved using computational geometry method? **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

BUSINESS INTELLIGENCE (CS-741)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What do you understand by mobile BI?
b) List some ways of performing advanced analytics.
c) What do you understand by single sign on (SSO)?
d) Define business analyst and data scientist.
e) Differentiate between dashboard and scorecard.
f) How BI is different from traditional DBMS?
g) Define business strategy.
h) How can one maximize the value of business from BI?
i) List any five benefits of BI.
j) What are BI user groups? **2×10**

PART-A

- Q.2 a) Describe BI component and architecture in detail with suitable diagram. **10**
b) What is analytics? Explain different kinds of analytics with example. **10**
- Q.3 a) Explain the functional areas of various BI tools. **10**
b) What is DSS? Explain three tier decision support system. **10**
- Q.4 a) How mobile BI is different from disconnected BI? Support your answer with examples. **10**
b) What is real-time monitoring in BI? Explain in detail. **10**

PART-B

- Q.5 a) Explain project planning activities with the help of suitable diagram. **10**
b) Describe how to design and plan a BI project? Also, Explain tasks of a BI project. **10**
- Q.6 a) What are filters? Why are they used in reports? Compare different types of filters that can be applied on reports. **10**
b) Explain the principles for dashboard design. **10**
- Q.7 Explain the following terms with respect to BI.
a) Authentication and authorization.
b) Centralized and decentralized BI.
c) Phased and incremental BI road map.
d) EPM **5×4**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

MOBILE APPLICATION PROGRAMMING USING ANDROID (CS-544)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Name any four application framework components of android.
b) Mention the name of the layer in Android. Architecture which communicates with hardware?
c) What is the purpose of Deloitte Virtual machine?
d) Which file in android provides the essential information about your application?
e) An activity will be placed in which state, when some activity begins and is placed on top of the stack?
f) Define toggle button with an example.
g) What are dialogs in android?
h) Mention any two limitations of widgets.
i) What is the purpose of dependencies defined in gradle script?
j) How we define array of type strings in android using string xml file? **2×10**

PART-A

- Q.2 a) Explain android architecture in detail. **8**
b) Differentiate between Android operating system and windows operating system. **5**
c) Write the steps for creation of android virtual device, also explain the purpose of using this device. **7**
- Q.3 a) Explain the activity life cycle in detail. Also give the program to support your answer. **10**
b) Describe the concept of security in android. **10**
- Q.4 a) What are themes in android? Write the code to change the theme of an android. **10**
b) Describe the concept of nine patch drawable in detail. **7**
c) Explain progress dialogs in android. **6**

PART-B

- Q.5 a) Write the code to integrate google maps API with android applications. **10**
b) Write the steps for setting the network access in android. **10**
- Q.6 a) What are widgets in android? Write the steps for the creation of widgets on home screen of a handset. **10**
b) Write the pre-requisites steps required for publishing an application in android market. **10**
- Q.7 Write the short note on following:
a) Fragments.
b) Auto text view implementation. **10×2**

End Semester Examination, May 2019
B. Tech. — Sixth / Seventh Semester
MANAGEMENT INFORMATION SYSTEM (IT-721)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain different components of MIS.
- b) Explain design of MIS as a system.
- c) Differentiate between MIS and DSS.
- d) What is role of staff training and functional manuals in MIS?
- e) Explain data warehouse and data mining in MIS in brief.

5×4

PART-A

- Q.2 a) Explain different organizational sector using MIS. Also explain their functional models with examples. **10**
- b) What is the need of automated MIS? Give examples in support of your answer. **10**
- Q.3 a) Briefly explain information concepts and justify the term 'information as a quality product'. **10**
- b) Describe MIS software and MIS team in detail with help of suitable examples. **10**
- Q.4 a) What do you understand by long range plan for MIS? Explain in detail. **10**
- b) Elaborate on architecture of MIS. **10**

PART-B

- Q.5 a) What is the role of MIS in decision making? Explain with the help of an example. **10**
- b) Discuss how could you transform different strategies into MIS activities. **10**
- Q.6 a) What are the objectives and domains of MIS in service sector? Explain in detail. **10**
- b) Differentiate between 'enterprise business system' and 'supply chain management system'. **10**
- Q7 a) What are ethical and societal challenges of IT? Explain in detail. **10**
- b) How could you assure security of management of information system? Discuss in detail. **10**

End Semester Examination, May 2019

B. Tech. — Third Semester

OBJECT ORIENTED PROGRAMMING AND SYSTEMS (CS-304A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following question:

- a) Distinguish between data abstraction and data encapsulation.
- b) Define "Reusability".
- c) What is a member function?
- d) What are merits of friend function?
- e) Discuss importance of destructors.
- f) When do we use protected visibility specifies to a class member?
- g) Distinguish between overloaded function and function template.
- h) What are enumerated data types? Give an example.
- i) What should be placed inside catch block?
- j) What are unary operators?

2×10

PART-A

Q.2 a) Write a program in C++ that prints prime numbers between 1 to 10. **6**
b) What is dynamic binding? Distinguish between dynamic binding and message passing. How is dynamic binding useful in OOPS? **8**
c) What is an access modifier? Differentiate between private, public and protected access modifiers with the help of an example. **6**

Q.3 a) Can we have multiple constructors in a class? Justify with help of an example. **5**
b) Write a C++ program to perform the following. Define a class account to represent a bank account including the following:

Data members:

- *Account number.
- *Name of depositor.
- *Type of account.
- *Balance amount in account.

Member functions:

- *To assign initial values.
- *To deposit an amount.
- *To withdraw an amount after checking the balance.
- *To display name and balance.

15

Q.4 a) Why is it necessary to overload an operator? Write a C++ program to overload "+" operator to add two complex numbers. **10**
b) Write a C++ program to compute volume of cube and cylinder by overloading volume () function. **10**

PART-B

Q.5 a) Explain multiple inheritance with the help of an example. **10**
b) Differentiate between virtual and pure virtual function. Why and when pure virtual function is used? Give an example. **10**

Q.6 a) What is a file mode? Describe various file mode options in C++. **10**
b) Write a program in C++ to copy the contents of a file into another file. **10**

- Q.7** a) Explain with example exception handling mechanism in C++. **10**
 b) What is the need of templates? Explain class templates with help of example. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

INFORMATION SECURITY INTELLIGENCE AND COMPLIANCE ANALYTICS (CS-705)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Recall and explain four characteristics of Big-data.
- b) List down factors affecting network configuration manager.
- c) Report the examples of human generated and machine generated structured data.
- d) Explain role of splunk in detail.'
- e) Discuss various encryption techniques in big data.

4x5

PART-A

- Q.2** a) State how machine learning is commanding the endeavors over a wide assortment of ventures. **10**
- b) If statement "BI using big data is intelligence" stands true, then, with the help of case studies explain the future of big data. **10**
- Q.3** List down and explain the roles and responsibilities of big data team members. **20**
- Q.4** Describe big data acquisition process in detail. **20**

PART-B

- Q.5** a) Recall the source of structured and unstructured big data along with proper example.
b) Infer how decision analysis and machine learning comes hand-in-hand with big data. **20**
- Q.6** a) Explain various intellectual property challenges. **10**
b) Discuss why decision analytics and machine learning are important. **10**
- Q.7** Explain in detail Big Data visualization with the help of a neat labeled diagram of Big Data Warehouse and Data Lake. Further, list various challenges faced during Big Data visualization. **20**

Summer Semester Examination, May 2019

B. Tech. — Seventh Semester

IT DATA CENTRE TRANSFORMATION (CS-728)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Discuss the types of cloud services.
- b) How will you manage the airflow in a data centre?
- c) Explain Proxmox.
- d) What is power usage effectiveness?
- e) Describe HVDC.

4×5

PART-A

- Q.2 a) Explain the electrical infrastructure related to data centre. **10**
b) How data centre works to meet business priorities associated with IoT? **10**
- Q.3 a) Explain how power management in a data centre can be optimized. **10**
b) How will you optimize site-end facility for data centre optimization? **10**
- Q.4 a) Explain the procedure to design a liquid cooled server. **10**
b) Why hot-aisle and cold-aisle configuration is required? **10**

PART-B

- Q.5 a) Explain liquid cooling techniques used for cooling in data centre. **10**
b) What do you mean by data centre infrastructure management? Explain the primary components of data centre infrastructure management model. **10**
- Q.6 a) Explain five power challenges. **10**
b) Explain the key element of optimization strategy for data centre transformation. **10**
- Q.7 a) Explain new future technologies used for green data centre. **10**
b) Explain the strategies of any leading company towards green data centre. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

SYSTEM PROGRAMMING AND SYSTEM ADMINISTRATION (CS-703)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Discuss the various types of drivers.
- b) Define operating system.
- c) Give three string handling commands
- d) Define Overlays.
- e) Differentiate between Loaders and Linkers.
- f) What are translators?
- g) What is standard O/P?
- h) How can we add a user to a group?
- i) Define shell variables.
- j) What are viruses?

2×10

PART-A

- Q.2 a) What are Macros? How a macro can be called within another Macro? Explain with an example. **10**
- b) What are Software Tools? Discuss any four in details. **10**
- Q.3 a) Explain briefly the machine dependent features of an Assembler. **10**
- b) Draw and explain in detail the flowchart of PASS 1 of Assembler. **10**
- Q.4 a) How is UNIX different from windows? Also explain its Architecture. **10**
- b) Explain five user-to-user commands in UNIX. **5**
- c) Explain the concept of swapping using an example. **5**

PART-B

- Q.5 a) What is shell? Discuss the various shell programming constructs with examples. **10**
- b) What are Metacharacters and wild cards? **10**
- Q.6 a) What is the role of system administrator? What are the commands used for backup and restoration of files in UNIX? **12**
- b) Explain filters and pipelines with examples. **8**
- Q.7 Write short notes on:
- a) Virus control mechanism. **7**
 - b) I/O devices and drivers. **7**
 - c) Application Software. **6**

End Semester Examination, May 2019

B. Tech – Seventh Semester

IT DATA CENTRE TRANSFORMATION (CS-728)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Explain hybrid cloud.
b) Explain how IT equipment cooling is done?
c) Define 'virtualization'.
d) Which metric is used for data centre energy efficiency calculation? How is it calculated?
e) Introduce DCIM. **4x5**

PART-A

- Q.2 a) Explain the need of data center transformation in today's scenario. **10**
b) Discuss the classification of types of servers. **10**
- Q.3 a) How budget planning is performed for transforming data centre? **10**
b) Discuss the architecture of an IT data center. **10**
- Q.4 a) Expand ASRAE and ASRAE list down the ASRAE guidelines for IT equipment maintenance. **10**
b) What do you think is the impact of virtualization on tower trends? **10**

PART-B

- Q.5 a) Summarize the power and cooling challenges in today's data centre. **10**
b) Explain the step by step approach to transform data center into an optimized and energy efficient data center. **10**
- Q.6 a) Write notes on:
i) HVDC
ii) Liquid cooling. **10**
b) Give brief description of equipments for measurement of power and cooling component in data center like temperature, humidity, pressure, power, voltage etc. **10**
- Q.7 Discuss the transformation features for green data centers adopted in
i) Google ii) Yahoo. **10x2**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

INTRODUCTION TO IoT (CS-764)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Explain various IoT verticals in detail.
- b) Write advantages of using point-to-multipoint bridge topology.
- c) How does Ival act as a precondition for M2M service bootstrap?
- d) How IoT sensors can be studied. Explain.

4x5

PART-A

Q.2 a) Explain with diagram how IoT works conceptually. **15**
b) How IoT communications has been introduced? Explain. **5**

Q.3 a) What is SCADA software? How it is used in telemetry? **10**
b) How logistics tracking is done with the help of IoT? **10**

Q.4 a) Explain different technologies used for connectivity. Also, mention how IoT devices are connected to each other. **12**
b) What do you mean by IoT hosted services and how they maintain data on cloud? **8**

PART-B

Q.5 a) What is Bluetooth technology and list down various problems in Bluetooth technology? Further, mention how it is corrected in IoT. **10**
b) What is hall effect sensor? Explain its types and advantages of using it? **10**

Q.6 a) Write the security requirement for the IoT system. **8**
b) What is RFID system and explain main components of an RFID system with diagram. **12**

Q.7 a) How M2M based infrastructure monitoring is done? Explain with diagram. **10**
b) Explain access control implementation in IoT. **10**

End Semester Examination, May 2019

M. Tech. (CSE) – Second Semester

ADVANCED COMPUTER ARCHITECTURE (CS-M-201)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|------------|
| Q.1 | a) Compare CISC, RISC and VLIW in brief. | 6 |
| | b) Explain SISD, SIMD, MISD in detail. | 9 |
| Q.2 | a) What are the hazards that occur in pipelining in your opinion? Explain it. | 5 |
| | b) Explain pipelining. Discuss the advantages of pipelining. | 10 |
| Q.3 | a) What is cross bar switch? Explain uniform memory access multiprocessor. | 7 |
| | b) Explain the hierarchical bus system with proper diagram. | 8 |
| Q.4 | a) Explain in detail different message routing schemes used in message passing mechanism. | 10 |
| | b) Explain Full map directories and chained directories. | 5 |
| Q.5 | a) What is Linear pipeline processor? | 5 |
| | b) Explain with diagram the synchronous and asynchronous model of linear pipeline process. | 10 |
| Q.6 | Explain different dynamic connection network for multiprocessor architecture. | 15 |
| Q.7 | Explain the following:
a) NUMA Multiprocessor.
b) Translation lookaside Buffer.
c) Write-back and write-through policy in coherence problem. | 5x3 |

End Semester Examination, May 2019

B. Tech. – Fifth Semester

C# AND .NET (CS-523)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List the key differences between C++ and C# languages.
- b) Discuss the various applications which can be developed under the .NET framework.
- c) Does C# support the concept of "Automatic fall through" in switch-case statement? Justify your answer.
- d) Discuss the role of "MSIL" in .NET compilation process.
- e) Predict the output of the following code snippet:

```
class Program
{
    static void Main(string[] args)
    {
        string s1 = "God";
        string s2 = s1.Insert(2,"o");
        Console.WriteLine(s2);
        Console.ReadLine();
    }
}
```
- f) Differentiate between "Radio button" and "Check box control", giving examples.
- g) Explain the role of delegates in C#.
- h) Define "form" and "form controls" with respect to GUI applications.
- i) Define the role of ADO.NET technology in an application development,
- j) Explain the notion of "assemblies".

2×10

PART-A

Q.2 a) How mutable strings are different from Immutable strings? Explain giving examples. Write a program to perform copy and concatenation operation on Immutable strings in C#. **10**

b) How arrays in C# are different from arrays in C++? Explain the concept and usage of Jagged Arrays. **5**

c) Explain the concept of boxing and unboxing, with the help of a code snippet. **5**

Q.3 a) List the key features of "collections". Explain the concept of "Hash Table" and "Stack" collection, giving syntax/examples for adding and removing an element from the specified collection. **10**

b) Highlight key benefits of the Inheritance. Explain how multiple inheritance is feasible in C#, with the help of a program. **8**

c) How a class object can be indexed as an array? Explain. **2**

Q.4 a) Discuss the .NET Architecture with neat diagram, detailing role of each component. List the key responsibilities of a CLR. Also, explain the compilation and execution process in Microsoft Visual Studio IDE. **14**

b) How "Automatic Garbage Collection" takes place in .NET? Specify the method to explicitly enforce the garbage collection. **6**

PART-B

- Q.5 a) Give steps for designing a GUI, using windows forms for creating a "Login Form". Also mention the code of the event handler, for handling the click event of a "Submit/Login" button at run time. **10**
- b) What do you mean by MDI Applications? Explain giving examples. Give steps for creating an MDI Parent & MDI Child forms. Which properties are required to preset to make an MDI Parent and MDI Child form? **10**
- Q.6 a) Discuss the ADO.NET Architecture with neat diagram, detailing role of each component and .NET data objects. **12**
- b) Define the concept of a "data binding". Differentiate "simple" and "complex" binding, giving an example. **5**
- c) Differentiate between "connected" and "disconnected" data access models. **3**
- Q.7 Briefly discuss the following (**any four**):
- a) Authentication and Authorization with respect to .NET security.
 - b) Role based security policy.
 - c) Code access security policy.
 - d) Process/steps of web application development in ASP.NET.
 - e) Features of web applications.
- 4×5**

End Semester Examination, May 2019

M.Tech. (CE) -First Semester

DATA SCIENCE (PE-CS-M-124)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

Q.1 Write short notes on **(any two):**

- a) Principal component analysis.
- b) Hidden Markov Model.
- c) Machine Learning Packages in R Tool.

10x2

Q.2 a) Define over fitting and underfitting. **10**

- b) Give Baye's Theorem. **10**

Q.3 a) Define Regression.

- b) Define Data Mining.

- c) What is True Positive and False Positive in classification.

- d) Define Feature Extraction. **4x5**

Q.4 a) What is Bayes Theorem? How is it useful in a machine learning context? **10**

- b) What are the Basic concepts of text classification? Explain each. **10**

Q.5 a) How is KNN different from K-Means Clustering? **10**

- b) Assume the following dataset as given below:

$$\{(2,2), (4,4), (5,5), (6,6), (7,7), (9,9), (0,6), (6,0)\}$$

10

Use K-Means with K=3, for a single iteration, What are the new clusters and what are their centroids?

Q.6 a) Deep learning represents an unsupervised learning algorithm. Justify. **5**

- b) Differentiate between the following terms: **15**

i) Probability and Likelihood.

ii) Supervised and unsupervised learning.

iii) Classification and Clustering.

Q.7 a) How Machine learning programming is used to optimize the performance? Explain in detail. **10**

- b) Explain any two applications of Machine learning. **10**

Q.8 a) What do you understand by confusion matrix? **10**

- b) Construct confusion matrix and compute accuracy, precision and recall.

$$TN=50$$

$$FP=10$$

$$FN=5$$

$$TP=100$$

10

End Semester Examination, May 2019

B. Tech. – Eighth Semester

DATA WAREHOUSING AND DATA MINING (IT-822)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Briefly explain the advantages of OLAP over OLTP.
b) What are the basic functions of a local manager and a data warehouse manager?
c) What are the data warehouse backend tools and utilities?
d) Explain different coupling schemas of data mining systems when integrated with database and data warehouse. **5x4**

PART-A

- Q.2 a) Discuss multidimensional data model, data cubes, usefulness of hyper (multi) data cubes in data warehousing. Illustrate with an example. **15**
b) Differentiate between metadata and data marts. **5**
- Q.3 a) How does distributed and virtual data warehouses play a significant role while designing and implementing a data warehouse? Discuss in detail. **15**
b) What are the advantages and disadvantages of ROLAP, MOLAP and HOLAP? **5**
- Q.4 a) With the help of an example differentiate between warehousing and OLTP model. **10**
b) Explain the need and functionalities of OLAP query manager. **10**

PART-B

- Q.5 a) Discuss hierarchy specification pattern presentation and visualization specification in DMQL. **15**
b) How does clustering differ from classification? Discuss in brief. **5**
- Q.6 a) Explain the importance of predication using decision tree induction. **10**
b) Explain the method for mining multiple level association rules. **10**
- Q.7 Can you show that an integration of similarity-based search with data mining may bring important progress in multimedia data mining? You may take any one mining task, such as multi-dimensional analysis, classification, association or clustering, as an example. **20**

End Semester Examination, May 2019

B. Tech. – First Semester

INTRODUCTION TO OPEN SOURCE SOFTWARE AND OPEN STANDARDS (CS-104 / CS-104A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate Monolithic kernel and Micro Kernel.
- b) Why are Industries adopting standards?
- c) Discuss the attributes of adoption cost.
- d) Explain briefly vendor lock-in.
- e) Explain the role of ASEAN.
- f) Explain the significance of copyleft.
- g) Explain the terms: GNU, GPL.
- h) Discuss Open source community in brief.
- i) Discuss the common challenges in open source projects.
- J) Differentiate between open source and closed source.

2×10

PART-A

Q.2 a) Discuss in detail the various drivers of open source adoption in the world today. **10**
b) Discuss ASF. Explain the roles of people associated with it? **10**

Q.3 a) Explain the benefits of open source. **5**
b) Explain how one can become an open source contributor? **5**
c) Discuss Open Source Initiative in detail. **10**

Q.4 a) Both Red Hat Enterprise Linux (RHEL) and Fedora are backed by Red Hat, Inc. What is the difference between the two? Explain briefly. **10**
b) Who writes kernel? Why companies support kernel development? **10**

PART-B

Q.5 a) Differentiate between De facto and De jure Standards. Give examples. **5**
b) Discuss the various phases of life cycle of the evolution of standards with neat diagram. **10**
c) Explain the importance of standards. Why are organizations adopting open standards? **5**

Q.6 a) Discuss the following:
i) De facto standard setters
ii) De Jure standard setters **5×2**
b) Discuss the standard adoption methods and process in detail. **10**

Q.7 Write short notes on the following:
a) Open Web Standards.
b) Adoption barriers.
c) Open Document Format.
d) Transfer Account Procedure. **5×4**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

ADVANCED JAVA PROGRAMMING (IT-801)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write a program to access the metadata of result set in JDBC.
b) Write a program to access the methods of URL class in Java.
c) How components can be organized in swings? Explain classes and their methods.
d) What makes beans reusable in Java?
e) Explain authentication and authorization. Why Java is a secure language? **4×5**

PART-A

- Q.2 a) Write a program to create a JDBC connection and run the following queries.
i) Display all employee data where salary is greater than 20000 in table employee.
ii) To display employee records from table in reverse order from table employee. **5×2**
b) Why we use prepared statement in JDBC? Explain with an example. **5**
c) How do we handle multiple connections in Java? Explain in detail. **5**
- Q.3 a) How sockets can be used to write client-server applications? Explain in detail. **10**
b) Write short notes on:
i) Interruptible sockets.
ii) InetAddress class. **5×2**
- Q.4 a) Write a program to implement progress bar. Which class is used to check progress of reading an input stream? **10**
b) Write a program to make 'Hello' as bold and 'Java' as italic and set the back ground and foreground colour as red and yellow. **10**

PART-B

- Q.5 a) Write a program to draw basic geometric shapes. **10**
b) How do we clip an image in java? Explain with a suitable example. **10**
- Q.6 a) Explain Beam writing process with an example "Vehicle-Beam". And set and get its properties. **10**
b) What is Java Bean? Explain its properties. **10**
- Q.7 a) Explain plain text and cipher text what are various encryption and decryption techniques used in Java security. **10**
b) What is the purpose of class loader? Explain its processing in detail. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ADVANCED JAVA PROGRAMMING (IT-801)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and any **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Write a program to access the methods of URL connection class in Java.
- b) Explain scrollable and updatable result set and mention how it is different from row set?
- c) What is a J table? How do we add or remove rows from tables?
- d) Explain the concept of reusability in Java Beans.
- e) Explain encryption and decryption techniques.

5x4

PART-A

- Q.2** a) Write a program in Java to create a JDBC connection & run the following queries:
i) To display employee record from table employee in reverse order.
ii) To display all employee data whose name start with 'A'. **10**
- b) Differentiate between statement & prepared statement by citing a suitable example. **5**
- c) How do we access LDAP? Explain architecture of LDAP in detail. **5**
- Q.3** a) Write a program to implement client-server application. Explain in detail. **10**
b) Write short notes on:
i) Socket time out.
ii) Half-days. **10**
- Q.4** a) Write a program to implement J List. How do we add and remove elements from J-List? **10**
b) Write a program to make 'Java' as bold and 'coffee' as *italic* and set the background and foreground colour as red and yellow. **10**

PART-B

- Q.5** a) Design a program to study basic geometric transformations. **10**
b) Explain printing process in AWT with a program. **10**
- Q.6** a) Define Java beans. How do we set and get properties of a bean? **10**
b) Explain bean writing process in detail with an example 'student-bean' and set and get its properties. **10**
- Q.7** a) How byte-codes can be verified in Java? Explain in detail. **10**
b) Is Java a secure language? Explain code signing process in detail. **10**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are Logic Bombs?
- b) Why there is need for key management in public key Cryptography?
- c) Describe the components of AAA.
- d) Discuss the role of SSL in OSI model.
- e) Define Multi-tenancy.
- f) Comment on PKI.
- g) What do you mean by IAM?
- h) How CIA components are helpful in Security.
- i) Discuss advantages of Digital Signature in Cloud Computing Security.

2×10

PART-A

Q.2 a) Explain how Users can be authenticated by operating System. Discuss how techniques of Cod review help to improve application security. **10**
b) State what role application layer plays to secure information and data. **10**

Q.3 a) Discuss various Security risk and benefits with respect to cloud computing. **10**
b) Comment on Multifactor authentication. **10**

Q.4 a) What are the factors to ensure that cloud networks and connections are secure? **10**
b) What are the various approaches existing for authorization. **10**

PART-B

Q.5 a) Discuss Challenges associated with phases of Identity and access management. **10**
b) Discuss in detail about federated identity management. **10**

Q.6 a) Explain PGP and X.509 Certificate format. **10**
b) Discuss importance of digital Signature. **10**

Q.7 a) How mutual SSL authentication works similar to SSL. **10**
b) Secret is not a secret if it is known to more than one person. State the challenge posed by Private key sharing and discuss corporate signing with respect to this. **10**

End Semester Examination, May 2019

B. Tech. — Seventh / Eighth Semester

NETWORK PROGRAMMING AND ADMINISTRATION (IT-701)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between socket and TLI.
- b) Differentiate between ipconfig and if config.
- c) Define echo service.
- d) Differentiate between SNFS and AFS.
- e) State the role of proxy server.
- f) State the differences between linux and windows OS.
- g) Differentiate between TCP and UDP.
- h) State the disadvantages of classful addressing.
- i) Name the four types of addresses in networking.
- j) Differentiate between ARP and RARP.

2×10

PART-A

- Q.2 a) State the primary purpose of ICMP protocol in network layer. **6**
b) Why do we need network address translation? **4**
c) State the difference between OSPF and BGP dynamic routing protocol. **7**
d) Write the examples of private address spaces. **3**
- Q.3 a) Define sockets and throw some light on its types. **5**
b) Differentiate between TCP and UDP. **5**
c) Explain the I/O system calls of TCP elementary socket with suitable diagram. **10**
- Q.4 a) Write and explain the algorithm for literature connection oriented server with its process structure. **8**
b) State the difference between iterative and concurrent server. **4**
c) Throw some light on multiprotocol server with its process structure. **8**

PART-B

- Q.5 a) State the analogy between RPC of client and server. **10**
b) Write and explain the algorithm of dynamic port mapping with a labeled diagram. **10**
- Q.6 a) Write the steps to configure Linux server as a router. **10**
b) Write the steps to configure DNS server. **10**
- Q.7 a) Differentiate between wrappers and firewalls. **7**
b) What is password aging? **3**
c) Explain the categories of security. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

ADVANCED JAVA PROGRAMMING (IT-801)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and any **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is socket time out?
- b) Explain difference between URL and URI.
- c) Write steps to configure LDAP server.
- d) What are beans? Explain bean writing process in detail with the help of an example.
- e) Illustrate the use of prepared statement with the help of a program. **4x5**

PART-A

- Q.2 a) Write a program to store student information in database. **10**
b) Explain different types of Rowset and write a program to implement cached Rowset. **10**
- Q.3 a) With reference to sockets, explain with program how client/server communication is accomplished in java? **10**
b) Explain how to get information about a given URL. **5**
c) Explain the need of JNDI with diagram. **5**
- Q.4 a) What are component organizers? Write a program to implement list? **10**
b) Describe various styled text components. **10**

PART-B

- Q.5 a) Explain the following:
i) Transparency.
ii) Composition. **10**
b) How printing is done using AWT components in java? Explain with the help of an example. **10**
- Q.6 a) What is java bean? List the steps to create a new bean. **10**
b) Describe various properties of java beans. **10**
- Q.7 Write short notes on:
a) Digital signatures.
b) Class loaders.
c) Code signing.
d) Encryption. **5x4**

End Semester Examination, May 2019

B. Tech – Seventh Semester

IT NETWORK SECURITY (CS-706)

Time: 3Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) What are the different characteristics of TCP and UDP Protocol with an example?
- b) Differentiate between Hub, Switch and Gateways with an example?
- c) What is the importance of NAT in Firewalls?
- d) Why Penetration testing is essential? Explain briefly.
- e) Explain the different types of VPN?

4x5

PART-A

- Q.2 a) Describe the OSI Model by characterizing each layer with its functions and various attacks? **10**
- b) Differentiate between the TCP header and UDP header with its applications? **10**
- Q.3 a) Explain the major weakness of LAN Manager Authentication Protocol? **5**
- b) Difference between RIP, OSPF and BGP Protocols? **5**
- c) What is DNS Server? Differentiate between iterative and recursive DNS Queries. **10**
- Q.4 a) Explain the architecture of Firewalls with various Firewall technologies? **10**
- b) What are the various E-mail security solutions? Difference between authentication and authorization? Describe the various authentication protocols". **10**

PART-B

- Q.5 a) Explain the advantages and disadvantages of a wireless network? Difference between WEP, WPA and WPA2? **10**
- b) Define RAID? Explain with its architecture? **10**
- Q.6 Write short notes on the following:
a) Net view.
b) Open view. **20**
- Q.7 a) List and explain different stages of Penetration Testing? **10**
- b) What are the different types and methods of Penetration Testing? **10**

End Semester Examination, May 2019

B. Tech – Seventh Semester

IT NETWORK SECURITY (CS-706)

Time: 3Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) Compare briefly OSI with TCP /IP.
- b) Briefly explain the importance of penetration testing.
- c) How HTTP differs from HTTPS? Explain.
- d) Differentiate between table driven and on-demand routing protocols.
- e) Briefly explain the special features of open view.

4x5

PART-A

Q.2 a) What functions are carried out by various layers of TCP/IP? Discuss with the help of a block diagram? **10**
b) What is LAN? Describe the various LAN technologies. **10**

Q.3 a) What is domain name system (DNS)? Explain the communication of application layer with WWW. **5**
b) Write short notes on following:
i) DHCP
ii) NFS **5x2**

Q.4 a) Briefly explain the concept of protocols in network. How authentication protocols are used in network security? **10**
b) What are the different types of firewall? Give the examples of hardware and software firewalls. **10**

PART-B

Q.5 a) Define 'encryption'. How encryption is done using WEP, WPA and WPA2? **10**
b) Explain WAN. How SDLC differs from HDLC? **10**

Q.6 Write short notes on the following:
a) Net manager.
b) Net view. **20**

Q.7 a) Explain the various stages of testing. **10**
b) Why penetration testing is essential? Discuss the different stages of penetration testing. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

TECHNOLOGY AND TOOLS FOR INFRASTRUCTURE MANAGEMENT (CS-729)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is hyper conveyed infrastructure?
- b) List the phases of incident management lifecycle.
- c) Define the term "Enterprise Mobility Management".
- d) Name any four important tools used for IT infrastructure management.
- e) How HEAT software provides voice-enabled "ZERO-TOUCH" support?
- f) Define the role of IP host N/W monitor.
- g) What kind of information is gathered for requirement fulfillment?
- h) Define "CMDB".
- i) State the purpose of event management.
- j) What are the benefits of RPA (Robotic Process Automation)? **2×10**

PART-A

- Q.2 a) What are the emerging trends in IT Ingra structure management (IOT)? **10**
- b) Explain Omni-channel IT support approach. Also discuss the kind of changes that it has bought in IT infrastructure. **10**
- Q.3 a) Explain release request life cycle with diagram. **10**
- b) State the functionalities of atrium service level management. **10**
- Q.4 a) What services are offered by ITIL service catalog? **5**
- b) State the advantages of BMC remedy. **5**
- c) Discuss Cherwell's ITIL incident management process with diagram. **10**

PART-B

- Q.5 a) How to monitor IT infrastructure? State differences between IT infrastructure mapping and IT infrastructure monitoring. **10**
- b) Discuss Cherwell's service desk software used for modern enterprise. Also mention its benefits. **10**
- Q.6 a) What are the IT operational challenges faced by an organization? **5**
- b) Define the roles and responsibilities in line with various ITSM processes. **5**
- c) Discuss the features of IPHost network monitoring tool. **10**
- Q.7 Write short notes on the following:
- a) Workflow management. **8**
 - b) Requirement gathering process. **5**
 - c) End-User experiences (EUX). **7**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

TECHNOLOGY AND TOOLS FOR INFRASTRUCTURE MANAGEMENT (CS-729)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is hyper conveyed infrastructure?
- b) List the phases of incident management lifecycle.
- c) Define the term "Enterprise Mobility Management".
- d) Name any four important tools used for IT infrastructure management.
- e) How HEAT software provides voice-enabled "ZERO-TOUCH" support?
- f) Define the role of IP host N/W monitor.
- g) What kind of information is gathered for requirement fulfillment?
- h) Define "CMDB".
- i) State the purpose of event management.
- j) What are the benefits of RPA (Robotic Process Automation)? **2×10**

PART-A

- Q.2 a) What are the emerging trends in IT Ingra structure management (IOT)? **10**
- b) Explain Omni-channel IT support approach. Also discuss the kind of changes that it has bought in IT infrastructure. **10**
- Q.3 a) Explain release request life cycle with diagram. **10**
- b) State the functionalities of atrium service level management. **10**
- Q.4 a) What services are offered by ITIL service catalog? **5**
- b) State the advantages of BMC remedy. **5**
- c) Discuss Cherwell's ITIL incident management process with diagram. **10**

PART-B

- Q.5 a) How to monitor IT infrastructure? State differences between IT infrastructure mapping and IT infrastructure monitoring. **10**
- b) Discuss Cherwell's service desk software used for modern enterprise. Also mention its benefits. **10**
- Q.6 a) What are the IT operational challenges faced by an organization? **5**
- b) Define the roles and responsibilities in line with various ITSM processes. **5**
- c) Discuss the features of IPHost network monitoring tool. **10**
- Q.7 Write short notes on the following:
- a) Workflow management. **8**
 - b) Requirement gathering process. **5**
 - c) End-User experiences (EUX). **7**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

IT DATA CENTRE TRANSFORMATION (CS-728)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is the need of green data centre?
b) Recall "blade server".
c) Explain the term virtualization.
d) What is HVDC?
e) What is the benefit of liquid cooling?

4×5

PART-A

- Q.2 a) What benefits do end users avail after data centre transformation? **10**
b) Discuss the performance overview of cloud computing. **10**
- Q.3 a) How optimization task is initiated for the objective of transforming data centre? **10**
b) How physical infrastructure of a data centre needs to be modified for its transformation? **10**
- Q.4 a) Discuss the importance of maintaining a particular temperature and humidity in a data centre. **10**
b) Introduce and explain liquid cooled servers. **10**

PART-B

- Q.5 a) What impact the data centre challenges can have on the data centre energy consumption? Discuss in detail. **10**
b) Which metric is used to check the energy efficiency of a data centre? How is it calculated? Explain with an example. **10**
- Q.6 a) Introduce data centre infrastructure management. **10**
b) What are the alternative sources of energy for data centres? **10**
- Q.7 Discuss the transformation features for green data centres adopted in:
a) IBM
b) Facebook **10×2**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

IT DATA CENTRE TRANSFORMATION (CS-728)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is the need of green data centre?
b) Recall "blade server".
c) Explain the term virtualization.
d) What is HVDC?
e) What is the benefit of liquid cooling?

4×5

PART-A

- Q.2 a) What benefits do end users avail after data centre transformation? **10**
b) Discuss the performance overview of cloud computing. **10**
- Q.3 a) How optimization task is initiated for the objective of transforming data centre? **10**
b) How physical infrastructure of a data centre needs to be modified for its transformation? **10**
- Q.4 a) Discuss the importance of maintaining a particular temperature and humidity in a data centre. **10**
b) Introduce and explain liquid cooled servers. **10**

PART-B

- Q.5 a) What impact the data centre challenges can have on the data centre energy consumption? Discuss in detail. **10**
b) Which metric is used to check the energy efficiency of a data centre? How is it calculated? Explain with an example. **10**
- Q.6 a) Introduce data centre infrastructure management. **10**
b) What are the alternative sources of energy for data centres? **10**
- Q.7 Discuss the transformation features for green data centres adopted in:
a) IBM
b) Facebook **10×2**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

E-COMMERCE AND ERP (IT-722)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Analyze and explain the need of using Digital Signature in E-commerce.
- b) Discuss OLAP and its functionality in brief.
- c) Discuss the difference between e-commerce and e-Governance.
- d) Explain knowledge engineering. Explain it with an appropriate example.
- e) What are the characteristic of data in the data warehouse?

4x5

PART-A

Q.2 a) Compare B2B, B2C, C2B and C2C with the help of suitable examples.

10

- b) Analyze the strategic methods for developing e-commerce in detail.

10

Q.3 Write short notes on:

- a) E-commerce serves.

7

- b) Online commerce environment.

7

- c) Digital cash vs Digital Payments.

6

Q.4 a) Explain the concept behind electronic data interchange. Also explain their benefits and applications.

10

- b) Explain the operational process of Digicash.

10

PART-B

Q.5 a) Explain origin of the term SCM. What is the role of ERP in SCM?

10

- b) What is the importance of ERP in business-era? State advantages and disadvantages of ERP.

10

Q.6 a) What are the basic models of ERP system? Explain each in detail.

15

- b) Discuss the difference between production scheduling and production control.

5

Q.7 a) What are the different phases of ERP implementation life cycle? List out the activities performed in each phase.

15

- b) Discuss the need of CRM in ERP.

5

End Semester Examination, May 2019

B. Tech. – Eighth Semester

IT NETWORK SECURITY (CS-706)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) Why penetration testing is essential?
- b) What is domain name system? Why it is used?
- c) Briefly explain the special features of netview?
- d) How hierarchical routing is better than other routing techniques? Describe.
- e) Briefly explain the co-axial cable and twisted pair cable?

4×5

PART-A

Q.2 a) What functions are carried out by various layers of OSI? Discuss with the help of a block diagram. **10**

- b) Difference between LAN and WAN. Describe the various pros and cons of topologies used in LAN. **10**

Q.3 a) What are the major weakness of LAN manager authentication protocols? **5**

- b) Differentiate between RIP, OSPF and BGP protocols. **5**

- c) What is a DNS server? Differentiate between recursive and iterative DNS queries. **10**

Q.4 a) Describe the architecture of firewall with various firewall technologies. **5**

- b) Briefly explain the following terms:

- i) Hub
- ii) Router
- iii) Switch
- iv) Gateway
- v) Bridge

2×5

- c) How e-mails are secured? Explain its security mechanisms. **5**

PART-B

Q.5 a) Describe the various WAN technologies in detail. **10**

- b) What is RAID? Explain it with the architecture. **10**

Q.6 Write short notes on the following:

- a) Net Manager
- b) Openview **10×2**

Q.7 a) Briefly explain the process of testing. Why and how the process of testing is done to enhance the security of a network? **10**

- b) Explain the different stages of penetration testing. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

IT NETWORK SECURITY (CS-706)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) Why penetration testing is essential?
- b) What is domain name system? Why it is used?
- c) Briefly explain the special features of netview?
- d) How hierarchical routing is better than other routing techniques? Describe.
- e) Briefly explain the co-axial cable and twisted pair cable?

4×5

PART-A

Q.2 a) What functions are carried out by various layers of OSI? Discuss with the help of a block diagram. **10**

- b) Difference between LAN and WAN. Describe the various pros and cons of topologies used in LAN. **10**

Q.3 a) What are the major weakness of LAN manager authentication protocols? **5**

- b) Differentiate between RIP, OSPF and BGP protocols. **5**

- c) What is a DNS server? Differentiate between recursive and iterative DNS queries. **10**

Q.4 a) Describe the architecture of firewall with various firewall technologies. **5**

- b) Briefly explain the following terms:

- i) Hub
- ii) Router
- iii) Switch
- iv) Gateway
- v) Bridge

2×5

- c) How e-mails are secured? Explain its security mechanisms. **5**

PART-B

Q.5 a) Describe the various WAN technologies in detail. **10**

- b) What is RAID? Explain it with the architecture. **10**

Q.6 Write short notes on the following:

- a) Net Manager
- b) Openview **10×2**

Q.7 a) Briefly explain the process of testing. Why and how the process of testing is done to enhance the security of a network? **10**

- b) Explain the different stages of penetration testing. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

SOCIAL WEB AND MOBILE ANALYSIS (CS-727)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Explain the impact of social media on business with example.
b) Explain the role of community managers in social media.
c) Explain various common social business objectives.
d) Explain any five mobile applications in details.
e) What is the impact of social media analytics? What are different techniques used for it? **4×5**

PART-A

- Q.2 a) What are different leverages of social media required for better services? **10**
b) What are the different analytics platforms used for social media and web analytics? **10**
- Q.3 a) What is conversion? How micro and macro conversions can be measured? **10**
b) How we can use waterfall strategy for social media analytics? How standard metrics differs from a critical web metrics? **10**
- Q.4 Explain the following with proper examples.
a) Sentiments and sentiment analysis
b) Content creation and tracking.
c) Viewing relationship.
d) Social media content creation process. **5×4**

PART-B

- Q.5 a) Explain in detail how a mobile customer behaviour can be analyzed? Explain with an example. **10**
b) Explain the need of WAP gateway also explain the role of GGSN support in detail. **10**
- Q.6 a) What do you mean by session explain different terms used to define its functionality? **10**
b) Explain multichannel campaign optimization. What are the challenges involved init? **10**
- Q.7 a) Explain in detail mobile handset analysis. **6**
b) What is email marketing, why is it required and what are the features of email marketing tool? **14**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

SOCIAL WEB AND MOBILE ANALYSIS (CS-727)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Explain the impact of social media on business with example.
b) Explain the role of community managers in social media.
c) Explain various common social business objectives.
d) Explain any five mobile applications in details.
e) What is the impact of social media analytics? What are different techniques used for it? **4×5**

PART-A

- Q.2 a) What are different leverages of social media required for better services? **10**
b) What are the different analytics platforms used for social media and web analytics? **10**
- Q.3 a) What is conversion? How micro and macro conversions can be measured? **10**
b) How we can use waterfall strategy for social media analytics? How standard metrics differs from a critical web metrics? **10**
- Q.4 Explain the following with proper examples.
a) Sentiments and sentiment analysis
b) Content creation and tracking.
c) Viewing relationship.
d) Social media content creation process. **5×4**

PART-B

- Q.5 a) Explain in detail how a mobile customer behaviour can be analyzed? Explain with an example. **10**
b) Explain the need of WAP gateway also explain the role of GGSN support in detail. **10**
- Q.6 a) What do you mean by session explain different terms used to define its functionality? **10**
b) Explain multichannel campaign optimization. What are the challenges involved init? **10**
- Q.7 a) Explain in detail mobile handset analysis. **6**
b) What is email marketing, why is it required and what are the features of email marketing tool? **14**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1

 - a) Explain how authenticity is being “repudiated”.
 - b) Compare public key cryptography and private key cryptography.
 - c) Discuss methods of addressing security risk.
 - d) Discuss the role of SSL in OSL model.
 - e) Define multi-tenancy.
 - f) Discuss key management and conventional encryption.
 - g) What do you mean by I AM?
 - h) How CIA helpful in managing security in cloud?
 - i) Discuss advantages of digital signature in cloud computing security.
 - j) ????????????????????????????????

2x10

PART-A

- Q.2** a) What are the factors that contribute to a data centre security? **10**
 b) State what role application layer plays to secure information and data. **10**

- Q.3** a) Discuss various security risk and benefits with respect to cloud computing. **10**
b) What is a tenant? How can u secure a multitenant environment? **10**

OR

Comment on multifactor authentication with diagram.

10

- Q.4 a) When a client is attempting to gain access to any system in the network, state the role of AAA in this process. **10**
b) ?????????????????????????????? **10**

PART-B

- Q.5** a) Discuss Challenges associated with phases of identity and access management. **10**
 b) Discuss in detail about federated identity management. **10**

- Q.6** a) Explain PGP protocol and X.509 certificate format in detail. **10**
 b) Discuss management of keys using public key certificates. **10**

- Q.7** a) Discuss SSL transaction in detail. **10**
 b) Secret is not a secret if it is known to more than one person. State the challenge posed by private key sharing and discuss corporate signing with respect to this. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

SECURITY IN CLOUD (CS-765)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1

 - a) Explain how authenticity is being “repudiated”.
 - b) Compare public key cryptography and private key cryptography.
 - c) Discuss methods of addressing security risk.
 - d) Discuss the role of SSL in OSL model.
 - e) Define multi-tenancy.
 - f) Discuss key management and conventional encryption.
 - g) What do you mean by I AM?
 - h) How CIA helpful in managing security in cloud?
 - i) Discuss advantages of digital signature in cloud computing security.
 - j) ????????????????????????????????

2x10

PART-A

- Q.2** a) What are the factors that contribute to a data centre security? **10**
 b) State what role application layer plays to secure information and data. **10**

- Q.3** a) Discuss various security risk and benefits with respect to cloud computing. **10**
b) What is a tenant? How can u secure a multitenant environment? **10**

OR

Comment on multifactor authentication with diagram.

10

- Q.4 a) When a client is attempting to gain access to any system in the network, state the role of AAA in this process. **10**
b) ?????????????????????????????? **10**

PART-B

- Q.5** a) Discuss Challenges associated with phases of identity and access management. **10**
b) Discuss in detail about federated identity management. **10**

- Q.6** a) Explain PGP protocol and X.509 certificate format in detail. **10**
 b) Discuss management of keys using public key certificates. **10**

- Q.7 a) Discuss SSL transaction in detail. **10**
b) Secret is not a secret if it is known to more than one person. State the challenge posed by private key sharing and discuss corporate signing with respect to this. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

DISTRIBUTED OPERATING SYSTEM (CS-825)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Briefly discuss a blocking primitive for sending messages in client-server model.
b) What are distributed systems? What are the objectives and goals of these systems?
How are these systems useful? Illustrate.
c) Discuss any two algorithms for ensuring the mutual exclusion in distributed systems.
d) What is stable storage? How it is importance for distributed system? **5x4**

PART-A

- Q.2 a) What are layered protocols in distributed systems? Outline the purpose of each of these protocols. **10**
b) What are the design issues for distributed systems? Discuss briefly. **10**
- Q.3 a) Discuss bully's algorithm for choosing a coordinator process. **10**
b) What do you mean by logical clocks? Discuss briefly. **10**
- Q.4 a) A real-time system has periodic processes with following computational requirements and periods:
P1 : 20 msce every 40 msce
P2 : 60 msce every 500 msce
P3 : 5 msce every 20 msce
P4 : 15 msce every 100 msce
Is this system schedulable on one C.P.U? Justify your answer **10**
b) Explain scheduling algorithm used in distributed system. **10**

PART-B

- Q.5 a) Why replication is needed in distributed file system? What are the reasons for offering such a service? **10**
b) How distributed file system differ from conventional file systems? **10**
- Q.6 a) Discuss page-based-distributed shared memory model briefly. **10**
b) Discuss the concept of shared variables in distributed shared memory. **10**
- Q.7 a) MACH supports the concept at a processor set on what class of machines does this concept make most sense? What is it used for? **5**
b) Explain the concept of UNIX emulation in MACH. **5**
c) Discuss how memory is managed in MACH? **5**
d) How threads can be implemented in MACH? **5**

End Semester Examination, May 2019

B. Tech. – First Semester

INTRODUCTION TO COMPUTERS SYSTEMS (CS-102A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) How does the Internet help the society?
b) Briefly discuss the booting process.
c) Describe how arithmetic and logic unit works?
d) Discuss the unique nature of multitasking.
e) What do you mean by low-level language?
f) List out few application areas where network security plays an important role.
g) What do you understand by ASCII code?
h) How a hub is different from a switch?
i) Define how worm is harmful to our computer system?
j) Explain the POST process in an operating system. **2×10**

PART-A

- Q.2 a) Explain each and every components or units of a computer system. **10**
b) Convert the following:
i) $(124)_{10} = (?)_2$
ii) $(519)_{10} = (?)_8$
iii) $(2732)_{10} = (?)_{16}$
iv) $(11011010)_2 = (?)_{10}$
v) $(A9E)_{16} = (?)_8$ **2×5**

- Q.3 a) Explain primary and secondary memory and their types in details. **14**
b) What do you understand by cache memory? **6**

- Q.4 a) What is a programming language? Differentiate between both high-level and low-level languages. **10**
b) Write short notes on CRT and LCD. **10**

PART-B

- Q.5 a) Explain all the functionalities of operating system. **10**
b) Brief mentions the working principle of compiler, interpreter, linker, loader and assembler. **10**
- Q.6 a) What is network topology? Explain different types of network topology with their corresponding pros and cons. **10**
b) Differentiate between wired and wireless networks and their further categories. **10**
- Q.7 a) Explain how antivirus works to protect our system from unknown virus? **5**
b) Write short notes on:
i) Intruder.
ii) Hacker. **5×2**
c) Explain how malicious software affect our system? **5**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

SOFTWARE TESTING (CS-723A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List the various phases in SDLC.
- b) State the myths associated to software testing.
- c) What is the purpose of testing?
- d) What is the source of knowledge for functional testing?
- e) What is security testing?
- f) Differentiate between alpha and beta testing.
- g) What is the difference between new and open bug?
- h) What will you do when developer rejects your defect?
- i) What are the characteristics of good plan?
- j) List some automated software testing tool.

2×10

PART-A

Q.2 a) What is the difference between use case test case, test plan and scenario and their templates? **6**

b) Write short note on software testing lifecycle? **7**

c) Explain the following:

i) Unit and Integration testing.

ii) Object oriented testing.

3½×2

Q.3 a) Explain the Capability Maturity Model (CMM). **10**

b) Explain the various activities performed in the procedural approach for quality management. **10**

Q.4 a) A program reads an integer number within the range [1, 100] and determines whether it is a prime number or not. Design test cases for this program using BVC, robust testing and worse case testing methods. **12**

b) Explain the equivalence class testing in detail. **8**

PART-B

Q.5 a) What are the different sources of knowledge for white-box testing? **5**

b) What is cyclomatic complexity? How can we relate this to independent paths? **5**

c) Explain the basic path testing in detail. **10**

Q.6 a) What do you mean by formal technical review? Discuss about review reporting. **10**

b) Explain any of the performance testing tools in detail. **5**

c) Write short note on 'QTP' testing tool. **5**

Q.7 a) What are the challenges involved in testing for web based software? **10**

b) Write short notes on:

i) Inheritance testing.

ii) System testing.

5×2

End Semester Examination, May 2019

B. Tech. – Fifth Semester

COMPONENT BASED PROGRAMMING TECHNOLOGY (CS-503)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the features of C# language as compared to C/C++ languages?
b) What are the type of applications developed in .Net framework?
c) What are jagged arrays?
d) Is there any way or method to force garbage collection? Explain in brief.
e) Where are all .Net collection classes located?
f) Name any four built-in controls, used in GUI designing.
g) Outline the key features of ADO.Net technology.
h) Difference between dataset and data reader.
i) Difference between managed code and unmanaged code.
j) What do you mean by .Net framework tools? **2×10**

PART-A

- Q.2 a) Compare mutable and immutable strings. Give an example of performing the following string operation on immutable strings.
i) Reading string from the keyboard.
ii) Inserting substring.
iii) Finding substring. **10**
b) What is the difference between stack and queue class? Explain their operations in detail with the help of a program. **10**
- Q.3 a) What do you understand by property and Indexer in C#? Explain in detail with the help of a program. **10**
b) What is the role of delegate in function calling? Whether events possible without the delegates? Justify the answer with the help of an example. **10**
- Q.4 a) Explain the CLR architecture, depicting its position in the .Net architecture. **10**
b) Write short notes on the following:
i) Framework class library.
ii) CLS, CTS. **10**

PART-B

- Q.5 a) Define 'MDI applications'. Write a program to create menu in window form. **10**
b) Define form controls. Using forms, write a program to implement factorial of a number entered by a user at runtime. **10**
- Q.6 a) Give complete ADO.NET architecture and explain its significance in windows and web application development. **15**
b) Difference between data-grid and data-grid view control with an example. **5**
- Q.7 a) Discuss the security architecture of .Net framework in detail. **10**
b) Write short notes on the following:
i) Benefits of web applications.
ii) Role based security. **5×2**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

INTRODUCTION TO IOT (CS-764)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Define IOT. Explain IOT communication networks. **5**
b) Explain IOT security framework in detail.
c) How information is exchanged in IOT without human intervention?
d) Define the architecture of the zigbee protocol in detail. **4**

PART-A

- Q.2 a) Explain applications of IOT communications in detail. **15**
b) Differentiate telemetry and IOT. **5**
- Q.3 a) What do you mean by automation and how it is applied to asset management. **12**
b) Explain working of cellular IOT connectivity services? **8**
- Q.4 a) Define reference point and explain them in context to IOT service layers. **10**
b) Define protocol and how it is used in IOT? Explain different protocols used for IOT service layer. **10**

PART-B

- Q.5 a) What is satellite communication and how it works? Explain various advantages of using satellite communication? **12**
b) Explain RF powered sensor node architecture in detail. **8**
- Q.6 a) Explain various challenges faced during IOT connectivity and how configuration management is implemented? **14**
b) Write functional requirements for the IOT system. **6**
- Q.7 a) Write various security vulnerabilities for the IOT devices and wireless communication network over which they communicate? **10**
b) What is secure booting and explain different procedures used in secure booting? **10**

End Semester Examination, Dec 2018

B. Tech.— Sixth Semester

E-COMMERCE AND ERP (IT-722)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Compare e-commerce and e-strategy.
- b) List advantage of e-commerce.
- c) Describe social media's importance in e-commerce.
- d) List risks associated with e-commerce.
- e) How is home shopping can be done?
- f) How is a smart card different from a debit card?
- g) Compare CIB and C2C.
- h) Explain production scheduling.
- i) SCM is important module of ERP. Comment on it.
- j) What is knowledge engineering?

2×10

PART-A

- Q.2** a) Explain e-commerce organization model based on transaction party. **10**
b) LIC's is the major concept of e-commerce. Explain each "C" with an example. **10**
- Q.3** a) What is digital payment system and explain cyber cash model? **10**
b) Explain different techniques used in electronic payment system. **10**
- Q.4** a) Explain the concept behind electronic data interchange and explain its benefits and applications. **15**
b) What is cryptography and what is its need? **5**

PART-B

- Q.5** a) Explain in brief the different modules of ERP. **10**
b) Explain origin of the term SCM. **5**
c) What are the various advantages and disadvantages of ERP? **5**
- Q.6** a) Explain various functions and applications of resource management. **10**
b) Compare the following terms Production planning, production scheduling and production control. **10**
- Q.7** a) Write short notes on the following
i) Customer relationship management.
ii) HRD module in ERD. **5×2**
b) What are the different phases of ERP implementation life cycle? List out the activities to be performed in each case. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DATA MINING AND PREDICTIVE MODELING (CS-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) List down the main phases of data mining process.
b) Briefly describe data transformation.
c) List down data visualization techniques.
d) Which partition of dataset is used to build the model?
e) Define the term “confidence” in association.
f) On what kind of data, data mining can be applied?
g) What do you mean by supervised learning?
h) Justify the need for preprocessing the data before mining.
i) Classify the parameters based on which association rules are classified.
j) Recall the terms bias and variance. **2×10**

PART-A

- Q.2 a) Recognize the broader term used for data mining. Explain its phases in detail with diagram. **10**
b) Summarize the issues which you think might arise while applying data mining. **10**
- Q.3 a) What is the advantage of data sampling? Explain the various sampling techniques. **10**
b) Consider the given values for attribute “age” in a dataset 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70.
i) Use smoothing by bin means to smooth above data, using a bin depth of 3.
ii) Use min-max normalization to transform the value 35 for age onto range [0.0, 1.0].
iii) Use z-score normalization to transform the value 35 for age where standard deviation. **10**
- Q.4 a) What is an outlier in a dataset? Why is it important to detect it? Compare the different approaches of outlier detection. **12**
b) Summarize the need to clean the raw data. Also mention various methods to fill in missing values. **8**

PART-B

- Q.5 Following are the data points which need to be clustered into 3 clusters.
A(2, 10), B(2, 5), C(8, 4), D(5, 8), E(7, 5), F(6, 4), G(1, 2), H(4,9).
The distance function used is Euclidean distance. Assume first three points as initial centroids.
a) Use K-means algorithm to show the cluster centers after first iteration.
b) The final three clusters. **20**
- Q.6 a) In what situation do we apply regression for predicting the response variable? Explain linear regression, its equation and take a suitable example? **10**
b) Write short notes on the following:
i) Support vector machine.
ii) Bayesian network **5×2**

- Q.7 a) List the different evaluation charts for model comparison. Explain any two of them. **10**
b) Name the popular methods for estimating prediction error. Explain two of them. **10**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

E-COMMERCE AND ERP (IT-722)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Digital certificates plays an important role in e-commerce. Explain.
- b) List various advantages and disadvantages of ERP.
- c) Analyze the concept behind HRD module in ERP.
- d) What are various techniques used by users for home-shopping?
- e) Explain information system planning in detail.

4x5

PART-A

Q.2 a) E-Commerce can be best explained with 4C's. What are there, elaborate each with a suitable example. **10**

- b) Elaborate the e-commerce organization model based on transaction party. **10**

Q.3 a) Elaborate cyber cash model in detail with a diagram. **10**

- b) Explain different techniques used in electronic payment system. **10**

Q.4 Write short notes on:

- a) EDI
- b) Cryptography
- c) Firewall
- d) Operational process of digicash

5x4

PART-B

Q.5 a) ERP plays an important role in managing an organization. Comment. **10**

- b) What are the different modules that companies the ERP. **10**

Q.6 a) What is the difference between production planning, production scheduling and production control. **10**

- b) Explain various functions and applications of source management. **10**

Q.7 Write short notes on:

- a) Critical success factors of ERP implementation. **7**

- b) Information system planning. **7**

- c) Product life cycle management. **6**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

SOFTWARE TESTING (CS-723A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List the basic principles of testing.
- b) Explain the software quality metrics.
- c) Differentiate between smoke and sanity testing.
- d) Explain mutation testing.
- e) What do you mean by FTR?
- f) What is integration testing?
- g) What is an 'Inspection' in static testing?
- h) What are the limitations of testing?
- i) Explain graphical user interface testing.
- j) Differentiate between static and dynamic testing.

2×10

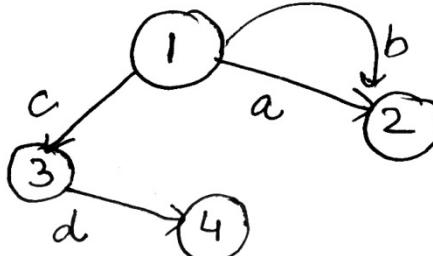
PART-A

Q.2 a) Differentiate between verification and validation. **5**
b) Define 'test case'. What is the information it contains? **5**
c) Explain the lifecycle of bugs. List the various status of bugs and explain them in detail. **10**

Q.3 a) Differentiate between quality control, quality assurance and quality management. **10**
b) Explain ISO standards in detail. **10**

Q.4 a) Generate the BVA (Boundary Value Analysis) test cases for the following:
"Next date is a function of three variables month, date and year. It returns the date of next day as output. It reads current date as input date. The conditions are:
 $C_1 : 1 \leq \text{month} \leq 12$
 $C_2 : 1 \leq \text{day} \leq 13$
 $C_3 : 1900 \leq \text{year} \leq 2025$
If any of the conditions C_1 , C_2 or C_3 fails, function output "Invalid". **12**

b) Consider the following graph:



- i) Represent this graph in the form of a graph matrix.
- ii) Represent this graph in the form of a connection matrix.

8

PART-B

- Q.5 a) Consider the program to find the greatest number:

```
#  
{  
    Float x, y, z;  
    classes ();  
    printf ("enter the three variables x, y, z");  
    scanf("%f %f %f", &x, &y, &z);  
    if (x>y)  
    }  
    if (x>z)  
        printf ("x is greatest");  
    else  
        printf ("z is greatest")  
{  
    else  
}  
    if (y>z)  
        printf ("y is greatest");  
    else  
        printf ("z is greatest");  
{  
    getch();  
}
```

- i) Draw the DD graph for the program.
- ii) Calculate the cyclomatic complexity of the program using all four methods.
- iii) List all independent paths.

- iv) Design all test cases from independent paths.

12

- b) Differentiate between alpha and Beta testing.

4

- c) What is the significance of cyclomatic complexity.

4

- Q.6 a) Explain the 'Inspection Process' of testing.

5

- b) Write short notes on the following testing tools:

- i) Load runner

15

- ii) Selenium

- Q.7 a) Discuss and compare the features of conventional testing and object oriented testing.

10

- b) Write short note on following testing:

- i) Inheritance, testing.

5×2

- ii) Unit and integration testing.

End Semester Examination, May 2019

B. Tech. — Second Semester

PROGRAMMING FOR PROBLEM SOLVING (ESC-CS-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Differentiate pre-increment and post increment operator.

- b) What will be the output of the following code?

```
main ( )
{
    int x = 15
    if (x%2 == 0);
        printf("no is even");
    else
        print("no is odd");
}
```

- c) Write turnery operator in C language.

- d) Differentiate structure and union.

- e) Give five predefined string functions in 'C' language.

- f) What will be the output of following?

```
main ( )
{
    int a = 5;
    printf("%d %d", ++a, a, a++);
```

- g) Differentiate *fprintf()* and *fscanf()* function.

- h) Write an algorithm to print odd numbers from 1-100.

- i) Differentiate local and global variable.

- j) What you meant by header files? Give example with their function of any two. **2×10**

PART-A

- Q.2 a) What you mean by operating system? State various types of operating system. **10**

- b) What is the purpose of memory in computer system? Explain its hierarchy. **10**

- Q.3 a) Write a program to print pattern

```

      1
     2   3
    4   5   6
   7   8   9   10
```

Also provide its flowchart.

10

- b) Write a program to perform arithmetic operations (atleast 6) using conditional branching. **10**

- Q.4 a) Write a program to perform multiplications of two 2-mendisional matrices. **10**

- b) Write a program to check whether a string is palindrome or not, without using in built function. **10**

PART-B

- Q.5 a) Write a program to search an element from a sorted array, using searching algorithm. **10**
b) Write a Pseudocode for selection sort. Explain its further working and complexity. **10**
- Q.6 a) Write a recursive function to print Fibonacci series of n natural numbers. **10**
b) Write a function to calculate multiplication of array elements. **10**
- Q.7 a) Write a program to copy a file into another file, using file function. **10**
b) What are the different file opening mode and functions available in 'C' language. Explain in detail. **6**
c) Define indirection operator '*' and access array elements using it. **4**

End Semester Examination, May 2019

BCA / / BBA (GEN) / (Banking) BBA (G) IB) / B.Com. (Hons.) and
Industry Integrated — Sixth Semester
M. COM. / MCA – Fourth Semester
BUSINESS PROCESSES (CS-610)

Time: 2 hrs. Max Marks: **50**
No. of pages: **1**

Note: Attempt **FIVE** questions in all; **PART-A** is compulsory. Attempt any **FOUR** questions from **PART-B**. Marks are indicated against each question.

PART-A

Q.1 Answer the following questions:

- a) List atleast three cross industry or industry application in SAP.
- b) Name various products offered by SAP.
- c) What is transactional code?
- d) What is created in a system each time a transaction is executed?
- e) What is meant by product lifecycle management?
- f) Name two components of SAP supply chain management.
- g) How can a billing document be created?
- h) What does document flow show?
- i) What is OLAP?
- j) What is the Primary source of management accounting?

1×10

PART-B

- Q.2 Describe various products offered by SAP. **10**
- Q.3 List and describe the forms of help in the SAP system. **10**
- Q.4 Explain how SAP and ERP supports key processes in sales order management. **10**
- Q.5 Explain how SAP supports supplier relationship management. **10**
- Q.6 Outline the tasks associated with SAP ERP human capital management. **10**
- Q.7 Differentiate between OLTP and OLAP environment. **10**

End Semester Examination, May 2019

B. Tech – Fourth Semester

INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY (CS-408)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Elaborate the real world benefits of ITIL in industry.
- b) Differentiate between foundation level and intermediate level.
- c) Explain service strategy and design.
- d) Differentiate between validation and testing.
- e) Describe information security management and deployment management.

4×5

PART-A

Q.2 a) Describe the importance of IT in modern business. Explain IT service management **10**
b) What is ITIL? Explain service transition and service operation. **10**

Q.3 a) What do you mean by service design? Explain the processes of service design in detail. **10**
b) Write short note on the following:
i) Supplier management.
ii) Availability management. **5×2**

Q.4 a) Compare and contrast transition planning and support. Explain with the help of example. **10**
b) Differentiate between release and deployment management. Explain why department management is important in context of ITIL. **10**

PART-B

Q.5 a) Explain the importance of balancing the priorities in ITIL. **10**
b) Write short notes on the following:
i) Request fulfillment.
ii) Access management phase. **5×2**

Q.6 a) Write short notes on the following:
i) Continual service improvement process.
ii) Continual service improvement model. **5×2**
b) Compare and contrast continual service improvement and service level management. Explain the importance of both in ITIL with the help of example. **10**

Q.7 a) Explain the benefits of ISO 20000:2011. Elaborate the interlink age between ITIL and ISO 20000:2011. **10**
b) Differentiate between ITIL expert and ITIL masters. Describe the manager's bridge with the help of example. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

SIMULATION AND MODELING (CS-805)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Explain the concept of a random numbers, with reference to a naturally occurring event.
b) What do you mean by psychic random number? Why it is called pseudo random number?
c) Explain covariance or correlation, its importance and method.
d) Explain one of the following continuous distributions and application area.
i) Uniform distribution.
ii) Exponential distribution.
e) What is the difference between verification and validation techniques?
f) List the factors to be considered before the selection of a simulation package.
g) What is the difference between fixed-time steps based and event to event based simulation models? Illustrate with one example for each.
h) Write a brief history of simulation.
i) Explain mid-square method for random number generation.
j) Explain the main features of GPSS. **2×10**

PART-A

- Q.2 a) Describe the characteristics of queuing systems. **10**
b) Name and explain some of the statistical models of queuing system. **10**
- Q.3 a) Explain at least two methods of generating random numbers in details. **10**
b) List the important properties and applications of random numbers. **10**
- Q.4 Explain the procedure to generate the samples from:
a) Erlang distribution.
b) Exponential distribution.
Explain their application areas **20**

PART-B

- Q.5 a) Explain the importance of goodness of fit test with the help of an example. **10**
b) How it can be decided that a particular distribution is applicable to input data? **10**
- Q.6 Discuss the output analysis for steady state simulation. **20**
- Q.7 Explain various terms/processes used in simulation of a servo system with the help of an example. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

IT SERVICE MANAGEMENT (CS-409)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following question:

- a) What is the relationship between ITSM and ITIL?
- b) Explain the term demand management.
- c) Classify security management.
- d) Give key activities of demand management.
- e) List various knowledge management tools.
- f) Discuss briefly the roles and responsibilities of service offerings and agreements.
- g) What does RCV stands for? Explain RCV briefly.
- h) What are the factors on which PPO process depends?
- i) Define knowledge management.
- j) What is RFCs?

2×10

PART-A

- Q.2** a) Describe the ITSM framework with the help of neat and labelled diagram. **10**
b) Discuss the various ITSM tools that are widely used across the globe. **10**
- Q.3** a) What is capacity management? Discuss its key activities. Also discuss the classification of capacity management. **10**
b) Explain the term availability management. How availability management help the top IT management to optimize the use of IT resources? **10**
- Q.4** a) Discuss the activities and the classification of IT service continuity management. **10**
b) Discuss the roles and responsibilities of the following under PPO.
i) Capacity manager.
ii) Demand management process owner. **10**

PART-B

- Q.5** a) Define and explain the terms service level management. **5**
b) What is service level agreement? Discuss its classification. **5**
c) What do you understand by supplies management? Explain and discuss its classification. **10**
- Q.6** a) Explain the service assets classification and its relationship with other processes. **10**
b) What do you understand by release and deployment management? Explain and give its classification along with relationship with other processes. **10**
- Q.7** Write short notes on the following:
a) Event management.
b) Incident management.
c) Service desk.
d) Problem management. **5×4**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADVANCED COMPUTING (CS-806)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the purpose of a distributed computing environment in the era of computing.
- b) Discuss the role of various actors involved in cloud ecosystem.
- c) Differentiate between public and private cloud.
- d) Discuss the advancement in technologies for network-based applications.
- e) Define grid. Explain characteristics of the grid computing environment.
- f) Outline the motivation behind the pervasive computing.
- g) Highlight the differences in classical information theory and quantum information theory.
- h) Explain the role of sensors and actuators in pervasive and ubiquitous computing.
- i) List various real world applications of ubiquitous computing.
- j) Differentiate between distributed process scheduling and conventional process scheduling.

2×10

PART-A

Q.2 a) How the various cloud service models are beneficial for the society? Discuss each model in detail with its relative advantages and limitations. **10**
b) Discuss the role and activities of five major actors involved in cloud computing reference architecture. **10**

Q.3 a) List the various applications of a grid computing and quote examples of grid computing efforts by IBM. Give the complete grid architecture, detailing functionalities of each component. **12**
b) Explain the correspondence between the term “autonomic” and nervous system of human beings. Explain the basic logic behind the autonomic computing. Discuss its four principles. **8**

Q.4 a) How quantum gates are different from conventional gates? Explain different types of gates in quantum computers with truth table of each. Explain the concept of reversible computing. **10**
b) Explain the following:
i) Differences between conventional computing and quantum computing.
ii) Quantum teleportation with example. **5×2**

PART-B

Q.5 a) List principles and characteristics of the pervasive computing. Give detailed architecture of pervasive computing with neat diagram. Also discuss the transparent computing paradigm in the context of pervasive computing. **12**
b) How context communication takes place in pervasive computing? Explain context awareness and management by taking an example scenario. **8**

- Q.6**
- a) Give detailed architecture for ubiquitous computing systems with a neat diagram and explain the role of each component. **10**
 - b) List the various advantages and challenges in implementation of the ubiquitous computing. **5**
 - c) Discuss the features of various interfaces, as per ubiquitous computing environment. **5**
- Q.7** Explain the following:
- a) Distributed process scheduling.
 - b) Dynamic load balancing and sharing.
 - c) Distributed shared memory.
 - e) Parallel I/O. **5×4**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

XML PROGRAMMING (CS-425)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define semi-structured data. Explain text database with example.
b) Explain container element with a suitable example.
c) Explain XML web service. Give few examples of web services.
d) Describe the benefits of CSS. **2×10**

PART-A

- Q.2 a) Define XML. Explain the applications that uses XML. **10**
b) Explain the drawback of using XML in any application. **10**
- Q.3 a) Define well formed XML document. Explain various XML syntax rules followed in any XML program. **10**
b) Define DTD for law many reasons DTD are used. Explain in detail. **10**
- Q.4 Explain the use of predirecetes in XML document. Suppose a program is written in XML for employee information system. What would be the output of following path expression of applied in that program.
a) /employees/employee[1]
b) /employees/employee [last()]
c) /employees/employee [last ()-1]
d) /employees/employee [position () < 3]
e) //employee [@id]
f) //employee [@id=1010]
g) /employees/employee [salary > 85000] **20**

PART-B

- Q.5 a) Explain types of elements used in schema element declaration. Draw a tree structure of such element type. **10**
b) Explain different data types used in XML schema definition. **10**
- Q.6 a) Define cascading style sheets. Write a program for book database using XML and CSS. **10**
b) Explain was services description language. **10**
- Q.7 a) Define Extensible Style-Sheet Language Transformation (XSLT). Write a program of employee database in XML with the help of XSLT. **10**
b) Why XML are used in e-business software? Explain the models used by e-commerce. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

BUSINESS PROCESSES (CS-610)

Time: 2 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Give short answers to **(any five)** of the following questions:

- a) Differentiate between application and components.
- b) Name various products offered by SAP.
- c) What is F1/F4 used for?
- d) What is a transactional code?
- e) What is meant by Master Data? Give an example.
- f) Which SAP components are included in SAP CRM?

2×5

PART-A

Q.2 Explain in detail SAP ERP system and the various solutions it incorporates. Also discuss evolution of SAP ERP. **10**

Q.3 Describe the layout of the SAP easy access screen. **10**

Q.4 Discuss the various key operational processes & illustrate the integration between them. **10**

PART-B

Q.5 Explains how SAP ERP supports key processes in supply chain management? **10**

Q.6 Explain with the help of diagram, various tasks in financial accounting in SAP. **10**

Q.7 Explain how SAP supports reporting, analytics & Strategic planning. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DATA MINING AND PREDICTIVE MODELING (CS-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) List down the main phases of data mining process. **2x10**
b) Briefly describe data transformation.
c) List down data visualization techniques.
d) Which partition of dataset is used to build the model?
e) Define the term “confidence” in association.
f) On what kind of data, data mining can be applied?
g) What do you mean by supervised learning?
h) Justify the need for preprocessing the data before mining.
i) Classify the parameters based on which association rules are classified.
j) Recall the terms bias and variance.

PART-A

- Q.2 a) Recognize the broader term used for data mining. Explain its phases in detail with diagram. **10**
b) Summarize the issues which you think might arise while applying data mining. **10**
- Q.3 a) What is the advantage of data sampling? Explain the various sampling techniques. **10**
b) Consider the given values for attribute “age” in a dataset 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70.
i) Use smoothing by bin means to smooth above data, using a bin depth of 3.
ii) Use min-max normalization to transform the value 35 for age onto range [0.0, 1.0].
iii) Use z-score normalization to transform the value 35 for age where standard deviation. **10**
- Q.4 a) What is an outlier in a dataset? Why is it important to detect it? Compare the different approaches of outlier detection. **12**
b) Summarize the need to clean the raw data. Also mention various methods to fill in missing values. **8**

PART-B

- Q.5 Following are the data points which need to be clustered into 3 clusters.
A(2, 10), B(2, 5), C(8, 4), D(5, 8), E(7, 5), F(6, 4), G(1, 2), H(4, 9).
The distance function used is Euclidean distance. Assume first three points as initial centroids.
a) Use K-means algorithm to show the cluster centers after first iteration.
b) The final three clusters. **20**
- Q.6 a) In what situation do we apply regression for predicting the response variable? Explain linear regression, its equation and take a suitable example? **10**
b) Write short notes on the following:
i) Support vector machine.
ii) Bayesian network **5x2**
- Q.7 a) List the different evaluation charts for model comparison. Explain any two of them. **10**
b) Name the popular methods for estimating prediction error. Explain two of them. **10**

End Semester Examination, May 2019

B. Tech. – Sixth / Seventh / Eighth Semester

NETWORK PROGRAMMING AND ADMINISTRATION (IT-701)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

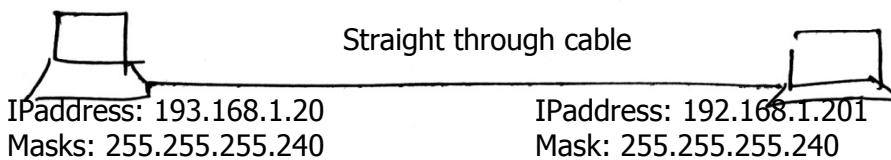
- a) What is a relationship between client and server?
- b) Define routing table.
- c) Define authentication.
- d) Differentiate between remote program and remote procedure.
- e) Define network file system (NFS).
- f) Differentiate between subnet mask, default mask and supernet mask.
- g) Differentiate between router and switch.
- h) State the role of a web server.
- i) Justify the term integrity in terms of security in networking.
- j) State the difference between stream socket and datagram socket.

2×10

PART-A

Q.2 a) Why IP is called best effort delivery protocol? **4**

- b) A network administrator is connecting hosts A and B directly through the Ethernet interfaces, as shown in the illustration. Ping attempts between the hosts are unsuccessful. What can be done to provide connectivity between the hosts?



6

- c) Define network troubleshooting. State the troubleshooting commands with syntaxes and explanations. **10**

Q.3 a) Write all the I/O system calls of UDP elementary socket with syntaxes and labelled diagram. **10**

- b) Write the syntaxes and purpose of the elementary name and address conversions. **10**

Q.4 a) State the difference between multiprotocol servers and multi-service server. **10**

- b) Write an algorithm of iterative connectionless server with its process structure. **10**

PART-B

Q.5 a) What is the sequence of events during remote procedure call? **10**

- b) Explain the differences between remote procedure call and local calls. **5**

- c) What is the purpose of stub? **5**

Q.6 a) Write a short notes on:
i) RADIUS
ii) RAS
iii) Network administration and approaches. **5×3**

- b) State the difference between static and dynamic routing. **5**

Q.7 a) State the difference between authorization and authentication? **5**

- b) State the difference between firewall and wrappers. **7**

- c) Write a short note on security planning. **8**

End Semester Examination, May 2019

B. Tech. – Second Semester

PROGRAMMING IN C (CS-103)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) How to declare a 2D array?
b) Give any two differences between 'while' and 'do-while' loop in C.
c) How would you define a structure?
d) Explain fundamental data types in C.
e) What is function prototype?
f) What are the uses of pointers?
g) Write different access modes of files in C.
h) What is the difference between strcpy() and strcat() string handling functions?
i) What are preprocessor directives?
j) Define conditional operator. **2x10**

PART-A

- Q.2 a) Define 'operators in C language'. Explain different C operators by giving examples. **10**
b) Write a program in C to check whether a number is prime or not. **10**
- Q.3 a) Write a program in C to print sum of first 10 natural numbers using array. **10**
b) What are string handling functions? Explain them briefly. **10**
- Q.4 a) What are the differences between structure and union? Give an example for each. **10**
b) How to declare an array within structure? Explain using an example. **10**

PART-B

- Q.5 a) Differentiate between * and \$ operator. Write a program to print a string using a pointer. **10**
b) What are pointers? How pointers variables are initialized? Explain with the help of an example. **10**
- Q.6 a) Write a program for swapping two numbers using i) call-by-value ii) call-by-reference. **10**
b) Write short notes on following:
i) Function declaration and prototype.
ii) Recursion. **5x2**
- Q.7 a) Write a program to copy contents of one text file into another file. **10**
b) Explain the different file handling functions by taking suitable example. **10**

End Semester Examination, May 2019

B. Tech. (Cloud Computing) – Sixth / Eighth Semester
BACKUP AND DISASTER RECOVERY (CS-623)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are capacity centric drivers?
- b) What is D2D2T backup?
- c) What are the different types of disasters?
- d) 'Plan The Test and Test The Plant'. Comment.
- e) Explain business continuity.
- f) What is Hot Plug?
- g) Explain Archiving.
- h) Explain two-site replication.
- i) What is mirroring?
- j) What is WORM?

2x10

PART-A

- Q.2** a) What is LTO? Explain the logical structure of LTO-6 with a neat diagram. **10**
b) What is disk storage? What are the types of disk drivers? **10**
- Q.3** a) What is backup? Explain recovery objectives in detail. **10**
b) Compare ATL with VTL. **5**
c) Compare and contrast incremental and differential backup. **5**
- Q.4** a) What is fault Tolerance? How fault tolerance can be achieved for HA systems? **10**
b) Write short notes on:
i) Hot Swap and Hot Plug.
ii) Redundant components to meet HA. **5x2**

PART-B

- Q.5** Write short notes on:
a) High availability on virtual machines.
b) Types of HA solutions.
c) Hardware layer storage.
d) HA clustering advantages. **5x4**
- Q.6** Explain disaster recovery. What are the different disaster recovery terminologies used? Explain each in detail. **20**
- Q.7** a) Explain disaster recovery planning. What are the different phases of a disaster recovery plan? **10**
b) Compare Remote, Local, Two-site and Multi-site Replication Techniques in detail. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

CLOUD DEPLOYMENT MODEL (CS-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) Define 'grid computing'.
b) Illustrate the concept of cloud computing.
c) State the role of virtualization in cloud.
d) List the limitations of public cloud.
e) Explain the objective of SLA.
f) List some IaaS vendors.
g) Describe the concept of hybrid cloud.
h) Name some openstack software projects.
i) Define cloud bursting.
j) Discuss the benefits of VMware Cloud. **2×10**

PART-A

- Q.2 a) Discuss the issues faced with the traditional data center model. **10**
b) Illustrate the benefits of expanding to a cloud environment. **10**
- Q.3 a) Discuss the scenario for the illustration of private cloud in an organization. **10**
b) Explain the importance of standardization and automation in cloud computing environment. **10**
- Q.4 a) What is public cloud? Compare the traditional IT model and public cloud with a help of a diagram. **10**
b) Explain in detail how public cloud reduces IT expenditure. **10**

PART-B

- Q.5 a) Summarize the important factors that should be considered before deciding on cloud vendor. **10**
b) List five common public cloud vendors and the services they offer in a cloud computing environment. **10**
- Q.6 a) Summarize the challenges in adopting a hybrid cloud. **10**
b) Discuss how workloads can be managed in a hybrid cloud environment. Also explain the different types of workloads and how they can be executed. **10**
- Q.7 a) Illustrate how openstack enables cloud federation. Also discuss the features of open stack. **10**
b) Briefly discuss the key components of openstack. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

INFORMATION STORAGE AND MANAGEMENT (CS-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define data, information and storage.
- b) What is the need of nested RAID?
- c) Explain the core elements of a data centre.
- d) Write difference between MTBF and MTTR.
- e) Explain the purpose of HBA.
- f) Define local and remote replication.
- g) Define disaster recovery.
- h) Explain iSCSI, FCIP and iFCP.
- i) Explain industry management standards.
- j) Differentiate between block level virtualization and file level virtualization. **2x10**

PART-A

- Q.2 a) What is structured and unstructured data? What are the challenges of storing and managing unstructured data? **10**
- b) Explain various phases of information life cycle management. Take any suitable example. **10**
- Q.3 Compare the RAID level (0, 1, 2, 3, 4, 5, 6) in terms of storage efficiency, cost, read and write performance. Write penalty and protection. **20**
- Q.4 a) Differentiate between DAS, SAN and NAS technologies. **10**
- b) Explain the Disk Drive components in detail with diagram? Define various factors that affect the performance of Disk Drives. **10**

PART-B

- Q.5 a) What is the purpose of performing operation backup, disaster recovery and archiving? Explain in detail. **10**
- b) Describe business continuity planning process. **10**
- Q.6 a) Describe storage security domains. **10**
- b) Explain industry management metrics. **10**
- Q.7 a) What is the need of virtualization? Define server virtualization, application virtualization and presentation virtualization. **10**
- b) Explain storage security model in detail. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ARTIFICIAL INTELLIGENCE (CS-801)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What are the various areas where AI can be used?
b) What is agent is AI?
c) What is heuristic function?
d) Show the steps unvalued in state space-search.
e) What does PEAS stands for?
f) Deduce the various problem characteristics.
g) Show the difference between FOL and propositional logics.
h) What are frames and scripts in AI?
i) Define knowledge base system.
j) Differentiate forward and backward chaining.

2×10

PART-A

- Q.2 a) Write Prolog program to merge two sequentially ordered lists. **10**
b) Discuss how AI is going to change our lines? **10**
- Q.3 a) Assess when hill climbing fails to find a solution? **10**
b) Discuss best first search and A* algo and various observations about algo briefly. **10**
- Q.4 a) Discuss the issues in knowledge representation. **10**
b) Analyze clausal form and its usefulness. Also write rules with example. **10**

PART-B

- Q.5 a) Explain fuzzy based reasoning systems. **10**
b) Illustrate is detail about forward and backward chaining with suitable example. **10**
- Q.6 a) Draw architecture of expert systems and explain its various components. **10**
b) Give some introduction about various types of intelligent agents. **10**
- Q.7 a) Explain various phases of NLP with example. **10**
b) What is $\alpha-\beta$ pruning? **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

MACHINE LEARNING TECHNIQUES (CS-808)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1
- What is supervised learning?
 - What is need of feature selection in machine learning?
 - What is principal component analysis?
 - Compare classification and regression.
 - Explain the term: reward, value function.
 - What is reinforcement learning?
 - List features of normal distribution.
 - How does neural n/w reduce the dimensionality? Explain.
 - What do you understand by semi-supervised learning?
 - Discuss features of factor analysis.
- 2×10**

PART-A

- Q.2
- Explain the terms: Expectation, probability, covariance, correlation with suitable examples. **8**
 - Given below is the data of previous patients (symptoms, diagnosis).

Chills	Runny Nose	Headache	Fever	Flu
Y	N	Mild	Y	N
Y	Y	No	N	Y
Y	N	Strong	Y	Y
N	Y	Mild	Y	Y
N	N	No	N	N
N	Y	Strong	Y	Y
N	Y	Strong	N	N
Y	Y	Mild	Y	Y

Do you believe that a patient with the following symptoms has flu?

Chills Runny Nose Headache Fever Flu

Y → Yes, N → No

12

- Q.3
- What is regression? Discuss various types of regression model? **10**
 - Explain generative learning algorithm. Discuss the applications of generative learning algorithm with suitable examples. **6**
 - Discuss bagging techniques. **4**
- Q.4
- Explain k-means algorithm taking suitable example. Discuss its advantages and disadvantages. **12**
 - List features of factors analysis. Mention the application of factors analysis in machine learning. **8**

PART-B

- Q.5
- Illustrate with example marker decision process in reinforcement learning. **12**
 - Explain the terms: Value iteration, policy iteration. **8**
- Q.6
- Explain the steps of back propagation algorithm in detail. **12**
 - Discuss artificial neural network with suitable example. **8**
- Q.7
- Define ‘inductive learning’. Why is inductive leaning an ill-posed problem? Explain. **8**
 - Write short notes on:
 - Generative methods
 - Support vector machine.
- 6×2**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

NATURAL LANGUAGE PROCESSING (CS-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define 'natural language'.
b) Give any four commercial applications of NLP.
c) Write the applications of semantic network.
d) Define 'machine translation'.
e) What do you understand by natural language querying?
f) Define 'type-I grammar'. Give an example.
g) Define 'ATN'.
h) Define 'precedence and associativity'.
i) What do you understand by computation linguistic?
j) Define 'intelligent agent'. **2×10**

PART-A

- Q.2 a) Differentiate between syntax and semantic in context of natural language. **10**
b) Why NLP is important? Classify the below sentences along each of the following dimensions, given that the person is uttering the sentence is responding to a complaint that the car is too cold:
i) Syntactically correct or not
ii) Semantically correct or not
iii) Programmatically correct or not
1) The heater are on.
2) The trees are band new.
3) Too many window cat the stress. **10**

- Q.3 a) Give the formal definition of left associative grammar. Explain rule type and derivation order of left associative grammar. **10**
b) Check whether grammar G with production rules.
$$x \rightarrow x + x | x \in x | a$$

Is ambiguous or not **10**

- Q.4 a) Explain CKY in detail. **10**
b) Define passing. What are the general techniques of passing? Explain with the help of an example. **10**

PART-B

- Q.5 a) What are the issues of knowledge representation? **10**
b) Draw the semantic network of the following:
Dogs are mammals. Mammal are animals. Girds and animals. Fish are animals. Birds have wings. Bats have wings. Bats are mammals. Cat are mammal. Dogs chase cats. Cats eat fish. **10**
- Q.6 a) Explain rule based machine translation in detail. **10**
b) How can the machine translation engine be designed? Explain the quality measures of the same. **10**
- Q.7 a) Differentiate between user interface and man machine interface. **10**
b) Explain tutoring and authoring system in detail. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADHOC AND WIRELESS SENSOR NETWORKS (CS-827)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Discuss the need of adhoc networks.
- b) Enlist the desirable characteristics of a MAC protocol for adhoc and wireless sensor network.
- c) Outline various advantages of reservation based MAC protocol over contention based MAC protocol.
- d) Compare features of proactive and reactive routing protocols.
- e) What do you understand by an energy efficient routing design?
- f) Briefly explain the issues and challenges in providing QoS in adhoc wireless networks.
- g) Why does the TCP not perform well in adhoc wireless networks?
- h) List advantages and disadvantages of various multiple access techniques used in WSNs.
- i) Describe a range based triangulation method for finding location of unknown nodes in wireless sensor networks.
- j) Summarize various transmission power management schemes.

2×10

PART-A

- Q.2**
- a) Describe various application areas of adhoc wireless networks **10**
 - b) Outline the major challenges that need to be addressed while designing adhoc and wireless sensor networks. **10**
- Q.3**
- a) Design and analyze the working framework of single channel sender-initiated contention based MAC protocols for adhoc wireless networks. **12**
 - b) Explain various design goals of an ideal MAC protocol for adhoc wireless networks. **8**
- Q.4**
- a) Give the classification of routing protocols for adhoc wireless networks based on the routing information update mechanism. **6**
 - b) Outline the characteristics of an ideal routing protocol for adhoc wireless networks. **6**
 - c) Describe the working principle of on-demand wireless routing protocol. **8**

PART-B

- Q.5**
- a) Discuss the need for energy management in adhoc wireless networks. **8**
 - b) Explain various energy management schemes used in adhoc wireless networks. **12**
- Q.6**
- a) Write in detail about cluster TDMA. **10**
 - b) Describe the typical architecture details of adhoc wireless sensor networks including data relaying and aggregation strategies. **10**
- Q.7**
- a) Discuss the basic mechanism of localization in wireless sensor networks. **4**
 - b) Illustrate the application scenario of indoor and sensor network localization. **10**
 - c) Elaborate the need of synchronization in adhoc wireless sensor networks. **6**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DATA WAREHOUSING AND MULTI-DIMENSIONAL MODELING (CS-407)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Write note on ETL and data staging in data warehousing.
b) How you can improve the performance of ROLAP?
c) Write note on data warehousing modeling.
d) What is cleansing in data warehouse?

5×4

PART-A

- Q.2 a) What is data replication? Explain. **8**
b) Differentiate between two-layer and three-layer architecture data warehouse system. **12**
- Q.3 a) Explain the use of slice and dice techniques in OLAP operators. **10**
b) What are the general characteristics and benefits of an ODS? **10**
- Q.4 a) Differentiate between 'OLTP model' and 'warehousing'. **10**
b) Discuss the criticality and the results of requirement analysis phase in modelling. **10**

PART-B

- Q.5 a) Explain the concept of Bitmap Indexing in DB2. **8**
b) List out the different challenges while designing ROLAP. **12**
- Q.6 a) How can you improve the service of OLAP and M-OLAP? **10**
b) What are the guidelines for developing a 'multidimensional models'? **10**
- Q.7 a) What is IBM Cognos architecture? **10**
b) Write note on power cube workflow and transformer model. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

BIG DATA ANALYTICS (CS-828 / CS-828A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) List the risks associated with big data analytics.
b) What is confusion matrix?
c) Explain role of oozie in Hadoop.
d) Discuss features of pig language.
e) Explain need of shuffling in map reduce.
f) Differentiate between parallel and distributed systems.
g) Define Hadoop cluster.
h) Discuss any three applications of big data analytics.
i) Mention 5Vs in big data.
j) How does Hadoop differ from traditional file system? **2×10**

PART-A

- Q.2 a) Discuss big data technologies and tools along with their applications. **10**
b) Explain data analytics file cycle with suitable diagram. **10**
- Q.3 a) What are different performance measures used by different machine learning algorithms? Explain any five of them. **10**
b) Explain linear regression. Compare linear and logistic regression. **10**
- Q.4 a) Explain HDFS architecture in detail. **10**
b) Write the queries for:
i) Creating a table in hadoop.
ii) Loading data into a table. **5×2**

PART-B

- Q.5 a) Explain role of combiner in map reduce. **10**
b) Explain main phases of recue phase with help of word count example. **10**
- Q.6 a) Differentiate between reporting and analysis. **10**
b) How Hadoop is differenit from conventional BI? Explain in detail. **10**
- Q.7 a) Explain role of big data in machine learning. **10**
b) Write short note on: Azure ML.

End Semester Examination, May 2019

B. Tech. — Seventh Semester

NATURAL LANGUAGE PROCESSING (CS-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following question:

- a) What is natural language?
- b) Define "Lexicon".
- c) Differentiate between semantic interpretation and contextual representation.
- d) Give an example of Type1 grammar.
- e) What is the role of Parsing in NLP?
- f) Give an example of right associative grammar.
- g) Explain in brief the concept of knowledge representation in NLP.
- h) What is rule based machine translation?
- i) Give an example of context sensitive grammar.
- j) Define "Semantic analysis".

10×2

PART-A

- Q.2 a) What is syntactic knowledge? Give tree representation of sentence "John ate the cat". **10**
- b) Explain various phases of Natural Language Processing. **10**
- Q.3 a) Explain different approaches used for resolving ambiguity. **10**
- b) Explain Chomsky hierarchy in detail. **10**
- Q.4 a) Write the algorithm for simple top down Parsing. **10**
- b) Explain three basic problems in top down Parsing with the help of example. **10**

PART-B

- Q.5 a) Why Semantic networks are used? Explain the property of inheritance in semantic network with example. **10**
- b) Draw the semantic network of the following:
"Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is black in color. Cat Sat on the mat. Cat is a mammal. Mammals have fur". **10**
- Q.6 a) How semantic based machine translation is different from phase based and syntax machine translation? **10**
- b) What are the major issues in machine translation? Explain in detail. **10**
- Q.7 a) Draw and explain schematic architecture for speech recognition. **10**
- b) Explain the conceptual working of SIRI in apple iphone showing the importance of man machine interface. **10**

End Semester Examination, May 2019

B. Tech – Fourth Semester IT DATA SECURITY (CS-423)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define 'Data breach'.
b) Explain clone phishing & spear phishing.
c) Explain cryptographic threats
d) Explain fizzing & birthday attack?
e) Define 'dumpster dining'.
f) Explain dumpster dining.
g) Explain the 'Mono' and 'companion' virus.
h) What is Wi-Fi hacking?
i) What is anti-spyware?
j) Explain hacking & social engineering threat.
k) Define 'honey pot'.

2x10

PART-A

- Q.2 Explain the following terms:
a) Logic Bombs.
b) Denial of service attack.
c) Database security threats.
d) Tempering.
- Q.3 a) Explain the various ways of identity theft. **5**
b) Explain BotNet threat **5**
c) What is banking fraud threat? Explain the three types of bank fraud threats. **10**
- Q.4 a) Explain the various steps in the SQL injection attack **10**
b) What is phishing? Explain the various steps used in the phishing threat technique. **10**

PART-B

- Q.5 Write short notes on:
a) Intrusion prevention system. **10**
b) Demilitarized zone (DMZ).
c) SQL injection counter measures.
d) Audit logs.
- Q.6 a) Define 'physical security threat'. Explain the various methods of physical security countermeasures. **12**
b) Explain the various database security counter measures. **8**
- Q.7 Discuss the usage of InDefend load. Explain its various functions. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

THEORY OF AUTOMATA AND COMPUTATION (CS-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **3**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1**
- State post correspondence problem.
 - Write all tuples of pushdown automata.
 - What do you understand by yield of a derivation tree?
 - Differentiate DFA and NDFA.
 - Why should one study undecidability?
 - Give regular expression for representing the set L of strings in which every '0' is immediately followed by at least two 1's.
 - State pumping lemma for regular sets.
 - Remove Null moves from following finite automata:

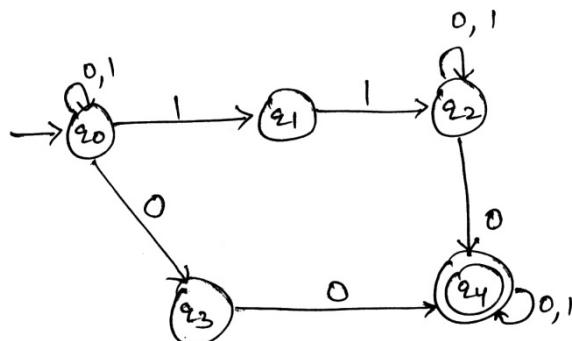


- Write applications of finite automata.
- Define linear bounded automata.

2×10

PART-A

- Q.2**
- Define finite state machine and explain its type with tuples.
 - Construct a DFA equivalent to the NDFA described by diagram.



5

- Construct a minimum state automation equivalent to a given automation whose transition table is defined:

State/ \in	a	b
$\rightarrow q_0$	q_1	q_0
q_1	q_0	q_2
q_2	q_3	q_1
(q_3)	q_3	q_0
q_4	q_3	q_5
q_5	q_6	q_4
q_6	q_5	q_6
q_7	q_6	q_3

10

- Q.3**
- Find the language generated by the following grammar:

$$S \rightarrow OSI / OAI$$

$A \rightarrow IA / I$

4

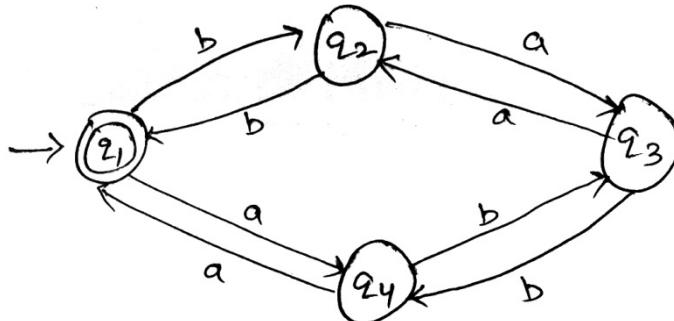
b) Construct grammar accepting language

$$L = \{a^j b^n c^n \mid n \geq 1, j \geq 0\}$$

8

c) Differentiate type 0, type 1, type 2 and type 3 grammar. Give example of each type. 8

Q.4 a) Find the regular expression corresponding to the automata given by:



8

b) Construct a DFA with reduced states equivalent to the regular expression $10 + (0 + 11) 0^* 1$. 8

c) If L is regular then L^T is also regular. Prove. 4

PART-B

Q.5 a) Construct reduced grammar equivalent to the grammar:

$$S \rightarrow aAa$$

$$A \rightarrow bBB$$

$$B \rightarrow ab$$

$$C \rightarrow aB$$

6

b) Reduce the following grammar to CNF:

$$S \rightarrow ASA / bA$$

$$A \rightarrow B / S$$

$$B \rightarrow C$$

8

c) Consider the following productions:

$$S \rightarrow aB / bA$$

$$A \rightarrow aS / bAA / a$$

$$B \rightarrow bS / aBB / b$$

For the string "aaabbabbba", find:

i) Leftmost derivation

ii) Rightmost derivation

6

Q.6 a) Design a PDA for language $L = \{a^n b^{3n} / n > 0\}$ accepted by final state. 8

b) Construct a CFG (a) which accepts $N(A)$ where

$$A = (\{q_0, q_1\}, \{a, b\}, \{b, z, z_0\}, \delta, q_0, z_0, \phi) \text{ and } \delta \text{ is given by:}$$

$$\delta(q_0, b, z_0) = (q_0, bz_0)$$

$$\delta(q_0, \wedge, z_0) = (q_0, \wedge)$$

$$\delta(q_0, b, z) = (q_0, bz)$$

$$\delta(q_0, a, z) = (q_1, z)$$

$$\delta(q_1, b, z) = (q_1, \wedge)$$

$$\delta(q_1, a, z_0) = (q_0, z_0)$$

12

Q.7 a) Prove that Harting problem of Turing machine is undecidable. 6

b) Show that the function $f(x, y) = x + y$ is primitive recursive function. 6

- c) Design a Turing machine over $\{1, b\}$ which can compute a concatenation function over $\sum = \{1\}$. If a pair of words (w_1, w_2) is the input, the output has to be $w_1 w_2$. Also, compute the output for strings $w_1 = 111$ and $w_2 = 11$. **8**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

MULTIMEDIA AND ANIMATION (IT-301)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) What are the advantages of CD-R?
b) Explain anti-aliasing.
c) Explain multimedia synchronization.
d) How the problem of differing sample rate is solved?
e) Explain intelligent multimedia system.
f) Explain vector drawing.
g) Explain cell animation.
h) Define virtual reality.
i) What are the challenges faced by multimedia system?
j) How multimedia presentation devices used in business era? **2x10**

PART-A

- Q.2 a) What are the layers used in ATM? Explain any two. **10**
b) Explain different types of multimedia devices. **10**
- Q.3 What are the different file formats used in multimedia? Which file format is used widely for advertising? Justify your answer. **20**
- Q.4 a) Draw a neat block diagram of intelligent multimedia system and explain purpose of each component. **10**
b) What are the applications of virtual reality? **10**

PART-B

- Q.5 Write short notes on:
a) Time domain sampled representation.
b) Sampling rate.
c) MIDI.
d) Quantization error. **4x5**
- Q.6 a) What is speech compression and speech synthesis? **10**
b) What are the principles of MPEG? **10**
- Q.7 What are the principles of animation? Compare different types of animation in multimedia. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

NEURAL NETWORKS (CS-743)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Discuss the important characteristic of artificial neural network.
b) What is error back propagation?
c) Compare the natural biological neural network with artificial neural network.
d) State applications of Hopfield neural network.
e) What are decision regions and discriminate functions in single layer perception classifier?
f) What do you understand by separability limitation?
g) Why a multi-layer perception is used to generate an XOR gate?
h) Differentiate between auto-associate and hetero-associate memory.
i) What is a self-organization neural network?
j) Distinguish between supervised, unsupervised and reinforcement learning. **2×10**

PART-A

- Q.2 a) Explain the concept of McCulloch-Pitts neural network. Draw a simple model for AND gate. **10**
b) Discuss at least five learning rules used in artificial neural network. **10**
- Q.3 a) Write down the training and classification mechanism used in discrete perception algorithm. **10**
b) Elaborate the concept of single layer continuous perception neural network for linearly separable classification. **10**
- Q.4 a) Brief out the working principle of error back propagation neural network. Discuss its training and testing mechanism. **15**
b) Comment upon the choice of learning factors in the back propagation learning. **5**

PART-B

- Q.5 a) Discuss the architecture of a single layer feedback neural network. Also explain its working with the help of an example. **15**
b) Differentiate between continuous and discrete time Hopfield neural network. **5**
- Q.6 a) Elaborate the concept of bidirectional associative memory. Also discuss its application areas. **10**
b) Discuss the basic principle of association encoding and association decoding. **10**
- Q.7 a) What is the significance of clustering models in neural network? **5**
b) Explain the role of winner-take-all learning in self-organizing neural network. **10**
c) What are the guidelines should be followed during recall mode and initialization of weights? **5**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

DISTRIBUTED OPERATING SYSTEM (CS-825)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain design issues of client server computing model in distributed systems. **4**
- b) How is the election done? State key properties of an election algorithm. **3**
- c) Which design approach is used for load distribution and specify the possible solutions? **3**
- d) How is page based DSM different from shared variable distributed shared memory (DSM)? **3**
- e) What is a consistency model? Differentiate between client-centric consistency models and data client-centric consistency models. **4**
- f) How memory management is called out in MACH? **3**

PART-A

- Q.2**
- a) Explain distributed operating system goals. What are different design issues that should be addressed in DOS? **10**
 - b) There are foul design issues for communication primitives. Explain different choices available for each of them in detail. **10**
- Q.3**
- a) What do you mean by mutual exclusion? Explain different algorithms used to achieve mutual exclusion. **10**
 - b) Explain different election algorithms to choose a coordinator among the different processes. **10**
- Q.4**
- a) What are different processor allocation methods and design issues for processor allocation algorithms? Explain in detail? **10**
 - b) What is a real time system? Explain different design issues in detail. **10**

PART-B

- Q.5**
- a) Explain different distributed file system design principles. **10**
 - b) Explain different ways of dealing with shared files in a distributed system. **10**
- Q.6**
- a) What are different kinds of shared memory multiprocessor? Explain each with diagram and example. **10**
 - b) Explain shared variable distributed shared memory concept. Describe two systems which follow this concept in detail? **10**
- Q.7**
- a) Explain goals of MACH along with MACH microkernel. **10**
 - b) Explain processes, threads and scheduling in MACH. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

DATA COMMUNICATION AND COMPUTER NETWORKS (IT-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Discuss the need for data communication.
- b) Explain difference types of networks.
- c) What is the role of physical layers interface X.21 in communication?
- d) Explain briefly “ICMP”.
- e) What are the applications of computer network? Explain.

4×5

PART-A

Q.2 a) What are the different data communication components and communication modes?
Explain. **12**

b) Differentiate between synchronization, asynchronous and synchronous transmission. **8**

Q.3 a) Explain different encoding with respect to data transmission system. **15**
b) Write advantages and disadvantages of transmission media. **5**

Q.4 Write short notes on the following:

- a) Error correction.
- b) Huffman encoding.
- c) Time division multiplexing.
- d) Packet switching.

5×4

PART-B

Q.5 a) Explain the working of OSI reference model. **10**
b) Explain CSMA/CD protocol in detail. How does it detect collision? **5**
c) What do you understand by term sliding window protocol? **5**

Q.6 a) What is the role of WAN technologies in routing? Explain in detail. **12**
b) Differentiate between distributed routing and hierarchical routing. **8**

Q.7 Write short notes on the following:

- a) Firewalls.
- b) Proxy servers.
- c) WWW.
- d) Virtual LANs.

5×4

End Semester Examination, May 2019

B. Tech. — Eighth Semester

BUSINESS INTELLIGENCE (CS-741)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define "Report".
- b) What is cross tab?
- c) List any five benefits of BI.
- d) What is association rule mining?
- e) List some ways of performing advance analytic.
- f) What does BI report contain?
- g) What do you understand by mobile BI?
- h) What is fact table?
- i) Explain drill down operation.
- j) What are various alerts in BI?

2×10

PART-A

Q.2 a) Differentiate between OLAP and OLTP. What are the different types of OLAP in data warehouse? **10**

b) What do you understand by analytics? Explain various types of analytics with example. **10**

Q.3 a) Explain various approaches of building a data warehouse. **10**
b) Contrast data warehouse with data marts. **10**

Q.4 a) What are the major reasons that make real time BI a necessity? **6**
b) Explain the types of dashboards with the help of examples. **7**

c) What do you understand by metadata? Explain various types of metadata. **7**

PART-B

Q.5 a) Explain project planning activities with the help of suitable diagram. **10**
b) What are the common project risks? Explain any two in details. **10**

Q.6 a) Explain the different types of charts in a BI reports and also write their applications. **10**
b) What are the operations that can be performed on BI report? **10**

Q.7 a) What is data warehouse? Explain its advantage and disadvantages and also explain data warehouse architecture. **10**
b) What is EPM? Explain in detail. **10**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

BA AS SERVICE (CLOUD) (CS-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain provisioning in terms of physical infrastructure.
- b) Explain the scenario of network virtualization.
- c) "Security is basic concern in public cloud". Comment.
- d) Explain about CAPEX and OPEX in terms of cloud computing.
- e) Explain how cloud bursting saves cost to the organization.
- f) While preparing for virtualization explain the role of proximity and locality.
- g) "Requirement of additional capacity to meet compute needs of Olympics or a world cricket". Identify the type of workload and solution for it.
- h) "Analytics has evolved from business initiative to business imperative in highly competitive environment. Explain in term of cloud analytics.
- i) Define cloud analytics trends.
- j) Explain relatives of grid and utility computing with cloud.

2×10

PART-A

- Q.2** a) Explain in detail classification on the basis of technology or area that is being virtualized in virtualization. **10**
- b) Explain Guest operating system and native operating system in terms of Type-I and Type-II hypervisors. **10**
- Q.3** a) What is host level storage virtualization and explain role of logical volume manager. **10**
- b) Discuss some benefits of application virtualization. **10**
- Q.4** a) "Trial on wide variety of platforms?" Comment and justify in terms of cloud offerings. **10**
- b) Discuss pros and cons of hybrid and public cloud. **10**

PART-B

- Q.5** a) Discuss complete process of cloud bursting and multilatency with the help of diagram. **10**
- b) A company is preparing for virtualization for its current infrastructure explain how server selection and server sizing is performed. **10**
- Q.6** Explain in detail which cloud solution is most appropriate for development and test workclouds and also explain what type of workcloud are not suitable for private clouds. **20**
- Q.7** a) Discuss new technologies that are driving business change. **5**
- b) "Cloud analytics help organization to address key analytic challenges". Justify how? **10**
- c) Discuss cloud analytics trends in terms of technologies to support optimizer, innovators and disruptors. **5**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

IT SERVICE DELIVERY (CS-606)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List out various delivery models, with example.
- b) Discuss various activities and benefits of the capacity management.
- c) Define 'business continuity management'.
- d) Discuss the benefits of IT SCM.
- e) List out the things, SLM must serve.
- f) Enlist all the elements of procedure document associated with SLM.
- g) Define 'ITIL framework'.
- h) Discuss the elements of risk management preparation and planning in BCM.
- i) What is disaster recovery plan?
- j) Discuss value and supply chain processes.

2×10

PART-A

- Q.2 a) Define the term "multiple vendor interlock". Discuss its elements. How is multiple vendor environment managed? **10**
- b) Discuss SIAM (Service Integration and Management). Explain the drivers for adopting SIAM focused models. **10**
- Q.3 a) List out these service management processes, which are integrated with availability management. Explain them. **10**
- b) Explain all the elements of procedure documents in capacity management. **10**
- Q.4 a) Highlight and discuss the elements of SLA process flowchart in detail. **15**
- b) Give neat flowchart, explaining each step of SLM implementation. **5**

PART-B

- Q.5 a) Which 4 R's, if carried out smoothly in BCM implementation, can make BCM to be carried out smoothly. **10**
- b) Why business continuity standards are required? Discuss the common regulations, which have been laid down for running the BCM. **10**
- Q.6 a) List all the elements involved in the procedure document of IT service continuity management. Explain them. **10**
- b) What is disaster recovery plan? Discuss its elements in detail. **10**
- Q.7 Write short notes on (**any four**) of the following:
- a) Demand and supplier.
 - b) Integration of ITSCM with other processes.
 - c) Risk analysis and management.
 - d) Contingency planning.
 - e) Tools and techniques for improving service availability.

5×4

End Semester Examination, May 2019

B.Tech. – Sixth Semester
COMPILER DESIGN (CS-701)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) How to compiler is classified list the names?
- b) What are the importance of symbol table?
- c) Differentiate between lexemes and patterns.
- d) What is semantic analysis? How it works explain briefly.
- e) What are the basic issues in passing.
- f) List the properties of LR(0) passes.
- g) What are the handles? How they use in shift reduce passing?
- h) What are the application of "DAG"
- i) Define "context free grammar" with eg.
- j) Define syntax directed translation.

2x10

PART-A

Q.2 a) Explain in detail:

- i) Implicit Sequence Control.
- ii) Specification of elementary data type. **5**

5

b) State the difference between dynamic and static scope of shared data with example. **10**

Q.3 a) 'p' or 'r' and 's' are regular grammar denoting the language L^R and $L(s)$ what are notation for Union, concatenation, regular expression, Kleenex closure.? **10**

b) Explain lexical analysis and syntax analysis phase of compiler. What are importance of error handles in the compilation process? **10**

Q.4 a) How we can define top down passing apply the top down passing for following grammar.

S r x d/rZd
X Oa/ea
Z Oi

String is "raid." **15**

b) Compute the 'follow' sets for the following grammar: **5**

S) Ba, B AD, A 6/E, D d/e

PART-B

Q.5 a) Write three address code for the following code:

Explain in detail Master plan of a city what are its salient features?

for (i(I = 1; i<= 10; i++)

A [i] = x +5;

10

P.T.O.

b) Draw "DAG" for $a+a^* (b-c) + (b-c)^* d$ and write semantic rule for the following
E E1+ T2, E T, T id, T Num

691/5

10

- Q.6 a) Which type of information used by compiler from symbol table? Which type of data structure is maintained in symbol table? What are the different operations performed on the symbol table.

15

- b) Explain any two data structure, those are used to implement symbol table, in detail. **5**

- Q.7 a) Differentiate between machine dependant and independent optimization. **6**

- b) Discuss in brief

- i) Assembles
- ii) Interprets
- iii) Compiler
- v) Cross compile

14

End Semester Examination, May 2019

B. Tech. – Sixth Semester

BAO, BAAS SERVICE (CLOUD) (CS-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) "Virtualization eliminates most of the inflexibilities inherent in the hardware systems". Explain how this statement is true.
- b) Outline limitations of LAN over VLAN.
- c) Discuss attributes of cloud enhanced user experience.
- d) What does cloud computing change for the provider?
- e) Explain when hybrid cloud is needed.
- f) Comment on locality while preparing for virtualization.
- g) What are new technologies that drive for business change?
- h) How cloud analytics help in marketing?
- i) Elaborate metered service in cloud computing.
- j) ?????????????????????

2×10

PART-A

Q.2 Explain Virtualization on the basis of technology or area that is being virtualized. **20**

Q.3 There are shortcomings of conventional storage system, new protocols and implementation mechanisms were required to build more flexibility, manageability and interoperability into the storage systems. Justify how these new protocols and implementation have overcome conventional storage system? **20**

Q.4 What are most common challenges faced by a user when moving an application from a system running an OS to another system running a different OS? How it is solved using application portability. **20**

PART-B

Q.5 An organization planning to transform their infrastructure to move towards cloud. Discuss complete cloud transformation roadmap. **20**

Q.6 Cloud is set up to handle a fraction of the workload on private cloud and a fraction of the workload on the public cloud. Identify cloud deployment model with pros and cons. **20**

Q.7 a) How cloud computing can help to address key analytics challenges. **10**
b) Discuss workload most suitable for a hybrid cloud. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

IT APPLICATION DISCOVERY AND DEPENDENCY MANAGEMENT (CS-607)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Briefly answer.

- a) What is CIM stands for and what are the layers CIM schema?
- b) Define 'restricted qualifier'.
- c) What is CMDB?
- d) Management data repository must register itself to what service?
- e) What is TADDM?
- f) Which management process provide capacity of key CIs?
- g) Name the different phases which occur during the discovery lifecycle?
- h) Name the advantages of agent-less CI discovery.
- i) What are the features of agent-based auto discovery?
- j) How to install OS agent remotely? Is it mandatory to deploy OS-agent prior to non-OS-agent?

2×10

PART-A

- Q.2** a) What are the basics of common information model? Explain in detail. **10**
b) What is CIM Meta schema? Explain in detail. **10**
- Q.3** a) Explain in detail CMDB as the foundation for IT management processes. **10**
b) Explain in detail basics of federated CMDBs. **10**
- Q.4** a) Explain in detail the basics of automatic discovery. **10**
b) What type of modification can be done on Common Information Modes (CIM)? **10**

PART-B

- Q.5** a) What is agent-less auto discovery and what different probes are used in agent-less auto discovery? Explain in detail. **10**
b) What are the advantages and disadvantages of agent-less auto discovery? Also state the pros and cons of agent-less auto discovery. **10**
- Q.6** a) Explain in detail agent-based auto discovery. Also state the pros and cons of agent-based auto discovery. **10**
b) Explain the procedure for agent installation on networked devices. **10**
- Q.7** a) Explain the three activities involved in reconciliation of CIS in CMDB. **10**
b) What is unique identification of CIs? What are the computer system naming rules for unique identification of CIs? Also explain any four standard UIDs. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DIGITAL FORENSICS (CS-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) List various types of digital data.
- b) List tools for network forensic.
- c) What does it mean if someone says that he was victim of DDOS?
- d) Key logger examines which layers of OSI model.
- e) When we shutdown the system, which information is lost?
- f) Expert witness format is an example of _____.
- g) What is steganalysis?
- h) What are common forms of loss of data?
- i) _____ was implemented in order to allow compatibility with the hierarchical file system (HFS).
- j) What is the purpose of polyinstantiation? **2×10**

PART-A

- Q.2 a) As an forensic investigator which rules you should follow in case of a cyber-crime? **10**
b) Which information should be provided by the victim in case of hacking? Justify your answer by giving suitable examples. **10**
- Q.3 a) How wireshark can be used for forensic investigation? List some important display filters. **10**
b) How timestamp attack can be mitigated? Explain in detail. **10**
- Q.4 a) Explain different laws and regulation of IT Act. **10**
b) Write short notes on the following.
 - i) Acquisition of evidence.
 - ii) Analysis of the evidence. **10**

PART-B

- Q.5 a) Describe data acquisition process? How do we perform RAID acquisition? **10**
b) How cyber crime is defined in IT Act? Give structure of IT Act in India. **10**
- Q.6 a) How do we collect and analyze the evidences in mobile forensics? **10**
b) Differentiate steganography and steganalysis. How steganalysis is performed practically? **10**
- Q.7 a) List various tools for memory data examinations. Explain any one in detail. **10**
b) How do we discover and extract malware in Linux systems? **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

SOFTWARE DEVELOPMENT PROCESS (CS-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Explain encapsulation using UML notation.
b) Why we will use swimlanes in activity diagram?
c) What do you mean by reflexive relationship?
d) How inheritance is created in rational rose?
e) What are the goals of iterative planning process? **4×5**

PART-A

- Q.2 a) Give the advantages of object oriented methodologies over traditional methodologies. **5**
b) Explain different types of concepts used in object oriented methodologies by using UML notations. **15**
- Q.3 a) Draw and explain activity diagram of ATM. **10**
b) Explain different components of use case diagrams and their relationships with the help of example. **10**
- Q.4 a) Explain “naming relationships” and “role names”. **5**
b) Draw and explain the class diagram of ATM. **15**

PART-B

- Q.5 a) Draw and explain the sequence diagram of online shopping. **10**
b) Draw and explain the collaboration diagram of online shopping. **10**
- Q.6 a) Explain the need and different views of architecture in detail. **15**
b) Explain the requirement of combining classes, splitting classes and eliminating classes. **5**
- Q.7 a) Explain iteration planning process. **15**
b) Explain emergence of pattern. **5**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

IMAGE PROCESSING (CS-643)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Give five application areas of image processing.
- b) What is histogram equalization?
- c) Explain Mexican hat filter.
- d) What is convolution?
- e) What are different discontinuities in digital images?
- f) Explain gradient magnitude and directions.
- g) How can we make chain-code descriptor rotation invariant?
- h) Differentiate between convolution and correlation.
- i) Explain the need of image restoration.
- j) What is salt and pepper noise? Explain.

2×10

PART-A

- Q.2** a) Describe the fundamental steps of digital image processing. **10**
b) What are various colour models? Explain how colour images are represented using them. **10**
- Q.3** a) What are the different types of edges? Explain them. **5**
b) Discuss different methods of edge detection. **10**
c) Explain various image smoothing filters. **5**
- Q.4** a) What is image segmentation? Discuss its areas of applications. **5**
b) Define thresholding. Explain the following thresholding techniques.
i) Global
ii) Adaptive **10**
c) Explain the terms opening and closing in morphology. **5**

PART-B

- Q.5** a) Explain the following representations:
i) Chain-code
ii) Shape numbers
iii) Geometric **10**
b) Write open cv code to implement hough transform for line detection. **5**
c) What is the use of image representation and description methods? **5**
- Q.6** a) Explain the need for image compression. **5**
b) How Huffman coding is used for compression? List the steps and properties of the algorithm. **10**
c) Differentiate between lossy and lossless compression techniques. **5**
- Q.7** Write short notes on the following:
a) Image restoration.
b) Noise models.
c) Inverse filtering.
d) Denoising filters. **5×4**

6975

End Semester Examination, May 2019

B. Tech. – Sixth Semester
COMPILER DESIGN (CS-701)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all. **Q1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) How to compiler is classified list the names?
- b) What are the importance of symbol table?
- c) Differentiate between lexemes and patterns.
- d) What is semantic analysis? How it works explain briefly.
- e) What are the basic issues in parsing?
- f) List the properties of LR(0) passes parser.
- g) What are the handles? How they are used in shift reduce passing?
- h) What are the application of "DAG"
- i) Define "context free grammar" with eg.
- j) Define syntax directed translation.

2x10

PART-A

Q.2 a) Explain in detail:

- i) Implicit Sequence Control. **5**
- ii) Specification of elementary data type. **5**

b) State the difference between dynamic and static scope of shared data with example. **10**

Q.3 a) 'p' or 'r' and 's' are regular grammar denoting the language L^R and L(s) what are notation for Union, concatenation, regular expression, Kleen closure.? **10**

b) Explain lexical analysis and syntax analysis phase of compiler. What are importance of error handles in the compilation process? **10**

Q.4 a) How we can define top down parsing apply the top down parsing for following grammer.

$$S \rightarrow r \ x \ d / rZd$$

$$X \rightarrow Oa / ea$$

$$Z \rightarrow Oi$$

String is "raid." **15**

b) Compute the 'follow' sets for the following grammer:

$$S \rightarrow Ba, B \rightarrow AD, A \rightarrow 6/E, D \rightarrow d/e$$

5

PART-B

Q.5 a) Write three address code for the following code:

for (i(i = 1; i<= 10; i++)

a [i] = x *5; **10**

b) Draw "DAG" for a+a* (b-c) + (b-c) * d and write semantic rule for the following
 $E \rightarrow E_1 + T_2, E \rightarrow T, T \rightarrow id, T \rightarrow Num$
 $T \rightarrow C(E), E \rightarrow E_1 * E_2$ **10**

Q.6 a) Which type of information used by compiler from symbol table? Which type of data structure is maintained in symbol table? What are the different operations performed on the symbol table. **15**

b) Explain any two data structure, those are used to implement symbol table, in detail. **5**

- Q.7 a) Differentiate between machine dependant and independent optimization. **6**
- b) Discuss in brief **14**
- i) Assembler
 - ii) Interpreter
 - iii) Compiler
 - v) Cross compiler

End Semester Examination, May 2019

B. Tech – Sixth Semester

NETWORK SECURITY AND MANAGEMENT (CS-721A)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) What is Cryptanalysis?
- b) Is the data block and key length different in DES?
- c) Can encryption and decryption be done with same key in public key cryptography? Explain briefly.
- d) What is message digest?
- e) Which scheme uses encryption one by one character?
- f) How electronic transaction can be made more secure?
- g) How data compression can affect transmission?
- h) Discuss the limitations of firewalls.
- i) Differentiate between HASH function and MAC
- j) What is purpose of S box in DES?

2x10

PART-A

Q.2 a) Show encryption and decryption using transposition cipher

PT - Network security and management

Ket- 531246

10

b) Explain OSI security architecture in detail.

10

Q.3 a) Define DES and discuss in detail.

10

b) Show encryption and decryption using RSA.

P=3 Q=7 e=5 M=6

10

Q.4 a) What is firewall? Discuss different types of firewall.

10

b) Define virus. Give different phases of life of a virus. Also differentiate virus with worm.

10

PART-B

Q.5 a) What are different ways to provide authentication?

10

b) How digital signatures provide security. Discuss in detail.

10

Q.6 a) What is need of IPsec? Give architecture of IPsec in detail.

10

b) Explain the process of dual signatures in secure electronic transactions.

10

Q.7 a) Discuss network management model. Also discuss SNMPV1.

10

b) How administrator can do risk management what are the possible ways to identifying risk. Explain in detail.

10

End Semester Examination, May 2019

B. Tech – Fourth Semester
CYBER SECURITY (CS-405)

Time: 3 hrs.

Max Marks: **50**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Write the syntax of IP config and trace route commands.
- b) Differentiate between the following:
 - i) Black hat and Grey hat hackers.
 - ii) Script-kidders and phreakers.
- c) Explain guidelines of forensics.
- d) Define virus scanner with example.

2½×4

PART-A

Q.2 a) Explain various types of networks and topologies used in networking. **7**
b) Convert IP address 192.60.60.30 into binary and also write its class. **3**

Q.3 a) What is meant by security breach and also provide its types with example. **6**
b) Illustrate denial of service attack with an appropriate example. **4**

Q.4 a) What is investment fraud and how can it be prevented while doing investments? **5**
b) Differentiate identity theft and cyber stalking. **5**

PART-B

Q.5 Describe the following in detail:

- a) SQL scripting.
- b) Passive scanning. **5×2**

Q.6 Discuss the following in detail:

- a) Cyber-crime.
- b) Document trail. **5×2**

Q.7 a) State cyber laws with its importance. **5**

- b) Explain the need to protect against cyber-crime. **5**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

NETWORK SECURITY AND MANAGEMENT (CS-721A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is cryptography?
- b) What is key length in DES?
- c) In public by cryptography which key is used for encryption?
- d) What are transpositional ciphers?
- e) Differentiate transport mode and tunnel mode.
- f) How electronic transaction can be made more secure?
- g) What is the need for data compression?
- h) Give four the limitations of firewall.
- i) Which protocol can be used for e-mail security?
- j) How MAC provide security?

2×10

PART-A

Q.2 a) Show encryption and decryption using Caesar cipher.

PT- All students are not notorious.

10

Key - 3

- b) Explain OSI security Architecture in detail.

10

Q.3 a) Discuss Data Encryption standard in detail. Is Double DES more secure? How? Explain it.

10

- b) What is purpose of Diffie-Hellman key exchange? Explain briefly.

10

Q.4 a) What is intrusion? Explain the working of IAS.

10

- b) What do you understand by malicious software? Discuss viruses and related threats.

10

PART-B

Q.5 a) Discuss MD5 in detail. How it helps in security?

10

- b) How SSL and TLS provides web security. Explain briefly.

10

Q.6 a) What are the benefits of using Digital signatures in security? Discuss in detail.

10

- b) Explain PGP for mail security.

10

Q.7 a) Discuss SNMPV2 in detail. How it is different from SNMPV1.

10

- b) What do you meant by security analysis?

10

End Semester Examination, May 2019

B. Tech. – Fourth Semester

COMPUTER NETWORKS (CS-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is switching? Differentiate between circuit switching and packet switching.
b) Differentiate between X.25 and frame relay.
c) What is an IP address? Discuss the functions of TCP/IP protocols.
d) Discuss the format of cell in ATM. **5×4**

PART-A

- Q.2 a) Explain OSI reference model, detailing functions of each layer with figure. **10**
b) What do you mean by network topology? Discuss the various topologies with their relative advantages and disadvantages. **10**
- Q.3 a) Explain ALOHA and compare pure ALOHA and slotted ALOHA. **10**
b) Explain the functionalities of SONET devices with diagram. **10**
- Q.4 a) Explain the frame format of frame-relay. **10**
b) What is ISDN? What are the types of services and channel ISDN provides? **10**

PART-B

- Q.5 a) Describe all unicast routing protocol at network layer in detail. RIP, BGP and OSPF. **15**
b) Explain types of errors handled by ICMP. **5**
- Q.6 a) Explain the electronic process and e-mail and also discuss the various e-mail protocols in detail, IMAP, SMTP, MIME. **15**
b) Compare FTP and TFTP briefly. **5**
- Q.7 a) What is data encryption? How cryptography is useful for encryption? **10**
b) How authentication is implemented using public key cryptography and by using firewall? **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

SOFTWARE PROJECT MANAGEMENT (IT-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is software?
b) What do you understand by project management?
c) What is the need of software lifecycle models?
d) Explain resource planning.
e) What are the differences between functional and non-functional requirements?
f) Name any two effort estimation models.
g) What is quality management?
h) Differentiate between project crashing and fast tracking.
i) What is milestone list?
j) Explain project closer analysis. **2×10**

PART-A

- Q.2 a) Explain software project management life cycle. **10**
b) What is the need of CMM models? Also explain KPA's project management. **10**
- Q.3 a) Explain the importance of SDLC. Also explain waterfall model in detail. **10**
b) Explain manpower planning and financial planning in detail. **10**
- Q.4 Explain effort estimation approaches: PERT and CPM scheduling with the help of suitable example. **20**

PART-B

- Q.5 a) Explain the different phases of defect prevention planning. Also explain quality control and quality assurance. **10**
b) What are the different phases of risk management model? Also explain configuration management process. **10**
- Q.6 a) Explain crash process and network analysis. **10**
b) Explain cost management base-line and flexibility matrix. **10**
- Q.7 a) Explain quality control tools: Perato chart and run chart. **10**
b) Explain critical change management. **10**

End Semester Examination, May 2019
B. Tech. – Sixth / Seventh / Eighth Semester
MANAGEMENT INFORMATION SYSTEMS (IT-721)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B**. Each question carries equal marks.

- Q.1 a) Differentiate between 'data' and 'information'.
b) Name few organizational sectors using MIS.
c) What is an automated MIS?
d) How information prove as quality product for MIS?
e) What is customization of MIS software?
f) What does management views in a system contain?
g) Explain MIS as a decision-maker.
h) What is a strategic planning?
i) Define 'work domain of service sector'.
j) Give any two examples for 'security issues of MIS'. **2x10**

PART-A

- Q.2 a) What is MIS? What are its basic components? Also explain functional model of production sector with respect to MIS. **10**
b) Distinguish between data warehouse and data mining. Explain their role in MIS in detail. **10**
- Q.3 a) Classify and explain information. What are the different methods of data and information collection? **10**
b) Describe MIS as a system. Explain with the help of an example the design of modules, layout and input/output. **10**
- Q.4 a) Explain complete architecture of MIS. Also discuss about the different types of system controls. **10**
b) How development, implementation and testing of MIS is done? **10**

PART-B

- Q.5 a) What is DSS? Explain DSS models along with their working in detail. **10**
b) Throw some light on planning tools of strategic management. **10**
- Q.6 a) What is the role of MIS in service sector? Discuss its various activities in detail. **10**
b) Discuss electronic business system and supply chain management system as an application of MIS. **10**
- Q.7 Write short notes on:
a) Security, ethical and societal challenges of IT. **10**
b) Security of MIS. **5**
c) DBMS in MIS. **5**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MANAGEMENT INFORMATION SYSTEM (IT-721)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are advantages and disadvantages of MIS?
b) Explain application of MIS to electronic business system?
c) Write short note on supply chain management system.
d) How do you classify information? Explain.
e) Why an automated MIS is needed in an organization. Explain briefly. **4x5**

PART-A

- Q.2 a) Explain role of DBMS, data warehouse and data mining in MIS. **10**
b) How to organize software support for MIS? Explain it. **10**
- Q.3 a) **Is there any need to customize MIS software for an organization? Justify by giving suitable example.** **10**
b) Discuss in detail general model of information processing. **10**
- Q.4 a) **Explain in detail development, implementation and testing of MIS.** **10**
b) What is role of staff training and its functional manual? **5**
c) **What do you understand by scheduling of activities?** **5**

PART-B

- Q.5 a) Explain different models of DSS along with their working. **10**
b) Explain strategic planning and tools of planning in detail. **10**
- Q.6 a) What are various activities of service sector? Why these activities of service sector implemented in MIS. **10**
b) Discuss in detail development of procedures, manuals and documents. **10**
- Q.7 Write short notes on (**any two**):
a) Security and strategies.
b) Privacy issues of MIS.
c) Ethical and societal challenges of IT. **10x2**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

INTRODUCTION TO VIRTUALIZATION AND CLOUD COMPUTING (CS-421)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) List some public cloud vendors.
- b) Define grid computing.
- c) What is application portability?
- d) Define network based storage virtualization.
- e) List the ring levels on an X86 Processor.
- f) Name the layers on XenServer.
- g) List the short comings of physical infrastructure.
- h) Define Cloud bursting.
- i) What is the role of cloud lifecycle management layer?
- j) List the advantages of VLAN.

2x10

PART-A

- Q.2** a) Illustrate the principle of hardware-software logical equivalence with help of an example. **7**
- b) Classify virtualization based on the technology and area that is being virtualized. **7**
- c) Compare pre and post virtualization server stacks. **6**
- Q.3** a) Discuss the working of desktop virtualization. Also, list the benefits of desktop virtualization. **10**
- b) Describe the purpose of hypervisor. Also classify the hypervisor based on architecture. **10**
- Q.4** a) What are the most common challenges faced by a user when moving an application from a system running an OS to another system running a different operation system? **10**
- b) Explain the concept of VPN. Also, discuss the VPN protocols briefly. **10**

PART-B

- Q.5** a) Compare virtualization and cloud computing. **10**
- b) Define cloud computing. Explain how cloud computing provides value to the business. **10**
- Q.6** a) Explain the concept of PaaS with its features and components. What are the list of considerations before a user goes for a PaaS provider. **10**
- b) Discuss the benefits and risks associated with cloud deployment models. **10**
- Q.7** a) Discuss the steps for deploying virtualization in an organization. **10**
- b) What is workload? Explain the different type of workload with example. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

COMPUTER NETWORKS (CS-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Give some advantages and disadvantages of combining the session, presentation, and application layer in the OSI model into one single application layer in the TCP/IP Internet model.
b) Explain the frame format of token ring.
c) Write a note on Simple Network Management Protocol.
d) Explain different data link protocols used by ISDN.
e) Explain different protocols and services provided by TCP/IP.

4x5

PART-A

- Q.2 a) Explain different network topologies; also give advantages and disadvantages of each type.
10
b) Give comparison of following multiplexing techniques. TDM, STDM and FDM. **10**
- Q.3 a) Discuss different types of 802.11 standards in detail. Give its layered architecture and also explain the functioning of each layer.
10
b) Explain the working of MAC sub layer.
10

- Q.4 a) What is ISDN? Explain the channels and interfaces defined by ISDN standards. **10**
b) Explain the different types of frame format of frame relays.
10

PART-B

- Q.5 a) What are the services provided by transport layer to the upper layer? How can transport layer service primitives may be used to build peer to peer applications? **10**
b) Write a note on Mobile IP.
10
- Q.6 a) What is E-Mail? Write a note on: 'MIME'.
10
b) What is role of application layer? Explain DNS.
10
- Q.7 a) Write a note on: 'IPsec'.
10
b) What is firewall? Explain different types of firewall techniques commonly used. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

DATA WAREHOUSING AND DATA MINING (IT-822)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Differentiate between fact table and dimension table.
b) Write down the issues of data mining.
c) How are the users of data warehouse classified?
d) Differentiate between operational systems and informational systems.
e) What is the significance of metadata in a data warehouse?
f) What is KDD? What are the steps involved in a KDD process?
g) Why is outlier mining important?
h) Explain slice and dice by citing an example.
i) List some characteristics of strategic information.
j) Briefly discuss multimedia database. **2×10**

PART-A

- Q.2 a) Differentiate between DBMS and data warehouse. **7**
b) Explain star and fact constellation schema. **6**
c) Explain various models of OLAP. **7**
- Q.3 a) Explain the three-tier architecture of data warehouse. Describe with a neat diagram. **10**
b) Give types of OLAP servers and differentiate between them. **10**
- Q.4 a) How are top-down and bottom-up approaches for building a data warehouse different? Discuss the merits and demerits of each. **10**
b) Explain data smoothing techniques in detail. **10**

PART-B

- Q.5 a) List the primitives that specify a data mining task. **10**
b) Explain the syntax for the following data mining primitives:
i) Task relevant data.
ii) Kind of knowledge to be mined. **5×2**
- Q.6 a) What is a decision tree? Where they can be used? Why is tree pruning useful in decision tree induction? **10**
b) Explain the following:
i) K-means algorithm.
ii) Partition methods. **5×2**
- Q.7 Write short notes on the following:
a) Mining spatial databases. **7**
b) Mining the www. **7**
c) Mining multimedia databases. **6**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

INTRODUCTION TO GAME PROGRAMMING (CS-641)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Give some characteristics of object oriented programming language.
b) State the contribution of top four states in world that contributed in the gaming industry.
c) Discuss various economic opportunities of gaming.
d) Discuss light impacts color and mood.
e) Discuss various animation parameters. **4×5**

PART-A

- Q.2 a) What is multilevel inheritance? Write a program to display student roll number, marks in two subjects and total Marks. Consider class student stores the roll no, class test, stores marks of two subjects class result contains total marks obtained in test the class result can inherit the marks obtained in test and roll no. through multiple inheritance. **12**
b) What do you mean by Inheritance? Explain different types of inheritance with example. **8**

- Q.3 a) Discuss the historical perspective of Game development in detail. **10**
b) Discuss the steps involved in Game designing in detail. **10**

- Q.4 a) Differentiate 2D and 3D projects and explain various ways to create game in unity. **10**
b) Discuss various features of unity editor in detail. **10**

PART-B

- Q.5 a) Discuss various types of light resources in unity in detail. **10**
b) Write the steps to create new game in unity and name them Roll-a-Ball, discuss various component of game object. **10**

- Q.6 a) Explain in details how we can create the collectable objects in unity. **10**
b) Write the script to picking up an game object in unity. **10**

- Q.7 a) Discuss animator state machine in detail with diagram. **10**
b) Explain the following rigid body class methods in detail.
i) AddForce()
ii) IsSleeping()
5×2

End Semester Examination, May 2019

B. Tech. – Sixth / Eighth Semester

ADVANCE JAVA PROGRAMMING (IT-801)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What are property editors?
b) Write a program to create progress bar using swings.
c) Explain the use of half close socket.
d) What is byte code verification?
e) How do you add and delete rows in Jtable? Write a program. **4×5**

PART-A

- Q.2 a) Explain in detail the various components of JDBC. Give the steps for using JDBC to access a database. **10**
b) Describe SO-TIMEOUT and SO_RCBUF socket option. **5**
c) How do you access LDAP directory information? **5**
- Q.3 a) Write a program using sockets to receive message from server. **10**
b) Write a program to print protocol post, host and file components of a URL. **10**
- Q.4 a) Write a program demonstrating creating a list in java. **10**
b) Describe various styled text components. **10**

PART-B

- Q.5 a) Explain:
i) Clipping
ii) Rendering **5×2**
b) Write a program to drag and drop on object. **10**
- Q.6 a) What is meant by bean in java? Explain the different types of java beans. **10**
b) Describe different bean-info classes. **10**
- Q.7 a) Explain the role of security manager and various permissions in java. **10**
b) Differentiate between symmetric and asymmetric key encryption techniques. **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

ELEMENTS OF DISCRETE STRUCTURES (CS-203)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 a) Determine the dual of each of the following:

- i) $(p \wedge \sim q) \vee (\sim p \wedge q)$
- ii) $((\sim p \vee q) \wedge (q \wedge \sim s)) \vee (p \vee T)$

(Here T means true)

b) Define the following terms:

- i) Complete Binary Tree.
- ii) Full binary tree.

c) Solve deferential equation $a_r - 3r_{r-1} + 2a_{r-2} = 0$.

d) What is the probability of getting 53 Sundays in a leap year?

e) Define homomorphism with an example.

4×5

PART-A

Q.2 a) Among the first 500 positive integers

- i) Determine the integers which are not divisible by 3, nor by 5, nor by 7.
- ii) Determine the integers divisible by 3, but not by 7, not by 9.

5×2

b) Define the following terms:

- i) Disjoint sets.
- ii) Bijective function.
- iii) Into functions
- iv) Injective function.

2½×4

Q.3 a) Construct the truth table for the following:

i) $(a \vee b) \leftrightarrow [((\sim a) \wedge c) \rightarrow (b \wedge c)]$

ii) $A \uparrow B \uparrow C$

5×2

b) Determine whether the following are tautology, contradiction or contingency:

i) $(p \leftrightarrow q) \leftrightarrow ((p \wedge q) \vee (\sim q \wedge \sim q))$

ii) $((p \rightarrow q) \rightarrow t) \leftrightarrow ((p \wedge \sim q) \rightarrow t)$

5×2

Q.4 a) Two cards are drawn from a pack of 52 cards, one after the other without replacement. Find the chance that one of these cards is an ace and other is a king of opposite shade.

10

b) What are the ways to select five team leaders from a group of 20 programmers when:

i) A particular programmer is included every time.

ii) A particular programmer is not included at all.

10

PART-B

Q.5 a) Solve the recurrence relation $a_{r+2} - 5a_{r+1} + 6a_r = r^2$.

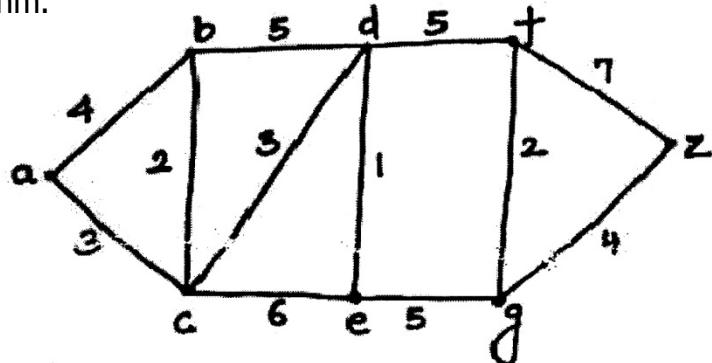
10

b) Solve the recurrence relation $a_{r+2} - 5a_{r+1} + 6a_r = 2$ by the method of generating functions with the initial conditions $a_0 = 1$ and $a_1 = 2$.

10

- Q.6 a) Define the following terms:
- Field
 - Order of group
 - Monoid
 - Ring
 - Abelian group.
- 2×5**
- b) Consider a ring $(R, +, \times)$ defined by $a \times a = a$. Determine whether the ring is commutative or not. **10**

- Q.7 a) Find the shortest path between a and z in the graph shown in figure by using Dijkstra's Algorithm.



10

- b) Draw the binary tree with following information
 Pre-order : G, B, Q, A, C K, F, P, D, E, R H
 In-order : Q, B, K, C, F, A, G, P, E, D, H, R

5×2

End Semester Examination, May 2019

B. Tech – Second Semester

WEB PROGRAMMING THROUGH PHP AND HTML (CS-205)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A**. and any **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is server side scripting?
b) What are cookies? How to create cookie in PHP?
c) Differentiate between echo and print statements.
d) Explain super globals.
e) Give an example defining class in PHP.
f) Specify XML syntax rules.
g) How do you start and destroy a session in PHP?
h) Write WAP in PHP to calculate square root of a number
i) Write WAP in PHP to print odd numbers from 1 to 10.
j) What are exceptions? Explain. **2x10**

PART-A

- Q.2 a) Explain various math functions available in PHP. Discuss any four. **10**
b) Explain steps of PHP installation. **5**
c) Differentiate between constants and variables with suitable examples. **5**
- Q.3 a) Explain the need of static variables. How we create static variables in PHP? **10**
b) Differentiate between include and require. **5**
c) Write a function in PHP to calculate average for a student. The user should provide marks for 5 subjects and the function should return the average based on the average, grade is assigned. **5**
- Q.4 a) What are multidimensional arrays? Write PHP script to insert and delete elements of multidimensional array. **5**
b) Discuss different types of file manipulation functions available in PHP. **5**
c) Design HTML page for getting student information such as name, age, gender, qualification. Write a PHP script to access employer information from HTML page and store it in a text file. **10**

PART-B

- Q.5 a) Elaborate various methods in PHP to handle exceptions. **10**
b) List advantages of Java script write Java script code to validate HTML from elements for online registration form, where the student can register for course online. **10**
- Q.6 a) How can we manage sessions in PHP? Discuss different session tracking mechanism. **10**
b) Differentiate between GET and POST methods. **10**
- Q.7 a) What is a data base? Discuss SQL functions with suitable example. **10**
b) Write PHP script to read data from XML document. **5**
c) Write note on DOM document. **5**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

PRINCIPAL OF OPERATING SYSTEM (CS-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) How context switching works in operating system?
- b) Explain how multiprogramming increases utilization of CPU?
- c) State dining philosopher problem and how it can be solved?
- d) What are the disadvantages of contiguous memory allocation?
- e) Differentiate multiprogramming & multithreading.
- f) How pre-emptive scheduling works? Explain.
- g) Define the term network operating system.
- h) What is system call? How it works?
- i) Explain the term physical address space.
- j) What is the need of virtual memory? Explain.

2x10

PART-A

Q.2 a) Describe the following types of operating system:

- i) Multiuser, ii) Time sharing, iii) Multitasking.

10

b) Explain in detail the role of operating system as a resource manager. **5**

c) Draw and explain architecture of an operating system. **5**

Q.3 a) Consider the following set of processes, with the CPU Burst time and arrival time in milliseconds:

Process	Burst time	Arrival time
P1	10	0
P2	1	2
P3	2	1
P4	9	3
P5	7	4

i) Draw Gantt Chart for the execution of processes using the scheduling algorithms;

- i) SJF (ii) Round Robin (Quantum = (2) (iii) FCFS

ii) What is the average waiting time for each of the algorithms?

iii) What is the average turnaround time for each of the algorithms? **14**

b) Explain the operations that could be performed on a process? **6**

Q.4 a) Write and explain Peterson's Solution for 2 – process problem? **10**

b) Consider the following snapshot of a system. Where A, B, C are different types of resources:

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	0	2	0	0	4	1	0	2

P1	1	0	0	2	0	1			
P2	1	3	5	1	3	7			
P3	6	3	2	8	4	2			
P4	1	4	3	1	5	7			

i) Is the system in safe state? If yes, find the safe sequence.

ii) If a request from P2 (002) arrives?; Can it be granted immediately?

10

PART-B

- Q.5 a) Discuss the term paging and how it overcomes the disadvantages of contiguous memory allocation. **12**
- b) Given the memory partition of 100k, 500k, 200k, 300k, 600 k, apply first fit, best-fit, worst-fit algo to place 212k, 417k, 112k, 426k, and also explain which algorithm will be most efficient in this scenario. **8**

- Q.6 a) What are directories? List different types of directory structures with example? Mention their advantages and disadvantages. **8**
- b) Suppose that a disk drive has 2000 cylinders (0 to 1999). The drive is currently serving at 8 cylinder 253 and previous request was at 145. The queue of pending request in FIFO order is: 78, 145, 950, 1774, 950, 1550, 1050, 1700, 130. Starting from the current position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending request for following disk-scheduling algorithms:
 i) SSTF, ii) C-SCAN, iii) Look **12**

- Q.7 a) What different versions of UNIX are available in market? Compare their features. **10**
- b) Write a short note on architecture of windows operating system. **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

INTRODUCTION TO INFORMATION SYSTEM (CS-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is significance of URL?
b) How do you create links to other documents?
c) What are DOCTYPE elements?
d) Explain the situation when using inheritance is not preferable.
e) What is polymorphism?
f) Define Servlet.
g) How do you insert an image in HTML page.
h) Name the data types available in java.
i) Explain the structure of for loop.
j) What are vectors? **2x10**

PART-A

- Q.2 a) Design a login page using an HTML Form and send its data to other form on the click of submit button. **10**
b) Explain the client server architecture. **10**
- Q.3 a) Describe HTTP Connections and Connection life cycle. **10**
b) Explain servlets. Write a servlet to print 'Hello World'. **10**
- Q.4 Explain the following concepts with the help of example:
a) Method Overloading'.
b) Classes and Objects.
c) Constructors.
d) inheritance. **5x4**

PART-B

- Q.5 a) Write a program in java to find factorial of a number. **10**
b) Write a program to search an element in an array. **10**
- Q.6 a) What is method overriding? Explain by writing a suitable program. **10**
b) Differentiate between public, private and protected access specifier. **10**
- Q.7 What are the guidelines of designing a class hierarchy? Explain the purpose of designing a class hierarchy and the design process. **20**

End Semester Examination, May 2019

B. Tech. - Sixth Semester

INFORMATION SECURITY AUDIT AND MONITORING (CS-627)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1** is compulsory. Attempt any **TWO** questions from **PART-A**. and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) List industry best practices in BISA.
- b) Elaborate "Bring your Own Device Policy"
- c) Write the uses of score cards in BISA.
- d) How can the cardholder data be protected? Discuss.
- e) Discuss the COB IT→IT governance framework global IS standard.

4x5

PART-A

Q.2 List the requirements, methodology and industry best practices in Business- information security alignment. Draw a figure to illustrate BISA. **20**

Q.3 a) What are the requirements of ISD 27001 standard? Why is SOA useful and why it is needed. **10**
b) Discuss various types of assets and write formula for valuation of assets using various methods. **10**

Q.4 Elaborate the following requirements of PCI-DSS standard:

- i) Do not use vendor – supplied defaults for system passwords.
- ii) Test security systems and process regularly.

20

PART-B

Q.5 a) Why security is required in healthcare sector? Discuss. **10**
b) Describe IT Act of India and advantages of cyber laws. **10**

Q.6 List the business skills, communication skills and interpersonal skills for auditors. Discuss each **20**

Q.7 Describe the following concepts of auditing and security:
i) Auditing tools
ii) Role of an auditor. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

JAVA PROGRAMMING (IT-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What is the role of JUM in Java?
- b) Which class is the super class of all classes?
- c) What is the difference between an applet and an application program in Java?
- d) Which keyword is used for accessing the features of a package?
- e) What is the importance of setting environment variable such as 'Path and class Path'?
- f) State whether the statement is true or false justify your answer.
"All methods in an abstract class must be declared as abstract"
- g) What is the use of final keyword?
- h) Can any component have multiple listeners associated with it? Justify your answer.
- i) What is the default layout for applet?
- j) Which class is used to establish a database connection?

2x10

PART-A

- Q.2**
- a) Design an interface with a method reversal. This method takes a string as its input and returns the reversed string. Create a class string reversal and implement the method. **10**
 - b) What is constructor overloading? Explain with an example. Which method is used to call base class constructor **10**

- Q.3**
- a) Write an applet to display an image. **5**
 - b) What are the two ways to execute an applet? Explain. **5**
 - c) Create a user-defined exception named check argument to check the number of arguments passed through command line. If the number of arguments is less than five, throw the check argument exception, else print the addition of all the five numbers. **10**

- Q.4**
- a) Write a program to show how mouse motion listener can be used to track mouse movements. **10**
 - b) Write an AWT program to create checkboxes for different courses belonging to a university such that the courses selected would be displayed. **10**

PART-B

- Q.5**
- a) Write short note on CORBA and SOAP. **10**
 - b) What is remote method invocation? Write steps to set up RMI. **10**

- Q.6**
- a) Write a program to copy characters from one file to another file. **5**
 - b) Explain the utility of Random access file class with example. **5**
 - c) Write a program to show, how can we set priorities to threads. **10**

- Q.7**
- a) Explain the following:
 - i) Scrollable result set.
 - ii) Resultant metadata. **5x2**
 - b) Write a program to insert a row in the database. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

OPERATIONS RESEARCH and OPTIMIZATION (CS-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Briefly Answer:

- Mention the background of Operations Research (OR) and also define the term.
- Mention any three types of OR models and how do you validate a model?
- List any three pros and cons of OR study.
- List four applications of Integer Linear Programming (ILP).
- What is goal programming? State clearly its assumptions.
- Explain the terms stage, state, policy, and optimal policy in dynamic programming.
- What do you mean by assignment problem? Differentiate between balanced and unbalanced ones.
- What is meant by queue discipline and what is the goal of many waiting line systems?
- Differentiate between balking, reneging and jockeying in queuing system.
- Define random variable and specify its role in simulation.

2×10

PART-A

Q.2 The dean of a college must plan the school's course offerings for the fall semester. Student demands make it necessary to offer at least 30 undergraduate and 20 graduate courses in the term. Faculty contracts also dictate that at least 60 courses be offered in total. Each undergraduate course taught costs the college an average of \$2500 in faculty wages, and each graduate course costs \$3000.

- Formulate an LP model to identify number of undergraduate and graduate courses that should be taught in the fall, so that total faculty salaries are kept to a minimum.
- What are the decision variables, objective, and the constraints? Indicate sign restrictions if any.

10×2

Q.3 Solve the following LP using Gomory's cut for Integer Linear Programming (ILP):

$$\text{Max } Z: 2X + 3Y$$

Subject to :

$$2X + 2Y \leq 7; X \leq 2; Y \leq 2; X, Y \geq 0$$

- Convert the given LP to standard form.
- Consider the third iteration as below and proceed for Phase-II:

Cb	Basis	X _b	X	Y	S ₁	S ₂	S ₃
2	x	3/2	1	0	1/2	0	-1
0	S ₂	1/2	0	0	-1/2	1	1
3	Y	2	0	1	0	0	1

5

- Find Gomory's cut equation and
- Solve for integer solutions.

7

8

Q.4 Consider the given scenario, formulate into a Goal Programming (GP) Model:

A small paint company manufactures two types of paint, latex and enamel.

In production, the company uses 10 hours of labour to produce 100 gallons of latex and 15 hours of labour to produce 100 gallons of enamel.

Without hiring outside help or requiring overtime, the company has 40 hours of labour available each week. Furthermore, each paint generates a profit at the rate of \$1.00 per

gallon.

The company has the following objectives listed in decreasing priority: P1: avoid the use of overtime P2: achieve a weekly profit of \$1000 P3: produce at least 700 gallons of enamel paint each week. 20

PART-B

- Q.5 Consider a balanced transportation problem that has three supply sources (silos) and four demand sources (mills). Solve using Vogel's Approximation Method (VAM).

		MILL				
		1	2	3	5	
SILO	1	10	2	20	11	15
	2	12	7	9	20	25
	3	4	14	16	18	10
		5	15	15	15	

20

- Q.6 a) Calculate the total time needed to complete both the jobs by using graphical method to minimize the time needed to process the following jobs on the machines shown below:

	Sequence	A	B	C	D	E
Job 1	Time	2	3	4	6	2
	Sequence	C	A	D	E	B
Job 2	Time	4	5	3	2	6

10

- b) What costs are considered in the basic EOQ model? Suppose that your company sells a product for which the annual demand is 10,000 units. Holding costs are \$1.00 per unit per year, and setup costs are \$200 per order.
- What is the Economic Order Quantity (EOQ) for your product?
 - What is the total annual cost of ordering and holding?
- 10**

- Q.7 a) Formally discuss Kendall's notation in queuing system. **6**
b) An automobile production line turns out about 100 cars per day, but deviations occur owing to many causes. The production is given below by probability distribution:

Production/day	Probability	Production/day	Probability
95	0.03	101	0.15
96	0.05	102	0.10
97	0.07	103	0.07
98	0.10	104	0.05
99	0.15	105	0.03
100	0.20		

Finished cars are transported across the bay, at the end of each day, by ferry. If the ferry has space only for 101 cars. Use Monte Carlo Simulation and simulate for 20-days. Random numbers are given as: <07, 21, 12, 80, 08, 03, 32, 65, 43, 74, 23, 37, 16, 28, 30, 18, 25, 34, 19, 21>

- What will be average number of cars, waiting to be shipped, and **7**
- What will be the empty spaces on boat? **7**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ARTIFICIAL INTELLIGENCE (CS-801)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Explain goal based agent in detail.
 b) State the significance of using heuristic function. Draw state space search for tic-tac toc problem.
 c) Differentiate semantic net and from knowledge representation techniques.
 d) Differentiate min-max algorithm with A* star algorithm.
 e) Discuss in detail, various component of prolog programming language. **4×5**

PART-A

- Q.2 a) Explain AO* algorithm with suitable example. **10**
 b) Explain A* algorithm of finding shortest path clarifying the Heuristic search. Also illustrate the two heuristic functions used. Is A* search used OR or AND graph? Briefly differentiate between AND/OR and OR tree or graph. **10**

- Q.3 a) Define clause goal (or definite goal) and a definite logic program from the following database.
 i) Ancestor (x, y) : Parent (x, y).
 ii) Ancestor (x, y) : Parent (x, z), Parent (z, y).
 iii) Parent (ann, mary).
 iv) Parent (ann, susan)
 v) Parent (mary, bob).
 vi) Parent (susam, John).

Give the response of the prolog to the goals:

- 1) ? Ancestor (ann, susan)
 2) ? Ancestor (ann, John). **10**
 b) Write prolog program to find the concatenation of two list and deleting an element from list. **10**

- Q.4 a) x, y, z are variables, l is a constant (a, b, c, d, e) are predicates, convert the following expressions into Conjunction Normal Form (CNF)
 i) $\forall(x)([a(x) \wedge b(x) \rightarrow [c(x, l)]])$
 ii) $(\exists y(\exists(z)[c(y, z) \rightarrow d(x, y) \cup \forall x(e, x)]))$ **10**
 b) What is resolution? How it is helpful in theorem proving? Explain resolution methods in detail. **10**

PART-B

- Q.5 a) Explain bays theorem in detail for uncertainty. **10**
 b) Differentiate monotonic and non-monotonic reasoning in detail with example. **10**
- Q.6 a) Explain the architecture of expert system in detail. Explain the use of knowledge base and inference engine in detail. **10**
 b) Explain goal based and model based agent in detail. **10**
- Q.7 a) Explain the drawback of min-max algorithm for game playing and explain alpha-beta pruning algorithm. **10**
 b) Discuss the application of AI for natural language processing and game playing. **10**

End Semester Examination, May 2019

M. Tech. – Second Semester

MOBILE AND WIRELESS COMMUNICATION (CS-M-221)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|------------|
| Q.1 | a) Discuss in details the reference model of mobile communication. | 10 |
| | b) Explain the concept and utility of modulation. | 5 |
| Q.2 | a) Explain DAMA in details. | 5 |
| | b) Explain how Collosia avoided in CSMA/CD? | 10 |
| Q.3 | Elaborate and using a suitable diagram, the call establishment procedure for a MTC. | 15 |
| Q.4 | a) Explain the structure and working of a Bluetooth System highlighting the physical and MAC layer. | 10 |
| | b) Explain how handovers take place in satellite systems? | 5 |
| Q.5 | Explain the working of DSDV algorithm using a suitable example. | 15 |
| Q.6 | a) What is indirect TCP? How is it implemented? What is the significance? | 10 |
| | b) What do you understand by time-out freezing? | 5 |
| Q.7 | Write in brief about. | |
| | a) Wireless transaction protocol. | |
| | b) WAP architecture. | |
| | c) Wireless transport layer security. | 5×3 |

End Semester Examination, May 2019

B. Tech. – Sixth Semester

SOFTWARE DEVELOPMENT PROCESSES (CS-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Explain Inheritance using UML notation.
b) Why we will use decision box in activity diagram.
c) What do you mean by package relationship?
d) How relationships are created in Rational Rose?
e) What are the benefits of Iterative planning process? **4×5**

PART-A

- Q.2 a) What are the capabilities of Rational Rose? **5**
b) Differentiate between association and aggregation. Explain with examples. **15**
- Q.3 a) Draw and explain object oriented software development process in detail. **10**
b) Draw and explain in detail the use case diagram of ATM. **10**
- Q.4 a) Explain “multiplicity indicators” with the help of examples. **5**
b) Draw and explain the class diagram of on-line shopping. **15**

PART-B

- Q.5 a) Draw and explain the sequence diagram of landline phone calling. **10**
b) Draw and explain the collaboration diagram of online shopping. **10**
- Q.6 a) Explain the consistency checking in Model Refinement. **10**
b) Explain in detail Logical and Component view. **10**
- Q.7 a) What are the goals of iteration planning process? Also, explain iteration planning process in detail. **15**
b) Explain “Designing Attributes and Operations” in iteration planning process. **5**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ANALYSIS AND DESIGN OF ALGORITHM (CS-402)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- Write and explain theta asymptotic notations with graph.
- How dynamic is different from back tracking?
- Does greedy approach always give optimal solution? Discuss.
- Explain minimum spanning tree.
- Distinguish between P and NP problem.
- Explain superious hit in rabin karp algo.
- What is the worst case complexity of selection sort?
- What will be the time complexity in case of “nested for loop”?
- Sort the following list using insertion sort: 5, 2, 7, 6, 1, 3, 9.
- What is 8 queen problems?

2×10

PART-A

- Q.2
- Differentiate between worst case, average case and best case analysis of an algorithm in detail with examples. **5**
 - What do you mean by asymptotic notation? Write and explain different type of notations with suitable example. **5**
 - Solve by master theorem as applicable:

$$T(n) = 37\left(\frac{n}{2}\right) + n^2 \text{ and } T(n) = 27\left(\frac{n}{2}\right)n \log n$$

10

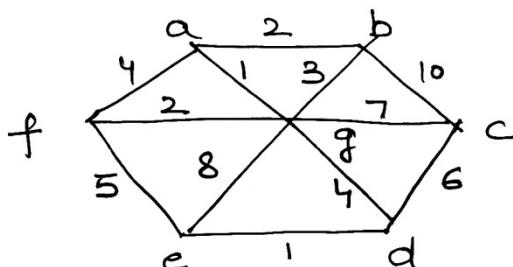
- Q.3
- Explain Naïve string matching algorithm and apply to the following string
 $T = AAAABCBBBCCCAABCBAABC$
 $P = ABC$ **10**

- Explain finite automata algo and apply to the following:
 $T = AABAACAADAABAABAABAA$
 $P = AABA$ **10**

- Q.4
- Explain the algorithm and its time complexity (for all 3 cases) to find minimum and maximum element in an array using minimum comparison with the help of examples. **10**
 - Explain selection sort and compare its performance in best, average and worst case. **10**

PART-B

- Q.5
- Explain prim's algorithm and find the minimum spanning tree using prim's algorithm for the following graph.



10

- Explain knapsack algo and solve it with greedy approach.
Number of object $n = 6$

End Semester Examination, May 2019

M. Tech. — Third Semester

HVDC AND EHVAC TRANSMISSION SYSTEM (EE-M-301)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ANY FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|-----------------------|
| Q.1 | Compare HVDC and EHVAC system for power transmission. | 15 |
| Q.2 | a) Derive an expression for voltage gradient of a three phase transmission line.
b) How is reactive power planned and controlled? | 10
5 |
| Q.3 | Explain the working of SVC and how reactive power is controlled by SVC? | 15 |
| Q.4 | a) How are harmonics generated?
b) Explain AC and DC transmission filters/ | 5
10 |
| Q.5 | Explain the principles of Dc link control and also explain converter control characteristics. | 15 |
| Q.6 | a) Briefly explain radio and TV interference due to EHVAC and HVDC transmission systems.
b) What are the methods of noise reduction? | 10
5 |
| Q.7 | Explain parallel operation of HVDC and EHVAC transmission system. | 15 |
| Q.8 | a) Briefly explain smoothing reactor.
b) Write a short note on transients in DC line. | 8
7 |

End Semester Examination, May 2019

B. Tech. — Fifth Semester

RENEWABLE ENERGY SOURCES (EE-539)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the share of renewable sources in the total power generation n India?
- b) What is meant by "Green house effect"?
- c) What is meant by "Solar photo voltaics".
- d) Give the expression for estimation of average solar radiation.
- e) How is wind energy related to solar energy?
- f) What are the advantages of tidal energy?
- g) How are ocean eaves generated?
- h) What is meant by biofuel?
- i) What is refuse derived fuel?
- j) What is geothermal energy?

2×10

PART-A

- Q.2** a) Explain solar thermal power generation. **10**
b) Write short notes on the following:
 i) Solar furnace.
 ii) Solar cooking. **5×2**
- Q.3** a) Explain the construction and working of a solar cell. **10**
b) Explain the measurement of solar radiation by pyranometer. **10**
- Q.4** a) Explain "Wind energy conversion system" with block diagram. **10**
b) Write a short note on vertical axis wind machines. **10**

PART-B

- Q.5** a) Explain "Ocean thermal energy conversion system". **10**
b) Give expression for potential and kinetic energy from ocean waves. **6**
c) Give advantages and disadvantages of wave energy. **4**
- Q.6** a) Explain the structure of small scale hydro power station. **10**
b) How energy can be extracted from biofuels through process of pyrolysis? **10**
- Q.7** Write short notes on **any two** of the following:
a) Hydrogen energy.
b) Geothermal energy.
c) Nuclear fusion. **10×2**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

FACTS DEVICES AND ITS APPLICATIONS (EE-831)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) State the relationship between reactive power and power factor.
- b) Enumerate the need of maintaining voltage within acceptable limits.
- c) Name any two conditions involved for influence of the SVC on system voltage.
- d) What is the importance of V-I characteristics of STATCOM?
- e) How STATCOM prevents voltage instability?
- f) What is the need for a reactor in basic single phase TSC diagram?
- g) Draw the VI capability characteristics of single module TCSC.
- h) Define SSSC and list the components in it.
- i) State how the SVC prevents the reactive power rating to reach its limits too frequently.
- j) Explain the load sharing criteria of two parallel connected SVC's

2×10

PART-A

Q.2 Elaborate different reactive power control technique in electrical power transmission line with proper diagram. **20**

Q.3 a) Find the expression for steady state power transfer capacity with and without static var compensation. **10**
b) Design a SVC controller. **10**

Q.4 a) i) Draw and Explain power circuit. ii) An equivalent circuit and power exchange circuit of STATCOM. **15**
b) State advantages of STATCOM. **5**

PART-B

Q.5 a) Describe the variable reactance model of TCSC with block diagram. **10**
b) Discuss its modeling for power flow studies. **10**

Q.6 a) Elaborate conceptual representation of unipolar power flow controller in a two machine power system. **15**
b) Plot transmitted power versus transmission angle characteristics. **5**

Q.7 Discuss the design of co-ordination of multiple controllers using linear-control technique. **20**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

EMBEDDED SYSTEMS (EC-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is embedded microcontroller? How is it different from external memory microcontroller?
- b) List all six fields of flex file format.
- c) What are hardware and file registers? Name memory banks available in PIC16F877a microcontroller?
- d) Describe in brief the operation of stack of mid-range pic microcontroller.
- e) List all the arithmetic and logical instructions used in PIC16F877a microcontroller.
- f) What is patch space?
- g) How subroutine is differed from macros in PIC microcontroller?
- h) Discuss parallel slave port (PSP) feature of mid-range microcontroller.
- i) Discuss the analog input/output capabilities of PIC microcontroller.
- j) What are relays and solenoids? Why electromagnetic devices require special interfaces to control?

2×10

PART-A

Q.2

- a) List and discuss the unique features of the PIC microcontroller. **5**
- b) Differentiate Harvard and Princeton architecture. Also explain their advantages and disadvantages. **5**
- c) Discuss the function of assembler in any development tool. Also explain the files or file produced by an assembler. **10**

Q.3

- a) Draw the basic PIC microcontroller processor architecture. Explain each block in detail. **10**
- b) What are the different situations that cause the PIC microcontroller reset to become active? Discuss in detail. **10**

Q.4

- a) Write a program to subtract a number say B from A (A-B). Write the sequence to be followed to perform the above operation. Store the result into file register. **10**
- b) How comparison can be performed in PIC microcontroller? Draw a table with three columns named; jump if, condition to check, and code for all the possible jump condition between two nos. say A & B. **10**

PART-B

Q.5

- a) Draw the mid-range PIC microcontroller option register. Explain its each bit in detail. **5**
- b) List the features of timer 0 (numeric zero) of PIC mid-range microcontroller. Draw the block diagram of timer 0 of P16F877a microcontroller and explain each block in detail. **10**
- c) What are pointers and arrays? **5**

Q.6

- a) Explore the features of PIC16F877a microcontroller that allow a microcontroller to act like an intelligent peripheral to any 8-bit data bus device. **10**
- b) Draw serial peripheral interface master/slave connection of PIC microcontroller. Explain it four pins (SDO, SDI, SCLK, CE) in detail. **10**

Q.7 Draw the interfacing circuit diagram of the following:

- a) DC motor.
- b) 7 segment LED display.

10×2

End Semester Examination, May 2019
B. Tech. — Eighth Semester
ADVANCES IN MOBILE COMPUTING (EC-841)

Time: 3 hrs. Max Marks: **100**
 No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 Answer the following questions:
- Define mobile computing.
 - What is the role of home agent and foreign agent in mobile IP?
 - List the various goals, assumption and requirements in mobile IP.
 - Categorize the various IP micromobility approaches / techniques.
 - Define MANET. What is the need of Adhoc Network?
 - What is reverse tunneling in mobile IP?
 - Distinguish between proactive and reactive protocols.
 - Define the team transaction model.
 - What do you understand by E-commerce and M-Commerce?
 - List the various classes of transaction services offered by wireless transaction layer and explain their role.
- 2×10**

PART-A

- Q.2 a) Draw and explain the architecture of mobile computing with design considerations. **12**
 b) Discuss the various challenges and applications of mobile computing. **8**
- Q.3 a) Explain briefly the system architecture of IEEE 802.11 standard WLAN. **10**
 b) Describe in detail the WATM generic reference model and its various access scenario. **10**
- Q.4 a) Discuss briefly the architecture of WAP 1.X and state the different types of scenario for integration of WAP components. **10**
 b) Differentiate between indirect TCP and snooping TCP alongwith its advantages and disadvantages. **10**

PART-B

- Q.5 a) Examine the role of venus in CODA file and explain in detail the three states of client in CODA. **12**
 b) What do you understand by DVB? Discuss the various functions of components in architecture of DVB scenario. **8**
- Q.6 a) Elaborate in detail the concept of destination sequence distance vector protocol. **10**
 b) Describe adhoc routing protocol in detail. **10**
- Q.7 a) Define the term transaction. State its various properties. **6**
 b) Describe in detail kangaroo and Joey transaction. **14**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

ADVANCES IN SATELLITE COMMUNICATION (EC-836)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Identify the frequency bands commonly used in satellite communication.
 - b) Define the terms –ascending node and descending node.
 - c) A satellite downlink at 12 GHz and operates with a transmit power of 6W and an antenna gain of 48.2 dB. Calculate EIRP in dBW.
 - d) Enumerate the advantages of FM in satellite communication.
 - e) Distinguish between pre-assigned and demand assigned traffic in relation to a satellite communication network.
 - f) List applications of VSAT system.
 - g) Mention the reasons for keeping uplink frequency higher than downlink frequency.
 - h) A speech signal with 3 KHz bandwidth frequency modulates on RF carrier with 30 KHz deviation. What is the FM improvement obtained?
 - i) List the properties of PN sequences.
 - j) State the reason of preferring FM modulation technique in analog satellite communication.

2x10

PART-A

Q.2 a) Explain various satellite subsystems, highlighting their important functions and characteristics. **10**

b) List various applications of satellite communication system.

10

Q.3 a) Two satellites are orbiting in different elliptical orbits with same perigee but different apogee distances. The semi major axis of two orbits are 16000 km and 24000 km. If the orbital period of satellite with small orbit is 10 hrs, determine the orbital period of satellite with large orbit.

b) Explain the terms:

- i) True anomaly ii) Satellite stabilization iii) Eccentricity iv) Station keeping v)
Look angles

Q.4 a) A low noise amplifier has a NF of 1.8 dB. Find the noise temperature of the amplifier. If the input signal to noise ratio is 100, what is the signal to noise ratio at the output of the amplifier? Assume reference noise temperature of 290 K. **10**

b) What is system noise temperature? How does it effect the C/N and G/T ratio? **10**

PART-B

Q.5 a) Briefly explain, why TDM is the only option for digital satellite link and why intermodulation products are not present in TDM? **10**

b) An FM-SCPC channel has 200 KHz bandwidth and carries an FM- modulated speech signal band limited to 4 KHz. If the received carrier to noise ratio is 10 dB, then calculate output signal to noise ratio obtained from the demodulator. **10**

Q.6 a) What is burst? What are the different types of bursts used in TDMA frame? What is the need for preamble bits? 10

b) Compare pre-assigned and demand assigned multiple access techniques? Explain DAMA in detail.

Q.7 Write short notes on:

- Write short notes on:

 - a) SARSAT
 - b) Earth exploration satellite
 - c) Laser Satellite Communication
 - d) GPS

5x4

End Semester Examination, May 2019

B. Tech. — Eighth Semester

SMART GRID TECHNOLOGIES (EE-834A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What all the key features of smart-grid?
- b) Differentiate between conventional grid and smart grid.
- c) Name the components of advanced metering infrastructure.
- d) Write down the advantages of smart meters.
- e) Illustrate distribution automation.
- f) Give the concept of EMS in transmission system.
- g) List the benefits of power quality management.
- h) How cloud computing makes smart grid smarter?
- i) Define microgrid.
- j) Why power quality auditing is required?

2×10

PART-A

- Q.2**
- a) Elaborate the concept of resilient and self-healing grid. **10**
 - b) Draw the architecture of smart grid and also explain the function of each component in detail. **10**
- Q.3**
- a) Describe plug in hybrid electric vehicles (PHEVs), with their benefits and types. **8**
 - b) Illustrate how wide area monitoring, protection and control (WAMPAC) meets the challenges of modern electric power transmission system. **12**
- Q.4**
- a) Explain how automatic meter reading (AMR) can make a system smarter. **10**
 - b) Highlight the key features and applications of the home automation and building automation. **10**

PART-B

- Q.5**
- a) Demonstrate the power quality issues of grid connected renewable energy sources. **10**
 - b) Classify power quality conditioners with their explanation. **10**
- Q.6**
- a) State and explain the issues of interconnecting the microgrid with the utility grid. **10**
 - b) Explain concept of microgrid and its need and applications. **10**
- Q.7**
- a) Describe the role of cyber security for smart grid. **10**
 - b) Differentiate between LAN and WAN. **10**

End Semester Examination, May 2019
B. Tech. — Eighth Semester
ADHOC AND SENSOR NETWORKS (EC-840)

Time: 3 hrs. Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 Answer the following questions:
- a) What are adhoc and sensor networks? List some examples.
 - b) Differentiate between cellular network and adhoc wireless network.
 - c) What is the difference between table driven routing protocol and hybrid routing protocol?
 - d) Describe the role of transport layer.
 - e) List the different parameter which are responsible for quality of service in adhoc networks.
 - f) How mobility of the nodes affect the topology of the adhoc wireless network?
 - g) What is replay attack? How can it be prevented?
 - h) What are the trade offs to be considered in the design of power management schemes?
 - i) How contention based protocols are different than contention based protocols with reservation mechanism?
 - j) Explain hidden terminal problem in adhoc wireless networks. **2×10**

PART-A

- Q.2 a) Explain the issues in designing adhoc wireless networks. How these issues affect the design, deployment and performance of adhoc wireless network? **10**
- b) Discuss the primary responsibility of a medium access control (MAC) protocol in adhoc wireless network? What are the major issues to be considered in designing the MAC protocol for adhoc wireless network? **10**
- Q.3 a) Describe the characteristics of an ideal routing protocol for adhoc wireless networks. **10**
- b) How routing protocol can be classified on the basis of routing information update mechanism and temporal information for routing? Explain one protocol from each mechanism. **10**
- Q.4 a) What is the need of transport layer in adhoc wireless networks? Why TCP does not perform well in adhoc wireless networks? **10**
- b) Describe the issues and challenges in security provisioning of adhoc wireless networks. Explain one network security attack. **10**

PART-B

- Q.5 Differentiate flow control and congestion control mechanism in adhoc wireless networks. Explain how dynamically varying network topology, lack of central coordination and hidden terminal problem affects the quality of service in adhoc wireless network. **20**
- Q.6 a) Discuss the classification of energy management schemes. **10**
- b) What are the advantages of distributed power control algorithms over the centralized power control algorithms in adhoc wireless networks? **10**
- Q.7 Discuss the following in detail:
a) Sensor network architecture.
b) Data dissemination and data gathering. **10×2**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PRINCIPLES OF RADAR SYSTEMS (EC-624)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Discuss the principle of operation of RADAR.
- b) Define 'maximum unambiguous range'.
- c) If prf of a radar is reduced then what will be its effect on maximum unambiguous range.
- d) Calculate the range of a target if the time taken by radar signal to travel to the target and back is 80 us.
- e) A target is moving away from RADAR, describe its effect on frequency of echo signal.
- f) An aircraft is circling around a RADAR at constant distance, will it be detected by an MTI RADAR? Justify.
- g) Discuss the advantage of using staggered frequency in MTI RADAR.
- h) Which type of tracking RADAR gives better accuracy and why?
- i) Mention one use of duplexer in RADAR system.
- j) A scope displays the range of the target and relative strength of echo (True/False). Justify your answer.

2x10

PART-A

- Q.2 a) Draw and explain the block diagram of a conventional RADAR with a superhetrodyne receiver. **10**
- b) Describe in brief the frequencies of operation of a RADAR. Also discuss the major applications of RADAR in detail. **10**
- Q.3 a) Two aircrafts are flying at same radial range of 40 km and at same elevation angle. The aircrafts are separated in azimuth by a distance of 1km. Determine what will be the maximum permissible half power beam width of the RADAR, if these aircrafts are to be resolved in azimuth. **10**
- b) Explain various system losses in detail. **10**
- Q.4 a) State Doppler frequency effect in a RADAR. Is it present, if a target is moving in a circular path around a RADAR station at a constant radial distance? **10**
- b) With the help of block diagram, describe the operation of a FMCW RADAR. Also list applications of FMCW RADAR. **10**

PART-B

- Q.5 a) Calculate the first three blind speeds for an MTI RADAR operating at 3GHZ and p.r.f 1500 HZ. **10**
- b) Derive an expression for blind speed for an MTI RADAR. List two remedial measures to overcome blind speed problem. **10**
- Q.6 a) What is the principle of operation of a conical scan tracking RADAR? Briefly discuss its operation with the help of block diagram. **10**
- b) Describe the operation of sequential lobbing in Tracking RADAR. **10**

- Q.7 Write short notes on:
- a) Receiver Protectors.
 - b) Low noise front ends.
 - c) Balanced duplexers.
 - d) Radar displays.

5x4

End Semester Examination, May 2019
B. Tech. — Fourth Semester
HARDWARE DIGITAL DESIGN (EC-422)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1** Answer the following questions: **2×10**
- Write different types of data objects used in VHDL.
 - List various advantages of VHDL.
 - Define entity. How is it different from architecture?
 - List the types of primary constructs or design units in VHDL.
 - Write the entity for half adder.
 - What is operator overloading and explain it with an example.
 - Draw the state table and state diagram for MOD-5 counter.
 - Design full subtractor using PAL.
 - Differentiate between Mealy and Moore FSM with an example.
 - What are the advantages of PLDs over fixed function IC?

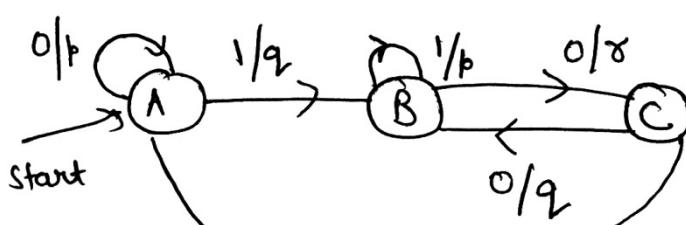
PART-A

- Q.2**
- Design a 2-bit comparator circuit. Write the structural modeling for 2-bit comparator circuit. **10**
 - What do you mean by multiplexer? Implement the behavioral model for 8:1 multiplexer. **5**
 - How can we implement case statement for an encoder? **5**
- Q.3**
- How is variable different from signal? Write two syntax for both variable and signal. **5**
 - Do the following shift operations:
 - “11100101” sll-2
 - “11010010” ror 2
 - “11110001” sla 3
 - “10101010” srl 3**8**
 - Draw the driver for the signal Z. The signal assignment statements for signal Z are given below:
 Process
 Begin
 Z<=transport 2 after 2ns;
 Z<=transport 1 after 1ns; **7**

- Q.4**
- What are various styles of modeling in VHDL? Also, elaborate the importance of each of them. **10**
 - What is the need of HDL? Explain the capabilities of VHDL. **10**

PART-B

- Q.5**
- Design a 4-bit ring counter. Write its VHDL code in behavioral modeling. **10**
 - Discuss various types of shift register. Write the VHDL code for SISO shift register. **10**
- Q.6**
- What is the need of test bench? **3**
 - Discuss various types of conversion function. **5**
 - Draw the state machine table for the following:
 shown in the figure:



- Q.7 a) Give examples of different types of PLDs. How is CPLD different from FPGA? **10**
 b) Design BCD to excess-3 code converter using PAL and PLA. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ANALOG ELECTRONIC CIRCUIT-II (EC-423)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) Draw the block diagram of a feedback amplifier with its various constituents.
b) Calculate input and output impedance of a voltage shunt feedback amplifier with open loop gain $A=500$, $R_i=1k$, $R_o=20K$ and feedback factor $\beta = 0.1$.
c) State Barkhausen's criterion of oscillations.
d) Illustrate the operation of a tank circuit with a neat diagram.
e) For a 741 operational amplifier, an instantaneous input voltage of 20V is applied to a unity gain inverting amplifier, how long will it take for the output voltage to change by 20V. The slew rate of 741 op-amp is $0.5 \text{ v}/\mu\text{s}$.
f) Enlist various characteristics of an ideal operational amplifier.
g) Tabulate differences between a basic comparator and Schmitt trigger.
h) Write a brief note on instrumentation amplifier.
i) Briefly explain the frequency response of a Band pass filter.
j) Discuss the significance of notch filter. **2×10**

PART-A

- Q.2 a) Design a voltage series feedback amplifier. Derive an expression to analyze the effect of a negative feedback on voltage gain, input and output impedance of a designed feedback amplifier. **12**
b) A feedback amplifier has an open loop gain of 500 dB, the gain is reduced to 100 dB with feed-back. Determine the value of feedback factor β . **4**
c) Illustrate how gain of an amp can be stabilized with the help of negative feedback. **4**
- Q.3 a) What do you understand by RC oscillator? Give their classification. Why do we require 3 –RC networks in RC-phase shift oscillator? **8**
b) Design and explain the working of Hartley oscillator with inductor L_1 , L_2 and capacitor C. **6**
c) Determine frequency of oscillation of designed Hartley oscillator with $L_1=10 \text{ mH}$, $L_2=150\text{mH}$, mutual inductance $M=20\text{mH}$ and $C=100\text{pF}$. **6**
- Q.4 a) Describe the various constituents of an operational amplifier alongwith its block diagram. **10**
b) Derive an expression for voltage gain of closed loop inverting amplifier. Explain the concept of virtual ground. **10**

PART-B

- Q.5 a) Describe the operation of operational amplifier as:
i) Differentiator.
ii) Voltage follower. **10**

- b) Design a practical integrator circuit to integrate a square wave of frequency 20 kHz.
The dc gain of designed integrator should be adjusted to 12. 10

- Q.6 a) Illustrate the need of a precision rectifier. Why it is known as super diode?
Draw a circuit diagram of half wave rectifier and explain its working. 10
- b) Design an inverting and non-inverting comparator circuit with reference voltage, $V_{ref} \neq 0$ (not equal to zero). Explain its working with the help of suitable waveforms. 10

- Q.7 a) Explain a second order low pass Butterworth filter with the help of a circuit diagram and frequency response plot. Derive an expression of its transfer function also. 10
- b) Design a first order low pass filter with cut off frequency $f_H = 100\text{kHz}$ and passband voltage gain=2. 10

End Semester Examination, May 2019

B. Tech. – Sixth Semester

VLSI TECHNOLOGY AND CIRCUITS (EC-623)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) What are the four generations of integrated circuits?
b) Define threshold voltage in CMOS.
c) Why NMOS technology is preferred more than PMOS technology?
d) Explain body effect with reference to MOSFET's.
e) What is oxidation? Why is it needed?
f) Explain the characteristics of a good photoresist.
g) Write short note on metallization.
h) What is ion implantation?
i) What is stick diagram?
j) For NMOS device why resistance is not used as a pull up? **2×10**

PART-A

- Q.2 a) Explain VLSI design flow in detail. **10**
b) Discuss advantages and disadvantages of FET's over BJT's **7**
c) What is backend and front end in VLSI? **3**
- Q.3 a) What are the different types of oxidation? **10**
b) What are the various methods of adding impurities in IC fabrication? List advantages and disadvantages of each method. **10**
- Q.4 a) Discuss the fabrication process of CMOS in detail. **10**
b) What are the advantages of silicon-on-insulator process? **5**
c) Explain optical lithography in detail. **5**

PART-B

- Q.5 a) Implement full adder circuit using CMOS. **7**
b) What do you mean by latch up problem in CMOS circuits? How can it be avoided? **8**
c) Draw stick diagram of CMOS inverter circuit. **5**
- Q.6 a) What is device scaling? Explain the effects of constant field and voltage scaling on MOSFET device performance. **12**
b) Explain the following terms: Short channel effects, channel length modulation, velocity saturation. **8**
- Q.7 Write short notes on the following:
a) Dry and wet etching. **6**
b) Depletion MOSFET **8**
c) Chemical vapour deposition (CVD). **6**

End Semester Examination, Dec. 2018
 B. Tech. — Fifth Semester
POWER SYSTEM PROTECTION (EE-521)

Time: 3 hrs. Max Marks: **100**
 No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1** Answer the following questions:
- Resolve an unbalanced three phase voltages of a power system into the symmetrical components and write down its equation.
 - Obtain the interconnection of sequence network for two conductor open fault on power system.
 - What are the functional requirements of a circuit breaker under fault condition?
 - Explain the phenomenon of current chopping in a circuit breaker.
 - Why it is necessary to protect the line and other equipment of power system against over voltages?
 - Give the significance of operator “ α ”.
 - Describe the phenomena of lightning.
 - For the power system shown below sketch the zero sequence networks.
- Figure**
- A relay is connected to 400/5 current transformer and set at 150% with fault current of 2400 A. Find the plug setting multiplier of the coil.
 - Write down the boundary condition for double line to ground fault. **2×10**

PART-A

- Q.2** Discuss transients produced on a transmission line and show how steady state current and DC offset current varies with time. **20**
- Q.3**
- Derive an expression for fault current for line to line fault by symmetrical component method. **10**
 - A 3-phase, 11 KV, 10 MVA alternator has sequence reactance of $X_0 = 0.05$ p.u and $X_1 = 0.15$ p.u and $X_2 = 0.15$ p.u if the generator is on no load. Find the ratio of fault currents for $L-n$ fault to that when all the 3-phase are short circuited. **10**
- Q.4**
- Define and explain the following terms as applied to circuit breaker with proper waveform:
 i) Arc voltage ii) Restriking voltage iii) Recovery voltage **10**
 - Explain the construction and working of vacuum circuit breaker with proper diagram. **10**

PART-B

- Q.5**
- Determine the time of operation of a 5 ampere, 3-sec over current relay having a current setting of 125% and time setting multiplier of 0.6 connected to supply circuit through 400/5 current transformer when the circuit carries a fault current of 4000 A. Given that:
- | | Plug settling multiplier | Time of operation |
|---|--------------------------|-------------------|
| 1 | 8 | 3.5s |
| 2 | 9 | 3.25s |
| 3 | 10 | 3s |
- 10**
- Describe the construction and principle of operation of induction type directional power relay. **10**
- Q.6**
- Analyze the reactance relay by using universal torque equation and also draw its characteristics. **10**
 - Explain with a neat diagram the application of MerZ-Price circulating current principle for protection of alternator. **10**

Q.7 Write short notes on the following surge arrestor:

- a) Horn gap
- b) Valve type
- c) Rod gap
- d) Expulsion type

5×4

End Semester Examination, May 2019

B. Tech. – Sixth Semester

CONSUMER ELECTRONICS (EC-625)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

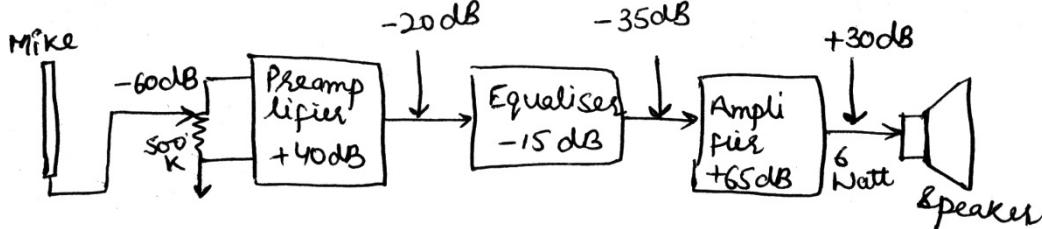
Q.1 Answer the following questions:

- List frequency range of audio signal.
- Justify the importance of IF amplifier in TV receiver.
- Compare dB and dBm.
- Define hue and saturation.
- List the components inside a LNBC.
- Differentiate between truth table and excitation table of flip-flops.
- Defined AM is used for video signal and FM is used for audio signal.
- Indicate the job of corona wires in Xerox machine.
- Define piezoelectric effect.
- Horizontal scanning duration is _____ μs in Indian TV system.

2x10

PART-A

Q.2 a)



A microphone has an output of -60dB (wrt zero level of 6 milliwatt) and is connected to 0.5 mega ohm input of a preamplifier. The preamplifier has a gain of $+40\text{dB}$. The signal then passes through an equaliser with an insertion loss of -15dB and through a main amplifier with a gain of $+65\text{dB}$. If the output to the speaker is 6 watt, find the total power gain and the input voltage to the preamplifier. **10**

- b) With the help of a diagram explain the working of a dynamic microphone. **10**

Q.3 a) Explain the working of Vidicon camera tube with the help of a simplified diagram. **10**
b) Differentiate between sequential scanning and interlace scanning. **10**

Q.4 a) Compare television camera tube and picture tube. **10**
b) What are the requirements of compatibility between a monochrome and colour TV receiver? **10**

PART-B

Q.5 a) Analyze the block diagram and principle of working of DTH. **10**
b) Explain the modules/applications that can be used as an alternative of cable TV using internet. **10**

Q.6 a) Explain the components and working of office equipment-Xerox machine. **10**
b) State the working principle of bar code readers. How many types of bar codes are there? Distinguish between bar codes and QR codes. **10**

Q.7 Write short notes on (**any two**):

- Digital clock.
- Microwave ovens.

c) Air conditioners.	10×2
Weights	$w_i = 15, 10, 9, 5, 4, 10$
Profit	$p_i = 1, 5, 3, 4, 6, 2$
Knapsack capacity	$m = 9$ 10

- Q.6 a) Find the optional parenthesis of matrix chain product whose sequence of dimensions are

$A_1 : 40 * 30; A_2 : 30 * 20; A_3 : 20 * 10$ **10**

- b) Explain LCS algorithm, find its complexity and determine LCS by using dynamic approach.

x = LONGEST

y = STRONG **10**

- Q.7 a) Explain back tracking in detail. Write algorithm for 8 queen problem. Explain with the help of suitable example and diagram.

10

- b) Differentiate between N, P, NP-complete and NP hard problems. Give example for each.

End Semester Examination, May 2019

B. Tech. – Sixth Semester

IT SYSTEM SECURITY (CS-628)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is the significance of key escrow?
b) Differentiate between worms and Trojan Horse: Give example.
c) What are the different access controls? Describe all with their significance.
d) How SSL keys and certificates are generated and used? **5x4**

PART-A

- Q.2 a) How the root-kits can be removed from the system? **10**
b) What is denial of service attack? What is the significance of distributed denial of service attack? How the attacker implements these attacks? **10**
- Q.3 a) What is the importance of sandboxing in OS security? **10**
b) What is the significance of trust model and threat model in operating system security? **10**
- Q.4 a) What is the significance of the fillers in endpoint security? Explain with example. **10**
b) Why Gartner's Magic Quadrant is important in endpoint security? Give real scenario to example. **10**

PART-B

- Q.5 a) Describe the security architecture of oracle application server? **10**
b) What is the significance of OWASP in mobile application security? **10**
- Q.6 a) Discuss the various attacks on database with its lifecycle. **10**
b) What is the significance of identifying assets in system security mechanism? **10**
- Q.7 a) Write short notes on the following:
i) Vendor strengths and limitations for:
— Landesk
— Microsoft
— Panda Security **10**
b) Characteristics of smart token and memory token. **10**

End Semester Examination, May 2019

M. Tech. — Third Semester

HVDC AND EHVAC TRANSMISSION SYSTEM (EE-M-301)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ANY FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|-----------------------|
| Q.1 | Compare HVDC and EHVAC system for power transmission. | 15 |
| Q.2 | a) Derive an expression for voltage gradient of a three phase transmission line.
b) How is reactive power planned and controlled? | 10
5 |
| Q.3 | Explain the working of SVC and how reactive power is controlled by SVC? | 15 |
| Q.4 | a) How are harmonics generated?
b) Explain AC and DC transmission filters/ | 5
10 |
| Q.5 | Explain the principles of Dc link control and also explain converter control characteristics. | 15 |
| Q.6 | a) Briefly explain radio and TV interference due to EHVAC and HVDC transmission systems.
b) What are the methods of noise reduction? | 10
5 |
| Q.7 | Explain parallel operation of HVDC and EHVAC transmission system. | 15 |
| Q.8 | a) Briefly explain smoothing reactor.
b) Write a short note on transients in DC line. | 8
7 |

End Semester Examination, May 2019

B. Tech. — Fifth Semester

RENEWABLE ENERGY SOURCES (EE-539)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the share of renewable sources in the total power generation n India?
- b) What is meant by "Green house effect"?
- c) What is meant by "Solar photo voltaics".
- d) Give the expression for estimation of average solar radiation.
- e) How is wind energy related to solar energy?
- f) What are the advantages of tidal energy?
- g) How are ocean eaves generated?
- h) What is meant by biofuel?
- i) What is refuse derived fuel?
- j) What is geothermal energy?

2×10

PART-A

- Q.2** a) Explain solar thermal power generation. **10**
b) Write short notes on the following:
 i) Solar furnace.
 ii) Solar cooking. **5×2**
- Q.3** a) Explain the construction and working of a solar cell. **10**
b) Explain the measurement of solar radiation by pyranometer. **10**
- Q.4** a) Explain "Wind energy conversion system" with block diagram. **10**
b) Write a short note on vertical axis wind machines. **10**

PART-B

- Q.5** a) Explain "Ocean thermal energy conversion system". **10**
b) Give expression for potential and kinetic energy from ocean waves. **6**
c) Give advantages and disadvantages of wave energy. **4**
- Q.6** a) Explain the structure of small scale hydro power station. **10**
b) How energy can be extracted from biofuels through process of pyrolysis? **10**
- Q.7** Write short notes on **any two** of the following:
a) Hydrogen energy.
b) Geothermal energy.
c) Nuclear fusion. **10×2**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

FACTS DEVICES AND ITS APPLICATIONS (EE-831)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) State the relationship between reactive power and power factor.
- b) Enumerate the need of maintaining voltage within acceptable limits.
- c) Name any two conditions involved for influence of the SVC on system voltage.
- d) What is the importance of V-I characteristics of STATCOM?
- e) How STATCOM prevents voltage instability?
- f) What is the need for a reactor in basic single phase TSC diagram?
- g) Draw the VI capability characteristics of single module TCSC.
- h) Define SSSC and list the components in it.
- i) State how the SVC prevents the reactive power rating to reach its limits too frequently.
- j) Explain the load sharing criteria of two parallel connected SVC's

2×10

PART-A

Q.2 Elaborate different reactive power control technique in electrical power transmission line with proper diagram. **20**

Q.3 a) Find the expression for steady state power transfer capacity with and without static var compensation. **10**
b) Design a SVC controller. **10**

Q.4 a) i) Draw and Explain power circuit. ii) An equivalent circuit and power exchange circuit of STATCOM. **15**
b) State advantages of STATCOM. **5**

PART-B

Q.5 a) Describe the variable reactance model of TCSC with block diagram. **10**
b) Discuss its modeling for power flow studies. **10**

Q.6 a) Elaborate conceptual representation of unipolar power flow controller in a two machine power system. **15**
b) Plot transmitted power versus transmission angle characteristics. **5**

Q.7 Discuss the design of co-ordination of multiple controllers using linear-control technique. **20**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

EMBEDDED SYSTEMS (EC-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is embedded microcontroller? How is it different from external memory microcontroller?
- b) List all six fields of flex file format.
- c) What are hardware and file registers? Name memory banks available in PIC16F877a microcontroller?
- d) Describe in brief the operation of stack of mid-range pic microcontroller.
- e) List all the arithmetic and logical instructions used in PIC16F877a microcontroller.
- f) What is patch space?
- g) How subroutine is differed from macros in PIC microcontroller?
- h) Discuss parallel slave port (PSP) feature of mid-range microcontroller.
- i) Discuss the analog input/output capabilities of PIC microcontroller.
- j) What are relays and solenoids? Why electromagnetic devices require special interfaces to control?

2×10

PART-A

Q.2

- a) List and discuss the unique features of the PIC microcontroller. **5**
- b) Differentiate Harvard and Princeton architecture. Also explain their advantages and disadvantages. **5**
- c) Discuss the function of assembler in any development tool. Also explain the files or file produced by an assembler. **10**

Q.3

- a) Draw the basic PIC microcontroller processor architecture. Explain each block in detail. **10**
- b) What are the different situations that cause the PIC microcontroller reset to become active? Discuss in detail. **10**

Q.4

- a) Write a program to subtract a number say B from A (A-B). Write the sequence to be followed to perform the above operation. Store the result into file register. **10**
- b) How comparison can be performed in PIC microcontroller? Draw a table with three columns named; jump if, condition to check, and code for all the possible jump condition between two nos. say A & B. **10**

PART-B

Q.5

- a) Draw the mid-range PIC microcontroller option register. Explain its each bit in detail. **5**
- b) List the features of timer 0 (numeric zero) of PIC mid-range microcontroller. Draw the block diagram of timer 0 of P16F877a microcontroller and explain each block in detail. **10**
- c) What are pointers and arrays? **5**

Q.6

- a) Explore the features of PIC16F877a microcontroller that allow a microcontroller to act like an intelligent peripheral to any 8-bit data bus device. **10**
- b) Draw serial peripheral interface master/slave connection of PIC microcontroller. Explain it four pins (SDO, SDI, SCLK, CE) in detail. **10**

Q.7 Draw the interfacing circuit diagram of the following:

- a) DC motor.
- b) 7 segment LED display.

10×2

End Semester Examination, May 2019
B. Tech. — Eighth Semester
ADVANCES IN MOBILE COMPUTING (EC-841)

Time: 3 hrs. Max Marks: **100**
No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 Answer the following questions:
- a) Define mobile computing.
 - b) What is the role of home agent and foreign agent in mobile IP?
 - c) List the various goals, assumption and requirements in mobile IP.
 - d) Categorize the various IP micromobility approaches / techniques.
 - e) Define MANET. What is the need of Adhoc Network?
 - f) What is reverse tunneling in mobile IP?
 - g) Distinguish between proactive and reactive protocols.
 - h) Define the team transaction model.
 - i) What do you understand by E-commerce and M-Commerce?
 - j) List the various classes of transaction services offered by wireless transaction layer and explain their role.
- 2×10**

PART-A

- Q.2 a) Draw and explain the architecture of mobile computing with design considerations. **12**
b) Discuss the various challenges and applications of mobile computing. **8**
- Q.3 a) Explain briefly the system architecture of IEEE 802.11 standard WLAN. **10**
b) Describe in detail the WATM generic reference model and its various access scenario. **10**
- Q.4 a) Discuss briefly the architecture of WAP 1.X and state the different types of scenario for integration of WAP components. **10**
b) Differentiate between indirect TCP and snooping TCP alongwith its advantages and disadvantages. **10**

PART-B

- Q.5 a) Examine the role of venus in CODA file and explain in detail the three states of client in CODA. **12**
b) What do you understand by DVB? Discuss the various functions of components in architecture of DVB scenario. **8**
- Q.6 a) Elaborate in detail the concept of destination sequence distance vector protocol. **10**
b) Describe adhoc routing protocol in detail. **10**
- Q.7 a) Define the term transaction. State its various properties. **6**
b) Describe in detail kangaroo and Joey transaction. **14**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

ADVANCES IN SATELLITE COMMUNICATION (EC-836)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Identify the frequency bands commonly used in satellite communication.
 - b) Define the terms –ascending node and descending node.
 - c) A satellite downlink at 12 GHz and operates with a transmit power of 6W and an antenna gain of 48.2 dB. Calculate EIRP in dBW.
 - d) Enumerate the advantages of FM in satellite communication.
 - e) Distinguish between pre-assigned and demand assigned traffic in relation to a satellite communication network.
 - f) List applications of VSAT system.
 - g) Mention the reasons for keeping uplink frequency higher than downlink frequency.
 - h) A speech signal with 3 KHz bandwidth frequency modulates on RF carrier with 30 KHz deviation. What is the FM improvement obtained?
 - i) List the properties of PN sequences.
 - j) State the reason of preferring FM modulation technique in analog satellite communication.

2x10

PART-A

Q.2 a) Explain various satellite subsystems, highlighting their important functions and characteristics. **10**

b) List various applications of satellite communication system.

10

Q.3 a) Two satellites are orbiting in different elliptical orbits with same perigee but different apogee distances. The semi major axis of two orbits are 16000 km and 24000 km. If the orbital period of satellite with small orbit is 10 hrs, determine the orbital period of satellite with large orbit.

b) Explain the terms:

- Explain the terms:
i) True anomaly ii) Satellite stabilization iii) Eccentricity iv) Station keeping v)
Look angles

Q.4 a) A low noise amplifier has a NF of 1.8 dB. Find the noise temperature of the amplifier. If the input signal to noise ratio is 100, what is the signal to noise ratio at the output of the amplifier? Assume reference noise temperature of 290 K. **10**

b) What is system noise temperature? How does it effect the C/N and G/T ratio? **10**

PART-B

Q.5 a) Briefly explain, why TDM is the only option for digital satellite link and why intermodulation products are not present in TDM? **10**

b) An FM-SCPC channel has 200 KHz bandwidth and carries an FM- modulated speech signal band limited to 4 KHz. If the received carrier to noise ratio is 10 dB, then calculate output signal to noise ratio obtained from the demodulator. **10**

Q.6 a) What is burst? What are the different types of bursts used in TDMA frame? What is the need for preamble bits? **10**

b) Compare pre-assigned and demand assigned multiple access techniques? Explain DAMA in detail. **10**

Q.7 Write short notes on:

End Semester Examination, May 2019

B. Tech. — Eighth Semester

SMART GRID TECHNOLOGIES (EE-834A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What all the key features of smart-grid?
- b) Differentiate between conventional grid and smart grid.
- c) Name the components of advanced metering infrastructure.
- d) Write down the advantages of smart meters.
- e) Illustrate distribution automation.
- f) Give the concept of EMS in transmission system.
- g) List the benefits of power quality management.
- h) How cloud computing makes smart grid smarter?
- i) Define microgrid.
- j) Why power quality auditing is required?

2×10

PART-A

- Q.2**
- a) Elaborate the concept of resilient and self-healing grid. **10**
 - b) Draw the architecture of smart grid and also explain the function of each component in detail. **10**
- Q.3**
- a) Describe plug in hybrid electric vehicles (PHEVs), with their benefits and types. **8**
 - b) Illustrate how wide area monitoring, protection and control (WAMPAC) meets the challenges of modern electric power transmission system. **12**
- Q.4**
- a) Explain how automatic meter reading (AMR) can make a system smarter. **10**
 - b) Highlight the key features and applications of the home automation and building automation. **10**

PART-B

- Q.5**
- a) Demonstrate the power quality issues of grid connected renewable energy sources. **10**
 - b) Classify power quality conditioners with their explanation. **10**
- Q.6**
- a) State and explain the issues of interconnecting the microgrid with the utility grid. **10**
 - b) Explain concept of microgrid and its need and applications. **10**
- Q.7**
- a) Describe the role of cyber security for smart grid. **10**
 - b) Differentiate between LAN and WAN. **10**

End Semester Examination, May 2019
B. Tech. — Eighth Semester
ADHOC AND SENSOR NETWORKS (EC-840)

Time: 3 hrs. Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 Answer the following questions:
- a) What are adhoc and sensor networks? List some examples.
 - b) Differentiate between cellular network and adhoc wireless network.
 - c) What is the difference between table driven routing protocol and hybrid routing protocol?
 - d) Describe the role of transport layer.
 - e) List the different parameter which are responsible for quality of service in adhoc networks.
 - f) How mobility of the nodes affect the topology of the adhoc wireless network?
 - g) What is replay attack? How can it be prevented?
 - h) What are the trade offs to be considered in the design of power management schemes?
 - i) How contention based protocols are different than contention based protocols with reservation mechanism?
 - j) Explain hidden terminal problem in adhoc wireless networks. **2×10**

PART-A

- Q.2 a) Explain the issues in designing adhoc wireless networks. How these issues affect the design, deployment and performance of adhoc wireless network? **10**
- b) Discuss the primary responsibility of a medium access control (MAC) protocol in adhoc wireless network? What are the major issues to be considered in designing the MAC protocol for adhoc wireless network? **10**
- Q.3 a) Describe the characteristics of an ideal routing protocol for adhoc wireless networks. **10**
- b) How routing protocol can be classified on the basis of routing information update mechanism and temporal information for routing? Explain one protocol from each mechanism. **10**
- Q.4 a) What is the need of transport layer in adhoc wireless networks? Why TCP does not perform well in adhoc wireless networks? **10**
- b) Describe the issues and challenges in security provisioning of adhoc wireless networks. Explain one network security attack. **10**

PART-B

- Q.5 Differentiate flow control and congestion control mechanism in adhoc wireless networks. Explain how dynamically varying network topology, lack of central coordination and hidden terminal problem affects the quality of service in adhoc wireless network. **20**
- Q.6 a) Discuss the classification of energy management schemes. **10**
- b) What are the advantages of distributed power control algorithms over the centralized power control algorithms in adhoc wireless networks? **10**
- Q.7 Discuss the following in detail:
a) Sensor network architecture.
b) Data dissemination and data gathering. **10×2**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PRINCIPLES OF RADAR SYSTEMS (EC-624)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Discuss the principle of operation of RADAR.
- b) Define 'maximum unambiguous range'.
- c) If prf of a radar is reduced then what will be its effect on maximum unambiguous range.
- d) Calculate the range of a target if the time taken by radar signal to travel to the target and back is 80 us.
- e) A target is moving away from RADAR, describe its effect on frequency of echo signal.
- f) An aircraft is circling around a RADAR at constant distance, will it be detected by an MTI RADAR? Justify.
- g) Discuss the advantage of using staggered frequency in MTI RADAR.
- h) Which type of tracking RADAR gives better accuracy and why?
- i) Mention one use of duplexer in RADAR system.
- j) A scope displays the range of the target and relative strength of echo (True/False). Justify your answer.

2x10

PART-A

Q.2 a) Draw and explain the block diagram of a conventional RADAR with a superhetrodyne receiver. **10**

b) Describe in brief the frequencies of operation of a RADAR. Also discuss the major applications of RADAR in detail. **10**

Q.3 a) Two aircrafts are flying at same radial range of 40 km and at same elevation angle. The aircrafts are separated in azimuth by a distance of 1km. Determine what will be the maximum permissible half power beam width of the RADAR, if these aircrafts are to be resolved in azimuth. **10**

b) Explain various system losses in detail. **10**

Q.4 a) State Doppler frequency effect in a RADAR. Is it present, if a target is moving in a circular path around a RADAR station at a constant radial distance? **10**

b) With the help of block diagram, describe the operation of a FMCW RADAR. Also list applications of FMCW RADAR. **10**

PART-B

Q.5 a) Calculate the first three blind speeds for an MTI RADAR operating at 3GHZ and p.r.f 1500 Hz. **10**

b) Derive an expression for blind speed for an MTI RADAR. List two remedial measures to overcome blind speed problem. **10**

Q.6 a) What is the principle of operation of a conical scan tracking RADAR? Briefly discuss its operation with the help of block diagram. **10**

b) Describe the operation of sequential lobbing in Tracking RADAR. **10**

Q.7 Write short notes on:

- a) Receiver Protectors.
- b) Low noise front ends.
- c) Balanced duplexers.
- d) Radar displays.

5x4

End Semester Examination, May 2019

B. Tech. — Fourth Semester HARDWARE DIGITAL DESIGN (EC-422)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Write different types of data objects used in VHDL.
- b) List various advantages of VHDL.
- c) Define entity. How is it different from architecture?
- d) List the types of primary constructs or design units in VHDL.
- e) Write the entity for half adder.
- f) What is operator overloading and explain it with an example.
- g) Draw the state table and state diagram for MOD-5 counter.
- h) Design full subtractor using PAL.
- i) Differentiate between Mealy and Moore FSM with an example.
- j) What are the advantages of PLDs over fixed function IC?

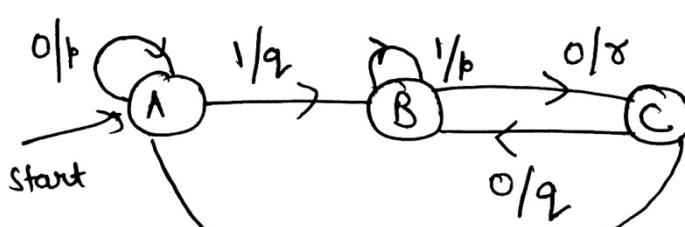
2×10

PART-A

- Q.2**
- a) Design a 2-bit comparator circuit. Write the structural modeling for 2-bit comparator circuit. **10**
 - b) What do you mean by multiplexer? Implement the behavioral model for 8:1 multiplexer. **5**
 - c) How can we implement case statement for an encoder? **5**
- Q.3**
- a) How is variable different from signal? Write two syntax for both variable and signal. **5**
 - b) Do the following shift operations:
 - i) "11100101" sll-2
 - ii) "11010010" ror 2
 - iii) "11110001" sla 3
 - iv) "10101010" srl 3**8**
 - c) Draw the driver for the signal Z. The signal assignment statements for signal Z are given below:
 Process
 Begin
 Z<=transport 2 after 2ns;
 Z<=transport 1 after 1ns; **7**
- Q.4**
- a) What are various styles of modeling in VHDL? Also, elaborate the importance of each of them. **10**
 - b) What is the need of HDL? Explain the capabilities of VHDL. **10**

PART-B

- Q.5**
- a) Design a 4-bit ring counter. Write its VHDL code in behavioral modeling. **10**
 - b) Discuss various types of shift register. Write the VHDL code for SISO shift register. **10**
- Q.6**
- a) What is the need of test bench? **3**
 - b) Discuss various types of conversion function. **5**
 - c) Draw the state machine table for the following:
 shown in the figure:



State Diagram 12

- Q.7 a) Give examples of different types of PLDs. How is CPLD different from FPGA? **10**
 b) Design BCD to excess-3 code converter using PAL and PLA. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ANALOG ELECTRONIC CIRCUIT-II (EC-423)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) Draw the block diagram of a feedback amplifier with its various constituents.
b) Calculate input and output impedance of a voltage shunt feedback amplifier with open loop gain $A=500$, $R_i=1k$, $R_o=20K$ and feedback factor $\beta = 0.1$.
c) State Barkhausen's criterion of oscillations.
d) Illustrate the operation of a tank circuit with a neat diagram.
e) For a 741 operational amplifier, an instantaneous input voltage of 20V is applied to a unity gain inverting amplifier, how long will it take for the output voltage to change by 20V. The slew rate of 741 op-amp is $0.5 \text{ v}/\mu\text{s}$.
f) Enlist various characteristics of an ideal operational amplifier.
g) Tabulate differences between a basic comparator and Schmitt trigger.
h) Write a brief note on instrumentation amplifier.
i) Briefly explain the frequency response of a Band pass filter.
j) Discuss the significance of notch filter. **2×10**

PART-A

- Q.2 a) Design a voltage series feedback amplifier. Derive an expression to analyze the effect of a negative feedback on voltage gain, input and output impedance of a designed feedback amplifier. **12**
b) A feedback amplifier has an open loop gain of 500 dB, the gain is reduced to 100 dB with feed-back. Determine the value of feedback factor β . **4**
c) Illustrate how gain of an amp can be stabilized with the help of negative feedback. **4**
- Q.3 a) What do you understand by RC oscillator? Give their classification. Why do we require 3 –RC networks in RC-phase shift oscillator? **8**
b) Design and explain the working of Hartley oscillator with inductor L_1 , L_2 and capacitor C. **6**
c) Determine frequency of oscillation of designed Hartley oscillator with $L_1=10 \text{ mH}$, $L_2=150\text{mH}$, mutual inductance $M=20\text{mH}$ and $C=100\text{pF}$. **6**
- Q.4 a) Describe the various constituents of an operational amplifier alongwith its block diagram. **10**
b) Derive an expression for voltage gain of closed loop inverting amplifier. Explain the concept of virtual ground. **10**

PART-B

- Q.5 a) Describe the operation of operational amplifier as:
i) Differentiator.
ii) Voltage follower. **10**

- b) Design a practical integrator circuit to integrate a square wave of frequency 20 kHz.
The dc gain of designed integrator should be adjusted to 12. 10

- Q.6 a) Illustrate the need of a precision rectifier. Why it is known as super diode?
Draw a circuit diagram of half wave rectifier and explain its working. 10
- b) Design an inverting and non-inverting comparator circuit with reference voltage, $V_{ref} \neq 0$ (not equal to zero). Explain its working with the help of suitable waveforms. 10
- Q.7 a) Explain a second order low pass Butterworth filter with the help of a circuit diagram and frequency response plot. Derive an expression of its transfer function also. 10
- b) Design a first order low pass filter with cut off frequency $f_H = 100\text{kHz}$ and passband voltage gain=2. 10

End Semester Examination, May 2019

B. Tech. – Sixth Semester

VLSI TECHNOLOGY AND CIRCUITS (EC-623)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) What are the four generations of integrated circuits?
b) Define threshold voltage in CMOS.
c) Why NMOS technology is preferred more than PMOS technology?
d) Explain body effect with reference to MOSFET's.
e) What is oxidation? Why is it needed?
f) Explain the characteristics of a good photoresist.
g) Write short note on metallization.
h) What is ion implantation?
i) What is stick diagram?
j) For NMOS device why resistance is not used as a pull up? **2×10**

PART-A

- Q.2 a) Explain VLSI design flow in detail. **10**
b) Discuss advantages and disadvantages of FET's over BJT's **7**
c) What is backend and front end in VLSI? **3**
- Q.3 a) What are the different types of oxidation? **10**
b) What are the various methods of adding impurities in IC fabrication? List advantages and disadvantages of each method. **10**
- Q.4 a) Discuss the fabrication process of CMOS in detail. **10**
b) What are the advantages of silicon-on-insulator process? **5**
c) Explain optical lithography in detail. **5**

PART-B

- Q.5 a) Implement full adder circuit using CMOS. **7**
b) What do you mean by latch up problem in CMOS circuits? How can it be avoided? **8**
c) Draw stick diagram of CMOS inverter circuit. **5**
- Q.6 a) What is device scaling? Explain the effects of constant field and voltage scaling on MOSFET device performance. **12**
b) Explain the following terms: Short channel effects, channel length modulation, velocity saturation. **8**
- Q.7 Write short notes on the following:
a) Dry and wet etching. **6**
b) Depletion MOSFET **8**
c) Chemical vapour deposition (CVD). **6**

End Semester Examination, Dec. 2018
B. Tech. — Fifth Semester
POWER SYSTEM PROTECTION (EE-521)

Time: 3 hrs. Max Marks: **100**
 No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1** Answer the following questions:
- Resolve an unbalanced three phase voltages of a power system into the symmetrical components and write down its equation.
 - Obtain the interconnection of sequence network for two conductor open fault on power system.
 - What are the functional requirements of a circuit breaker under fault condition?
 - Explain the phenomenon of current chopping in a circuit breaker.
 - Why it is necessary to protect the line and other equipment of power system against over voltages?
 - Give the significance of operator “ α ”.
 - Describe the phenomena of lightning.
 - For the power system shown below sketch the zero sequence networks.
- Figure**
- A relay is connected to 400/5 current transformer and set at 150% with fault current of 2400 A. Find the plug setting multiplier of the coil.
 - Write down the boundary condition for double line to ground fault. **2×10**

PART-A

- Q.2** Discuss transients produced on a transmission line and show how steady state current and DC offset current varies with time. **20**
- Q.3**
- Derive an expression for fault current for line to line fault by symmetrical component method. **10**
 - A 3-phase, 11 KV, 10 MVA alternator has sequence reactance of $X_0 = 0.05$ p.u and $X_1 = 0.15$ p.u and $X_2 = 0.15$ p.u if the generator is on no load. Find the ratio of fault currents for $L-n$ fault to that when all the 3-phase are short circuited. **10**
- Q.4**
- Define and explain the following terms as applied to circuit breaker with proper waveform:
 i) Arc voltage ii) Restriking voltage iii) Recovery voltage **10**
 - Explain the construction and working of vacuum circuit breaker with proper diagram. **10**

PART-B

- Q.5**
- Determine the time of operation of a 5 ampere, 3-sec over current relay having a current setting of 125% and time setting multiplier of 0.6 connected to supply circuit through 400/5 current transformer when the circuit carries a fault current of 4000 A. Given that:
- | | Plug settling multiplier | Time of operation |
|---|--------------------------|-------------------|
| 1 | 8 | 3.5s |
| 2 | 9 | 3.25s |
| 3 | 10 | 3s |
- 10**
- Describe the construction and principle of operation of induction type directional power relay. **10**
- Q.6**
- Analyze the reactance relay by using universal torque equation and also draw its characteristics. **10**
 - Explain with a neat diagram the application of MerZ-Price circulating current principle for protection of alternator. **10**

Q.7 Write short notes on the following surge arrestor:

- a) Horn gap
- b) Valve type
- c) Rod gap
- d) Expulsion type

5×4

End Semester Examination, May 2019

B. Tech. – Sixth Semester

CONSUMER ELECTRONICS (EC-625)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

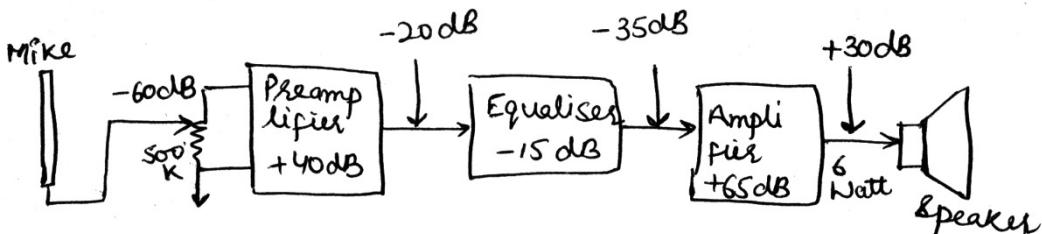
Q.1 Answer the following questions:

- List frequency range of audio signal.
- Justify the importance of IF amplifier in TV receiver.
- Compare dB and dBm.
- Define hue and saturation.
- List the components inside a LNBF.
- Differentiate between truth table and excitation table of flip-flops.
- Defined AM is used for video signal and FM is used for audio signal.
- Indicate the job of corona wires in Xerox machine.
- Define piezoelectric effect.
- Horizontal scanning duration is _____ μ s in Indian TV system.

2×10

PART-A

Q.2 a)



A microphone has an output of -60dB (wrt zero level of 6 milliwatt) and is connected to 0.5 mega ohm input of a preamplifier. The preamplifier has a gain of $+40\text{dB}$. The signal then passes through an equaliser with an insertion loss of -15dB and through a main amplifier with a gain of $+65\text{dB}$. If the output to the speaker is 6 watt, find the total power gain and the input voltage to the preamplifier. **10**

- b) With the help of a diagram explain the working of a dynamic microphone. **10**

Q.3 a) Explain the working of Vidicon camera tube with the help of a simplified diagram. **10**
b) Differentiate between sequential scanning and interlace scanning. **10**

Q.4 a) Compare television camera tube and picture tube. **10**
b) What are the requirements of compatibility between a monochrome and colour TV receiver? **10**

PART-B

Q.5 a) Analyze the block diagram and principle of working of DTH. **10**
b) Explain the modules/applications that can be used as an alternative of cable TV using internet. **10**

Q.6 a) Explain the components and working of office equipment-Xerox machine. **10**
b) State the working principle of bar code readers. How many types of bar codes are there? Distinguish between bar codes and QR codes. **10**

Q.7 Write short notes on (***any two***):

- a) Digital clock.
- b) Microwave ovens.
- c) Air conditioners.

10×2

End Semester Examination, May 2019

M. Tech. - Second Semester

DIGITAL CONTROL OF POWER ELECTRONICS AND DRIVE SYSTEM (PC-EE-M-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carry equal marks.

- Q.1 Derive equivalent values of drive parameters for. **10**
a) Load with rotational motion. **10**
b) Load with translation motion. **10**
- Q.2 a) What are the requirements of closed loop control of electric drives? **5**
b) Explain with proper block diagram how closed loop speed control of multi motor drive is done. **15**
- Q.3 a) With the help of schematic diagram explain controlled speed drive of DC motor with current and speed feedback control loop. **10**
b) Explain the working of chopper fed DC motor drive. **10**
- Q.4 a) Discuss how power factor correction schemes for electrical load can be simulated? **15**
b) State different parameters used to describe the characteristics of rectifier. **5**
- Q.5 Discuss the simulation of chopper fed DC motor. **20**
- Q.6 Show with the help of proper waveform that DC/AC PWM inverter is the first order element that have one zero and one pole, which is located at unity? **20**
- Q.7 Write short notes on:
a) Single phase half bridge VSI.
b) Single phase full bridge voltage source inverter (VSI).
c) Three phase full bridge voltage source inverter (VSI).
d) Three-phase full bridge current source inverter (CSI). **5x4**
- Q.8 a) Extrapolate criteria for steady state stability of synchronous machine. **15**
b) Explain why large dc motors cannot normally be started by applying full voltage? **5**

End Semester Examination, May 2019

B. Tech. – Second Semester

BASIC ELECTRICAL ENGINEERING (ESC-EE-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What is time constant of an RL network supplied by a dc source?
- b) Define average value of a sinusoidal quantity.
- c) State Kirchoff's voltage Law.
- d) Write down the expression for slip of induction motor.
- e) Name two types of batteries.
- f) Define admittance.
- g) List two difference between star and delta connected system.
- h) What is coercive force?
- i) What is a power converter?
- j) What is a commutator in dc machine?

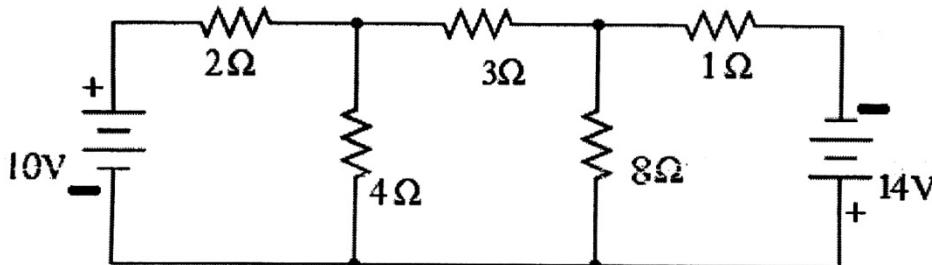
2×10

PART-A

Q.2 a) Explain thevenin's theorem.

10

b) Obtain the current in the 3Ω resistor using Superposition's theorem.



10

Q.3 a) A coil of resistance 20Ω and an inductance of 150 mH is connected in series with a capacitance of $85\mu\text{F}$ across $225 \sin 314 t$ ac supply. Calculate
i) magnitude of current,
ii) power factor,
iii) voltage across coil
iv) voltage across the capacitance
v) power dissipated in the network

10

b) Derive the relation between line voltage and phase voltage in a star connected system.

10

Q.4 a) Discuss the different losses in a transformer.

5

b) Derive the condition for maximum efficiency in a transformer.

15

PART-B

Q.5 a) Draw and explain the parts of dc machine.

10

b) Explain the different characteristics of dc shunt motor.

10

Q.6 a) Explain the generation of rotating magnetic field in a $3-\phi$ induction motor.

10

b) Explain two types of single phase induction motor.

10

Q.7 a) Why earthing is necessary? Explain any one method of earthing.

10

b) Explain the working of lead acid battery while charging and discharging.

10

End Semester Examination, May 2019

M. Tech. — Second Semester

POWER ELECTRONICS CONVERTERS (PC-EE-M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Analyse the battery charging circuit with appropriate wave forms of voltage and current. **10**
b) Find the performance parameters of a full wave rectifier with resistive load. **10**
- Q.2 a) Discuss the operation of single phase full converter with R-L load with appropriate waveforms of load voltage and current. Determine the expression of load voltage and current. **10**
b) Explain the working of a dual converter. **10**
- Q.3 a) Analyse the boost converter and determine the expression of ripple current and voltage when it is operating in discontinuous mode. **10**
b) Discuss the state space representation of a buck converter. **10**
- Q.4 a) Discuss the working of a three phase inverter when conducting in 120° mode. Support the answer with the help of appropriate waveform of load voltage. **15**
b) Compare the voltage source inverters with current source inverter. **5**
- Q.5 a) Describe the operation of the matrix converter having three phase input supply and connected to three phase inductive load. **10**
b) Discuss how fixed ac input frequency can be changed to the variable frequency without an intermediate conversion link. **10**
- Q.6 a) Design a buck converter having input voltage of 110V, average load voltage of 60V, average load current of 20A. The choking frequency is 20 kHz. The peak to peak ripples are 2.5 % for load voltage, 5% for load current and 10% for filter Le current. Determine the value of Le, L and C. **12**
b) Discuss the practical consideration in the design of power converters. **8**
- Q.7 a) Explain the techniques for the voltage control of single phase inverters. **10**
b) Discuss the operation of the Cuk converter with suitable waveforms. **10**
- Q.8 Write short notes on **(any two):**
a) Voltage regulators.
b) Buck-boost converters.
c) Harmonics. **10x2**

End Semester Examination, May 2019

M. Tech. - Second Semester

SMART GRIDS (PE-EE-M-226)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt any **FIVE** questions in all. Each question carry equal marks.

- | | | |
|-----|--|-------------|
| Q.1 | a) What are the forced drivers for demanding smart Grid? | 10 |
| | b) Describe principle of self-healing grid and its need in smart grid network. | 10 |
| Q.2 | a) Illustrate primary and secondary functions of distribution automation system. | 10 |
| | b) Give an overview of advanced meter reading and explain how it makes a system smarter. | 10 |
| Q.3 | a) What is phase measurement unit? Explain its features and applications in power systems. | 10 |
| | b) Outline the concept of GIS. Explain its components in detail. | 10 |
| Q.4 | a) Why are microgrids important to the world? Also differentiate between microgrid and conventional power plant. | 10 |
| | b) State and explain the issues of interconnecting the microgrid with the utility grid. | 10 |
| Q.5 | a) Explain types of 'power quality conditioners' with their control circuits. | 10 |
| | b) Highlight the issues related to power quality in smart grid. | 10 |
| Q.6 | a) Why cyber-security is of prime importance in smart grid and how it can be achieved? | 10 |
| | b) Differentiate between HAN and NAN. | 10 |
| Q.7 | Write short notes on (any two): | |
| | a) PHEV. | |
| | b) Cloud computing in smart grid. | |
| | c) Power quality and EMC in smart grid. | 10x2 |

End Semester Examination, May 2019

B. Tech. – Fourth / Fifth Semester

MICROPROCESSOR AND INTERFACING (EC-401B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) How many address lines are required to address two megabyte (2048k) of memory?
- b) What are assembler directive? Explain DD and END directive.
- c) For what purpose 1NTO and 1NT1 are used in 8086 microprocessor?
- d) What is the difference between physical and logical address in 8086 microprocessor? Explain with an example.
- e) Distinguish between the following instructions CMPB and Sub B.
- f) Determine the control word for the following configuration of 8255:
Port A= output
Mode of port A = Mode 1
Port B = output
Mode of port B = Mode 0
Port C lower bits = output
- g) What is the function of in-service-register (ISR) in programmable interrupt controller (8259)?
- h) Explain the function of AEN and ADSTB pin in DMA controller 8237.
- i) What is the necessity of programmable interval timer?
- j) Discuss the advantages of interrupt driven data transfer scheme over polling method.

2x10

PART-A

Q.2 a) With respect to block diagram of 8085, explain the function of i) Flag register ii) program counter iii) stack pointer. **10**
b) What is the role of ALE signal in 8085 microprocessor? How can address and data lines be de-multiplexed? **5**
c) Draw and explain interrupt structure of 8085 microprocessor. **5**

Q.3 a) Explain the function of following pins of 8086 microprocessor:

- i) TEST
- ii) MN / MX
- iii) ALE
- iv) BHE / ST
- v) LOCK **10**

b) What do you understand by memory segmentation with reference to 8086? What are its advantages? **10**

Q.4 a) Explain the following instructions of 8086 microprocessor with suitable example and addressing mode:
i) LAHF ii) XLAT iii) NOP iv) DAA v) ROR **10**
b) Write an assembly language program to copy 16 byte data from the offset 0500H to 0600H in the segment 2000H. **10**

PART-B

- Q.5 a) Interface 4K ROM with 8086 microprocessor. Draw its interfacing circuit and write the memory map. **10**
b) Differentiate between memory mapped I/O and I/O mapped I/O. **10**
- Q.6 a) Explain the working of 8255 PPI in mode 2. **4**
b) Write a BSR control word subroutine to set bits PC₂, PC₄ and PC₆ and reset them after 10 ms. **8**
c) Draw and explain architecture of 8255 PPI. **8**
- Q.7 a) Draw the block diagram of 8237 DMA controller and explain its working in detail.
b) Briefly state the function of following in 8259 programmable interrupt controller:
i) Interrupt Request Register (IRR)
ii) Interrupt Mask Register (IMR) **10x2**

End Semester Examination, May 2019

B. Tech – Sixth Semester

DESIGN OF ELECTRICAL MACHINES (EE-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Why copper is most suitable as a conductor for the winding of an electrical machine?
- b) What are the factors to determine the rotor slots in induction motor?
- c) Why LV winding is kept near the case?
- d) What is window space factor?
- e) Calculate the output coefficient of dc generator if it is built with an armature diameter of 0.87m and core length of 0.32m, for a 350kW, 500V, 450 rpm 6 pole generator.
- f) What are the advantages of choosing higher values of magnetic loading of synchronous machine?
- g) Why in an induction motor, the number of slots should never be equal to the number of rotor slots?
- h) Write the output equation of 1- transformer.
- i) Define the short circuit ratio of a synchronous machine.
- j) Give the difference between fringing flux and leakage flux.

2x10

PART-A

Q.2 a) Explain the different cooling methods used in electrical machines. **10**
b) What are the various methods of measurement of temperature rise in electrical machines? **10**

Q.3 a) Derive the output equation of 3- ϕ transformer. **10**
b) Determine the main dimension of core, the number of turns and cross section of conductor for 95 kVA, 1100/400V, 50 Hz single phase core type distribution transformer. The net conducting area in the window is 0.6 times the net cross-section of iron in the assume a square cross-section for the core, a flux density 0.1 wb/m², current density 1.4 A/mm² and space factor 0.2. The height of window is 3 times its width. **10**

Q.4 a) Write a note on i) mmf for teeth ii) Real and apparent flux density. **10**
b) Calculate the apparent flux density at a particular section of a tooth from the following data:
Tooth width=12 mm, slot width=10mm, gross core length=0.32m, number of ventilating ducts=4, each 10 mm wide, real flux density=2.2 wb/m² permeability of teeth corresponding to real flux density=31.4x10⁻⁶H/m, stacking factor=0.9. **10**

PART-B

Q.5 a) Develop the expression for design of field winding in dc machines. **10**
b) A 50 hp 4 pole 480V, 600 r.p.m shunt motor has a wave wound armature with 770 conductors. The leakage factor for the poles is 1.2. The poles are to be of circular in cross-section, the field coils are 70 mm thick and produce on mmf of 10,000 A per pole. The flux density in the poles is 1.5 wb/m². Calculate the i) diameter of pole ii) diameter of field conductor iii) length of field coil iv) field current. **10**

- Q.6** a) Explain the cooling methods for alternators. **10**
b) Derive the expression for output equation of synchronous machine. **10**
- Q.7** a) Explain the design of rotor bars and slots of an induction motor. **10**
b) Explain the dispersion coefficient and how does it effect the performance of an induction motor. **10**

End Semester Examination, May 2019

B. Tech. — Fourth Semester POWER SYSTEM PROTECTION (EE-521)

Time: 3 hrs.

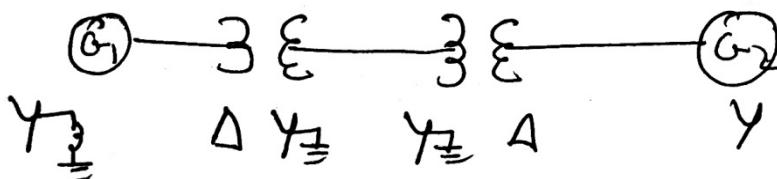
Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- Resolve an unbalanced three phase voltages of a power system into the symmetrical components and write down its equation.
- Obtain the interconnection of sequence network for two conductor open fault on power system.
- What are the functional requirements of a circuit breaker under fault condition?
- Explain the phenomenon of current chopping in a circuit breaker.
- Why it is necessary to protect the line and other equipment of power system against over voltages?
- Give the significance of operator “ a ”.
- Describe the phenomena of lightning.
- For the power system shown below sketch the zero sequence networks.



- A relay is connected to 400/5 current transformer and set at 150% with fault current of 2400 A. Find the plug setting multiplier of the coil.
- Write down the boundary condition for double line to ground fault. **2×10**

PART-A

Q.2 Discuss transients produced on a transmission line and show how steady state current and DC off-set current varies with time. **20**

Q.3 a) Derive an expression for fault current for line to line fault by symmetrical component method. **10**
 b) A 3-phase, 11 KV, 10 MVA alternator has sequence reactance of $X_0 = 0.05$ p.u and $X_1 = 0.15$ p.u and $X_2 = 0.15$ p.u if the generator is on no load. Find the ratio of fault currents for LG fault to that when all the 3-phase are short circuited. **10**

Q.4 a) Define and explain the following terms as applied to circuit breaker with proper waveform:
 i) Arc voltage ii) Restriking voltage iii) Recovery voltage **10**
 b) Explain the construction and working of vacuum circuit breaker with proper diagram. **10**

PART-B

Q.5 a) Determine the time of operation of a 5 ampere, 3-sec over current relay having a current setting of 125% and time setting multiplier of 0.6 connected to supply circuit through 400/5 current transformer when the circuit carries a fault current of 4000 A. Given that:

	Plug settling multiplier	Time of operation
1	8	3.5s
2	9	3.25s
3	10	3s

10

b) Describe the construction and principle of operation of induction type directional power relay. **10**

Q.6 a) Analyze the reactance relay by using universal torque equation and also draw its characteristics. **10**

b) Explain with a neat diagram the application of MerZ-Price circulating current principle for protection of alternator. **10**

Q.7 Write short notes on the following surge arrestor:

- a) Horn gap
- b) Valve type
- c) Rod gap
- d) Expulsion type

5×4

End Semester Examination, May 2019

M. Tech. - Second Semester

SWITCHED MODE AND RESONANT CONVERTERS (PE-EE-M-221)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt any **FIVE** questions in all. Each question carry equal marks.

- | | | |
|-----|---|------------------------|
| Q.1 | Discuss the concept of Buck-Boost SMPS topologies with its circuit and analyze its waveforms. | 20 |
| Q.2 | a) Sketch flowchart of a single pass transformer design procedure.
b) How switching stresses and losses effect the transformer? | 10
10 |
| Q.3 | a) What is the principle of a resonant converter?
b) Classify different types of resonant converters. | 5
15 |
| Q.4 | a) Explain voltage mode control of switched mode power supply and its loop-gain and stability considerations.
b) How trans-conductance current mode control of SMPS a works? | 15
5 |
| Q.5 | Write short notes on:
a) DC Transformer.
b) PWM Control $I_{c(s)}$. | 10x2 |
| Q.6 | a) Illustrate conducted and radiated emission mechanisms in SMPS.
b) Analyze shielding and grounding in SMPS. | 10
10 |
| Q.7 | a) Distinguish control of switching loci in switched mode power supply.
b) Calculate effects of EMI filter on SMPS control. | 10
10 |

End Semester Examination, May 2019

B. Tech. – Sixth Semester

COMMUNICATION SYSTEMS-II (EC-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) If the encoding bits/sample in PCM is increased from 6 bits to 8 bits what will be the increase in SNR?
 b) Find the Nyquist rate and Nyquist interval for the signal

$$x(t) = \frac{1}{2\pi} \cos(4000\pi t) \cos(1000\pi t)$$

 c) Define cumulative distribution function (CDF). Write different properties of CDF.
 d) State central limit theorem.
 e) Give one point of difference between ASK, FSK and PSK modulation techniques.
 f) Data transmission is required to operate at 1 Mbps. It uses QPSK scheme. Find out the bandwidth requirement.
 g) Write down the expression for probability of error for baseband signal receiver.
 h) A source generate some of five possible messages Q1 to Q5 having probabilities $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{16}$ respectively, every microsecond. Calculate the information rate.
 i) Differentiate between uniform and non-uniform quantization.
 j) What is auto correlation function $R_{xx}(\tau)$? Prove that $|R_{xx}(\tau)| \leq R_{xx}(0)$. **2×10**

PART-A

- Q.2 a) Draw the block diagram of a PCM generator and explain its operation? **7**
 b) What is the difference between PAM and PTM? Discuss any two types of PTM techniques. **5**
 c) Find out the following for audio signal with bandwidth of 20 KHz and digitally encoded using PCM:
 i) Nyquist rate.
 ii) If the Nyquist samples are quantized into 256 levels, determine the number of binary digits required to encode the quantized samples.
 iii) Determine the maximum bandwidth required to transmit the encoded signal. **8**

- Q.3 a) Draw the block diagram of DPSK modulator and explain how synchronization problem is avoided for its detection. **12**
 b) What is Gaussian minimum shift keying (GMSK) technique? What are its advantages over other digital modulation techniques? **8**

- Q.4 Derive the expression for probability of error, P_e and transfer function of matched filter. **20**

PART-B

- Q.5 a) State and prove Shannon-Hartley theorem. **8**
 b) A discrete memory source (DMS) has five messages with their probabilities as given below:

Messages (X_1)	(X_1)	(X_2)	(X_3)	(X_4)	(X_5)
Probability $P(X_1)$	0.4	0.19	0.16	0.15	0.1

Calculate the average code length and efficiency by Shannon Fano coding method. **12**

Q.6 a) The joint PDF of x and y is given as $f_{xy}(x,y) = xye^{-(x^2+y^2)/2}U(x).U(y)$

i) Find the marginal PDFs of $f_x(x)$ and $f_y(y)$.

ii) Are x and y independent? 6

b) Write notes on:

i) Cross spectral density.

ii) Random process transmission through linear filters. 14

Q.7 a) The power spectral density of a stationary process is given by:

$$S_{xx}(f) = A, -k < f < k$$

$$0, \text{ otherwise}$$

Determine the autocorrelation function. 8

b) Let $X(t)$ and $Y(t)$ be defined by:

$$X(t) = A \cos(wt + \theta)$$

$$Y(t) = A \sin(wt + \theta)$$

where w and A are constants and θ is a uniform random variable over $[0, 2\pi]$. Find the cross correlation of $X(t)$ and $Y(t)$. 12

End Semester Examination, May 2019

B. Tech. – Sixth Semester

COMPUTER APPLICATIONS IN POWER SYSTEMS (EE-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

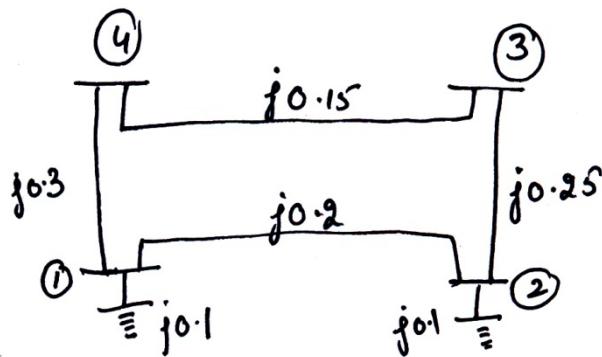
Q.1 Answer the following questions:

- a) Define Contingency.
- b) What is meant by state estimation?
- c) State draw backs of Newton-Raphson method.
- d) What is sequence operator?
- e) List the major concerns of power system design and operation.
- f) Discuss sparsity in power system.
- g) List advantages of per unit system.
- h) What do you understand by economic dispatch?
- i) Define unit commitment.
- j) What is use of Jacobian matrix?

2x10

PART-A

- Q.2 a) Explain the term AGC. What are its functions and operation? Explain with a block diagram. **10**
- b) Discuss power quality issues and challenges in present situation of power generation and distribution in detail. **10**
- Q.3 a) Draw and explain equivalent circuit of synchronous motor, generator, transformer and transmission line during fault conditions. **10**
- b) What are symmetrical components? **10**
- Q.4 a) Develop Z_{BUS} by building algorithm technique.



All values are given in ohm.

10

- b) Explain Y_{BUS} building algorithm. **10**

PART-B

- Q.5 a) Explain line to line fault. Derive an expression for it. **10**
- b) Define contingency analysis. Discuss the single outage contingency analysis using an example. **10**
- Q.6 a) Write the flow chart for Newton-Raphson method. **10**
- b) For the power system shown below; compute the bus voltage using GS method. Bus 1 is slack bus. Bus 2 and 3 are load bus and voltage control bus respectively.

Q.7 a) Develop the co-ordinating equation for economic dispatch of all thermal units without considering transmission line losses. **10**

b) A constant load of 300 MW is supplied by two 200MW generators for which respective IFC are:

$$\frac{dc_1}{dP_{G1}} = 0.1P_{G1} + 20$$

$$\frac{dc_2}{dP_{G2}} = 0.12P_{G2} + 15$$

Where PG is in watts and C in Rs/hr. Find the most economic division of load between generators. Also find saving in Rs/day thereby obtained compared to equal load sharing. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

POWER ELECTRONICS-II (EE-608)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is a dc chopper?
- b) What is the principle of operation of a step up chopper?
- c) List the applications of ac voltage controller.
- d) What is ripple voltage?
- e) What is PWM?
- f) What is zero voltage switching?
- g) Define inverter and give its applications.
- h) Give the classification of inverters.
- i) Define firing angle.
- j) Give input and output relation of a dc step down chopper.

2×10

PART-A

- Q.2** a) Explain the working of a buck converter with its circuit. **10**
 b) Differentiate between 1st and 3rd quadrant dc chopper. **10**
- Q.3** a) With the help of circuit, describe the operation of type-D chopper? **10**
 b) Explain the purpose of a snubber circuit. Draw its circuit diagram. **10**
- Q.4** a) Describe the reasons of adding a filter at the output of an inverter. Also draw the sketch of an inverter with a filter. **10**
 b) Describe the working of a three-phase inverter in 180° mode of conduction. **10**

PART-B

- Q.5** a) Describe the working of a zero-current-switching. (ZCS) resonant converters in detail. **10**
 b) Write the effects of siwes and parallel loading in a sevies resonant inverter. **10**
- Q.6** a) Explain the working of 3-wire, 3-phase inverter. **10**
 b) Explain the space vector control of three phase inverter of three phase inverter. **10**
- Q.7** a) What is cycloconverter? Give its advantages and disadvantages. **10**
 b) A single phase ac voltage controller has a resistive load of $R = 10\Omega$ and the input voltage is $V_S = 120V$; 50Hz. The delay of thyristor T_1 is $\alpha = \frac{\pi}{2}$. Determine:
 i) The rms value of output voltage V_0
 ii) The input power factor
 iii) The average input current. **10**

End Semester Examination, May 2019

M. Tech. — Second Semester

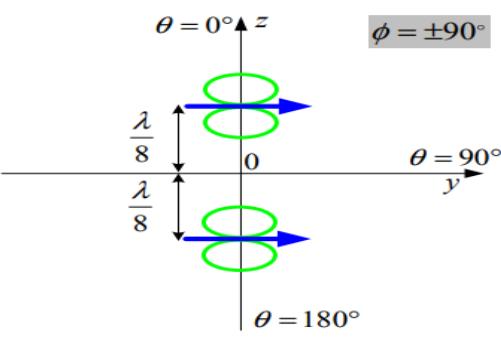
ANTENNAS AND RADIATING SYSTEMS (PC-EC-M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1** Answer the following questions: **4×5**
- Identify challenges in antenna design.
 - Identify needs of frequency independent antenna.
 - Give reason of flaring in horn antenna.
 - Define role of dielectric constant and permeability in antenna.
 - State Huygen's field principle of radiation.
- Q.2** a) A fender image monopole car antenna forming a dipole 62 inch long and 1/8 inch in diameter. Monopole antenna treated as dipole model for operating frequency of 1MHz the electric length is 0.00525λ . Analyze its efficiency and give concluding remark in this case. **5**
 b) Evaluate radiation resistance of infinitesimal dipole. **10**
 c) Describe vector potential and its need with suitable flow diagram. **5**
- Q.3** a) Differentiate various polarization schemas. Also explain its role antenna design. **10**
 b) The radial component of a radiate power density of an antenna is given by:
- $$W_{rad} = \oint_r W_r = \oint_r A_o \frac{\sin \theta}{r^2} \quad (w/m^2)$$
- Where A_o is the peak value of the power density θ is usual spherical coordinate and \oint_r is the radial unit vector. Determine the total radiation power. **10**
- Q.4** a) Evaluate the nulls of the total field when $d = \lambda/4$ and $\beta = 0, + \pi/2$ and $- \pi/2$ two element array as shown in figure: **10**
- 
- b) Derive mathematical expression for directivity of end-fire array. **10**
- Q.5** a) Differentiate between MOM, FDTD and FMS technique of mathematical modeling. **10**
 b) Evaluate the relative excitation level of binomial array of 2 and 3 element. **5**
 c) Describe parasitic element of antenna. **5**
- Q.6** a) Describe various feeding technique of microstripline patch antenna with suitable mathematical modeling. **10**
 b) Design rectangular patch antenna for frequency of 2.45 GHz. (Given FR4 sheet of relative dielectric constant = 4.4, Z_{top} = 1.6 mm and loss tangent = 0.002) **10**
- Q.7** a) Analyze gain optimization of parabolic reflector antenna. **10**
 b) Differentiate various shapes of flaring of horn antenna with its application and advantages. **10**
- Q.8** a) Discuss the concept and principle of design of MIMO. **10**
 b) Judge "Friis transmission equation" in communication system. **10**

End Semester Examination, May 2019

B. Tech – Sixth Semester

ELECTRIC DRIVES (EE-602B/EE-602A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) List the applications of DC drives.
- b) What are the various types of load torques?
- c) Recall the types of the electric drives.
- d) What is regenerative braking in dc motors?
- e) What are the methods employed for controlling the speed of dc drives?
- f) State the advantages of electric braking.
- g) What is duty cycle?
- h) Write the expression for calculating angular displacement in stepper motor.
- i) What is the advantage of using BLDC motor over DC motors?
- j) What is slip power recovery scheme?

2x10

PART-A

- Q.2 a) Explain the multi-quadrant operation and speed convection of an electric drive with an appropriate example. **10**
- b) Discuss the closed loop control schemes of electric drives. **10**
- Q.3 a) Discuss the operation of single phase fully controlled rectifier fed separately excited dc motor in discontinuous conduction mode. Support your answer with appropriate waveform of armature voltage and current and required expression. **10**
- b) A 200 V, 875 rpm, 150 A, separately excited dc motor has an armature resistance of 0.06Ω . It is fed from single phase fully controlled rectifier with an ac source of 220V, 50Hz. Assuming continuous conduction, calculate:
i) Firing angle for rated motor torque and (-500) rpm.
ii) Motor speed for $\alpha = 160^\circ$ and rated torque. **10**
- Q.4 a) Explain the working of four quadrant chopper fed dc drive. **10**
- b) Discuss how motoring and braking operation can be obtained in chopper fed dc drives. **10**

PART-B

- Q.5 a) Describe how speed of the induction motor can be controlled by using voltage source inverter. **10**
- b) What is the concept of slip power recovery scheme? Explain the static scherbius drives. Also, draw its closed loop control block diagram. **10**
- Q.6 a) What are the modes of variable frequency control of synchronous motor? Discuss the synchronous drive operating in true synchronous mode. **10**
- b) Explain self-controlled synchronous motor drive employing load commutated thyristor inverter. **10**
- Q.7 a) Discuss the working of BLDC motor? Also, enumerate features and applications of BLDC motor. **10**
- b) Explain the working of the variable reluctance stepper motor drive. Also, list its advantages and applications. **10**

End Semester Examination, May 2019

M. Tech. — Second Semester

ADVANCED DIGITAL SIGNAL PROCESSING (PC-EC-M-202)

Time: 3 hrs.

Max Marks: **100**
No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Calculate 8 pt DIT-FFT of $x(n) = [1, 0, 2, 0, 3, 0, 4, 0]$. **10**
- b) Determine the cascade and parallel realization of the IIR digital filter with the given transfer function:

$$H(z) = \frac{3(z^2 + 5z + 4)}{(2z + 1)(z + 2)}$$

10

Q.2 a) Convert analog filter into digital IIR filter by using impulse invariant technique.

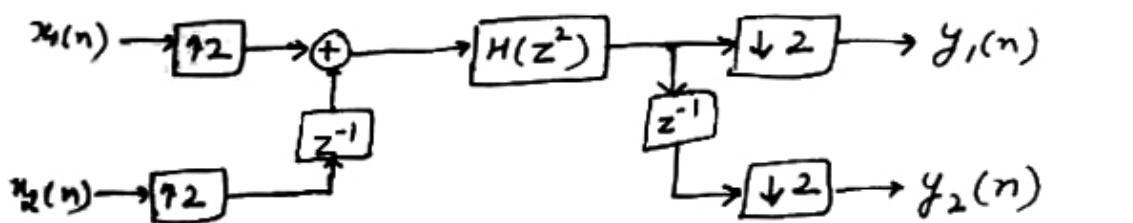
$$H(S) = \frac{9}{s^2 + 4s + 16}$$

10

- b) Discuss the application of multirate DSP in sub-band coding. **10**

Q.3 a) Derive equations for Quadrature Mirror Filter Bank. Also state the conditions to remove aliasing effects. **10**

- b) Analyze the structure of the system and determine its input-output relationship.



10

Q.4 Derive the expression of energy density spectrum for:

- a) Continuous time signals
- b) Discrete time signals. **10x2**

Q.5 a) Derive equation for Weiner filter and discuss the concept of forward and backward prediction. **10**

- b) Explain the concept of ARMA lattice ladder filter with the help of a generalized second order equation. **10**

Q.6 a) Explain how the weights of an adaptive system are adjusted by the help of Gradient adaptive search method. **10**

- b) Compare LMS and RLS algorithm by deriving corresponding equations. **10**

Q.7 a) Explain the role of wavelet transform in digital signal processing domain. **10**

- b) Discuss the application of digital signal processing in the area of speech processing and image processing. **10**

Q.8 a) Discuss various limitations of non-parametric methods for a power spectrum estimation. **10**

- b) Describe in detail different power spectrum estimation models using parametric methods. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ELECTROMAGNETIC THEORY (EC-421)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Express the value of differential volume in rectangular and cylindrical coordinate systems.
 b) What is the physical significance of divergence of any vector?
 c) Give the relationship between potential and electric field.
 d) State Gauss's law for electric field.
 e) Write down magnetic boundary conditions.
 f) The magnitude of \vec{H} at a radius of 1m long wire is 1 A/m. Calculate the current in the wire.
 g) State faraday's law of induction.
 h) What is the significance of displacement current?
 i) What do you understand by depth of penetration?
 j) A lossless transmission line of 100Ω characteristic impedance is connected to a load of 200Ω . Calculate VSWR.

2×10

PART-A

- Q.2 a) Transform the vector:
 i) $r(\hat{a}_\phi + \hat{a}_z)$ and
 ii) $r(\hat{a}_\theta + \hat{a}_\phi)$ in Cartesian coordinate system. **10**
 b) Check validity of divergence theorem for vector $\vec{A} = 4x\hat{a}_x - 2y^2\hat{a}_y + z^2\hat{a}_z$ taken over a cube bounded by $x = 0; x = 1, y = 0; y = 1, z = 0; z = 1$. **10**
- Q.3 a) Derive an expression for electric field intensity due to a straight and uniformly charged wire of length 'L' meters and with a charge density of ' ρ_L ' c/m. **10**
 b) Derive the Laplace's equation and Poisson's equation in all coordinate systems. **10**
- Q.4 a) Obtain magnetic field intensity (\vec{H}) due to infinitely long straight filament of current 'I', using Ampere's circuital law. **10**
 b) Explain the magnetic boundary conditions for static field. **10**

PART-B

- Q.5 a) Show that the Ampere's circuital law is inconsistent for time varying field. Derive the equations in modified form. **10**
 b) Derive the expression for poynting theorem. Also explain instantaneous, average and complex poynting vector. **10**
- Q.6 a) A plane wave is propagating through a medium with $\epsilon_r = 8$ and $\mu_r = 2$ has

$$\vec{E} = 0.5e^{\frac{-z}{3}} \sin(10^8 t - \beta z)\hat{a}_x$$
 Determine:
 i) Direction of propagation.
 ii) Attenuation constant.

- iii) Phase constant. 10
 - iv) Velocity of propagation. 5
 - b) Derive an expression for surface impedance. 5
 - c) Find the value of intrinsic impedance for free space. 5
- Q.7 a) For a transmission line, the following are its parameters. $R = 10.4\Omega/m$, $L = 3.66 \text{ mH/m}$, $G = 0.08\text{S/m}$ and $C = 8.35 \times 10^{-6}\text{F}$. Calculate z_0, α, β and phase velocity at $w = 500 \text{ rad/sec}$. 10
- b) Derive an expression for input impedance of a transmission line terminated with its characteristic impedance. 10

End Semester Examination, May 2019

M. Tech. — Second Semester

ANALOG AND DIGITAL CMOS VLSI DESIGN (PE-EC-M-223)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|--|-----------|
| Q.1 | a) Discuss the transfer characteristics of CMOS inverter. | 10 |
| | b) Derive the power dissipation in CMOS circuits. | 10 |
| Q.2 | a) Design a circuit of given equation using CMOS technology.
$\overline{(A \cdot B \cdot C) + D}$ | 6 |
| | b) What do you mean by layout and technology used for layout? | 4 |
| | c) Draw the layout of the equation given above. | 10 |
| Q.3 | a) Discuss the physical design flow in details. | 8 |
| | b) List the various types of routing techniques in detail. | 12 |
| Q.4 | a) How would you describe the concept of pipelining? | 10 |
| | b) Explain the FinFET transistor in details. | 10 |
| Q.5 | a) Calculate the small signal voltage gain of common source amplifier with diode connected load. | 10 |
| | b) Explain the Gilbert cell model in details. | 10 |
| Q.6 | a) Discuss the types of noises in amplifier circuits. | 10 |
| | b) How would you explain the cascade current mirror? | 10 |
| Q.7 | a) Calculate the gain and PSRR of 2 Stage CMOS operational amplifier. | 10 |
| | b) What do you mean by compensation? Explain all compensation techniques. | 10 |
| Q.8 | a) Plot and find out the common mode response of differential amplifier. | 12 |
| | b) Differentiate between active and passive current mirror. | 4 |
| | c) What do you mean by Miller effect? | 4 |

End Semester Examination, May 2019

M. Tech. — Second Semester

MIMO SYSTEM (PE-EC-M-226)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Discuss in detail various types of multi antenna system. What is a key advantage of using MIMO system? **7**
- b) Differentiate between Multiple antenna and MIMO system. **5**
- c) Calculate the Eigen value for the matrix:
 $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$ **8**
- Q.2 a) Design 2×2 MIMO wireless system using the Alamouti block code. **8**
- b) Elaborate in detail the structure of rake receiver? **8**
- c) Differentiate between spatial multiplexing and spatial diversity. **4**
- Q.3 a) Find the Eigen vector for the matrix:
 $\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ **10**
- b) Evaluate the singular value decomposition of the given matrix:
 $\begin{bmatrix} 2 & 3 \\ 0 & 2 \end{bmatrix}$ **10**
- Q.4 a) Draw and explain the model for MIMO system. **6**
- b) How does capacity increases in MIMO systems? **6**
- c) Suppose A is 3×3 matrix given below:
 $\begin{bmatrix} 0 & 0 & 2 \\ -3 & 1 & 6 \\ 0 & 0 & 1 \end{bmatrix}$
Find the bases for each Eigen space. **8**
- Q.5 a) Cite the differences between single carrier and multicarrier system. **6**
- b) What is OFDM system? Mention its various advantages as compared to other wireless techniques. **8**
- c) Differentiate between narrowband and wideband communication systems. **6**
- Q.6 a) Elaborate the method of increasing the spectral efficiency in MIMO systems. **10**
- b) Discuss the principle of beam forming. How to classify different types of beam forming? **10**
- Q.7 a) Elaborate in detail the various classification of fading? **12**
- b) Write the features of AWGN channel? **4**
- c) Distinguish between various types of channel model used in MIMO systems. **4**
- Q.8 a) Briefly explain the method of blind channel estimation. **10**
- b) Describe the various types of channel estimation techniques. **10**

End Semester Examination, May, 2019

B.Tech–Sixth Semester

MICROWAVE DEVICES AND CIRCUITS (EC-621)

Time: 3 Hours

Max Marks:**100**

No.of pages: 2

Note: Attempt **FIVE** questions in all. **Q.1** is compulsory. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the active microwave components? Give two examples. **10**
b) What are TE, TM, TEM, waves?
c) Describe faraday's Rotation.
d) Interpret negative resistance n gunn diode.
e) State the transferred election effect.
f) Why magnetron is called crors field device?
g) Differentiate baratter and thermistor
h) Evaluate the VSWR and return loss measurement through reflectometer method.
i) Define pulse repetition frequency with reference to RADAR.
j) A cylindrical waveguide has a radius of 4 cm. Find the cut off wavelength for the guide operating in TM_{01} . **2x10**

PART-A

- Q.2 a) What are the essential components of a microwave communication system? Discuss in detail. **10**
b) List advantages of microwave communication. **10**
- Q.3 a) Derive the equation of propagation of TM waves in a rectangular waveguide. **10**
b) A 8 GHz signal is propogated in a circular waveguide, whose redius is 2.5 cm. assuming the TE_{11} mode, calculate:-
i) Cut-off wavelength
ii) Guide wavelength
iii) Group velocity
iv) Phase velocity
v) Characteristic impedance of waveguide. **10**
- Q.4 a) Derie the scattering motive of magic tee. **10**
b) What is the Q factor of a cavity resonator? Discuss the terms critical coupled , under coupled and over coupled cavity. **10**
- Q.5 a) A two cavity klystron amplifier has the following specifications:-
Beam voltage = 600 V, Beam current = 20 mA, frequency = 6 Hz, gap spacing in either cavity: 2mm, spacing between centres : 4 cm, $R_{SH} = 40 \text{ K}\Omega$ Determine:-
i) E-velocity ii) De transit time
iii) Input voltage for maximum output voltage. **10**
b) Illustrate with interaction region diagram and mechanism of operation of TWT amplifier, its applications and the gain of TWT. **10**
- Q.6 a) With neat diagrams, explain operation of tunnel diode and its application as an oscillator and amplifier. **15**

b) Explain in detail PIN diode and its applications.

5

Q.7 a) What is a RADAR? Derive the RADAR range equation.

10

b) Double minimum method is used to determine the VSWR value on a waveguide. If the separation between two adjacent nulls is 3.5 cm and that between twice minimum power points is 2.5mm. Determine VSWR.

c)

Explain the electronic technique for measurement of frequency.

5

End Semester Examination, May 2019

B. Tech. – Sixth Semester

CONTROL ENGINEERING (EE-606/EE-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- Compare open loop and closed loop systems.
- Mention the characteristics of linear system.
- Find type and order of the given system:

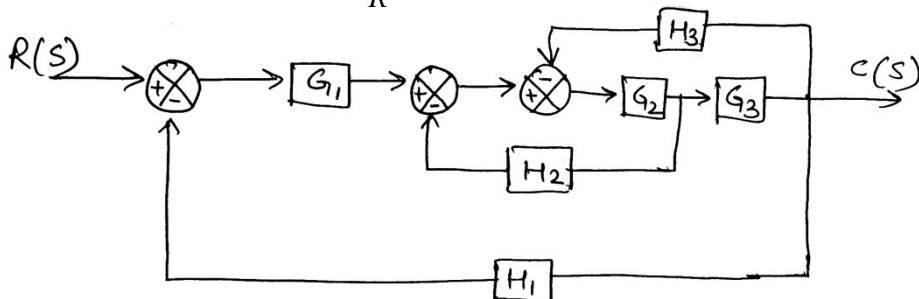
$$G(S)H(S) = \frac{1}{S(S+2)(S^2 + 2S + 4)}$$

- Define peak time and rise time of a second order system.
- Discuss the effect of adding zero to a system.
- List the factors which influence the decision about the types of compensation to be adopted.
- Define the term stability in reference to control system analysis.
- Draw an electrical network of lag compensator.
- What factors decide the number of branches of the root locus?
- What is phase cross over frequency?

2x10

PART-A

Q.2 a) Determine the transfer function $\frac{C}{R}$ from the block diagram shown in the figure.



10

- Explain Mason's rule as used to determine the overall transfer function from a signal flow diagram.
- Derive the transfer function of an armature controlled dc motor.

5

5

Q.3 a) Define the various standard signals normally used for analyzing a control system. Also set up an expression for time response of a first order system when subjected to unit step input function.

12

b) An unity feedback system is characterized by an open loop transfer function $\frac{K}{S(S+10)}$. Determine the gain K so that the system will have a damping ratio of 0.5. for this K, obtain the settling time, peak overshoot, peak time for a unit step input.

8

Q.4 a) The forward transfer function of a unity feedback control system is represented by:

$$G(S) = \frac{K}{S(S+1)(S+3)}$$

Sketch the root locus plot for the system.

10

b) A unity negative feedback control system has open loop transfer function given by

$$G(S) = \frac{K}{(S+2)(S+4)(S^2 + 6S + 25)}$$

Using Routh criterion determine:

- i) How much variation in the value of K can be permitted so that system remains stable?
- ii) Value of K which will cause sustained oscillations in closed loop system and corresponding oscillation frequencies. **10**

PART-B

Q.5 a) Sketch the polar plot for open loop transfer function:

$$G(S) = \frac{K}{S(1+ST_1)} \quad \textbf{10}$$

b) Explain the procedure of drawing Bode Plot and how the stability can be analyzed using it? **10**

Q.6 a) Discuss phase lead compensation with circuit diagram and find its transfer function. **10**

b) Explain PI control action. Discuss the effect of using PI controller in a second order control system on the steady state error due the unit ramp input. **10**

Q.7 Write short notes on **(any two)**:

- a) AC servo motors.
- b) Magnetic Amplifier.
- c) Stepper Motor and its applications.

10x2

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ELECTRICAL MACHINE-II (EE-401A)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Why do cylindrical rotor alternators operate with steam turbines?
- b) Define winding factor.
- c) Why are alternators rated in KVA and not in kW?
- d) What is meant by load angle?
- e) When does a synchronous motor get over excited?
- f) Why the rotor slots of 3-phase induction motor are skewed?
- g) Write an expression for the slip of an induction motor.
- h) Mention different types of speed control of slip ring induction motor.
- i) List application of $1-\phi$ induction motor.
- j) State the working principle of reluctance motor.

2x10

PART-A

Q.2 a) Derive the expression for rotor torque in case of 3-phase induction motor and further find out the conditions for maximum torque developed. **8**

b) A $3-\phi$, 400V induction motor gave the following test reading:

No load: 400V , 1250W , 9 Amp

Block rotor 150V , 4KW , 38 Amp

Draw the circle diagram.

If the normal rating is 14.9 kW, find from the circle diagram, the full load value to current, power factor and slip. **12**

Q.3 a) Explain any one slip power recovery scheme used for speed control in $3-\phi$ induction motor. **10**

b) Write notes on:

- i) Double cage rotor.
- ii) Induction generator.

5x2

Q.4 a) Explain double field revolving theory for operation of single phase induction motor. **10**

b) Give the classification of single phase induction motor. Explain any two types of $1-\phi$ induction motor. **10**

PART-B

Q.5 a) Explain ZPFC/Poter triangle method used to find voltage regulation of alternator. **10**

b) Derive the expression for power developed as a function of load angle, for a salient pole synchronous machine. **10**

Q.6 a) An over excited synchronous motor is called a synchronous condenser. Explain. **10**

b) What is synchronization? Explain methods of synchronization. **10**

Q.7 Explain the construction and working of:

- i) Brushless DC motor.
- ii) Reluctance motor.

10x2

End Semester Examination, May 2019

M. Tech. – Second Semester

VLSI DESIGN VERIFICATION AND TESTING (PE-EC-M-227)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|-------------|
| Q.1 | a) What is a test bench? Explain various components of a test bench in detail. | 10 |
| | b) Explain the following terms with reference to VLSI verification: functional coverage, maximum code reuse. | 6 |
| | c) Write a short note on 'test bench performance'. | 4 |
| Q.2 | a) What is the difference between data type logic and reg? | 5 |
| | b) What is a dynamic array? Explain with suitable example how dynamic array is different from a fixed size array. | 10 |
| | c) Explain enumerated types in detail. | 5 |
| Q.3 | a) What is the difference between initial block and final block in System Verilog? | 6 |
| | b) Differentiate between tasks, functions and void functions. | 8 |
| | c) Explain how time values are specified in System Verilog? | 6 |
| Q.4 | a) What are global variables? How global variables are different from static variables? | 8 |
| | b) What is a clocking block and why is it used? | 7 |
| | c) Explain how interface can provide connection between design blocks and a test bench. | 5 |
| Q.5 | a) What is randomization? Explain the difference between rand and randc. | 10 |
| | b) Explain the following with suitable examples: valid constraints and inline constraints. | 10 |
| Q.6 | a) Why pre-randomize and post-randomize functions are used in System Verilog? | 8 |
| | b) Explain Pseudorandom Number Generators (PRNG) in detail. | 12 |
| Q.7 | a) What is randsequence and what is its use? | 10 |
| | b) What is inheritance and polymorphism? | 10 |
| Q.8 | Write short notes on the following: | |
| | a) Atomic stimulus generation vs. scenario generation. | |
| | b) System Verilog assertions. | 10×2 |

End Semester Examination, May 2019

M. Tech. — Second Semester

INTERNET OF THINGS (PE-EC-M-222)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|------------|
| Q.1 | a) What do you understand by machines in M2M and things in IoT? | 4 |
| | b) Compare machine to machine (M2M) communications and internet of things in terms of underlying technologies, system architectures and type of applications. | 8 |
| | c) Explain the generic block diagram of an IoT device. | 8 |
| Q.2 | a) Illustrate the architectural details of software defined networks. | 10 |
| | b) Discuss various IoT enabling technologies. | 10 |
| Q.3 | a) Describe various service models available in cloud computing. | 10 |
| | b) How does fog computing contribute towards efficient IoT implementation also explain its advantages? | 10 |
| Q.4 | a) Elaborate the architecture of a wireless sensor node and its role in IoT. | 8 |
| | b) Analyze various object detection algorithms in wireless sensor networks. | 6 |
| | c) How does cooperation of nodes/node behavior affect the throughput of a wireless sensor network? | 6 |
| Q.5 | a) Enlist various operating systems available for internet of things implementation. Compare their features in detail. | 10 |
| | b) Design IoT levels for home automation IoT system which includes smart lighting and intrusion detection. | 10 |
| Q.6 | a) Discuss various security and privacy issues in Edge computing. | 10 |
| | b) Illustrate the role of big data analytics in IoT applications. | 10 |
| Q.7 | Write short notes on (any four) of the following: | |
| | a) Multithreading. | |
| | b) Role of gateways in IoT. | |
| | c) Smart objects as building blocks of IoT. | |
| | d) Internet protocols: IPv4 vs IPv6. | |
| | e) IoT networks. | |
| | f) MIST networking for IoT communications. | 5×4 |
| Q.8 | a) Describe IT Act 2000 and comment on the scope for IoT legislation. | 10 |
| | b) Describe major application areas of IoT and how IoT is implemented in smart grids. | 10 |

End Semester Examination, May 2019

B. Tech. — Sixth Semester

ELECTRIC POWER APPLICATION AND TRACTION (EE-721A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is need for choke in fluorescent tube light?
- b) Which system of lightning is recommended for drawing office?
- c) State requirements for good Illumination.
- d) The flux emitted by a lamp in all direction is 1000 lumens. Calculate its MSCP.
- e) Why a DC series motor is ideally suited for traction purpose?
- f) Compare the three-phase induction motor and DC shunt motor from the point of view of ease of speed control.
- g) Stat the difference between plastic and fusion welding.
- h) What is the practical unit of refrigeration? Define it.
- i) Emulate properties for selecting material for heating element.
- j) Discuss the specification for AC transformer used in metallic arc welding.

2x10

PART-A

- Q.2** a) Estimate the number and wattage of lamps which would be required to illuminate a workshop space 60X15m by means of lamps mounted 5m above the working plane. The average illumination required is 100 lux, coefficients of utilization = 0.42, maintenance factor = 0.8, luminous efficiency = 16 lumen/watt, space height ratio – unity. Also show its design. **10**
- b) Discuss the construction and working principle of fluorescent tube light with proper diagram. **10**
- Q.3** a) Formulate the design procedure of the heating element for circular wire when the power and voltages are given. **10**
- b) Categorize different modes of heat transfer with proper examples. **10**
- Q.4** a) Explain different arc welding process used in Industries. **15**
- b) Outline the principle of spot welding with diagram. **5**

PART-B

- Q.5** a) Calculate the amp-hr required to deposit a coating of silver 0.5mm thick on a sphere of 5 cm radius. Assume electro chemical equivalent of silver = 0.001188 gm/coulomb and density of silver = 10.5 **10**
- b) Discuss how electro-forming is done? **5**
- c) Enumerate the factors on which quality of electro deposit depends. **5**
- Q.6** a) Explain the method of series – Parallel starting of DC traction motion and also derive the expression for starting efficiency. **10**
- b) A sub urban train sum with an average speed of 36 kmph between two stations 1.8 km apart. Values of acceleration and retardation are 1.8 km/h/s and 3.6 km/h/s. Calculate the maximum speed of the train assuming trapezoidal speed-time curve. **10**
- Q.7** a) Explain with proper diagram the construction and working of Domestic refrigerator. **15**
- b) What do you mean by water cooler? Name its various types. **5**

End Semester Examination, May 2019

B. Tech – Sixth Semester

MICROWAVE DEVICES AND CIRCUITS (EC-621)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What are the active microwave components? Give two examples. **10**
b) What are TE, TM, TEM, waves?
c) Describe faraday's Rotation.
d) Interpret negative resistance n GUNN diode.
e) State the transferred electron effect.
f) Why magnetron is called cross field device?
g) Differentiate baratter and thermistor
h) Evaluate the VSWR and return loss measurement through reflectometer method.
i) Define pulse repetition frequency with reference to RADAR.
j) A cylindrical waveguide has a radius of 4 cm. Find the cut off wavelength for the guide operating in TM_{01} mode. **2x10**

PART-A

- Q.2 a) What are the essential components of a microwave communication system? Discuss in detail. **10**
b) List advantages of microwave communication. **10**
- Q.3 a) Derive the equation of propagation of TM waves in a rectangular waveguide. **10**
b) A 8 GHz signal is propogated in a circular waveguide, whose redius is 2.5 cm. assuming the TE_{11} mode, calculate:-
i) Cut-off wavelength
ii) Guide wavelength
iii) Group velocity
iv) Phase velocity
v) Characteristic impedance of waveguide. **10**
- Q.4 a) Derive the scattering motive of magic Tee. **10**
b) What is the Q factor of a cavity resonator? Discuss the terms critical coupled, under coupled and over coupled cavity. **10**

PART-B

- Q.5 a) A two cavity klystron amplifier has the following specifications:-
Beam voltage = 600 V, Beam current = 20 mA, frequency = 6 Hz, gap spacing in either cavity: 2mm, spacing between centres: 4 cm, $R_{SH} = 40 \text{ K}\Omega$ Determine:
ii) e-velocity ii) de transit time
iv) Input voltage for maximum output voltage. **10**
b) Illustrate with interaction region diagram and mechanism of operation of TWT amplifier, its applications and the gain of TWT. **10**
- Q.6 a) With neat diagrams, explain operation of tunnel diode and its application as an oscillator and amplifier. **15**
b) Explain in detail PIN diode and its applications. **5**
- Q.7 a) What is a RADAR? Derive the RADAR range equation. **10**

- b) Double minimum method is used to determine the VSWR value on a waveguide. If the separation between two adjacent nulls is 3.5 cm and that between twice minimum power points is 2.5mm. Determine VSWR. **5**
- c) Explain the electronic technique for measurement of frequency. **5**

End Semester Examination, May 2019

B. Tech–Second Semester

INTERNET OF THINGS – II (EC-2001)

Time: 3 Hours

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) A sensor measured output value is 5.8V while the actual value of voltage is 4.7 V. Calculate the accuracy of sensor.
b) An example of half duplex mode of transmission is _____
c) "All transducers are sensors" true or false. Support your answer.
d) What are the different materials of the wire in a potentiometric sensor?
e) Define series and parallel transmission.
f) Discuss the terms sensitivity and selectivity of a sensor.
g) Give examples of two sensors which can be used in industrial manufacturing
h) If the bandwidth of a channel is 4000 Hz and no of levels required is 4, calculate the bit rate and band rate.
i) List the various types of sensor characterization.
j) Evaluate the terms:
MAN, WAN and PAN.

2x10

PART-A

- Q.2 a) Explain in detail the static characteristics of sensor **10**
b) Differentiate between sensors and transducers. **10**
- Q.3 a) Explain the working principle of a resistive potentiometer. **10**
b) For a 200 twin potentiometer, calculate the output voltage if:
i) Jockey is contacted at 80th wire,
ii) 80th and 81st wire is shorted by jockey. **10**
- Q.4 a) What is Hall effect? Explain the working of Hall effect sensor with suitable diagram **10**
b) For a gas thermometric sensor prove that:
$$T = T_r (P/P_r)$$
 10

PART-B

- Q.5 a) Discuss in detail the data communication system with the help of a block diagram **10**
b) How can you say that optical fibre is better than other guided media? **10**
- Q.6 a) Elaborate with examples the interaction between sensors and its different levels of operations. **10**
b) Compare the characteristics of different topologies of LAN. **10**
- Q.7 Write short notes on the following:
a) Magnetic sensor.
b) Radiation sensor.
c) Smart sensors.
d) Sensors used for medical diagnostic. **5x4**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ANDROID AND ITS APPLICATIONS (EC-730)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) List various key features of android.
b) What do ADT stands for?
c) What is the use of dialog and alert dialog classes?
d) Define style and theme. How are they applied to an activity?
e) What do you mean by frame layout?
f) How screen orientation changes are managed in an android application?
g) Explain preference fragment in brief.
h) Which view displays the images horizontally as a scrolling list?
i) Briefly discuss clock view with reference to android.
j) Which database is in built in the android OS? **2×10**

PART-A

- Q.2 a) Explain android framework in detail. **10**
b) What is emulator? **5**
c) What is virtual device and SDK manager? **5**
- Q.3 a) Create an android application which pops up an alert dialog with three buttons. **12**
b) Explain lifecycle of fragment in detail. **8**
- Q.4 a) Design an android application for a simple calculator to perform addition, subtraction, multiplication and division operations. **12**
b) Write a short note on the process of controlling the orientation of the activity in an android application. **8**

PART-B

- Q.5 a) Explain how time picker view is used in an android application. **10**
b) Create an android application with two toggle buttons named as toggle 1 and toggle 2. Use an extra button called state which on tapping shows the current status (i.e. ON or OFF) of the two buttons through a toast notification. **10**
- Q.6 a) Why image switcher view is used in an android app? **10**
b) How digital clock view is used in an android app? **10**
- Q.7 a) What is SQLite database? How database connection is made in an android app using SQLite? **12**
b) Explain the role of shared preference class. **8**

End Semester Examination, May 2019

M. Tech. – First Semester

WIRELESS AND MOBILE COMMUNICATION (PE-EC-M-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|-----|
| Q.1 | a) Define frequency reuse concept. Prove that $C=MS$, where "M" is the number of time the cluster is replicated and "S" is the number of duplex channel available to use. | 7 |
| | b) If 600 channels are available in a cellular system, calculate the number of channels available per cell if the system uses 4-cell reuse. | 3 |
| | c) With the help of input and output speech flow describe signal processing in GSM systems. | 10 |
| Q.2 | a) State multiple access techniques and discuss time division multiple access (TDMA). | 14 |
| | b) Consider a GSM system that uses a frame structure where each frame consists of 8 time slots and each slot contains 156:25 bits and data is transmitted at 270.833Kbps in the channel. Calculate:
i) Time duration of a bit.
ii) Time duration of a slot.
iii) Time duration of a frame. | 2x3 |
| Q.3 | a) Derive the expression for path loss and power received in a free-space propagation model. | 10 |
| | b) Discuss the signal prediction in Okumura model. | 6 |
| | c) Find the Fraunhofer distance for an antenna with maximum dimension of 1 meters and operating frequency of 900MHz. If antenna has unity gain, calculate path loss ($d_f = 2D^2 / \lambda$). | 4 |
| Q.4 | a) Justify the need of equalization in a communication system. Explain the block diagram of a simplified communication system using an adaptive equalizer at the receiver. | 10 |
| | b) List the various diversity techniques and describe space diversity in detail. | 10 |
| Q.5 | a) Explain the reverse-link operation in CDMA system. | 15 |
| | b) Outline the salient features of CDMA (IS-95). | 5 |
| Q.6 | Write short notes on the following:
a) LTE
b) UMTS
c) Introduction to 5G
d) Evolved EDGE | 5x4 |
| Q.7 | a) Determine how the coverage and capacity can be improved in the cellular system? | 10 |
| | b) Categorize types of small scale fading due to multipath time delay spread and Doppler spread. | 10 |
| Q.8 | a) Derive the expression for the received power signal $P_r(d)$ for two ray propagation model or ground reflection model, where d is the distance of separation between the transmitter and receiver. | 16 |
| | b) A spectrum of 30MHz is allocated to a cellular service provider, which can use two 25KHz simplex channels to provide full duplex voice and control channels. Calculate the total no of channels available in the system. | 4 |

End Semester Examination, May 2019

M. Tech. — First Semester

WIRELESS SENSOR NETWORKS (PE-EC-M-121)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Describe the characteristics of wireless sensor networks. **10**
b) Sketch a block diagram of basic components in a wireless sensor network and explain them briefly. **10**
- Q.2 a) Classify different types of wireless sensor networks on the basis of their mode of operation or functionality. **10**
b) Give points of comparison between WSN and mobile Adhoc network. **10**
- Q.3 a) Describe in detail the characteristics of the following motes:
i) Mica Z ii) Sun SPOT
iii) Cricket iv) Telos B **2½×4**
b) List the various types of operating systems available for wireless sensor network. **10**
- Q.4 a) Enumerate the various types of simulation tools available for wireless sensor networks. **10**
b) Distinguish between the characteristics of any two simulation tools available. **10**
- Q.5 a) Enumerate the fundamental features of IEEE 802.15.4. **10**
b) Design a node to blink LED at 1Hz. **10**
- Q.6 a) Evaluate the issues related to fault tolerance in wireless sensor network. **10**
b) Give the importance of localization and discuss it as an issue in wireless sensor networks. **10**
- Q.7 a) Enumerate and describe the various challenges of security in wireless sensor network. **10**
b) List and elaborate the various applications of wireless sensor network. **10**
- Q.8 a) Write short notes on the following:
i) Bluetooth.
ii) Bluetooth low energy.
iii) Sensor web.
iv) Sensor deployment mechanism and coverage issues. **2½×4**
b) List the various categories of protocols associated with the network layer and describe each of them briefly. **10**

End Semester Examination, May 2019

M. Tech. — First Semester

RTL SIMULATION AND SYNTHESIS WITH PLDs (PE-EC-M-123)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Design a finite state machine for a system which has two input w and z . The machine has to generate $z=1$ when previous values of w is 1001 otherwise $z=0$. Overlap of input patterns is allowed. **10**
 b) Analyze the requirement of multi-clock domain designs to be implemented for VLSI circuits. **7**
 c) Define setup time and hold time. **3**
- Q.2 a) Develop a ripple carry adder using T-flip-flop in Verilog. **10**
 b) Differentiate blocking and non-blocking statements in Verilog. **7**
 c) Compare the HDLs Verilog and VHDL. **3**
- Q.3 a) Develop a Verilog code for ring counter along with the test bench. **10**
 b) Define clock skew? Specify the reason for its appearance in an SOC. Also discuss any two techniques to minimize the skew in clock distribution network in a VLSI circuit. **10**
- Q.4 a) Outline the complete ASIC design flow in detail. Also specify the tools used at different design steps. **10**
 b) Compare global routing and local routing in VLSI circuits. Explain any one routing algorithm. **10**
- Q.5 a) What is IP prototyping? List the different aspects of system design for which IP prototyping is implemented. **5**
 b) Illustrate the methodology for protection and licensing of HDL.IP. **15**
- Q.6 a) Interpret various techniques implemented for improving the design performance of VLSI circuits and systems. **15**
 b) Identify different sources of power dissipation in low power VLSI circuits. **5**
- Q.7 a) Outline following scan design approaches used for design for testability:
 i) MUXED scans.
 ii) Level sensitive scan design. **5x2**
 b) A 32 bit off-chip bus operating at 5V and 66MHz clock rate is deriving a capacitance of 25pF/bit. Each bit is estimated to have a toggling probability of 0.25 at each clock cycle. Evaluate the power dissipation in operating the bus. **5**
 c) Why is physical verification process executed in a VLSI circuit? Specify any two methods used for the process. **5**
- Q.8 a) Identify various design considerations in VLSI circuits. **6**
 b) Comparative analysis of SRAM cell implemented in FinFET and CMOS technology are given in table below:

Parameters	FinFET 6T SRAM	CMOS 6T SRAM
Dynamic Power (W)	1.40e-04	3.37e-04
Leakage Power (W)	1.32e-06	3.19e-06
Delay-Write Operation (Ps)	27.3	29.1
Delay-Read Operation (Ps)	21.5	23.4

Elaborate the reasons for the given results. **10**

- c) What is power delay product? Specify the importance of this parameter to design VLSI circuits. **4**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ADVANCED MICROPROCESSOR AND MICROCONTROLLER (EC-824A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Calculate the signal frequency found at CLKOUT pin if 20 MHz crystal is connected to X_1 and X_2 pin.
 b) The extended register are addressable by which microprocessor?
 c) Discuss the function of GDTR in 80386 microprocessor.
 d) Explain the role of NMI and ARDY signals of 80186 microprocessor.
 e) At what instant and in which applications watch dog timer should be enabled in 8096/80196 microcontroller?
 f) How many DMA channels can be controlled by programmable DMAC of 80186 microprocessor? Discuss in brief.
 g) Define level-1 and level-2 cache memory system with example.
 h) What do you understand by relocation register?
 i) Compare and contrast real and protected mode addressing.
 j) What is the purpose of IP/EIB register?

2×10

PART-A

- Q.2 a) Why is 80186 often called as embedded controller? **8**
 b) Calculate the memory address of the next instruction executed by the microprocessor, when operated in real mode, for the following CS:IP combination:
 i) CS : 1000H and IP = 2000 H
 ii) CS : 1A00H and IP = ABCDH **12**
- Q.3 a) Develop a program that causes shifting of PCB to memory locations 10000H – 100FFH. **5**
 b) Discuss the operational modes of interrupt controller. **5**
 c) Illustrate and explain the protected mode addressing with context to 80286. **10**
- Q.4 a) State the process used to switch the 80386 from protected mode to real mode. **5**
 b) Identify two additional segment register that are found in the 80386 programming model but are not present in the 8086. **5**
 c) Design a read protected data segment with privilege level 10, starting at an address 20AB00DIH and ending at address 20ADIIDI H. **10**

PART-B

- Q.5 a) Differentiate between the memory systems of 80386 with 80486 microprocessor. **10**
 b) Describe the internal programming model of the 80486. **10**
- Q.6 a) Analyze vertical and horizontal windows in 80196. **7**
 b) What do you understand by interrupts? How is it differ from polling? **7**
 c) Classify various memory segments of 80196. **6**
- Q.7 a) Explain and demonstrate how pulse width modulation output is obtained using programmable timers. **10**
 b) Summarize various addressing modes of 80196 along with suitable example. **6**
 c) Identify the addressing modes in below instructions:
 i) ADD AX, BX, [CX]+
 ii) POPF
 iii) LD AX, [BX]
 iv) EXTW DX **4**

803/5

End Semester Examination, May 2019

B. Tech. – Seventh Semester

SATELLITE COMMUNICATION (EC-821A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Differentiate between active and passive satellites.
b) Define the terms:
i) Eccentricity
ii) Sub-satellite point
c) What do you mean by SCPC (single channel per carrier) signaling? What are its advantages?
d) A satellite downlink at 12GHz operates with a transmit process of 6W and antenna gain of 48.2 dB calculate EIRP in dBw.
e) Write in brief about MSAT.
f) List the factors that affect the uplink design and downlink design in geostationary satellite communication.
g) Describe advantages and disadvantages of FDMA.
h) A satellite in low earth elliptical orbit with semi-major axis of 6969 km and eccentricity of 0.00402, find the apogee and perigee heights of this satellite.
i) Define satellite. What are the services provided by satellite?
j) Give two points of difference between multiplexing and multiple access techniques with examples.

2×10

PART-A

- Q.2 a) Classify various satellite sub-systems and highlight their important functions and characteristics. **8**
b) Draw the block diagram of a satellite communication system and explain each block in detail. Also list the various frequency bands used in satellite communication. **12**
- Q.3 a) What is meant by look angle? Describe it with reference to a geostationary satellite and the earth station. **7**
b) State the Kepler's laws of planetary motion. **3**
c) Discuss the various orbital aspects which are of importance in synchronous satellite communication. **10**
- Q.4 a) Derive the general link equation. Find out the expression for C/N and G/T ratios. Explain the importance of these ratios on satellite link design. **10**
b) Define the following terms with respect to satellite communication.
i) EIRP
ii) Noise temperature
iii) Noise figure **3×2**
c) In a satellite link the uplink C/N is 20dB and the downlink C/N is 16dB. Calculate the overall C/N for this link **4**

PART-B

- Q.5 a) Discuss the purpose of pre-emphasis and de-emphasis in FM transmission. **15**
b) For a SCPC-FM-FDMA system having S/N=33 dB and a test tone deviation of $\Delta f = 9.1\text{KHz}$. Calculate the bandwidth. Also calculate (C/N) ratio of the system. (Assume speech signal frequency 300 Hz -3.4 KHz). **5**

c) Categorise various methods of digital modulation techniques. Which one is mostly used in digital satellite communication Justify with reasons. **10**

Q.6 a) Define multiple access techniques and describe TDMA (Time Division Multiple Access) frame structure and principle of TDMA in detail. **12**

b) Explain the following:

- i) Satellite switched TDMA system.
- ii) DAMA system.

4×2

Q.7 Write short notes on the following:

- a) Earth sensing satellite.
- b) GPS
- c) Laser satellite communication.
- d) VSAT

5×4

End Semester Examination, May 2019

B. Tech. – Third Semester

ANALOG ELECTRONIC CIRCUITS-I (EC-321)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1**
- a) Why h-parameters are required for port network of transistor?
 - b) Enlist the various types of distortions in transistor circuits.
 - c) What are the advantages and disadvantages of multistage transistor configuration?
 - d) Draw the emitter follower circuit at high frequency with resistive load.
 - e) What are the transfer characteristics of FET?
 - f) What are the advantages of class-B amplifier?
 - g) What is the necessity of Miller Theorem?
 - h) How $r_{b'c}$ and $r_{bb'}$ of hybrid π models are obtained from h-parameters?
 - i) Draw the symbol of Darlington pair. What are the advantages of Darlington pair?
 - j) What is the need of biasing in FET? Justify your answer.
- 2×10**

PART-A

- Q.2**
- a) Draw Eber's Moll model of pnp and npn transistor. Also write down emitter current and collector current equations. **10**
 - b) Derive the expression for voltage gain and output resistance of FET amplifier of common source with unbypassed R_s . **10**
- Q.3**
- a) Determine the h-parameters from input characteristics of CB configuration. **10**
 - b) A transistor with $h_{fe} = 100$; $h_{ie} = 2.1K$; $r_{bb'} = 100\Omega$; $C_{b'c} = 3\text{ pF}$ and $C_{b'e} = 8\text{ pF}$ is connected in CE amplifier with load resistance of $6.8\text{k}\Omega$ in collector load.
 - i) Calculate the effective input capacitance of the amplifier
 - ii) Calculate the effective input capacitance if a 100 pF capacitance is connected between
 - 1) Emitter and base
 - 2) Collector and base
 - 3) Collector and emitter**10**
- Q.4**
- a) Determine the current gain of single stage CE transistor amplifier at high frequency with resistive load. **10**
 - b) Draw and explain self bias circuit of FET in common drain configuration. **10**

PART-B

- Q.5**
- Draw the small signal transistor model of CE amplifier with unbypassed R_E . Also determine the current gain, voltage gain, input resistance and output resistance from the small signal model of CE amplifier with unbypassed R_E . **20**
- Q.6**
- a) For determining the low frequency response of amplifier, explain the effect of
 - i) coupling capacitor
 - ii) emitter bypass capacitor
 - iii) combined effect of coupling capacitor and emitter bypass capacitor.**12**
 - b) Draw and explain the importance of Dual of Miller's Theorem. **8**
- Q.7**
- a) Prove that efficiency of class-B push pull amplifier is 78.5%. Also describe the advantages and disadvantages of class-B push pull amplifier. **10**
 - b) Describe the following:
 - i) Class AB amplifier
 - ii) Class-B amplifier without output transformer
 - iii) Harmonic distortion. **10**

End Semester Examination, May 2019
B. Tech. — Eighth Semester
NANOTECHNOLOGY (EC-833)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 Answer the following questions:
- a) List the characteristics of nanoparticles which are required in any fabrication technique.
 - b) Distinguish between CVD and PVD techniques.
 - c) Why objects in the nanoscale cannot be seen by visible lights?
 - d) Compare the properties of macro, micro and nano-particles.
 - e) Define “Mook’s law”.
 - f) State the biomedical applications of nanotechnology.
 - g) Why is photolithography not suitable for nanofabrications?
 - h) What are quantum dots?
 - i) Give any two excellent properties of carbon Nano-tubes.
 - j) What do you understand by Nanosensors? **2×10**

PART-A

- Q.2 a) List the various challenges in nanotechnology. Justify the statement “Nanotechnology. Justify the statement “Nanotechnology a scientific revolution.” **10**
- b) Differentiate between top-down and bottom-up approach for nanotechnology. **10**
- Q.3 a) Describe optical and mechanical properties of nanomaterials in detail. **10**
- b) Show that the surface area to volume ratio of nanoparticle is much higher than that of bulk one. **10**
- Q.4 a) Discuss about the properties and applications of nano gold, nano silver and metal oxides based nano particles. **10**
- b) Give an overview on carbon based nano materials. **10**

PART-B

- Q.5 a) Demonstrate the concept of molecular beam epitaxy (MBE). **10**
- b) Explain chemical vapour deposition process in detail (CVD). **10**
- Q.6 a) With a neat diagram demonstrate the working of scanning electron microscopy (SEM) in detail. **8**
- b) Elaborate the working of Rutherford backscattering spectroscopy with a neat diagram. **8**
- c) Give reasons why nanotechnology plays an important role in cancer research. **4**
- Q.7 Write short notes on (**any two**) of the following:
- a) Nano medicine and Nano biotechnology.
 - b) Nano materials for data storage.
 - c) Nano toxicology challenges.
 - d) Molecular electronics and Nano electronics. **10×2**

End Semester Examination, May 2019
B. Tech. — Eighth Semester
NANOTECHNOLOGY (EC-833)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 Answer the following questions:
- a) List the characteristics of nanoparticles which are required in any fabrication technique.
 - b) Distinguish between CVD and PVD techniques.
 - c) Why objects in the nanoscale cannot be seen by visible light?
 - d) Compare the properties of macro, micro and nano-particles.
 - e) Define “Mook’s law”.
 - f) State the biomedical applications of nanotechnology.
 - g) Why is photolithography not suitable for nanofabrications?
 - h) What are quantum dots?
 - i) Give any two excellent properties of carbon Nano-tubes.
 - j) What do you understand by Nanosensors? **2×10**

PART-A

- Q.2 a) List the various challenges in nanotechnology. Justify the statement “Nanotechnology a scientific revolution.” **10**
- b) Differentiate between top-down and bottom-up approach for nanotechnology. **10**
- Q.3 a) Describe optical and mechanical properties of nanomaterials in detail. **10**
- b) Show that the surface area to volume ratio of nanoparticle is much higher than that of bulk one. **10**
- Q.4 a) Discuss about the properties and applications of nano gold, nano silver and metal oxides based nano particles. **10**
- b) Give an overview on carbon based nano materials. **10**

PART-B

- Q.5 a) Demonstrate the concept of molecular beam epitaxy (MBE). **10**
- b) Explain chemical vapour deposition process in detail (CVD). **10**
- Q.6 a) With a neat diagram demonstrate the working of scanning electron microscopy (SEM) in detail. **8**
- b) Elaborate the working of Rutherford backscattering spectroscopy with a neat diagram. **8**
- c) Give reasons why nanotechnology plays an important role in cancer research. **4**
- Q.7 Write short notes on (**any two**) of the following:
- a) Nano medicine and Nano biotechnology.
 - b) Nano materials for data storage.
 - c) Nano toxicology challenges.
 - d) Molecular electronics and Nano electronics. **10×2**

End Semester Examination, May 2019

B.A. (Liberal Arts) — First Semester

INTRODUCTORY MICROECONOMICS (BLA-EC-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 (Part-A) and Q.2 (Part-B) are compulsory.** Attempt any **THREE** questions from **PART-C.** Marks are indicated against each question.

PART-A

Q.1 Answer the following questions:

- Explain the assumption of constant marginal utility.
- Define discrete goods with suitable example.
- Explain the quasilinear preferences.
- Define the Economies of Scale
- Explain the Concept of Expansion Path.
- Define the Lexicographic preferences with the help of example.
- What does consumer Surplus measures?
- What is meant by scale in production?
- Define Average Revenue and Marginal Revenue.
- If the price of good 1 doubles and price of good 2 triples does the budget line become flatter or steeper. Explain.

2×10

PART-B

Q.2 Attempt **(any four)** questions out of the following:

- Outline the assumption of revealed preference theory of demand. Distinguish between the Weak Axiom of revealed preference and Strong Axiom of revealed preference.
- With the help of diagram, define the ridge lines and the economics and non-economics region of production.
- Derive the demand curve from the law of diminishing marginal utility.
- A firm's TFC is 500 and its MC schedules are given below. Work out on TC, TVC, AC, AVC and AFC schedules and sketch them on the same graph.

Output	0	2	4	6	8	10	12	14	16	18	20	22	24
MC	-	34	30	20	15	12	12	13	15	17	21	30	34

- Depict the pollution on X-axis and electricity on Y axis, what would the indifference curve look like if,
 - Pollution is a bad commodity and electricity is a good commodity.
 - Pollution is a neutral commodity and electricity is a good commodity.

5x4

PART-C

Q.3 a) Explain the concept of linear break even analysis. What is the significance in production decision in the short run? **10**
b) Obtain the expression and graph for the break even outputs with or without profits. **10**

Q.4 The marginal product of a variable input at different levels of employment is given as below:

Input	0	2	3	4	5	6	7	8	9	10	11	12
MP	0	3	9	11	13	15	16	10	2	0	-2	-4

- a) Determine the total and average product of the input and graph them. Distinctly mark off different stages of production on your graph and outline their distinctive features. **10**
- b) What are the isoquants? Explain their essential features with the help of diagrams. **10**

Q.5 A consumer faces price of hot dogs and burgers of \$1 each. Consumption of the two commodities at various weekly incomes are shown as follows:

Income	Hot Dogs	Burgers
10	3	
15	6	
20	10	

- a) Use the information to sketch the income consumption curve. **10**
- b) Define the Engel curve and draw the Engel curves for hot dogs and burgers. **10**

Q.6 a) Define the elasticity of factor substitution. Show that it is constant for cob-douglous production function. **10**

b) Given the output function, $Q = 1000L^{\frac{1}{3}}K^{\frac{2}{3}}$ and the consumers budget is $3000 = 100L + 50K$, determine the equilibrium level of employment for the producer. **10**

Q.7 Assuming the following total value schedule for some consumer.

- a) Calculate the Marginal Value, from the table below:

Q	1	2	3	4	5	6	7	8	9
TV	10	19	27	34	40	45	49	52	54

- b) Derive the consumer's demand curve. **4**
- c) Assume the price of this good is Rs.6. To maximize consumer surplus, a consumer would produce how many units? What is the consumer surplus at this quantity? Show it on the graph. **10**

End Semester Examination, May, 2019

B.Tech.– Second Semester

BASIC ELECTRICAL ENGINEERING (ESC-EE-101)

Time: 3 Hours

Max Marks: **100**

No.of pages: 2

Note: Attempt **FIVE** questions in all. **Q.No.1** is **compulsory**. Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What is capacitive reactance?
- b) An ideal voltage source should possess _____ source resistance.
- c) Define real power.
- d) State Kirchoff's Voltage Law.
- e) Write down the expression for synchronous speed.
- f) Can an induction motor run at synchronous speed? State reasons.
- g) List two differences between star and delta connected system.
- h) State the condition of maximum efficiency in a transformer.
- i) Name two power semiconductor devices.
- j) What is the difference between MCCB and MCB

2x10

PART-A

Q.2 a) Explain superposition theorem

- b) Find the current flowing in the 15Ω resistor using Thevenin's theorem.

20

Space here for Diagram.....

Q.3 a) A coil of resistance 200Ω and an inductance of 20 mH is connected in series with a capacitance of $40 \mu\text{F}$ across $225 \sin 314 t \text{ ac supply}$. Calculate:
i) Magnitude of current
ii) Power factor
iii) Voltage across coil
iv) Voltage across the capacitance
v) Power dissipated in the network.

2X5

- b) Derive the relation between line current and phase current in a delta connected system.

10

Q.4 a) Differentiate shell type and core type transformer.

5

- b) Drive the emf equation of transformer.

5

- c) Explain the equivalent circuit of an actual transformer.

10

PART-B

Q.5 a) Derive the emf equation of a dc machine.

5

- b) Explain the different characteristics of dc series motor.

8

- c) Explain the working principle of dc generator.

7

Q.6 a) Explain the working principle of 3-Φ induction motor.

10

- b) Discuss the methods of speed control of Induction motor. **10**
- Q.7 a) Explain the working of lead acid battery **8**
b) What are the methods of power factor improvement? **7**
c) What is the necessity of earthing? **5**

End Semester Examination, May 2019
 B. Tech. — Fifth Semester
DIGITAL SYSTEM DESIGN (EC-503A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 Answer the following questions:
- a) Design a VHDL code for the following Boolean expression in dataflow modeling:

$$y = (A + B)\bar{C}$$
 - b) Carry out the following operations:
 - i) 10111100 SII-2
 - ii) 10111100 SIa-3
 - c) Describe scalar data types. List the examples of any two scalar types.
 - d) Compare pure and impure functions with example.
 - e) Differentiate between basic and extended identifier.
 - f) List out the differences between synchronous and asynchronous counter.
 - g) What do you understand by type conversion function.
 - h) Interpret the statement “wait for onsec”.
 - i) Design 2-input 4-output ROM.
 - j) How application specific ICs are different from fixed function IC?
- 2×10**

PART-A

- Q.2 a) Discuss various design phases of a digital IC. Also give examples of CAD tools used at various design steps. **10**
- b) Differentiate between dataflow, behavioural and structural style of modeling. **10**
- Q.3 a) Illustrate with an example inertial and transport delay models. Also write their applications in digital systems. **10**
- b) Describe various data types used in VHDL with suitable examples. Also discuss the allocation and de-allocation of objects to access the objects. **10**
- Q.4 a) Design a 16:1 multiplexer using dataflow and behavioural modeling. **10**
- b) Construct a 4 bit full adder using structural modeling. **10**

PART-B

- Q.5 a) Design a pulse counter which shows overflow if count exceeds “Max count”. **10**
- b) Construct a 4 bit SIPO shift register using VHDL code. **10**
- Q.6 a) Implement a simple microcomputer using VHDL which should be able to perform atleast eight operations. **10**
- b) Discuss briefly the design specifications of simple microcomputer system. **10**
- Q.7 a) How FPGA is different from CPLD? Discuss its advantages and drawbacks? Also, explain its design implementation. **10**
- b) What do you understand by programmable logic devices? **5**
- c) Construct a half adder using PAL. **5**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

MICROCONTROLLER AND INTERFACING (EC-521)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- 8051 microcontroller has _____ bit address bus and _____ bit data bus.
- Calculate the period of machine cycle for 8051 microcontroller based system if crystal frequency is 22MHz.
- Explain the difference between a directive, an operation and an instruction. Give an example of each.
- Why are PC and DPTR registers of 8051 are 16 bit wide, whereas the 8051 SP register is 8 bit wide only? Justify.
- What is the difference between overflow and carry flag?
- How are timers 0 and 1 started and stopped by instructions?
- With XTAL = 11.059 MHz, find the TH1 value needed to have the following baud rates:
 - 9600
 - 2400
- What is the hex value of the command code for “display on” and “cursor on”?
- What instructions are used to enable and disable all interrupts of 8051 microcontroller?
- If you write to SBUF in serial mode 1, nothing is being transmitted. What may be the possible reason for this?

2×10

PART-A

Q.2

- List the major differences between microprocessor and microcontroller. **5**
- What is the size of internal ROM of 8051? Draw and explain the internal RAM structure of 8051 microcontroller. **10**
- Explain the following pins of 8051 microcontroller.

i) ALE	ii) \overline{EA}
iii) \overline{PSEN}	iv) RST
v) TXD	

1×5

Q.3

- Write one instruction each using the following addressing mode:
 - Immediate.
 - Register.
 - Register indirect.
 - Direct.
 - indexed addressing mode.**2×5**
- Write a program to a) load the accumulator with the SSH and b) complement the accumulator 700 times. **10**

Q.4

- Configure the TMOD value for both timer 0 and timer 1, mode 2, software start, with clock coming from 8051's crystal. **5**
- With a frequency of 22 MHz, generates a frequency of 100 KHz on pin p2.3. Use timer 1 in mode 1. **10**
- Assume that XTAL = 11.059 MHz. What value do we need to load into the timer's register if we want to have a delay of 5msec. **5**

PART-B

Q.5

- Write a program to receive the data which has been sent in serial from and send it out to port 0 in parallel form. Also save the data at RAM location 60H. **10**
- Design a serial interface between 8051 microcontroller and computer via DB-25 RS-232 connector. **10**

Q.6

- How many hardware interrupts are there in 8051? How are they activated? **5**

- b) Mention the bits of the IE register used to set/reset the external hardware interrupt. 5
- c) Generate a square wave of frequency 1KHz using timer interrupt. 10
- Q.7 a) Interface 8 K external ROM and 8 K external RAM with 8051 microcontroller. Draw interfacing diagram and address mapping. 10
- b) Two switches are connected to pins P_{0.1} and P_{0.2}. They are also vectored to interrupt location 0003H, i.e INT O. Write a program to test which key is pressed or to verify if both keys are pressed. 10

End Semester Examination, May 2019

B. Tech. — Fifth Semester

ELECTRICAL MACHINE DESIGN (EE-503)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain difference between fringing flux and leakage flux.
- b) What are the various methods adopted to cool the transformer?
- c) List any five limitations of electrical machine design.
- d) How does the specific magnetic loading affect the design of electrical machine?
- e) Define "Window space factor".
- f) What is function of damper winding?
- g) Write the expression for the output of water wheel alternators.
- h) What do you mean by runway speed?
- i) What is the advantage of using stepped core in transformer?
- j) Why circular coils are preferred over rectangular coils for windings of transformer. **2×10**

PART-A

- Q.2** a) Briefly explain various enclosures of electrical machines. **10**
b) What are the common methods for measurement of temperature rise in electric machines? **10**
- Q.3** a) Develop output equation of single and three phase transformer. **10**
b) The ratio of flux to full load mmf in a 400KVA, 50Hz, single core type power transformer is 2.4×10^{-6} . Calculate the net iron area and the windows area of the transformer. Maximum flux density in the core is 1.3 wb/m^3 , current density 2.7 A/mm^2 and windows space factor is 0.26. Calculate full load mmf. **10**
- Q.4** a) Derive an expression for overall design of electromagnetic coil. **10**
b) Write short notes on the following:
i) mmf for teeth.
ii) Real and apparent flux density. **5×2**

PART-B

- Q.5** a) Develop the expression for design of field winding of DC machine. **10**
b) Find the main dimensions of 200KW, 250V 6 pole and 1000rpm generator. The maximum value of flux density in the gap is 0.87 wb/m^2 and the ampere conductors per meter of armature periphery are 31000. The ratio of pole arc to pole pitch is 0.67 and the efficiency is 91%. Assume the ratio of length of core to pole pitch=0.75 **10**
- Q.6** a) Derive an expression for output equation of synchronous machine. **10**
b) Write short notes on the following:
i) Short circuit ratio.
ii) Stator winding of turbo alternators. **5×2**
- Q.7** a) Explain how stator winding is designed for an induction motor. **10**
b) Explain how slip ring rotor is designed for an induction motor. **10**

End Semester Examination, May 2019
 B. Tech. — Fifth Semester
PRINCIPLES OF COMMUNICATION (EC-605)

Time: 3 hrs. Max Marks: **100**
 No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1** Answer the following questions: **2×10**
- Define “Signal”. What are different types of signals?
 - The modulating signal $f(t)$ in an Am-SC system is a multiple-tone signal given by;

$$f(t)E = A_1 \cos w_1 t + A_2 \cos w_2 t .$$

 Plot the spectrum of the modulated signal.
 - What is the significance of RF section in super heterodyne receiver?
 - The modulating frequency in frequency modulation is increased from 10kHz to 20kHz. What will be the effect on bandwidth?
 - Explain the principle of generation of frequency modulation using voltage controlled oscillator.
 - In PCM, if the number of quantization levels is increased from 4 to 64, then what will be the effect on bandwidth requirement?
 - What is aliasing effect? Suggest methods to eliminate it. What is Nyquist interval for the signal $x(t) = 5 \cos^2(500\pi t)$.
 - Differentiate between ASK and FSK.
 - List the characteristics of PN sequence.
 - Define “Noise temperature”. How is it related to noise figure? The noise figure of an amplifier is 0.2dB. Find the equivalent temperature.

PART-A

- Q.2** a) Define “Communication”. With the help of block diagram, explain the working of a communication system. **10**
 b) What is modulation? Why is it needed? Explain different types of analog modulation. **10**
- Q.3** a) A carrier $A \cos \omega_C t$ is modulated by a signal tone modulating signal $f(t) = E_m \cos \omega_m t$, find:
 i) Total modulated power.
 ii) Rms value of the modulated signal.
 iii) Transmission efficiency for a 100 percent modulation. **6**
 b) With a block diagram, explain the functioning of a coherent detector. Derive an expression for output voltage. Hence, show that any shift in phase or frequency of locally generated carrier from that of transmitter carrier results in phase distortion or delay. **7**
 c) Discuss “Vestigial sideband system”. **7**
- Q.4** a) A carrier $A \cos \omega_C t$ is modulated by a signal tone modulating signal $f(t) = 2 \cos 10^4.2\pi t + 5 \cos 10^3.2\pi t + 3 \cos 10^4.4\pi t$. Find the bandwidth of the FM signal. Assume $k_f = 15 \times 10^3$ Hz per volt. Also, find the defulation index, m_f . **4**
 b) Compare phase modulation and frequency modulation. Explain how a FM wave can be generated using phase modulator. **8**
 c) Discuss the operation of ratio detector as FM demodulator. **8**

PART-B

- Q.5** a) Explain “Pulse code modulation”. Derive the relation between signaling rate and transmission bandwidth in a PCM system. **7**
 b) With the help of a block diagram, discuss differential pulse code modulation (DPCM) system. What is the need of predictor in DPCM? **7**
 c) What is companding? How does it improves S/N ratio in PCM system? **6**

- Q.6 a) Illustrate with suitable block diagram, differential PSK modulator and explain how synchronization problem is avoided for its detection. **8**
- b) What is spread spectrum techniques? Explain in detail, direct sequence spread spectrum technique using suitable diagrams. **8**
- c) In FHSS system using MFSK with $M=4$, 1000 different frequencies are employed. What is processing gain? **4**

- Q.7 a) Find the power density spectrum of the thermal noise voltage across terminals 1, 2 of a passive network shown below:

FIGURE

- b) Define “Noise”. Discuss in detail the different types of noise. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

PRINCIPLES OF COMMUNICATION (EC-605)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 Answer the following questions:
- a) Define signal. What are different types of signals?
 - b) What are the functions of transmitter in a communication system? Draw the block diagram of a transmitter.
 - c) What is the need for modulation?
 - d) What is vestigial sideband transmission? How is it used for TV broadcast?
 - e) An AM signal with a carrier of 1 KW power has 200 watt in each sideband. Find the percentage modulation.
 - f) State Carson's rule for determining the bandwidth for a FM signal.
 - g) Distinguish between Narrowband and Wideband FM.
 - h) Describe the difference between uniform and non-uniform companding.
 - i) What is pulse modulation? What are different types of pulse modulation techniques?
 - j) Differentiate between ASK and FSK.
- 2x10**

PART-A

- Q.2 a) What are the elements of a communication system? Explain their fundamental limitations in detail. **10**
- b) What is the need for modulation in a communication system? **10**
- Q.3 a) Derive the expression for power in AM. **10**
- b) Describe the Square law method of generating AM signal and envelope detector for demodulation. **10**
- Q.4 a) A carrier is frequency modulated with a sinusoidal signal of 2 kHz resulting in a maximum frequency deviation of 5 kHz.
 - i) Find the bandwidth of modulated signal.
 - ii) The amplitude of modulating sinusoid is increased by a factor of 3 and its frequency is lowered to 1 kHz. Find the maximum frequency deviation and bandwidth of the new modulated signal. **7**
- b) Discuss Armstrong method for FM generation with suitable block diagram. Why is it also called indirect method? **8**
- c) Explain ratio detector in detail. **5**

PART-B

- Q.5 a) Explain pulse code modulation. Derive the relation for signaling rate and transmission bandwidth in a PCM system. **10**
- b) With the help of a block diagram, explain in detail differential pulse code modulation (DPCM) system. What is the need of predictor in DPCM? **10**
- Q.6 a) Explain in detail, QPSK system. Compare the bandwidth of QPSK system with BPSK system. **10**
- b) Write a short note on 'Direct sequence Spread spectrum technique'. **10**
- Q.7 a) What is the difference between external and internal noise. Explain different types of internal noises in detail. **10**
- b) Define the following and obtain the relation between them:
 - i) Noise figure.
 - ii) Noise temperature. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

MEASUREMENT AND INSTRUMENTATION (EE-306)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) List the advantages and disadvantages of LVDT.
- b) Classify the different types of transducer.
- c) What are the types of electrodes used in EEG?
- d) What do you mean by Aquadag?
- e) What are lissajous pattern?
- f) What is the difference between electrostatic and electromagnetic deflection?
- g) What are the various types of distortion?
- h) What are the properties of ideal of AMPS?
- i) What is a resolution of a 3 * (1/2) digit display?
- j) List the components of time base circuit.

2×10

PART-A

Q.2 a) What are the different types of method used for the measurement of temperature? Explain any two in detail. **10**
b) What is strain gauge? Derive the expression of gauge factor of a strain gauge. **10**

Q.3 a) Draw and explain the block diagram of EEG measurement. **10**
b) What are the types of amplifiers used in biomedical applications? Discuss different amplifier in detail. **10**

Q.4 a) Draw and explain the block diagram of general purpose CRO. **10**
b) Explain how the frequency and phase can be measured using CRO? **10**

PART-B

Q.5 a) Discuss different types of wave analyzers. Also enumerate the applications of wave analyzer. **10**
b) Explain the different types of signal generator circuit. **10**

Q.6 a) Draw the block diagram of DC signal conditioning system and explain the function of each block. **10**
b) What is PLLIC565? Discuss it in detail with the help of block diagram and pin configuration. **10**

Q.7 a) What is decode counting assembly? Draw diagram for 5 decode counting assemblies connected in cascade. **10**
b) What are the different Types of Digital Voltmeter (DVM)? Explain any two in detail. **10**

End Semester Examination, May 2019

M. Tech. — Third Semester

LOAD AND ENERGY MANAGEMENT (EE-M-324)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Explain preliminary energy audit and its importance. **8**
b) Write and explain the major steps involved in electrical energy audit. **7**
- Q.2 a) Discuss the factors affecting economics of generation and distribution of power and how to reduce the power generation cost. **8**
b) Write short note on Maximum Demand Control. **7**
- Q.3 a) What are the measures of energy conservation in electrical drives. **8**
b) With a typical case analysis explain the energy saving in a electric fan cooling system. **7**
- Q.4 a) Describe various methods for short, medium and long range load forecasting in power system. **8**
b) What is the significance of these load forecasting for various type of power system operation and control. **7**
- Q.5 a) How has demand side management been implemented in the different countries of the world? What is the level of their success? **8**
b) Discuss the tariff options for DSM and which tariff promotes DSM. **7**
- Q.6 a) Explain the difference between chronological curve and load duration curve. **8**
b) The load curve of an electrical system is linear with the following values at different times.

Time	12	2	5	8	5	6	9	12
Load MW	20	10	10	50	50	100	100	100

- i) Plot chronological load curve and load duration curve for the system.
ii) Plot energy load curve and mass curve.
iii) Find load factor of the system.
iv) Find capacity factor and utilization factor if the station capacity is 125 MW. **7**

- Q.7 a) Explain various government policies regarding captive power implementation of deregulation in India. **8**
b) Explain power system restructuring efforts made in foreign countries. **7**

End Semester Examination, May 2019

B. Tech. — Third Semester ELECTRONIC DEVICES AND CIRCUITS (EC-301)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

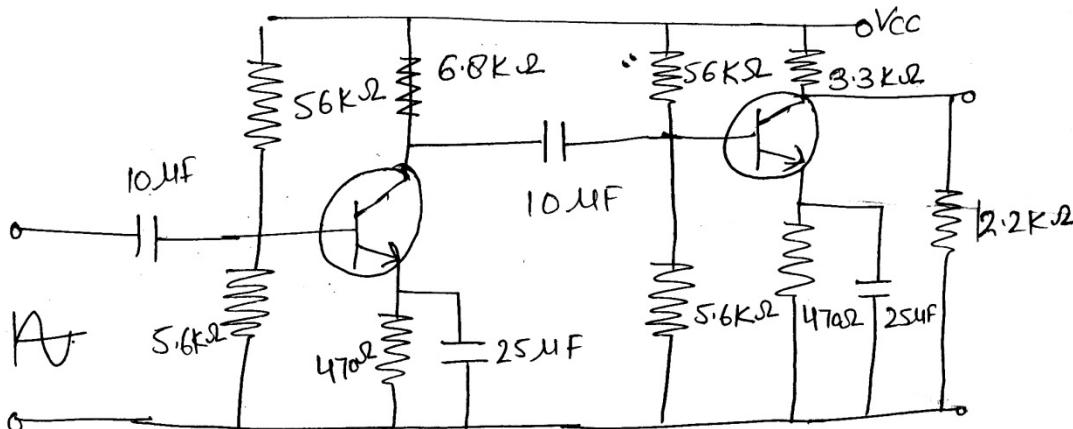
Q.1 Answer the following question:

- a) Differentiate between majority and minority charge carriers.
- b) Define role of potential barrier in a P-N junction diode.
- c) Distinguish between transition and space charge capacitance of a diode.
- d) Identify significance of emitter, base and collector in BJT.
- e) Describe role of common terminal in transistor.
- f) Justify role of (**b**) beta in BJT.
- g) Analyse feedback amplifier as oscillator.
- h) State “Miller’s theorem”.
- i) Compare various coupling techniques of transistor as amplifier.
- j) Give reason of using three RC networks in RC phase shift oscillator.

2×10

PART-A

- Q.2** a) Demonstrate functioning of P-N junction diode under forward and reverse bias conditions, also draw its V-I characteristics. **7**
 b) Explain tunneling mechanism of tunnel diode with the help of energy band diagram **7**
 c) Discuss the role of the switching time in a P-N junction diode. **6**
- Q.3** a) Formulate current component of common base, common emitter and common collector configuration with suitable mathematical explanation. **10**
 b) Investigate input and output characteristics of common base configuration of P-N-P transistor. Clearly indicate the cut-off, active and saturation region graphically. **10**
- Q.4** a) Design a single stage RC coupled BJT amplifier circuit assuming:
 $V_{CC} = 10V$, $I_C = 4mA$, $hfe = 100$, $hie = 1K\Omega$, $R_L = 100K\Omega$ and $F_L = 100Hz$. **10**
 b) Evaluate Z_{in} , Z_o , A for 2-stage RC coupled amplifier circuit as in the figure:



Given- $C_{in} = C_c = 10\mu F$ $R_1 = 56k\Omega$ $R_{c2} = 3.3k\Omega$
 $C_E = 25\mu F$ $R_2 = 5.6k\Omega$ $R_L = 2.2k\Omega$
 $R_E = 470\Omega$ $R_{C1} = 6.8k\Omega$ $hie = 1.1k\Omega$
 $hfe = 120$

10

PART-B

- Q.5** a) Analyze collector efficiency for class-B power amplifier. **10**

- b) Justify usage of push pull amplifier over the normal power amplifier. **10**
- Q.6 a) Discuss merits of negative feedback amplifier with suitable derivation. **10**
b) Derive expression for voltage gain and R_{in} (Input resistance of Trans-conductance amplifier).**10**
- Q.7 Demonstrate the working of Hartley oscillator. Also derive resonance frequency for it. **20**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

PROGRAMMABLE LOGIC CONTROLLER AND SCADA (EE-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the types of languages used in PLC programming?
- b) Explain how PLC is different from microcontroller?
- c) What is the latest series of PLC manufactured by Mitsubishi Electric India?
- d) What are the types of sensor available in the market?
- e) What do you mean by normally ON switch?
- f) What is the Base Rack?
- g) Compare modular types PLC with brick type PLC.
- h) How is the size of the ladder programme can be determined?
- i) Write a program to reset a timer.
- j) Discuss the application of SCADA system. **2x10**

PART-A

- Q.2** a) Explain with example the terms “economy of scale” and “economy of scope”. How does Industrial automation help in achieving this with examples? **10**
- b) Discuss the evolution of programmable logic controller. Also list the feature of PLC. **10**
- Q.3** a) Discuss the architecture of PLC with appropriate block diagram. **10**
- b) List the various steps in the scanning process of PLC. **10**
- Q.4** a) Write the ladder programme of the entry/exit of the parking lot is a single lane passage by controlling the indicators, the program ensures that only one car can pass through the entry/exit so as to prevent car accident between entering and leaving cars.

Devices:

Device	Function	
X ₀	Car entering sensor, when car passes through sensor, X ₀ = ON	
X ₁	Car leaving sensor, when car passes through the sensor X ₁ = ON	
Y ₀	Entering car indicator (ON means “Go”, off means “stop”)	
Y ₁	Leaving car indicator (ON means “Go”, off means “stop”). 10	

- b) Explain the following instruction in Mitsubishi PLC:
- i) MOV
 - ii) BMOV
 - iii) DMOV
 - iv) FMOV
 - v) Shift instruction. **10**

PART-B

- Q.5** a) List the benefits of automation in power system. **5**
- b) Explain the hardware architecture of SCADA system in detail. Also discuss the implementation of SCADA in AGC. **15**
- Q.6** a) Discuss how the communication of PLC with SCADA system on Ethernet can be achieved? **10**

- b) Explain the MTU communication Interface. **10**
- Q.7 a) What are types of function and benefits of EMS? Discuss in detail. **10**
- b) Discuss the operating state of power system. **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

POWER GENERATION OPERATION AND CONTROL (EE-504)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the functions of automatic generation control?
- b) How can the voltage be controlled in AVR loop?
- c) Write an expression for transmission line coefficient (B_{ij}).
- d) State the constraints to be taken while doing the minimization of fuel cost of thermal units.
- e) How can we check upon the transient stability of a power system?
- f) Brief out the concept of equal area criterion for the stability of a system.
- g) Distinguish between capacity interchange and diversity interchange.
- h) Outline the concept of energy banking.
- i) When the condition of system blackout arises? Explain.
- j) What do you mean by line outage distribution factor?

2×10

PART-A

Q.2 a) Derive an expression for tie line power and frequency deviation for a two area system. **10**

b) Draw the diagram of a typical automatic voltage regulator and develop its block diagram representation. **10**

Q.3 a) The fuel inputs per hour of plants 1 and 2 are given below:

$$F_1 = 0.2Pg_1^2 + 40Pg_1 + 120 \text{ Rs / hr}$$

$$F_2 = 0.25Pg_2^2 + 30Pg_2 + 150 \text{ Rs / hr}$$

Determine the economic dispatch and the corresponding cost of generation. The maximum and minimum loading on each unit is 100 MW and 25 MW. Assume that the transmission losses are ignored and the total demand $P_D = 180MW$. **10**

b) Develop an algorithm for economic dispatch using Newton Raphson method. **10**

Q.4 a) Formulate the swing equation using the dynamics of a synchronous machine. **10**

b) Demonstrate the effect of clearing time on the stability of a system. **10**

PART-B

Q.5 a) Discuss and analyze how two power systems could operate interconnected for less money than if they operated separately. **10**

b) Explain the concept of power pools by enlisting its function, advantages and disadvantages. **10**

Q.6 a) What is meant by power system security? Enumerate its major functions and also the factor affecting the system security. **10**

b) With the help of flow chart, explain contingency analysis using linear sensitivity factors. **10**

Q.7 a) Where and when hydrothermal co-ordination is required? Categorize the hydro-scheduling required for the co-ordination of the operation of hydro-electric plant. **10**

b) A hydro plant and a steam plant are to supply a constant load of 90 MW for 1 week (168hr). The unit characteristics are:

Hydro plant; Water flow $q = 300 + 15P_H$ acre Ft / h; $O \in P_H \in 100MW$.

Steam plant; $= 53.25 + 11.27P_S + 0.0213P_S^2$; $12.5 \in P_S \in 50MW$

Solve for run time (T_S) of the steam unit for following cases:

- i) When hydro plant is limited to 10,000 MWh of energy?
- ii) When maximum drawdown of (q) hydro plant is 2,50,000 acre-feet?

10

End Semester Examination, May 2019

M. Tech. - First Semester

ELECTRIC DRIVES SYSTEM (PC-EE-M-101)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- | | | |
|-----|--|-----------|
| Q.1 | a) Explain the factors effecting selection of drives. | 8 |
| | b) Explain the block diagram of Electric Drive and classification of Power Modulator of Electric Drive. | 12 |
| Q.2 | a) Derive the dynamic equation of Electric Drives. | 10 |
| | b) Explain the multiquadrant operation and speed convention of Electric Drives. | 10 |
| Q.3 | Explain the single phase half controlled rectifier control of DC separately excited motor in discontinuous and continuous conduction mode. | 20 |
| Q.4 | a) Describe two quadrant control of chopper fed dc drive. | 10 |
| | b) The chopper used for on-off control of a DC separately excited motor has supply voltage of 230 V DC, an on time of 10ms and off time of 15ms. Neglecting armature inductance and assuming continuous conduction of motor current, calculate the average load current when the motor speed is 1500 rpm and has a voltage constant $9 \text{ kV} = 0.5\text{V}/\text{rad/sec}$. The armature resistance is 3 ohms. | 10 |
| Q.5 | a) Explain V/f control in induction motor drive. | 10 |
| | b) Describe in detail vector control method of speed control in AC motor drive. | 10 |
| Q.6 | a) State the mechanical and electrical features of electric traction motors
i) DC series motor ii) AC series motor | 10 |
| | b) Explain briefly how regenerative braking differs from other methods of braking in traction motors. | 10 |
| Q.7 | Explain in detail application of servo motors and steppers motors with the working principles. | 20 |

End Semester Examination, May 2019

B. Tech. – Seventh Semester

OPTICAL COMMUNICATION (EC-723A / EC-723B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What do you understand by refractive index of a material?
- b) Differentiate between direct and sub-carrier intensity modulation.
- c) How is refractive index related to velocity of light?
- d) Define population inversion with the help of a characteristic diagram.
- e) List characteristics of a good optical source.
- f) Find the value of critical angle at core cladding interface of a silica optical fiber having core refractive index 1.30 and cladding refractive index 1.25.
- g) State sensitivity of optical receivers. Which one of the two detectors (APD or P-I-N) has improved sensitivity?
- h) Which type of feedback (Positive/Negative) is used in LASER and why?
- i) A P-n photodiode has a quantum efficiency of 50% at a wavelength of 0.9 μm . Calculate its responsivity.
- j) Define fictive temperature.

2x10

PART-A

Q.2 a) With the help of a diagram explain each block of optical fibre communication system. **10**
b) Compare optical fibre communication system with other popular transmission media or communication systems. **10**

Q.3 a) Classify different types of optical fibres on the basis of material, refractive index and transmission mode. **10**
b) Derive the expression for acceptance angle of a fibre and discuss the concept of acceptance cone. **10**

Q.4 a) State dispersion and categorize different types of dispersions that take place in optical fibre communication system. **8**
b) Analyze various types of scattering losses. **7**
c) When the mean optical power launched in to an 8km length of fiber is 120 μW and the mean optical power at fibre output is 3 μW . Calculate:
i) The overall signal loss in decibels through the fibre assuming there are no connectors or splices.
ii) The signal attenuation per kilometers.
iii) The overall signal attention for a 12km optical link using the some fibre with splices at 1km interval each giving an attenuation of 1db. **5**

PART-B

Q.5 a) Justify the concept of Recombination process in LED and draw energy band diagram for P-n junction at equilibrium condition. **12**
b) Describe the characteristics of LED. **8**

- Q.6** a) Differentiate between spontaneous emission and stimulated emission for optical sources. **5**
b) Draw representative diagram of Fabry-Perot Laser and explain its operation. **10**
c) Discuss briefly the injection laser characteristics. **5**
- Q.7** a) Demonstrate the working principle of APD and model APD structure with guard rings. **10**
b) Categorize the various types of noises in photodiodes. **5**
c) Distinguish between phototransistors and photoconductors. **5**

End Semester Examination, May 2019

B. Tech. — Fifth Semester COMMUNICATION SYSTEM-I (EC-522)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1** Answer the following questions: **2×10**
- Discuss merits of digital communication over analog communication.
 - State information capacity theorem.
 - Give a brief comparison of various analog modulation techniques: DSB, DSB-SC, SSB, VSB.
 - Illustrate the significance of term “Depth of modulation”.
 - The modulating frequency in frequency modulation is increased from 10KHz to 20KHz. Analyze the effect on bandwidth.
 - Summarize various advantage and applications of frequency modulation.
 - Compare low level and high level modulation techniques.
 - Discuss neutralization effect with respect to super heterodyne receivers.
 - The noise figure of an amplifier is 0.8db. Calculate the equivalent temperature, T_e .
 - What do you understand by threshold effect in FM systems?

PART-A

- Q.2**
- Design and explain the model of a digital communication system. **10**
 - What do you understand by modulation of a signal? Why is it needed? **7**
 - Compare baseband and passband signals. **3**
- Q.3**
- Discuss coherent detection of a DSBSC wave with the help of block diagram and related equations. Enlist its various advantages and disadvantages. **8**
 - An SSB transmission contains 10kW of power. This transmission is to be replaced by standard amplitude modulated signal with the same power content. Determine the power content of the carrier and each of the sidebands when percentage modulation is 80%. **8**
 - Prove that in amplitude modulation the maximum average power transmitted by an antenna is 1.5 times the carrier power. **4**
- Q.4**
- An angle modulated signal is given as $v(t) = 12 \cos(6' 10^8 t + 8 \sin 1250t)$. Determine carrier and modulating frequency, modulation index, maximum frequency deviation, bandwidth and power dissipated in 10Ω resistor. **10**
 - Categorize different methods of FM generation. Summarize their advantages and disadvantages. **4**
 - Describe indirect method of FM generation. Why is it called indirect method? **6**

PART-B

- Q.5**
- Illustrate the function of simple and delayed AGC in a radio receiver. Design an AM receiver using simple AGC and explain its principle of operation. **10**
 - In a broadcast super heterodyne receiver having no RF amplifier, the loaded “Q” of the antenna coupling circuit (at the input to the mixer) is 100. If the intermediate frequency is 455 KHz. Determine:
 - The image frequency and its rejection ratio at 1000 KHz.
 - The image frequency and its rejection ratio at 25 MHz.
 Analyze the results. **10**
- Q.6**
- Two resistors of $60\text{ K}\Omega$ and $80\text{ K}\Omega$ are connected at room temperature. For the bandwidth of 70 KHz, determine the thermal noise for the following:
 - For each resistor.

- ii) Two resistors connected in series.
 - iii) Two resistors connected in parallel.
- b) What do you understand by equivalent noise bandwidth? Derive an expression for it. 10
- Q.7 a) Design a receiver model for coherent detection of SSB modulated wave and determine its figure of merit. 10
- b) Evaluate the performance of various amplitude and frequency modulation systems in the presence of noise. 10

End Semester Examination, May 2019

B.A. (Liberal Arts) - First Semester

INTRODUCTION TO ENGLISH LITERATURE (BLA-EL-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer (**any four**) of the following questions:

- a) Brief the condition of the character Lydia in the novel *Pride and Prejudice*.
- b) Give the reference to the context of the lines below.

Light, Oh! Where is the light? Kindle it with the burning fire of desire!

There is the lamp but never a flicker of a flame, is much thy fate, my heart! Ah, deaths were better by far for thee!

- c) Write the character sketch of Amy Elliott Dunne in Gilian Flynn's *Gone Girl*.
- d) Mention the types of written communication.
- e) Is justice achieved in "To kill a Mockingbird"? Justify.
- f) Write about the character "Swami" in the novel *Swami and Friends*.

5×4

PART-A

Q.2 Mrs. Bennet had 5 daughters. Discuss their behavior and desires as depicted in the novel *Pride and Prejudice*. **20**

Q.3 Critically justify the themes in the text Premchand's "*The Shroud*". **20**

Q.4 Gilian Flynn's "*Gone Girl*" is an example of mystery, suspense and crime genres. Explain **20**

PART-B

Q.5 Discuss Harper Lee "*To kill a Mocking bird*" as a humorous novel depicting the serious issues. **20**

Q.6 Evaluate RabindraNath Tagore's poem "*Oh! Where is the Light?*" as a poem of morality. **20**

Q.7 What is Creative writing? Write a short story about your experiences in the University. **20**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

DATA COMMUNICATION AND NETWORKING (EC-725)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Mention the drawback of go-back-n protocol. How is it overcome in the selective repeat protocol? **2x10**
b) Compare NRZ and RZ line coding with an example.
c) Give application the coaxial cable, optical fibre and twisted pair cable.
d) Construct the HDLC frame format structure.
e) List the steps followed in checksum generator.
f) Line code the bit stream 110001 using differential Manchester encoding.
g) For 'n' devices in a network, determine the number of cable links required for a mesh and ring topology.
h) List the three criteria necessary for an effective and efficient network.
i) Mention some services provided by application layer.
j) Suppose the bandwidth of a channel is 5MHz. If the signal to noise ratio is found to be 15dB, find the maximum channel capacity.

- Q.2 a) The lucky corporation has a fully connected mesh topology consisting of eight devices. Calculate the total number of cable links needed and the number of ports for each device. **5**
b) Define computer network. Discuss various types of network topologies in computer network. Also outline various advantages and disadvantages of each topology. **12**
c) List three main functions performed by the data link layer of ISO-OSI model. **3**

- Q.3 a) Differentiate bit stuffing and byte stuffing in synchronous protocols. Draw the information frame of HDLC protocol. **12**
b) Design a selective reject ARQ mechanism for flow control. How can be inefficiency of stop and wait protocol be overcome in sliding window protocol? **8**

- Q.4 a) Categorize different types of Ethernet standards. Evaluate the performance of CSMA/CD and CSMA/CA. **8**
b) Design the structure of ATM used for WAN network. Discuss the functions of each layer in ATM network. **12**

PART-B

- Q.5 a) State line coding. Compare unipolar NRZ, RZ, NRZ-I, NRZ-L Manchester encoding by applying on the information sequence "101011100". **10**
b) Design the structure of AT & T's FDM hierarchy. **10**
- Q.6 a) Evaluate the class of each address.
i) 4.23.145.90
ii) 128.15.18.20
iii) 198.15.14.44
iv) 224.67.45.38 **5**
b) Compare and contrast the differences between IPV4 and IPV6. **12**
c) Examine various addressing modes of IPV6. **3**
- Q.7 a) Explain the purpose of DNS. Discuss the three divisions of DNS. **12**

b) Model the structure of HTTP protocol. Classify various types of documents used in web. **8**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

EMBEDDED SYSTEM DESIGN (EC-822A)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1

 - a) Differentiate microprocessor and microcontroller on the basis of their operating frequency and power requirements.
 - b) How many interrupts are available in PIC16F877A? Name them.
 - c) List all the six parts of Intex hex file.
 - d) Summarize emulators and simulators.
 - e) Name the four different options that are available for clocking the PIC microcontroller.
 - f) Explain option register and its bits.
 - g) Draw the block diagram of Harvard architecture.
 - h) Discuss the prescaling and postscaling concept of timers in PIC.
 - i) Describe the term 'interrupt handler'.
 - j) How PWM can be used to control the speed of dc motor?

PART-A

PART-B

- Q.5 a) Define the size of program memory available in PIC 16 family. Explain the role of program counter in accessing program memory. **5**
b) Classify the addressing modes of PIC 16. Discuss each addressing mode with the help of register file structure. **15**

Q.6 a) Draw and give interpretation of timer 2 block diagram. Explain each block in detail. **10**
b) Discuss the timer 1 operation in asynchronous counter mode. **10**

Q.7 Sketch the connections of **(any two)** with 8051:
a) Keyboard.
b) Temperature sensor.
c) ADC0804. **10×2**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

MICROCONTROLLER AND APPLICATIONS (EC-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Which of the register bank in 8051 assigned for a stack? What is the default value of a stack pointer?
b) Differentiate between Data Memory and Code Memory.
c) Describe the need of Addressing Modes. Name the addressing modes used in 8051 microcontroller.
d) Describe the SFRs in 8051. Which of the memory segment of RAM is assigned for SFRs?
e) What is the difference between Bit addressable and Byte addressable RAM?
f) Calculate the value of TH1 for the following baud rates:
i) 9600
ii) 2400
iii) 1200
g) List the interrupts available in 8051 on the basis of their priority. Also write their default addresses for ISR.
h) Draw the following registers with their respective bits:
i) IE Register
ii) IP Register
j) What voltage levels are used for binary 1 and binary 0 in RS-232?
j) For the XTAL = 11.0592MHz, what frequency is used by the timer to set the baud rate?

2×10

PART-A

- Q.2 a) Draw and explain the internal RAM structure of 8051 microcontroller. Also explain the working of stack using PUSH and POP instructions. **10**
b) Explain and draw the PIN diagram of 8051. **10**
- Q.3 Develop a program to copy 44H into RAM location 40H to 50H using: **8**
a) Direct addressing mode.
b) Register indirect addressing mode:
i) With Loop.
ii) Without Loop. **6×2**
- Q.4 a) Configure TMOD register for the timer 0 which operate in mode 1 as a timer and controlled using software. **6**
b) Design a program to generate a square wave on P1.4. Assume an XTAL of 12MHz. **14**

PART-B

- Q.5 a) Define the programming steps used to send the data through serial port. **10**
b) Design a code to transfer the letter "Hi" serially at 4800 baud rate continuously. Use 8 bit data and 1 stop bit and Timer 1. **10**
- Q.6 How many interrupts are available in 8051 microcontroller? List them all. Also give example of each interrupt available in 8051. **20**
- Q.7 Draw the interfacing diagram of LCD with 8051 microcontroller. Also explain the pins of LCD. **20**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ADVANCED CONTROL THEORY (EE-703)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Define state space formulation.
- b) Define state space.
- c) Write the advantage of state space analysis.
- d) Write the property of state transition matrix.
- e) Define observability.
- f) Explain sampling.
- g) Describe zero order hold.
- h) Define z-transform and region of convergence.
- i) Write two property of linear system.
- j) Name two non-linearity.

2×10

PART-A

Q.2 a) Determine the state model of armature controlled d.c. motor. **10**
b) Define state transition matrix and derive if using Laplace transformation method. **10**

Q.3 a) Construct state model of a system whose transfer function is given by

$$\frac{Y(S)}{U(S)} = \frac{10(s+4)}{s(s+1)(s+3)}$$

10

b) A LTI system is characterized by state equation:

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Find the solution of state equation, assuming the initial state vector

$$\alpha_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

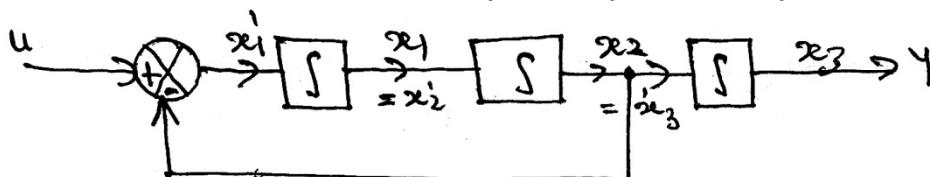
10

Q.4 a) The transfer function of a discrete-time system is

$$\frac{Y(z)}{U(z)} = \frac{4z^3 - 12z^2 + 13z - 7}{(z-1)^2(z-2)}$$

Determine the state model of the system. **10**

b) Determine the state model of the system represented by the block diagram.



10

PART-B

Q.5 a) Check the stability of the sampled data system described by the characteristic equation.

838/5

$$9z^2 - 5z + 8 = 0$$

10

- b) Determine the describing function of saturation non-linearity.

10

- Q.6 a) Response of a system is

$$y = ax^2 + e^{bx}$$

Test whether the system is linear or non-linear.

10

- b) Explain, how non-linearity are introduced in the systems? Write in details any two nonlinearity.

10

- Q.7 Write short notes on:

- a) Jury's stability test.
b) Lyapunov stability.

10×2

End Semester Examination, May 2019

B. Tech. — Seventh Semester

MICROCONTROLLER AND APPLICATIONS (EC-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List the available register bank in 8051 with their addresses.
- b) Examine the given program and evaluate the output:

```
org 00H  
MOV A, #63H  
MOV B, #11H  
DIV AB  
end
```

- c) Describe the functioning of RS and WR pins of 8051.
- d) List all logical instructions used in 8051.
- e) Define program status word register.
- f) Describe the TMOD register for timer 1 mode 2.
- g) Explain address buses of 8051. How much memory can be accessed through it?
- h) Differentiate polling and interrupt method.
- i) Examine the maximum and minimum delay generated using mode 1 operation of timer.
- j) Describe timer control (TCON) register.

2×10

PART-A

Q.2 a) Differentiate microprocessor and microcontroller on the following parameters:

- i) Hardware requirement
- ii) Software size
- iii) Operating frequency
- iv) Cost
- v) Power consumption
- vi) Applications

- b) Construct the architecture of 8051 and explain each block in detail.

10

Q.3 a) Design a program to copy the contents of SBUF register into RI register using register addressing mode.

5

- b) List all the conditional jump instructions of 8051 with examples.

10

- c) Write a program to generate a delay of 10ms using jump instruction (looping method).

5

Q.4 Construct the code for the given waveform using timer 1 mode 1, XTAL=16MHZ.



20

PART-B

Q.5 a) With XTAL = 11.0592 MHz, find the THI value to be needed for the following baud rates:

- i) 9600
- ii) 2400
- iii) 1200

6

- b) Write the programming steps taken by the 8051 to transfer character byte serially.

10

- c) Define the serial control register and its each bit.

4

Q.6 a) State advantages of interrupt based data transfer.

3

- b) What are the contents of the IE register upon reset? What do these values mean?

3

c) Design a code using interrupts for flashing LED's on port 2 while timer 0 is generating a square wave of 3 KHz on P1.7. 14

Q.7 Draw the pin diagram of 8255 and design its connections with 8255. 20

OR

Design the interfacing circuit of LCD with 8051. Also develop the code for sending “Good Day” to the LCD using delay.

End Semester Examination, May 2019

B. Tech. – Seventh Semester

MOBILE COMPUTING (EC-823)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Define mobile computing.
b) Differentiate between mobility and portability.
c) List three stages of client of CODA file system.
d) What are proactive and reactive protocols?
e) Compare clan 0 and clan 1 WTP.
f) Give the outline of IP micromobility. List various techniques.
g) Interpret transaction model.
h) What is triangular routing? How it can be avoided?
i) List various techniques of agent discovery.
j) Define frequency reuse. **2×10**

PART-A

- Q.2 a) Elaborate the roles of HLR, VLR and AVC in the GSM system. Design the architecture of GSM to explain the working of registers. **10**
b) Compare the working of TDMA and FDMA systems. **6**
c) A spectrum of 30 MHz is allocated to a wireless FDD cellular system which uses two 25 KHz simplex channels to provide full duplex voice communication. Calculate the number of channels available per cell if the system uses:
i) 4-cell reuse.
ii) 7 cell reuse. **4**
- Q.3 a) Create a generic reference model of WATM and explain various access scenarios. **10**
b) Describe tunnelling and encapsulation process. Enumerate various encapsulation techniques and discuss any one briefly. **10**
- Q.4 a) Summarize the working of snooping TCP along with its advantages and disadvantages. **10**
b) Construct WAPI.X architecture and explain various layers. **10**

PART-B

- Q.5 a) Give an overview of CODA. **10**
b) Analyze the working of high bandwidth internet access using digital video broadcasting. **10**
- Q.6 a) Define Adhoc network. Discuss the working of destination sequence distance vector along with its advantages and disadvantages. **10**
b) Categorize fixed (wired) and adhoc wireless network from routing point of view. **10**
- Q.7 Write short notes on **(any two):**
a) Kangaroo Joey model.
b) Team transaction model.
c) Push architecture in WAP.
d) IP Packet delivery to and from the mobile node. **10×2**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

UTILIZATION OF ELECTRIC POWER AND TRACTION (EE-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) How is air from microorganism, gaseous contaminant and odours purified?
- b) What are the advantages of composite system of traction over AC supply and DC traction supply system?
- c) What are the applications of electrolysis?
- d) List the advantages of electric heating.
- e) What are the conditions for maximum output for an electric arc furnace?
- f) Define the following terms:
 - i) Illumination
 - ii) Lumen.
- g) Why tungsten is used as filament material?
- h) What is the scope of application of battery drive?
- i) What is the function of thermostat in domestic refrigerator?
- j) Give merits and demerits with respect to arc welding.

2x10

PART-A

- Q.2** a) Explain the construction and operation of a Fluorescent tube and compare it with tungsten filament lamp. **10**
- b) An illumination of 25lux is to be produced on the floor of a room 12m X 9m. 18 lamps are required to produce this illumination in the room, if 50% of the emitted light falls on the floor what is the power of the lamp in candela? **10**
- Q.3** a) Explain with the help of neat sketch the working of Ajax Wyatt furnace. What is its field of application? **10**
- b) Explain the methods of induction heating? **10**
- Q.4** a) Discuss the principle of arc welding and the difference between carbon and metallic arc welding. **10**
- b) Compare AC and DC welding. **10**

PART-B

- Q.5** a) Explain briefly extraction and refining of metals by electrolysis. **10**
- b) Estimate ampere-hours required to deposit a coating of silver 0.04mm thick on a sphere of 4.5 cm radius. Electro-chemical equivalent of silver = 111.8×10^{-8} kg/C and relative density of silver = 10.5. **10**
- Q.6** a) Explain the different systems of track electrification. **10**
- b) A train is required to run between two stations 1.5km apart at a schedule speed of 36 km/h, the duration of stops being 25 seconds. The braking retardation is 3km h/s. Assuming trapezoidal speed-time curve, calculate the acceleration if the ratio of maximum speed to average speed is to be 1.25. **10**
- Q.7** a) Draw electric circuit of refrigerator and explain its working. How can temperature inside the refrigerator be adjusted? **10**
- b) Explain the working of a central air-conditioning system. Use a neat sketch. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

NETWORK ANALYSIS AND SYNTHESIS (EE-301A / EE-301B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1**
- Write any two properties of Laplace transformation.
 - Inductor behaves as an _____ and capacitor as _____ at $t = \infty$ [steady state condition].
 - Define scale factor.
 - Enlist the restrictions on location of poles and zeros in driving point functions.
 - State the reciprocity and symmetry condition for ABCD parameters.
 - Draw the equivalent circuit representation of h-parameters.
 - Test for positive realness of the function.

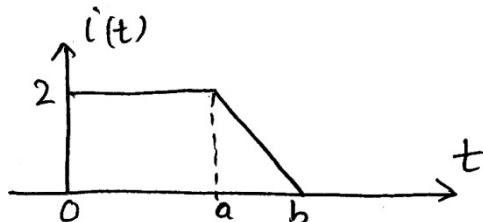
$$F(s) = \frac{s+4}{s+2}$$

- State the properties of RL impedance function.
- Draw the dual network for the series RLC circuit connected to a voltage source.
- What is characteristic impedance (z_0)? Write formulae also.

2×10

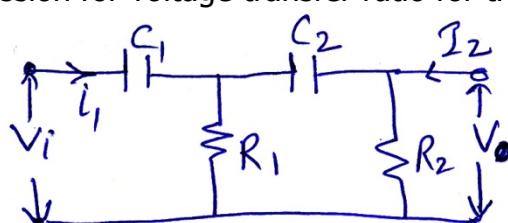
PART-A

- Q.2**
- Derive an expression for transient current $i(t)$ of series RLC circuit with step input. **12**
 - Using the concept of waveform analysis, obtain the waveform components of given waveform $i(t)$



8

- Q.3**
- Find the expression for voltage transfer ratio for the given network.



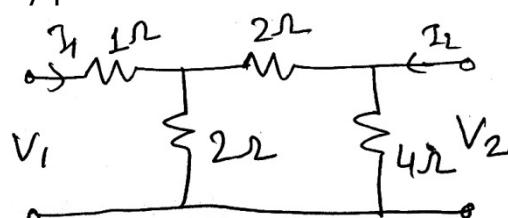
12

- For the network function, draw pole zero plot and obtain time domain response $i(t)$

$$I(s) = \frac{(s+5)}{(s+2)(s+7)}$$

8

- Q.4**
- Find the y-parameters for the network of figure.



10

- Explain the interconnection of two port networks for parallel connection.

10

PART-B

- Q.5 a) Identify whether the following impedance function represents a RL or RC network and find its 1st Cauer form

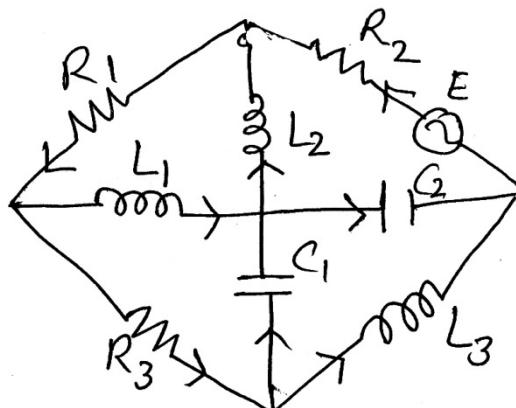
$$z(s) = \frac{(s+4)(s+6)}{(s+3)(s+5)} \quad 14$$

- b) List the properties of LC driving point impedance function. 6

- Q.6 a) Design a constant K-HPF T and π section having $f_c = 5 \text{ KHz}$ and nominal characteristic impedance $R_0 = 600\Omega$. 10

- b) Describe the analysis process of a band pass filter to find the expression of cut-off frequency. 10

- Q.7 Figure represents a graph of a network. Show the tree, twigs and links and hence obtain the incidence, tie-set and cut-set matrix.



20

End Semester Examination, May 2019

B. Tech. — Fifth Semester
POWER GENERATION (EE-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1** Answer the following questions:
- a) Discuss the following terms:
i) Demand factor.
ii) Load factor.
iii) Plant factor. **2×3**
 - b) List the factor considered for site selection of wind power plant. **2**
 - c) What is meant by co-generation? **2**
 - d) Why energy audit is necessary? **2**
 - e) What are the desirable characteristics of tariff? **2**
 - f) The max demand on a power station is 100 MW. If the annual load factor is 40%. Calculate the total energy generated in 2 year. **2**
 - g) Name non-conventional source of energy. **2**
 - h) List advantage of tidal energy. **2**

PART-A

- Q.2** a) Explain the construction and working of thermal power plant. **10**
b) Discuss recent trends in power generation. **10**
- Q.3** a) The maximum demand of a power plant is 60 MW. The capacity factor is 0.5 and utilization factor is 0.8. Find:
i) Load factor.
ii) Plant capacity.
iii) Reserve capacity.
iv) Annual energy production. **3×4**
- b) Prove that load factor of supply system is improves by an increase in diversity of load. What is the significance of load factor? **4**
- c) The value of demand factor and load factor are always less than 1 why? **4**
- Q.4** a) Discuss the various methods of determining the depreciation of the equipment. **10**
b) What is tariff? Give its objective and desirable characteristics. **10**

PART-B

- Q.5** a) With the help of schematic diagram, explain working of nuclear power plant. **10**
b) Differentiate thermal and diesel power plant. **10**
- Q.6** a) Explain complete layout, construction and working of wind power plant. **10**
b) How geothermal sources are used for energy generation. Discuss in detail. **10**
- Q.7** a) Write short notes on (**any two**) of the following:
i) Energy audit.
ii) Energy management.
iii) Co-generation. **10×2**

End Semester Examination, May 2019

M. Tech. - First Semester

ADVANCED POWER ELECTRONICS CIRCUITS (PE-EE-M-121)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- Q.1 a) Discuss the concept of Automatic power factor correction. **8**
 b) Analyze the boost type Automatic power factor corrector with appropriate waveform. **12**
- Q.2 List the various topologies of switched mode power supply and discuss Buck, Boost, Buck-Boost converter topology in detail. **20**
- Q.3 a) Explain the basic concept of resonant converters. Also enumerate its application. **10**
 b) Explain the operating modes of fly back converter with appropriate waveform, and analysis. **10**
- Q.4 a) Analyze the operation of forward converter in its different modes of operation. **10**
 b) Discuss the working of full bridge converter with appropriate waveform. **10**
- Q.5 a) Discuss how the voltage can be controlled in resonant inverter. List the various types of resonant inverter. **10**
 b) Analyze the zero voltage switching of resonant converter. **10**
- Q.6 a) Develop the mathematical model of the photovoltaic based Buck convertor. **10**
 b) List the advantage of using renewable energy source based converters. **10**
- Q.7 Write short notes on **(any four):**
 a) Push pull converter.
 b) Zero current switching.
 c) Wind energy.
 d) Control of APFC.
 e) Load resonant converter. **5x4**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

MICRO ELECTRO MECHANICAL SYSTEM (EC-727)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define MEMS and explain MEOMS technology. **2×10**
b) Interpret MEMS micro mirror.
c) Compare the properties Gallium arsenide with silica.
d) List various packaging materials used in MEMS.
e) Distinguish between isotropic and anisotropic etching process.
f) State the working principle of sputtering.
g) Illustrate the working principle of acoustic sensors.
h) What are chemical sensors? Where do we use them?
i) Clarify the types of magnetic materials used in MEMS. Defend their use in MEMS.
j) Tabulate microelectronics and nanoelectronics.

- PART-A**
- Q.2 a) Explain micro mechanical miniaturization. Why is it required to miniaturize MEMS devices? **5**
b) Describe in detail the working principle, applications and advantages of microsystems. **15**
- Q.3 a) Elaborate the applications of SiO_2 , Gallium Arsenide and conducting polymers in MEMS devices. **15**
b) Justify the use of silicon as a piezoresistive material. **5**
- Q.4 a) Analyze the CVD process to be utilized during fabrication of microsystem. **10**
b) Classify various types of lithography. Explain in detail X-ray lithography with its major features. **10**

PART-B

- Q.5 a) How would you express the function of:
i) Biomedical and biosensors. **10**
ii) Acoustic sensors.
b) Design an accelerometer based on electro thermal principle. **10**
- Q.6 a) Assess micropump and its working. **5**
b) Paraphrase in detail actuation using piezoelectric effect. **10**
c) Illustrate the working principle of micro-motors. **5**
- Q.7 a) How can the thermal properties of nano-materials be evaluated using a suitable characterization process? **10**
b) Discuss the social impact of nano-scale engineering. **5**
c) List various applications of nano-products. **5**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

CONSERVATION OF ENERGY AND MANAGEMENT (EE-726)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is meant by effective energy use?
- b) Name various non-conventional sources of energy.
- c) What is meant by feasible energy?
- d) What is meant by climate protection?
- e) Explain the concept of energy effectiveness.
- f) Define payback method.
- g) Give mathematical expression for the internal rate of return method.
- h) What is meant by cogeneration of energy?
- i) What is least cost power planning?
- j) What do you understand by compensator in heating?

2x10

PART-A

Q.2 a) State and explain the principles of energy management.

15

b) What is the importance of energy management in industry and environment?

5

Q.3 Explain the “energy management program” in detail. What is the role of energy audit in energy management program? **20**

Q.4 a) Discuss the Laws of Thermodynamics.

8

b) Explain in detail the management of air conditioning.

12

PART-B

Q.5 a) How is electric load analyzed? Explain.

10

b) What are the general opportunities in managing lighting systems?

10

Q.6 a) With mathematical expression explain Total Life Cycle cost.

10

b) State and explain discounted payback period.

10

Q.7 Write short notes on:

a) DEFENDUS Strategy.

10

b) Use of computers in energy management.

10

End Semester Examination, May 2019

B. Tech. – Third Semester

COMMUNICATION ENGINEERING-I (EC-404)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define signal. Differentiate between analog and digital signal.
b) State and prove time shifting property of Fourier transform.
c) The modulating signal $f(t)$ in an AM-SC system is multiple tone signal given by $f(t) = E_1 \cos \omega_1 t + E_2 \cos \omega_2 t$. The signal $f(t)$ modulates a carrier $E_c \cos \omega_c t$ plot the spectrum of the signal.
d) Calculate the Fourier transform of impulse function $\delta(t)$.
e) Describe vestigial sideband transmission. How is it used for TV broadcast?
f) Distinguish between narrowband and wideband FM.
g) Given an angle modulated signal $s(t) = 10 \cos[(10^8)\pi t + 5 \sin 2\pi(10^3)t]$. Determine the total power in the signal and bandwidth required to transmit it.
h) Explain how the use of an RF amplifier improves signal to noise ratio of a superheterodyne receiver?
i) Explain the need for pre emphasis and de-emphasis in FM receiver.
j) The noise figure of an amplifier is 2 dB. Find the equivalent temperature, T_e . **2x10**

PART-A

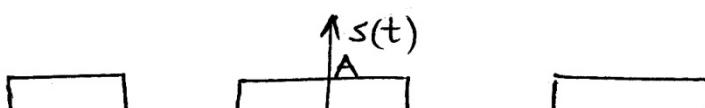
- Q.2 a) What are the elements of a communication system? Explain their fundamental limitations. **8**
b) Define modulation. Discuss the need of modulating a signal. **8**
c) Explain the properties of continuous time LTI system. Determine whether the following is an LTI system. $y(n) = n \cos[x(n)]$ **4**

- Q.3 a) The antenna current of an AM broadcast transmitter modulated to a depth of 40% by an audio sine wave is 11 A. It increases to 12 A as a result of sinusoidal modulation by another sine wave. Evaluate the modulation index due to second wave. **7**
b) Analyze in detail envelope detector method for demodulation of AM wave. **7**
c) How is SSB signal generated by the filter method? Illustrate using block diagram and necessary equations. **6**

- Q.4 a) Explain reactance modulator used for FM generation using transistor. **7**
b) Analyze the working of PLL detector. **8**
c) An angle modulated signal is given by $s(t) = 100 \cos(2\pi f_c t + 4 \sin 2000\pi t)$ where $f_c = 1000 \text{ MHz}$. Determine:
i) The average transmitted power.
ii) The peak deviation and bandwidth required. **5**

PART-B

- Q.5 a) For the periodic gate function shown below:



Find the Fourier series expansion.

10

- b) Evaluate the Fourier transform of a Gaussian pulse given by:

$$f(t) = e^{\left(\frac{-t^2}{2\sigma^2}\right)}$$

10

- Q.6 a) Explain TRF receiver with suitable block diagram and give its advantages and disadvantages.

7

- b) Discuss in detail the following terms w.r.t superheterodyne receiver:

i) AGC

ii) Image frequency.

6

- c) Analyze the features of broadcast receiver.

7

- Q.7 a) Derive the expression of noise temperature in terms of noise figure. Given a receiver connected to antenna whose resistance is 75Ω . The equivalent noise resistance is 25Ω . Calculate the noise figure of the receiver and its noise temperature. Assume ambient temperature of 17°C .

10

- b) Define noise. List and explain different types of noise that occur in an electronic circuit.

10

End Semester Examination, May 2019

M. Tech. — First Semester

MODELING AND ANALYSIS OF ELECTRICAL MACHINES (PC-EE-M-102)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) From the principle of co-energy, deduce the expression for developed torque in singly excited system. **12**
b) Explain the energy balance equation for electrical machine as per principle of electromagnetic energy conservation. **8**
- Q.2 a) Derive the torque and voltage equation for DC shunt machine. **14**
b) Write short note on real and apparent flux density. **6**
- Q.3 Using the d-q theory develops the voltage equation of three phase induction motor in stationary reference frame. **20**
- Q.4 a) Develop and explain mathematical modeling of synchronous machine. **10**
b) Develop and analyze equivalent circuit phase induction motor. **10**
- Q.5 Derive the expression for power input and torque if a PMSM (Permanent magnet synchronous motor). Explain how its torque speed characteristics are obtained. **20**
- Q.6 a) Investigate the performance of the synchronous reluctance motor with help of phaser diagram. **10**
b) Generalize the expression for torque equation of BLDC. **10**
- Q.7 A synchronous generator experience a sudden three phase short circuit fault at its terminals obtain the voltage equation under short circuited condition and draw its dynamic characteristics.

OR

Using the d-q theory deduce the voltage equation of three phase induction motor in stationary reference frame. **20**

- Q.8 a) An electromagnetic structure is characterized by following inductance:
 $L_{11} = L_{22} = 4 + 2 \cos 2q$,
 $L_{12} = L_{21} = 2 + \cos 2q$
- Neglecting the resistances of the winding, find the torque as a function of when both the winding are connected to the same AC voltage source such that:
 $V_1 = V_2 = 200\sqrt{2} \sin 314t$. **10**
- b) Briefly explain why a rotating commutator winding may be represented by a pseudo stationary coil along the brush axis in a DC machine. **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

RENEWABLE ENERGY SOURCES (EE-539)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the share of renewable sources in the total power generation n India?
- b) What is meant by "Green-house effect"?
- c) What is meant by "Solar photo voltaics".
- d) Give the expression for estimation of average solar radiation.
- e) How is wind energy related to solar energy?
- f) What are the advantages of tidal energy?
- g) How are ocean eaves generated?
- h) What is meant by biofuel?
- i) What is refuse derived fuel?
- j) What is geothermal energy?

2×10

PART-A

- Q.2** a) Explain solar thermal power generation. **10**
b) Write short notes on the following:
 i) Solar furnace.
 ii) Solar cooking. **5×2**
- Q.3** a) Explain the construction and working of a solar cell. **10**
b) Explain the measurement of solar radiation by pyranometer. **10**
- Q.4** a) Explain "Wind energy conversion system" with block diagram. **10**
b) Write a short note on 'vertical axis wind machines'. **10**

PART-B

- Q.5** a) Explain "Ocean thermal energy conversion system". **10**
b) Give expression for potential and kinetic energy from ocean waves. **6**
c) Give advantages and disadvantages of wave energy. **4**
- Q.6** a) Explain the structure of small scale hydro power station. **10**
b) How energy can be extracted from biofuels through process of pyrolysis? **10**
- Q.7** Write short notes on (**any two**) of the following:
a) Hydrogen energy.
b) Geothermal energy.
c) Nuclear fusion. **10×2**

End Semester Examination, May 2019

B. Tech. – First Semester

ELEMENTS OF ELECTRONICS ENGINEERING (EC-101A)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Compare conductors, insulators and semi-conductors.
- b) Define drift and diffusion current.
- c) Discuss the concept of virtual ground.
- d) Convert $(AB + CD)$ into POS form.
- e) Analyze the need of doping.
- f) Interpret Ripple factor.
- g) Deduce the relation between α and β .
- h) Construct full wave bridge rectifier and draw its input and output waveforms.
- i) Design a voltage follower using operational amplifier.
- j) If $I_B = 10\mu A$; $\beta = 99$ and $I_{co} = 1\mu A$, Calculate I_c .

2x10

PART-A

- Q.2** a) Name special diodes. Describe any two along with its current voltage characteristics. **10**
 b) Design half wave and centre tapped full wave rectifier and calculate
 i) I_{dc} ii) V_{dc} iii) I_{rms} iv) V_{rms} **10**
- Q.3** a) Design and Explain P-channel JEET. Build its characteristic curves in support. **10**
 b) Model the static characteristics of transistor in common Base configuration. Calculate its various parameters. **10**
- Q.4** a) State De-Morgan's theorem. Using De-Morgan's theorem prove that:
 i) $AB + CD = \overline{\overline{AB} \cdot \overline{CD}}$
 ii) $(A + B)(C + D) = \overline{(A + B)} + \overline{(C + D)}$ **10**
 b) Describe a Flip Flop. Compare latch and a flip flop. Design J-K and S-R flip flops along with its truth tables. **10**

PART-B

- Q.5** Design the following using operational amplifier and deduce the output for the same:
 a) Differential amplifier b) Summing Amplifier
 c) Differentiator d) Integrator **5x4**
- Q.6** a) Design and Explain successive approximation type Analog to digital convertor. **10**
 b) Construct a 4-bit R-2R ladder type Digital to analog converter and explain the same. **10**
- Q.7** Write short notes on **(any two):**
 a) Comparison between Microprocessor and Microcontroller.
 b) Architecture of 8085 Microprocessor.
 c) Static characteristics of transistor in CE configuration.
 d) Characteristics of ideal operational amplifier. **10x2**

End Semester Examination, May 2019

M. Tech. — First Semester

MICROCONTROLLERS PROGRAMMABLE DIGITAL SIGNAL PROCESSORS (PE-EC-M-128)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Demonstrate three stages of pipelining in Cortex-M3 with diagram. Justify the importance of use of buffer in the instruction fetch unit to improve 32 bit instruction handling. **10**
b) Design the architecture of Cortex-M3 processor system. **10**
- Q.2 Describe the pending behavior of interrupts, handled by Cortex-M3. **20**
- Q.3 Discuss the importance of SYSTICK TIMER. What are different SYSTICK TIMER controller registers? **20**
- Q.4 a) Examine how higher throughput is obtained using VLIW architecture. **10**
b) Define MAC unit for P-DSP, and also identify the importance of implementation of MAC operation in P-DSPs. **10**
- Q.5 a) Illustrate and explain the architecture of TMS 320 C6x devices. **10**
b) Examine the register cross path for programmable digital signal processor TMS 320 C6X, and also describe the application of register cross path. **10**
- Q.6 a) Classify the different onchip peripherals in C6x timer with diagram. **10**
b) State and explain various steps involved in C6X code generation using code composer studio tool. **10**
- Q.7 a) Describe the internal memory configuration for C6X processor. **10**
b) Demonstrate context switching with “Pend SV” using suitable diagram, and also discuss different supervisor calls provided by the operating system to access hardware in Cortex-M3. **10**
- Q.8 Write short notes on (**any two**) of the following:
a) Classify addressing mode registers of P-DSP.
b) Thumb instructions.
c) Cortex-M3 memory map. **10×2**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

ANTENNA AND WAVE PROPAGATION (EC-501A / EC-501B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Justify that strength of EM waves received is inversely proportional to the distance from transmitting antenna.
 b) What is a Hertzian dipole?
 c) Calculate the radiation efficiency of an antenna if the radiation resistance is $2\ \Omega$ and loss resistance is $1\ \Omega$.
 d) Differentiate between input impedance and characteristic impedance.
 e) Why is the tapering of array required?
 f) Discuss importance of parasitic elements.
 g) List advantages and disadvantages of lens antenna.
 h) Distinguish between near field and far field.
 i) Evaluate the critical frequency for F_1 layer for which maximum ionic density is given as 2.3×10^6 electrons/cm³.
 j) The noise figure of an antenna is 3dB at T = 290K. Calculate the effective noise temperature. **2x10**

PART-A

- Q.2 a) Obtain the wave equations for electric field and magnetic field in terms of electromagnetic potential. **10**
 b) Prove that the radiation resistance of short dipole is given as

$$R_{rad} = 20\pi^2 \left(\frac{l}{\lambda} \right)^2, \text{ where 'l' is length of the dipole.} \quad \textbf{10}$$

- Q.3 a) Calculate the beamwidth in x-y and y-z planes of an antenna, the power pattern of which is given by:

$$U(\theta, \phi) \begin{cases} \sin^2 \theta \sin \phi & ; 0 \leq \theta \leq \pi ; 0 \leq \phi \leq \pi \\ 0 & ; 0 \leq \theta \leq \pi ; \pi \leq \phi \leq 2\pi \end{cases} \quad \textbf{10}$$
- b) State and prove reciprocity theorem for antennas. Show that the power transfer ratio is independent of power flow. **10**

- Q.4 a) Analyse a n-element broadside array. Derive an expression for the directivity of the same when the elements are equally placed. **10**
 b) What is a binomial array? Find the excitation coefficients of binomial array of 7 elements. **10**

PART-B

- Q.5 a) Develop the design equations for pyramidal horn antenna. Why is flaring required for horn antenna? **10**
 b) Design a 6-element Yagi-Uda antenna that has a directivity of 12dB at 145 MHz. **10**
- Q.6 a) Explain the following:
 i) Critical frequency.

- ii) Maximum usable frequency.
 - iii) Virtual Height. **3x3**
 - b) Determine the change in the electron density of e-layer when critical frequency changes from 8 MHz to 2 MHz between mid-day and sunset. **11**
- Q.7 a) Explain the method to measure the directivity of an antenna. **10**
- b) How can we measure noise figure and noise temperature of an antenna? Discuss in detail. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

INTERNET OF THINGS-I (EC-1001)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Compare and give a point of difference between IPV₄ and IPV₆.
- b) Find the class of each address:
 - i) 11000001 10000011 00011011 11111111
 - ii) 252.5.15.111
- c) Name any two measurement devices used in Internet of Things .
- d) What do you understand by the term Megatrends?
- e) List the most commonly used home automation protocols.
- f) Mention the unit of communication at the Network layer.
- g) Elaborate on the significance of a value chain in Internet of Things.
- h) Discuss two features of Machine to Machine communication.
- i) Differentiate between TCP-IP and UDP.
- j) Who coined the term Internet of Things?

2x10

PART-A

- Q.2** a) Draw the building blocks of IOT hardware and explain each block in detail. **10**
b) Describe in detail the various disadvantages of Internet of Things. **10**
- Q.3** a) Compare Machine to Machine communication and Internet of Things. **10**
b) List down various applications of Machine to Machine communication. **10**
- Q.4** a) Demonstrate with the help of a block diagram an IOT value chain. **10**
b) Give a detailed description of various technologies and protocols used in Internet of Things. **10**

PART-B

- Q.5** a) Elucidate the utilization of Domain Name server. **8**
b) Explain the layered architecture of TCP/IP Protocol suite in detail. **12**
- Q.6** a) Interpret the utilization of Internet of Things in Shopping . **10**
b) Apply the knowledge of Internet and analyze in detail the static and dynamic IP address assignment. **10**
- Q.7** Write short notes on (**any four**):
a) MAC Address.
b) HTTP.
c) IOT in smart manufacturing.
d) IOT in Homes.
e) MQTT. **5x4**

End Semester Examination, May 2019

M. Tech. — First Semester

DSP ARCHITECTURE (PE-EC-M-126)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|--|-----------|
| Q.1 | a) Explain Von Neuman and Harvard architectures. Also defend why the Von Neuman architecture is not suitable for DSP operations. | 7 |
| | b) Write short note on zero overhead looping. | 5 |
| | c) Distinguish circular addressing mode and the bit reversal addressing modes used in DSP processor. | 8 |
| Q.2 | a) Draw schematic block diagram of TMS 320 CIX processor and explain its major block. | 10 |
| | b) Generalize various addressing modes used in TMS 320C4X processor. | 10 |
| Q.3 | a) Express how graphic processor unit (GPU) takes over digital signal processor. | 7 |
| | b) Describe VLIW architecture? Why is it opted? | 10 |
| | c) Briefly describe important features of C6000 device. | 3 |
| Q.4 | a) Justify why we use openMP. Design a parallel computer using openMP. | 10 |
| | b) Name IEEE standards used to define API for portable operating system. Explain how the communication between threads take place. | 10 |
| Q.5 | a) Generalize “State of the art FPGA technology for DSP applications”. | 10 |
| | b) With the help of suitable block diagram analyze Xilinx Virtex-5 FPGA’s DSP 48E slice in detail. | 10 |
| Q.6 | a) Summarize the typical debugging system using EonCE in PDSP device. | 10 |
| | b) Analyze the memory organization and multithread support of PDSPs. | 10 |
| Q.7 | a) Criticize different types of architectures used in processor. | 10 |
| | b) Indicate the major update of TMS 320 C2X over TMS 320 C1X processor. | 5 |
| | c) State the process of measuring the algorithm execution time of DSP on FPGA modules. | 5 |
| Q.8 | a) Explain the data and task parallelism in router application. | 10 |
| | b) Draw the schematic block diagram of TMS 320 C6X processor and explain its major blocks. | 10 |

End Semester Examination, May 2019

B. Tech. – Eighth Semester NANOTECHNOLOGY (EC-833)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What do you mean by nanosystems also list its various synthesis techniques? **2x10**
b) State the different issues and challenges faced in designing nanomaterials.
c) Define "Monies Law".
d) What is defect structure? How can we classify defects in materials?
e) Compare the properties of macro, micro and nano-particles.
f) Why nanotech weapons are superior over nuclear weapons?
g) What is the diameter of a buckyball? How many pentagons and hexagons are there in a buckyball?
h) Differentiate between CVD and PVD techniques.
i) List the advantages of RF sputtering over DC sputtering.
j) Distinguish between nanoscience and nanotechnology.

PART-A

- Q.2 a) Justify that, "botto-up technique is more convenient for nano-fabrication." **8**
b) Discuss about the time and length scale for nanostructures. **5**
c) Write a short note on "nanotechnology a scientific revolution." **7**
- Q.3 a) Show that the surface area to volume ratio of nanoparticle is much higher than that of bulk one. **10**
b) Describe optical, electronic and mechanical properties of nanomaterials in detail. **10**
- Q.4 a) Give an overview on carbon based nanomaterials. **10**
b) Discuss about the properties and applications of nanogold, nanosilver and metal oxide based nanoparticles. **10**

PART-B

- Q.5 a) With a neat diagram explain Chemical Vapor Decomposition (CVD) technique in detail. **10**
b) Demonstrate the ball milling process for synthesis of nanomaterials and state its advantages and disadvantages. **10**
- Q.6 a) Describe all the steps involved in lithography process for nanofabrications and propose a design approach to fabricate nanostructures. **15**
b) Give reasons why nanotechnology plays an important role in cancer research? **5**
- Q.7 Write a short note on **any two** of the following:
a) Nanomedicine and nanobiotechnology.
b) Nanomaterials for data storage.
c) Nanotoxicology challenges.
d) Molecular electronics and nanoelectronics. **10x2**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

FACTS DEVICES AND ITS APPLICATIONS (EE-831)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Why reactive power is called a byproduct of alternating current (AC) system?
b) Enumerate the importance of slope in the SVC dynamic characteristics.
c) State how the SVC prevents the reactive power rating to reach its limit too frequently?
d) Discuss how transient stability is enhanced by using STATCOM?
e) Distinguish between load compensation and system compensation.
f) List the different modes of TCSC operation.
g) Draw VI characteristics of STATCOM.
h) Compare synchronizing torque with damping torque.
i) List the various possible combination for the study of controller interaction.
j) Compare STATCOM with SVC on basis of their basic configuration. **2×10**

PART-A

- Q.2 a) Discuss with proper diagram how active and passive compensation on power transmission line is done? **10**
b) Derive the expression for power in active power compensation. **10**
- Q.3 a) State basic principle of SVC control and show the voltage profile at the receiving end of a loaded line with a varying power factor load. **10**
b) Outline different ratings of static Var compensation. **10**
- Q.4 a) Outline the areas at which STATCOM can improve power system performance. **5**
b) Discuss how power exchange is done between STATCOM and the ac system? **15**

PART-B

- Q.5 a) Elaborate different modes of operation of Thyristor Controlled Series Capacitor (TCSC). **15**
b) Explain how power system stability limit is improved by using TCSC? **5**
- Q.6 Discuss the control scheme for static synchronous series compensator (SSSC) with proper block diagram and also describe its each component in detail. **20**
- Q.7 Discuss the effect of electrical compiling and short circuit level for SVC-SVC interaction for
a) Uncoupled SVC buses.
b) Coupled SVC buses. **10×2**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ADVANCE TELEVISION ENGINEERING (EC-801A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Define the term flicker.
b) List the contents of a composite video signal.
c) Why is AM preferred over FM for broadcasting the pictures signal?
d) Enumerate any three requirements to be satisfied for compatibility in colour television systems.
e) Give two advantages of digital TV.
f) Calculate the percentage interlace error for a system in which the second field is delayed by 32 μ sec.
g) Discuss why medium persistence phosphor is preferred in monochrome picture tube.
h) Comment on why (G-Y) signal is not considered suitable for transmission.
i) Compare photoemission and photoconductivity with one point of difference between their characteristics.
j) Calculate the transmitted power for a system working with a modulation index of 75% having a carrier power of 4 watts. **2x10**

PART-A

- Q.2 a) Derive an expression for the highest modulating frequency in a television system and show that it is nearly 5MHz in the 625 B monochrome systems. **10**
b) Elucidate the significance of scanning in TV transmission. Why is it carried out at a fast rate? **10**
- Q.3 a) Describe the construction and working of vidicon camera tube with the help of a diagram. **10**
b) Why is electromagnetic deflection preferred in TV picture tubes? **10**
- Q.4 a) Show that a total channel bandwidth of 7 MHz is necessary for successful transmission of both picture and sound signals in the 625 line TV system. Sketch frequency distribution of the channel and mark the location of picture and sound carrier frequencies. **12**
b) What is modulation index in FM transmission and how does it affect the bandwidth required for each FM channel? **8**

PART-B

- Q.5 a) Describe with a diagram the construction of a colour TV camera and its optical system. **10**
b) Sketch the gun arrangement and constructional details of a delta gun colour picture tube and explain its working. **10**
- Q.6 a) Compare positive and negative amplitude modulation in TV systems. **10**
b) Enumerate the factors that influence the choice of picture IF = 38.9 MHz and sound IF = 33.4 MHz in the 625 B monochrome TV system. **10**
- Q.7 Write short notes on the following:
a) Television via satellite.
b) Remote control.
c) HD TV
d) LCD TV **5x4**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ADVANCES IN WIRELESS COMMUNICATION (EC-726)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) List the frequency band of GSM system and Bluetooth technology.
b) In flat fading what is the relationship between signal bandwidth B_s and coherence channel bandwidth B_c .
c) List various propagation mechanisms.
d) Differentiate between FDD and TDD.
e) Define co-channel re-use ratio and write its expression.
f) Deduce the relation between S, k and N.
g) Interpret path loss exponent.
h) If 40MHz of spectrum is allocated from the band of 800MHz to a cellular operator with a channel bandwidth of 60 KHz for full duplex communication calculate the total number of channels allotted.
i) Define 'EIRP'.
j) What do you understand by packet radio? **2×10**

PART-A

- Q.2 a) Describe the working procedure of
i) Paging system
ii) Cordless system **10**
b) With the help of input and output speech flow describe signal processing in GSM system. **10**
- Q.3 a) Describe multiple access techniques in detail. **10**
b) If a GSM uses a frame structure where each frame consists of 8 time slots and each slot contains 156.25 bits and data is transmitted at 270.833 kbps in the channel calculate:
i) Time duration of a bit
ii) Time duration of a slot and
iii) Time duration of a frame. **3**
c) Determine the maximum throughput that can be achieved using pure and slotted ALOHA packet radio protocols. Justify the calculation graphically. **7**
- Q.4 a) Draw the various upgrade paths from 2G to 3G technology and explain the evolution of 3G family. **10**
b) Write brief notes on:
i) GPRS
ii) EDGE **10**

PART-B

- Q.5 a) Assume the distance between the co-channel cells is 'D' and the radius of hexagonal cell is 'R'. Derive the expression for worst case signal to interference ratio (S/I). **10**
b) Consider a single high power transmitting antenna that can support 40 voice channels over an area of 140 km^2 with the available spectrum. If the area is divided into 7 cells, such that each cell supports 30% of the channels, calculate the
i) Coverage area of each cell.
ii) Total no. of channels in each cell. **5**
c) Compare various channel assignment strategies. **5**

- Q.6 a) Derive an expression for received signal level $P_r(d)$ for two ray propagation model; where 'd' is the distance of reperation between transmitter and the receiver. **15**
b) Describe various factors influencing small scale fading. **5**

Q.7 Write short notes on **(any two):**

- a) Simplified communication system using adaptive equalizer at the receiver.
b) Diversity techniques.
c) Types of small scale fading.
d) Okumura or Hata model.

10×2

End Semester Examination, May 2019

B. Tech. – Sixth Semester

COMPUTER APPLICATIONS IN POWER SYSTEMS (EE-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

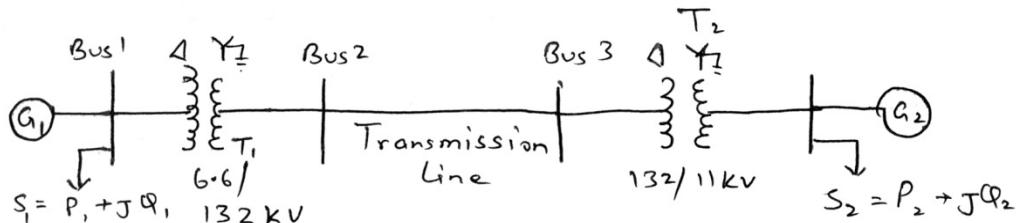
- What is meant by short circuit capacity of a bus?
- What is the effect of mutual coupling in Y_{BUS} formation?
- Differentiate between 'voltage controlled bus' and 'swing bus'.
- Define 'power quality'.
- What are advantages of interconnected system?
- Why is iterative method used for solving load flow problem?
- Define 'contingency'.
- What are drawbacks of Newton Raphson method?
- What is positive, negative and zero sequence?
- State advantages of AVR.

2x10

PART-A

Q.2 a) Briefly explain automatic generation control. **10**
 b) What are the functions of various blocks in a SCADA system? **10**

Q.3 a) Discuss the representation of:
 i) Synchronous machine.
 ii) Overhead transmission line. **10**
 b) The power system shown has the following specifications:



Generator G₁: 20 MVA, 6.6 kV, XG₁=0.10 pu

Generator G₂: 25 MVA; 11 kV, XG₂=0.20 pu

Transformer T₁: 25 MVA; 6.6/132 kV; X₁=0.08 pu

Transformer T₂: 30 MVA; 11/132 kV; X₂ = 0.10 pu

Transmission line : Line to line voltage = 132 kV

Impedance Z = (30+j120)Ω

Load=S₁=10 MVA at 0.8 pf lagging and

S₂=25 MVA at 0.9 pf leading

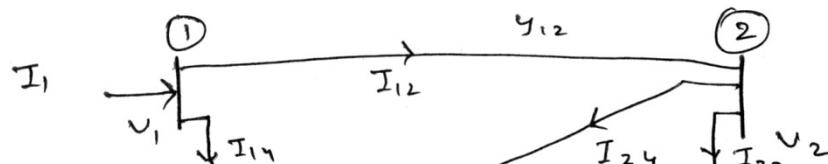
Assuming MVA_{base}=50 for the system, calculate the pu values of generators, transformer, transmission line and load. Draw single line diagram and show pu values of the system components. **10**

Q.4 a) For given power system, build Y_{BUS} matrix. Branch impedances of lines are as:

Line 1-2 : (10+j40)Ω Line 1-4 : (15+j50)Ω

Line 2-3 : (5+j25)Ω Line 2-4 : (15+j20)Ω

Line 3-4 : (10+j30)Ω



Assume an impedance of $(20+j40)$ is connected between node 4 and ground.

10

b) Write Z_{BUS} formulation algorithm using modifications.

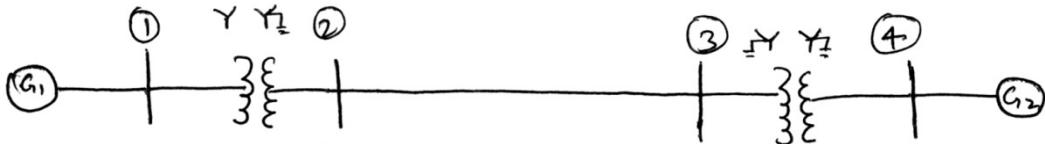
10

PART-B

Q.5 a) Derive an expression for $L-L$ fault.

10

b) An SLG fault occurs at node 3 of the power system.



Determine fault current, sequence voltage, line and phase voltages at the point of fault. Assume a fault resistance $Z_f=0.05$ pu.

Generator 1 : 40 MVA; 6.6 kV, $X_1=X_2=0.1$ pu, $X_0=0.2$ pu

Generator 2 : 60 MVA; 6.6 kV, $X_1=X_2=0.15$ pu; $X_0=0.2$ pu

Transformer 1 to 2 : 50 MVA, 6.6/132 kV, $X_1=X_2=X_0=0.10$ pu

Transmission line 2 to 3 : $(30+j90)\Omega$

Load : 50 MVA at 0.8 power factor lagging at 11 kV.

10

Q.6 a) Draw flow chart for Gauss Seidal method.

10

b) Derive an expression for load flow problem.

10

Q.7 a) Derive transmission loss formula for transmission line.

10

b) The operating characteristics of three plants with total capacity of 700 MW are given as:

$$F_1 = 0.8P_1^2 + 30P_1 + 100; \quad 50 \leq P_1 \leq 250$$

$$F_2 = 0.10P_2^2 + 32P_2 + 125; \quad 50 \leq P_2 \leq 250$$

$$F_3 = 0.12P_3^2 + 35P_3 + 150; \quad 50 \leq P_3 \leq 200$$

Determine economic dispatch if plants are scheduled for a load of 500 MW.

10

End Semester Examination, May 2019

B. Tech. — Seventh Semester

WIRELESS AND MOBILE COMMUNICATION (EC-704)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) List the difference between TDMA and FDMA.
- b) State the different techniques used for improving coverage and capacity in cellular systems.
- c) Explain “Frequency Reuse” in cellular systems.
- d) Write different types of small scale fading.
- e) Name the techniques, in which Near Far Problem occurs and discuss how it can be reduced?

4x5

PART-A

Q.2 Draw the block diagram of a cellular system and explain how a cellular telephone call is made between the landline and the mobile user and when the call is initiated by the landline customer. Draw suitable timing diagrams. **20**

Q.3 a) Discuss any two 2.5G and any two 3 G standards. **10**
b) Why is CDMA preferred over GSM? Discuss. **10**

Q.4 What do you understand by large scale fading? Explain the 2-ray ground reflection model for path loss prediction. **20**

PART-B

Q.5 Explain the significance of the following cellular concepts in detail:

- a) Interference.
- b) System capacity enhancement strategies.
- c) Handoff strategies.

20

Q.6 a) What is Quantization? Discuss various Quantization techniques. **10**
b) What do you mean by Vocoder? Discuss LPC in detail. **10**

Q.7 Discuss the following spread spectrum moderation techniques:

- a) Direct-sequence spread spectrum (DS-SS)
- b) Frequency hopped spread spectrum (FH-SS).

20

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ELECTRIC POWER APPLICATIONS AND TRACTION (EE-721)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Derive the relationship between Luminance, Luminance intensity and Illumination.
- b) Cite the specification for AC transformer used in metallic arc welding.
- c) How carbon arc welding differ from common shield metal arc welding?
- d) State Faraday's first Law of Electrolysis.
- e) Why DC series motor is ideally suited for traction purpose?
- f) What are the properties of refrigerants?
- g) What do you understand by pinch effect?
- h) Identity different causes of failure of heating element.
- i) Briefly describe the principle of high frequency eddy current heating.
- j) Explain stroboscopic effect.

2x10

PART-A

Q.2 a) Find the average illumination produced on the floor by 10, 100W lamps in a room of 5X2.5m. The MSCP of each lamp is 125. Assuming depreciation factor and utilization factor as 1.2 and 0.6 respectively. **10**
b) Give comparison between tungsten filament lamp and incandescent lamp. **10**

Q.3 a) A 15KW, 220V, 1-p resistance oven employs nickel-chrome wire for its heating. If the wire temperature is not to exceed 100°C and the temperature of the charge is 600°C . Calculate the diameter and the length of the wire. Assuming radiating efficiency as 0.6 and emissivity as 0.9 for nickel-chrome resistivity is $1.016 \times 10^{-6} \Omega\text{-m}$. **10**
b) Discuss the design of heating element for both circular wire and ribbon type of conductor. **10**

Q.4 a) Give comparison between electric are welding and resistance welding. **10**
b) Discuss how projection welding is done with the help of proper diagram. **10**

PART-B

Q.5 a) A copper refining plant use 500 electrolytic cell carries a current of 6000A, voltage per cell being 0.25V. If the plant were to work 40hrs/week. Calculate the energy consumption per ton. Assuming ECE of copper as 0.328mg of electricity. **10**
b) What is electroplating? Why it is done for? Also, describe the various operations involved in electroplating. **10**

Q.6 a) A sub urban electric train has a maximum speed of 70 Kmp. The schedule speed including station stop of 30sec in 45 Km/h. If the acceleration is 1 kmph. Find the value of retardation when the average distance between the stops is 4 Km. **10**
b) Derive an expression for a trapezoidal speed time curve of an electric train. **10**

Q.7 a) What do you mean by water cooler? Discuss its various types with proper diagram. **15**
b) Discuss the factors which lead to efficient air conditioning. **5**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ENERGY CONSERVATION AND MANAGEMENT (EE-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is efficient energy use?
- b) What is the need of energy management?
- c) State the practical example of Boyle's Law.
- d) What do you mean by feasible energy?
- e) List the advantages of HVAC.
- f) What is meant by climate protection?
- g) List the opportunities of energy management.
- h) List the method used for calculating rate of return.
- i) What is the use net present value?
- j) What is meant by cogeneration of energy?

2x10

PART-A

- Q.2** a) Discuss the value of energy management. **10**
b) Explain the concept of energy intensity. **10**
- Q.3** Explain in detail entire structure of energy management program. **20**
- Q.4** a) Describe the system for the centralized heating of a building. **10**
b) Differentiate between forced and natural ventilation. **10**

PART-B

- Q.5** a) What are various process used for improving lighting efficiency? **10**
b) Discuss the opportunities in management of electrical lighting system. **10**
- Q.6** a) How total life cycle cost can be determined? Also, enumerate its uses. **10**
b) Differentiate between:
i) Average rate of return method and internal rate of return method.
ii) Payback method and present value method. **10**
- Q.7** Write short notes on:
a) Use of computers in energy management.
b) Least cost power planning. **10x2**

End Semester Examination, May 2019

M. Tech. — First Semester

PWM CONVERTER AND APPLICATIONS (PE-EE-M-126)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- | | | |
|-----|---|-----------|
| Q.1 | With the help of example explain the difference between voltage source inverter and current source inverter. | 20 |
| Q.2 | Explain how is PWM implemented in inverter and AC to DC converter. | 20 |
| Q.3 | Explain with the help of an example space vector based PWM. | 20 |
| Q.4 | Input voltage range of a step-up converter is 12V to 36V for an output voltage of 48V for an maximum power of 120W. The converter operates at 25KHz in discontinuous conduction mode. Assuming, Ideal case and C as very large, Calculate maximum value of L that can be used. | 20 |
| Q.5 | Derive an expression for ripple voltage and ripple current in a continuous conduction mode of a buck-boost converter, in terms of the circuit parameters. | 20 |
| Q.6 | A 3- phase 11.2KW , 1750rpm , $460V$, 60Hz , 4-pole Y-connected induction motor has the parameters $R_s = 0.66\Omega$, $R_r = 0.38\Omega$, $X_s = 1.14\Omega$, $X_r = 1.71\Omega$ and $X_m = 33.2\Omega$. The motor is controlled by varying both the voltage and frequency. The V/f ratio is maintained constant. Then calculate maximum torque T_m and the corresponding speed ω_m for 60Hz and 30Hz . | 20 |
| Q.7 | Explain the cause of harmonics in the output of the inverter. What is the effect of these harmonics? Also, explain how can these harmonics be eliminated. | 20 |
| Q.8 | Explain the working principle of a multilevel converter with the help of circuit diagram and output work form. | 20 |

End Semester Examination, May 2019

B. Tech. — Fifth Semester

POWER ELECTRONICS I (EE-505)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Name the two methods to turn on thyristor.
- b) Draw the reverse recovery time of characteristic of Schottky diode.
- c) Draw the characteristic of MOSFET.
- d) Write two application of IGBT.
- e) Differentiate between GTO and BJT.
- f) Differentiate between latching and holding current of SCR.
- g) What is the function of freewheeling diode?
- h) Define forward break over and reverse break over voltage.
- i) Why advancement of power electronics is required?
- j) What is a snubber circuit?

2×10

PART-A

- Q.2 a) What are the different communication techniques? Explain one of them. **10**
- b) Draw the characteristic of a thyristor and give the name of a thyristor which can be on and off by gate pulse. **10**
- Q.3 a) Name different firing circuit. Explain one of them. **10**
- b) Differentiate between line communication and forced communication. **10**
- Q.4 a) What are the types of MOSFET? Explain the differences between them. **10**
- b) Name different voltage controlled power electronics devices. Explain their working principle. **10**

PART-B

- Q.5 a) Explain the working of pulse transformer. Also give its application. **10**
- b) With the help of circuit diagram, describe the working of a snubber circuit. **10**
- Q.6 a) Explain the working principle of phase controlled converter and give its application. **10**
- b) Explain the working principle of a dual converter and give its application. **10**
- Q.7 Write short notes on the following:
a) Heat sink selection.
b) Effect of source and load inductance.
c) Necessity of isolation.
d) Optocoupler. **5×4**

End Semester Examination, May 2019

B. Tech – Seventh Semester

POWER SYSTEM MANAGEMENT (EE-727)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the total installed capacity of electricity sector in India?
- b) Who regulates and administers Indian Power Sector?
- c) What is the purpose of providing controls in a power station?
- d) State generator fuel cost curve.
- e) How forecasting helps in acquiring resources?
- f) What are the limitations of peak demand forecasting?
- g) Point out the difficulties faced in forecasting the future needs for electricity.
- h) State time series forecasting.
- i) What is generation planning?
- j) What is pattern based trend forecasting?

2x10

PART-A

- Q.2**
- a) What is the scope of various non-conventional energy sources in power sector in India? **10**
 - b) Briefly explain the current scenario of state and central government owned power companies. What is their source of funding? **10**
- Q.3**
- a) What are the various costs involved in steam stations? **10**
 - b) Briefly explain the layout of a hydroelectric power plant. **10**
- Q.4**
- a) Explain Box-Jenks forecasting in detail. **10**
 - b) How can forecasting methods be categorized? **10**

PART-B

- Q.5**
- a) What is short term load forecasting? Explain any one method of short term load forecasting. **10**
 - b) Differentiate between the various long term forecasting techniques. **10**
- Q.6**
- a) What are the steps involved in multivariate procedures? **6**
 - b) Explain the use of Artificial Neural network in load forecasting. **8**
 - c) Briefly explain pattern based forecasting. **6**
- Q.7**
- a) Write a short note on 'distribution system planning'. **10**
 - b) List various forecasting load and energy requirements. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

SOLAR ENERGY ENGINEERING (EE-725)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is meant by scattered radiation?
- b) What is meant by spectrum?
- c) Define Reynolds number and it's usefulness.
- d) Give applications of flat plate collectors.
- e) Define altitude angle.
- f) Define thermal inertia.
- g) State why solar constant is not a constant?
- h) What is meant by diffused radiation?
- i) What is meant by photovoltaic?
- j) Why is the storage of solar energy essential?

2x10

PART-A

Q.2 a) Calculate Zenith angle, solar azimuth angle for a place with latitude of 43° at 9:00 AM solar time on February 11. **10**
b) Explain difference between terrestrial and extraterrestrial spectrum. **10**

Q.3 a) Name the instrumental used to measure direct radiation. Explain it's construction and working. **15**
b) Explain in detail solar constant. **5**

Q.4 a) Explain the effect of changing heat transfer fluid. **10**
b) Define and explain convection. **5**
c) Differentiate between direct and scattered radiation. **5**

PART-B

Q.5 a) Differentiate between liquid heating and air heating flat plate collector. **10**
b) Describe Latent heat storage in detail. **10**

Q.6 a) Explain in detail the process of sensible heat storage in water. **10**
b) Describe the principle of separation of solar ponds. **5**
c) State the applications of solar ponds. **5**

Q.7 Write short notes on:

- a) Pool heating with solar energy.
- b) Solar Cells.
- c) Solar water pumping.

10x2

End Semester Examination, May 2019

B. Tech. — Fifth Semester

POWER ELECTRONICS (EE-502A / EE-502B /EE-502C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define "Latching current".
- b) What is power electronics? List its applications.
- c) What are circulating current?
- d) Explain dv/dt rating.
- e) List the application of AC voltage controller.
- f) What is snubbers circuit?
- g) What is pulse width modulation?
- h) What is the duty rate of step up chopper?
- i) Draw the block diagram of UPS.
- j) What is derating factor?

2×10

PART-A

- Q.2 a) Explain the construction details and working of MOSFET. Also enumerate its application. **10**
- b) What are the various types of power diodes? **10**
- Q.3 a) Discuss the layout of firing circuit. Explain R and RC firing scheme in detail. **10**
- b) List the various types of commutation techniques. Discuss any one forces commutation technique with appropriate waveforms. **10**
- Q.4 a) Explain the principle of working of single phase full wave converter with R-L-E load. Draw the appropriate waveform of load voltage and load current. **10**
- b) Consider a single phase half wave converter with R load. For a firing angle delay of $\alpha = P/2$. Calculate the rectification efficiency, form factor, ripple factor and transformer utilization factor (TUF). **10**

PART-B

- Q.5 a) Discuss the principle of working of three phase bridge inverter with appropriate circuit diagram. Draw phase voltage waveform on the assumption that each SCR conducts for 180° and load is star connected. **15**
- b) Compare VSI and CSI. **5**
- Q.6 a) Describe the working of Type E chopper with relevant circuit diagram. **10**
- b) Explain the buck converter with relevant circuit and waveform. **10**
- Q.7 a) Discuss the operation of cycloconverter with appropriate waveforms of load voltage and load current. **10**
- b) Explain the working of single phase voltage controller with R-L load with suitable waveform. **10**

End Semester Examination, May 2019

B. Tech. — First / Second Semester

ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING (EE-102A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) State Kirchoff's current law with its significance.
- b) Superposition theorem is applicable only to _____ circuits.
- c) List two difference between star and delta system.
- d) State the condition of resonance in Series RLC circuit.
- e) Draw the impedance triangle of RL circuit.
- f) Write EMF equation of transformer.
- g) Can 3-Φ induction motor run at synchronous speed?
- h) What are the filter circuits?
- i) Differentiate between unipolar and bipolar transistors.
- j) Why NAND and NOR gates are called as universal logic gates?

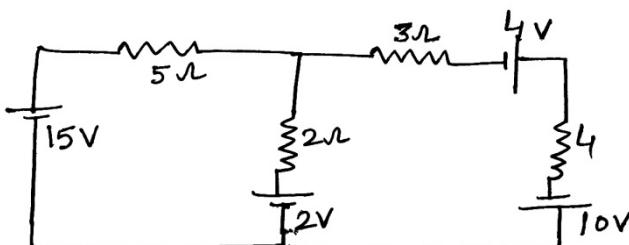
2x10

PART-A

Q.2 a) State and explain superposition theorem.

10

b) Find the current in the 2Ω resistor for the network.



10

Q.3 a) A coil of resistance 10Ω and an inductance of 0.16H are connected in series across $230\text{V}, 50\text{Hz}$ supply. Find the current flowing in the circuit and calculate its power factor.

10

b) Derive the relation between line current and phase current in delta connected system.

10

Q.4 a) Differentiate core and shell types transformer.

10

b) Explain construction and working principle of induction motor.

10

PART-B

Q.5 a) What are clamping circuits? Explain its working with its classification.

10

b) Write short notes on the following:

- i) Varactor diode.
- ii) Schottky diode.

10

Q.6 a) Draw and explain the input and output characteristics of common base configuration.

10

b) What is an Oscillator? Explain transistor as an Oscillator.

10

Q.7 a) Convert:

- i) Decimal Number 371 into hexadecimal number.

- ii) Convert the hexadecimal number 4A9 into its decimal equivalent.

5x2

b) Explain BCD to seven segments with block diagram.

10

End Semester Examination, May 2019

B. Tech. – Seventh Semester

DATA COMMUNICATION (EC-802)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Briefly explain the twisted pair cable and its application. **10**
b) List the steps followed in checksum checker. **1**
c) Line encode the bit stream "10010" using Manchester encoding. **1**
d) Suppose the bandwidth of a channel is 10 MHz. If the signal to noise ratio is 15dB, find the maximum channel capacity. **1**
e) Draw the frame format of SDLC. **1**
f) Generate the hanening code for '1001' data signal. **1**
g) How many voice band carriers are required for group formation? **1**
h) Describe the relationship between bit rate and baud rate. **1**
i) List the examples of serial interfaces. **1**
j) Expand the following terms:
i) SDH **1**
ii) SONET **1**

2×10

PART-A

- Q.2 a) Elaborate the need of standard organization in data communication. What is the role of ISO organization in data communication? **12**
b) Classify different types of guided transmission media. **8**
- Q.3 a) Explain different methods of error detection. Determine the error for the given data signal 1101001 using hamming code. **12**
b) State line coding. Draw and compare the unipolar, RZ and differential Manchester encoding for 11001 data signal. **8**
- Q.4 a) Compare and contrast serial interface and parallel interface. **10**
b) Write notes on:
i) RS-232 **5**
ii) X.21 **5**

PART-B

- Q.5 a) Determine the bit pattern for the control field of an information frame sent from a secondary station to the primary for the following:
i) Secondary is sending information frame 5. **1**
ii) Secondary is not sending its final frame. **1**
iii) Secondary is confirming correct reception of frames 4 and 5 from the primary (nr-6). **1**
b) Compare and differentiate the frames of HDLC in control field. **8**
- Q.6 a) Construct the structure of AT&T FDM hierarchy. **12**
b) Construct PCM based TDM system used in T-1 carrier system. **8**
- Q.7 a) Compare Narrow-band ISDN and broadband ISDN. **10**
b) How is ISDN network is different from PSTN network? **5**
c) How many channels are present in ISDN network? **5**

End Semester Examination, May 2019

B. Tech. – Third Semester

SIGNALS AND SYSTEMS (EC-303A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **3**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

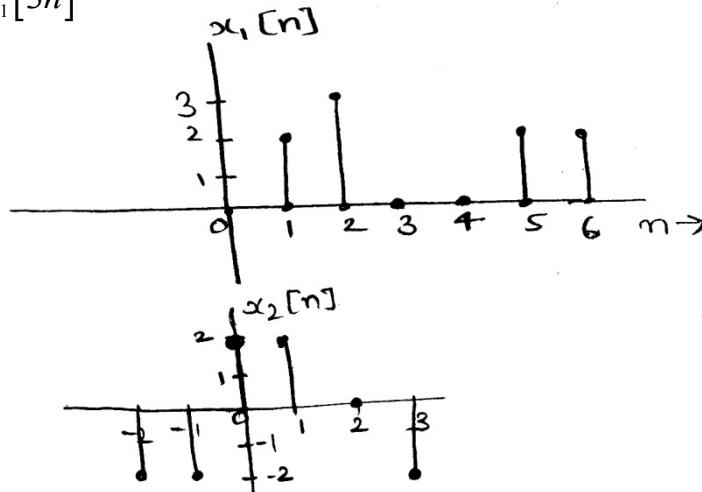
- Q.1 a) Show that a composite signal is periodic if the ratio of the fundamental periods of its constituent signal is a rational number.
 b) How would you distinguish between energy and power signals?
 c) What approach would you use to check the linearity of the given system?
 d) How would you define causal and non-causal systems?
 e) Discuss the relation between Laplace transform and Fourier transform.
 f) Illustrate the necessary condition for the convergence of Laplace transform.
 g) Explain how aperiodic signal can be represented by Fourier transform?
 h) Calculate the Fourier transform of unit step signal.
 i) List the necessary and sufficient conditions for the existence of Fourier series.
 j) Determine the DTFT of given sequence $x[n]$

$$x[n] = \alpha^n u[n], \alpha < 0$$

2×10

PART-A

- Q.2 a) Using the discrete time signals $x_1[n]$ and $x_2[n]$ as shown in figure, represent each of the following signals by a graph and by a sequence of numbers.
 i) $y_1[n] = x_1[n] + x_2[n]$
 ii) $y_2[n] = 2x_2[n]$
 iii) $y_3[n] = x_1[n]x_2[n]$
 iv) $y_4[n] = x_1[3n]$



10

- b) Determine whether the following signals are energy signals, power signals or neither.
 i) $x(t) = A \cos(\omega_0 t + \theta)$
 ii) $x(t) = e^{-at} u(t) \quad a > 0$
 iii) $x[n] = u[n]$
 iv) $x[n] = 2e^{j3n}$

10

- Q.3 a) Test the linearity, causality and invariance of the following systems.
 i) $y(t) = at^2 x(t) + btx(t-4)$

ii) $y(n) = x(n)x(n-2)$

10

- b) A system having impulse response $h[n] = \{ -2, 2, 3, 3 \}$ is initiated with an input $x[n] = \{ 2, 3, -3, 2 \}$. Calculate its output $y[n]$.

10

- Q.4 a) Consider an LTI system whose response to the input $x(t) = [2e^{-t} - e^{-3t}]u(t)$ is $y(t) = [3e^{-2t} - 3e^{-4t}]u(t)$. Compute the impulse response of the system, using Laplace transform.
- b) State and prove the time shifting and frequency shifting properties of Laplace transform.

10

PART-B

- Q.5 a) Verify Parsevel's identity for the Fourier series is

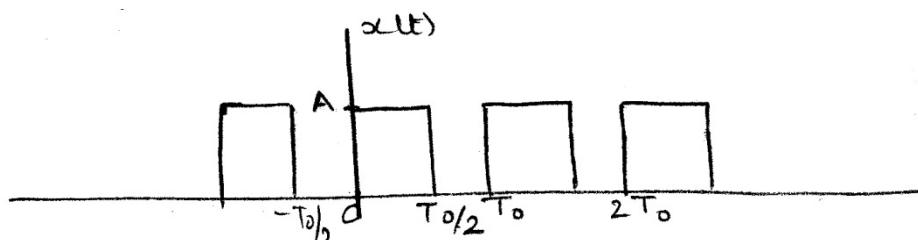
$$\frac{1}{T_0} \int_{T_0} |x(t)|^2 dt = \sum_{k=-\infty}^{\infty} |C_k|^2$$

10

- b) Consider the periodic square wave $x(t)$ as shown in figure.

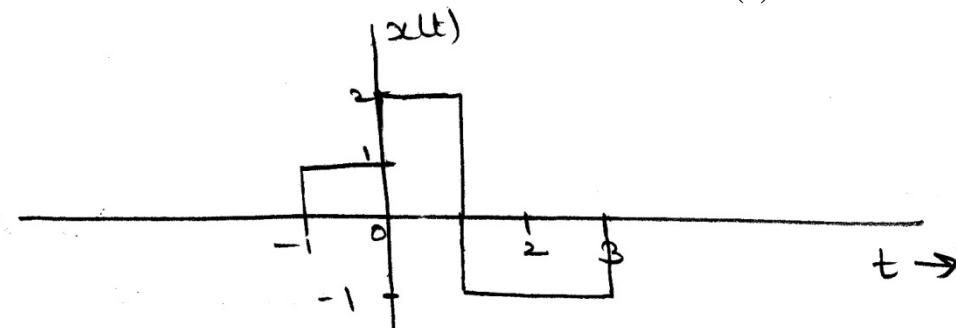
i) Deduce the complex exponential Fourier series of $x(t)$.

ii) Deduce the trigonometric Fourier series of $x(t)$.



10

- Q.6 a) Compute the Fourier transform for the following signal $x(t)$, shown in figure.



10

- b) Calculate the Fourier transform of the following signals:

i) $x(t) = 1$

ii) $x(t) = e^{j\omega_0 t}$

iii) $x(t) = e^{-j\omega_0 t}$

iv) $x(t) = \cos \omega_0 t$

v) $x(t) = \sin \omega_0 t$

10

- Q.7 a) Using properties of DTFT, compute the DTFT of the following signals:

i) $x(n) = \left(\frac{1}{3}\right)^{n-3} u(n-3)$

ii) $x(n) = \delta(n-2) - \delta(n+2)$

iii) $x(n) = e^{3n}u(n)$

iv) $x(n) = u(n+1) - u(n+2)$

10

b) Consider a discrete-time LTI system with impulse response $h(n) = \left(\frac{1}{3}\right)^n u(n)$. Use DTFT to determine the response of the system when input is $x(n) = \left(\frac{1}{2}\right)^n u(n)$.

10

End Semester Examination, May 2019

B. Tech. – Third Semester

ELECTRICAL MACHINES-I (EE-302B / EE-302C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What is back emf?
b) Why is belt drive not suitable for DC series motor?
c) Transformer is rated in kVA. Why?
d) Air gap between the pole pieces and armature is kept very small. Give reason.
e) List the factors involved in voltage build up of a shunt generator.
f) What do you mean by co-energy?
g) Draw the general block diagram of electromechanical energy conversion device.
h) The emf per turn for a single phase 2200 220V, 50 Hz transformer is 11kV. Calculate the number of 1° and 2° turns.
i) Define regulation of a transformer.
j) What happens if DC supply is given to the transformer? **2×10**

PART-A

- Q.2 a) Develop an equation for induced emf in a transformer winding in terms of flux and frequency. **8**
b) A 500 KVA transformer has 95% efficiency at full load and also at 60% of full load both at unity power factor.
i) Separate out the transformer loss.
ii) Determine the transformer efficiency 75% full load, upf. **12**
- Q.3 a) What are open delta connections? Give its merits and demerits. **10**
b) Explain the construction and working of Auto transformers. Prove that there is Cu saving in case of auto transformer as compared to 2 winding transformer of same rating. **10**
- Q.4 From the principle of co-energy, deduce the expression for torque and force in singly excited system. **20**

PART-B

- Q.5 a) Draw the developed winding diagram of progressive lap winding for 4 poles, 24 conductor single layer showing the position of poles, direction of motion, direction of induced emf and position of brushes. **10**
b) Draw the performance characteristics of different types of Dc generators and explain them. **10**
- Q.6 a) Explain Ward Leonard method of speed control in detail. **10**
b) What is importance of back emf? Derive expression for torque developed in DC motors. **10**
- Q.7 a) Write short notes on **(any two):**
i) Hopkinson's test.
ii) Brake test.
iii) Retardation test. **5×2**
b) Explain regenerative braking in detail list its merits and demerits. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADVANCES IN MOBILE COMPUTING (EC-841)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Define the terms:
i) CoA (Care of Address)
ii) Mobile Node (MN)
- b) State the process of agent discovery in mobile IP.
c) What do you mean by MANET? What is the need of Adhoc networks?
d) Classify the various IP micro mobility approaches techniques.
e) Differentiate between proactive and reactive protocol.
f) List the various properties of mobile transaction process.
g) What do you understand by M-Commerce and E-Commerce?
h) Discuss the role of DUB for high speed internet access.
i) List the various classes of transaction services offered by wireless transaction layer and compare the role of each class.
j) Define mobile computing. **2×10**

PART-A

- Q.2 a) Draw and explain the architecture of mobile computing with design considerations. **12**
b) Discuss the various challenges and applications of mobile computing. **8**
- Q.3 a) Describe briefly the system architecture and user scenarios of IEEE-802.15 standard-Bluetooth. **10**
b) Illustrate the process of IP packet delivery and registration process in detail. **10**
- Q.4 a) Draw and explain the concept of WSP/B session establishment and termination. **8**
b) Discuss the architecture of WAP I.X and state the different types of scenario for integration of WAP components. **12**

PART-B

- Q.5 a) What do you understand by DAB? Describe in detail the various transport mechanisms and DAB frame structure. **10**
b) Examine the role of venus in CODA file and explain the three states of client in CODA in detail. **10**
- Q.6 a) Demonstrate the concept of dynamic source routing protocol in detail. **10**
b) Give an overview of adhoc routing protocol in detail. **10**
- Q.7 a) Describe briefly kangaroo and Joey transaction model. **12**
b) Define transaction and elaborate the concept of team transaction model. **8**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

POWER SYSTEM PROTECTION (EE-521)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 Answer the following questions:
- Classify the faults which occur in a power system.
 - Explain primary and backup protection.
 - Draw the equivalent sequence impedance network from which L-L fault current can be calculated.
 - Why resistance switching is done across circuit breaker?
 - Define 'TSM' and 'PSM'.
 - What are the advantages of oil circuit breaker?
 - What is switching surges?
 - Write the boundary conditions for SL-G fault.
 - What are the merits of using per unit computations?
 - On what factors does arc resistance of circuit breaker depend upon? **2x10**

PART-A

- Q.2 a) Explain in detail how transients occur on synchronous machines and transmission lines. **10**
- b) A three phase impedance local take currents $I_a = 5[60^\circ] A$, $I_b = 5[-60^\circ] A$ and $I_c = 0A$. Determine the symmetrical sequence currents. **10**
- Q.3 a) Derive the expression to find the fault current fed due to line to line fault and also draw the sequence impedance network for the same. **10**
- b) The positive, negative and zero sequence impedance or reactances of a 20 MVA, 132 kV alternator are 0.3 pu, 0.2 pu and 1.0 pu respectively. A line to earth fault develops on phase 'a' of a unloaded generator. Assuming the neutral of the alternator to be solidly grounded, determine the fault current and fault voltages in p.u. **10**

- Q.4 Write short notes on the following:

- Vaccum circuit breaker. **8**
- SF6 circuit breaker. **8**
- Current chopping phenomenon. **4**

PART-B

- Q.5 a) What are the fundamental requirements of protective relaying? Also derive the equation for the torque developed by induction disc type relay. **10**
- b) Explain the types of electromagnetic relays. **10**
- Q.6 a) Write a short note Buchholz's protection for transformers. **10**
- b) Explain with diagram the application of the Mertz Price circulating current system for protection of alternators. What precautions must be taken in installing this system? **10**
- Q.7 a) What are the main causes of voltage surges on overhead transmission lines? Explain how the wave form of a surges is specified **15**
- b) Why are lighting arresters and surge absorbers used together in important substations? **5**

End Semester Examination, May 2019

M. Tech. — First Semester

ADVANCE COMMUNICATION NETWORKS (PC-EC-M-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Marks are indicated against each question.

- Q.1 a) Discuss in detail the concept of token bucket algorithm and how it is different from leaky bucket algorithm? **10**
- b) Determine the network id and host id in the given IP addresses:
i) 195.162.12.18
ii) 122.16.43.58 **5**
- c) Calculate the bandwidth delay product for the following networks:
i) Ethernet (10Mbps)
ii) T3 (54 Mbps)
Assume a round trip time of 200ms. **5**
- Q.2 a) How the inefficiency of Stop and Wait protocol is overcome in sliding window protocol? **5**
- b) For a K-bit numbering scheme, what is the range of sequence numbers used in sliding window protocol? **4**
- c) Design a selective reject ARQ mechanism for flow control. **11**
- Q.3 a) Design a network-network interface cell format for ATM. How is it different from user-network interface? **12**
- b) Differentiate between latency and throughput. **3**
- c) Discuss in detail various challenges in internet. **5**
- Q.4 a) Expand the following term RED, WRED. **3**
- b) Outline the advantages of software based packet classification methods. **8**
- c) How exterior routing is different from interior routing? **9**
- Q.5 a) Discuss various IP addresses lookup challenges in internet. **7**
- b) Design a divide and conquer packet classification algorithm. **7**
- c) List various examples of two dimensional packet classification algorithms. **6**
- Q.6 a) Develop the algorithm for admission control. **12**
- b) Differentiate between diffserv and intserv. Illustrate the framework of diffserv. **8**
- Q.7 a) Differentiate between routing and switching. **6**
- b) Why MPLS is called layer 2.5 technology? Design the architecture of MPLS. **14**
- Q.8 a) Describe in detail the protocols used in TCP/IP reference model. **12**
- b) How IP switching is different from MPLS switching? **8**

End Semester Examination, May 2019
B. Tech. — Third Semester
DIGITAL ELECTRONICS (EC-302A)

Time: 3 hrs. Max Marks: **100**

Max Marks: **100**
No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 Answer the following questions:

 - Why NAND and NOR gates are called as universal logic gates? Draw EXOR gate by using only four NAND gates.
 - What are error detection and correction codes? Explain with example.
 - Differentiate between decoder and demultiplexer.
 - How fixed logic devices are different from programmable logic devices? Differentiate between ROM, PLA and PAL.
 - Justify necessity of Flip-Flop over Latch.
 - Describe advantages and disadvantages of synchronous and asynchronous counters.
 - What are shift register counters? Explain with example.
 - Identify the difference between bipolar and unipolar logic family with example.
 - Explain noise margin in a logic family with its significance.
 - Define the term resolution of a digital to analog convertor with example.

PART-A

- Q.2 a) A hamming code 1000010 is received at receiver end. Identify whether it is correct/incorrect. If incorrect, find the correct hamming code. (Assume even parity has been used). 6

b) Represent decimal number $(94)_{10}$ in binary form using:
 i) Binary code ii) BCD code
 iii) Gray code iv) Excess-3 code 2×4

c) Perform BCD addition on given decimal numbers:
 i) $(67)_{10} + (53)_{10}$ ii) $(16)_{10} + (15)_{10}$ 3×2

Q.3 a) Minimize the following function using k-Map and QM methods:
 $f(A,B,C,D) = \sum m(0,1,5,9,13,14,15) + d(3,4,7,10,11)$. 14

b) Implement the following function using 8:1 multiplexer:
 $f(A,B,C,D) = \sum m(0,1,3,4,8,9,15)$. 6

PART-B

- Q.5 a) Draw and explain the working of 3bit ripple counter with the help of truth table and timing diagram and justify why it is called:
i) Asynchronous counter.
ii) Modulus 8 counters.
iii) Divide by 8 counters. 14
b) Design synchronous modulus 7 counter using J-K flip-flop with all necessary steps. 6

Q.6 a) Justify the requirement of analog to digital and digital to analog converters and explain the working of R-2R ladder type D/A converter with the help of circuit diagram. 12
b) Highlight advantages of flash type analog to digital converter over other ADCs. Draw and explain 2-bit flash type ADC with its working. 8

Q.7 a) Specify the following characteristics of digital IC:

- | | | |
|---|---------------------------|-----|
| i) FAN IN | ii) FAN OUT | |
| iii) Propogation delay | iv) Operating temperature | 2×5 |
| v) Power dissipation | | |
| b) Design TTL configuration with following specification: | | |
| i) Totem pole output | ii) Tristate output | 5×2 |

End Semester Examination, May 2019

B. Tech. – Fifth Semester

DIGITAL SIGNAL PROCESSING (EC-502A / EC-502B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) A discrete time signal $x(n)$ is given as:

$$x(n) = \{0.5, 0.5, 1, 1, 1, 1, 2\}. \text{ Sketch the following:}$$

i) $x(n+3)$

ii) $x(n)u(n-3)$

- b) Differentiate between truncation and rounding off operations in digital filters.

- c) Compute N-point DFT of $x(n) = a^n$ for $0 \leq n \leq N-1$.

- d) Determine z-transform and ROC of $x(n) = \delta(n-2) + \delta(n)$.

- e) State and prove time shifting property of z-transform.

- f) Enumerate differences between decimation in time and decimation in frequency FFT algorithms.

- g) What do you understand by gibbs oscillations? How these can be removed?

- h) Illustrate the effect of frequency warping.

- i) Draw ideal mapping between s-plane and z-plane for designing of IIR filters. Explain its significance.

- j) Discuss the need and various applications of multirate digital signal processing. **2×10**

PART-A

- Q.2 a) Enlist various application areas of digital signal processing. Explain the role of DSP in image processing. **10**
- b) Design Harvard and Von-Neumann architectures of DSP processor. Illustrate the concept of pipelining. **10**

- Q.3 a) A DSP system is described by the second order difference equation:

$$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$$

Determine its unit impulse response. **10**

- b) Compute z-transform and ROC of the signal

$$x(n) = [5(5)^n - 6(2)^n]u(n)$$

- Q.4 a) Design 8-point decimation in time FFT algorithm to obtain the DFT of $x(n) = \{1, 2, 1, 3, 0, 0, 0, 0\}$. **10**

- b) Determine the circular convolution of two finite duration sequences

$$x(n) = \delta(n) + \delta(n-1) - \delta(n-2) - \delta(n-3)$$

and $h(n) = \delta(n) - \delta(n-2) + \delta(n-4)$. **10**

PART-B

- Q.5 a) Design and realize a digital filter using bilinear transformation whose analog system function is:

$$H(s) = \frac{S + 0.1}{(S + 0.1)^2 + 9}$$

The digital filter should have a resonant frequency of $\omega_r = \frac{\pi}{4}$. 10

- b) Derive impulse invariant transformation mapping of stable analog to stable digital IIR filter. Analyze the results for stability and prove that it supports many to one mapping. 10

- Q.6 a) Consider a low pass filter with the following desired frequency response:

$$H_d(e^{jw}) = \begin{cases} e^{-j2w} & ; -\frac{\pi}{4} \leq w \leq \frac{\pi}{4} \\ 0 & ; \frac{\pi}{4} < w \leq \pi \end{cases}$$

Design a FIR filter by determining its frequency response $H(e^{jw})$ for $M = 5$ using rectangular window function. 10

- b) Illustrate the steps to design a FIR filter using Fourier series method. 10

- Q.7 a) Consider the system function:

$$H(z) = \frac{2(z+2)}{z(z-0.1)(z+0.5)(z+0.4)}$$

Realize the structure of IIR filter using parallel realization. 10

- b) Obtain the cascade realization of FIR filter whose transfer function is given as:

$$H(z) = \frac{(1+z^{-1})(1+2z^{-1})}{1+6z^{-1}+8z^{-2}} \quad \text{10}$$

End Semester Examination, May 2019

B. Tech. – Third Semester

POWER SYSTEM-I (EE-304A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What is the function of a hydraulic turbine? How are the turbines classified?
- b) Enumerate the components of a nuclear reactor.
- c) What are the considerations on which the location of power plant depends?
- d) What points should be considered while choosing the type of generation?
- e) How is string efficiency improved?
- f) How are the transmission line insulators classified?
- g) How transposition of conductors helps in equalizing the capacitances in an unsymmetrically spaced 3 phase overhead transmission line?
- h) How does A.C distribution differ from D.C. distribution?
- i) What are the requirements of distribution system?
- j) What are the functions of grounding in power system?

2×10

PART-A

Q.2 a) Describe with the help of neat sketch the construction and working of hydro power plant. **12**
b) Compare the advantages of hydro power plant over steam power plant. **8**

Q.3 a) A 60 MW power station has an annual peak load of 50 MW. The power station supplies loads having maximum demands of 20 MW, 17 MW, 10 MW and 9 MW. The annual load factor is 0.45. Find:
i) Average load
ii) Energy supplied per year
iii) Diversity factor
iv) Demand factor. **10**
b) Explain briefly the straight meter rate and heat rate related to depreciation method. **10**

Q.4 a) Discuss briefly the factors which affect the sag. Also derive an expression for sag at equal levels of supports. **10**
b) Explain why suspension type insulators are preferred for high voltage overhead lines. Sketch a sectional view of one unit of the suspension type insulator and describe its construction. **10**

PART-B

Q.5 a) Derive an expression for the loop inductance of single-phase, two wire system. **10**
b) Discuss briefly the four parameters on which the performance of transmission line as an element of power system depends. **10**

Q.6 Write short notes on the following:

- a) Ring main distributor.
- b) Single-phase 2-wire A.C distribution system.
- c) Current distribution in 3-wire D.C system.

20

Q.7 Discuss and compare various methods of neutral grounding. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADVANCES IN MOBILE COMPUTING (EC-841)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Define the terms:

 - i) CoA (Care of Address)
 - ii) Mobile Node (MN)

b) State the process of agent discovery in mobile IP.

c) What do you mean by MANET? What is the need of Adhoc networks?

d) Classify the various IP micro mobility approaches or techniques.

e) Differentiate between proactive and reactive protocol.

f) List the various properties of mobile transaction process.

g) What do you understand by M-Commerce and E-Commerce.

h) Discuss the role of DUB for high speed internet access.

i) List the various classes of transaction services offered by wireless transaction layer and compare the role of each class.

j) Define mobile computing.

PART-A

- Q.2 a) Draw and explain the architecture of mobile computing with design considerations. **12**
b) Discuss the various challenges and applications of mobile computing. **8**

Q.3 a) Describe briefly the system architecture and user scenario of IEEE-802.15 standard-Bluetooth. **10**
b) Illustrate the process of IP packet delivery and registration process in detail. **10**

Q.4 a) Draw and explain the concept of WSP/B session establishment and termination. **8**
b) Discuss the architecture of WAP (1.x) and state the different types of scenario for integration of WAP components. **12**

PART-B

- Q.5 a) What do you understand by DAB? Describe in detail the various transport mechanisms and DAB frame structure. **10**
b) Examine the role of venus in CODA file and explain the three states of client in CODA in detail. **10**

Q.6 a) Demonstrate the concept of dynamic source routing protocol in detail. **10**
b) Give an overview of adhoc routing protocol in detail. **10**

Q.7 a) Describe briefly kangaroo and Joey transaction model. **12**
b) Define transaction and elaborate the concept of team transaction model. **8**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PRINCIPLES OF RADAR SYSTEMS (EC-624)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Discuss the principle of operation of RADAR.
 - b) Define 'maximum unambiguous range'.
 - c) If p.r.f of a radar is reduced then what will be its effect on maximum unambiguous range.
 - d) Calculate the range of a target if the time taken by radar signal to travel to the target and back is 80 (μ s).
 - e) A target is moving away from RADAR, describe its effect on frequency of echo signal.
 - f) An aircraft is circling around a RADAR at constant distance, will it be detected by an MTI RADAR? Justify.
 - g) Discuss the advantage of using staggered frequency in MTI RADAR.
 - h) Which type of tracking RADAR gives better accuracy and why?
 - i) Mention one use of duplexer in RADAR system.
 - j) A scope displays the range of the target and relative strength of echo (**True/False**). Justify your answer.

2x10

PART-A

Q.2 a) Draw and explain the block diagram of a conventional RADAR with a superhetrodyne receiver. **10**

10

b) Describe in brief the frequencies of operation of a RADAR. Also discuss the major applications of RADAR in detail. **10**

10

Q.3 a) Two aircrafts are flying at same radial range of 40 km and at same elevation angle. The aircrafts are separated in azimuth by a distance of 1km. Determine what will be the maximum permissible half power beam width of the RADAR, if these aircrafts are to be resolved in azimuth. **10**

10

b) Explain various system losses in detail. **10**

Q.4 a) State Doppler frequency effect in a RADAR. Is it present, if a target is moving in a circular path around a RADAR station at a constant radial distance? **10**

10

b) With the help of block diagram, describe the operation of a FMCW RADAR. Also list applications of FMCW RADAR. **10**

10

PART-B

Q.5 a) Calculate the first three blind speeds for an MTI RADAR operating at 3GHz and p.r.f 1500 Hz. **10**

10

b) Derive an expression for blind speed for an MTI RADAR. List two remedial measures to overcome blind speed problem. **10**

10

Q.6 a) What is the principle of operation of a conical scan tracking RADAR? Briefly discuss its operation with the help of block diagram. **10**

10

b) Describe the operation of sequential lobbing in Tracking RADAR. **10**

10

Q.7 Write short notes on:

End Semester Examination, May 2019

B. Tech. – Fifth / Sixth Semester

CONTROL SYSTEM ENGINEERING (EE-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

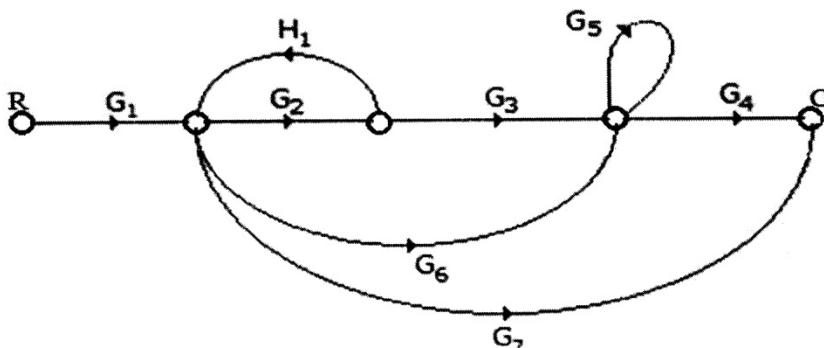
Q.1 Answer the following questions:

- Compare open loop and closed loop system.
- What do you mean by type 2 systems?
- What is gain cross over frequency?
- Define peak time of a second order system.
- Define bounded input bounded output stability.
- What is characteristic equation?
- Draw an electrical network for lag compensation.
- What is a non-touching loop in signal flow graph?
- Draw the polar plot of transfer function $K / s(1+sT_1)(1+sT_2)$
- What do you mean by a PID controller?

2x10

PART-A

Q.2 a) Obtain the overall transfer function $\frac{C(s)}{R(s)}$ of the signal flow graph shown below in the figure using Mason's gain formula.



10

- b) Find the transfer function of an armature controlled dc motor.

10

Q.3 a) Drive an expression for $c(t)$ of a second order system subjected to unit step input.

10

- b) Determine the position, velocity and acceleration error constants of a unity feedback control system with forward path gain given as $G(s) = \frac{k(s+a)}{s(s+b)(s+c)}$ Also, find the steady state error due to an input $r(t) = a_0 + a_1t + \frac{a_2}{2}t^2$.

10

Q.4 a) Using Routh Hurwitz criterion, determine the stability of closed loop control system whose characteristic equation is $S^6 + 5S^5 + 11S^4 + 25S^3 + 36S^2 + 30S + 36 = 0$.

10

- b) Draw the root locus of a system with $G(s)H(s) = \frac{K}{(s+1)(s-2)(s+3)}$ When K is varied from 0 to ∞ .

10

PART-B

- Q.5 a) A unity feedback control system has $G(s) = \frac{10}{(s+5)(s+2)}$. Draw the Bode plot. **10**
- b) Using Nyquist stability criterion, find the stability of closed loop system with

$$G(s)H(s) = \frac{10}{s(s+1)}$$
.
- Q.6 Write short notes on (**any two**) of the following:
 a) Stepper motor and its applications.
 b) AC servomotor.
 c) Synchros. **10x2**
- Q.7 a) Discuss lead compensator using an electrical network. Derive its transfer function.
 Also draw its Bode plot. **10**
- b) Obtain the state space representation for a system characterized by the differential equation $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^2} + 8\frac{dy}{dt} + 17y = 20u(t)$ where y is the output and u is the input to the system. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

MICROPROCESSOR AND INTERFACING (EC-401B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) How many address lines are required to point 2K byte memory?
b) Differentiate between overflow, carry and auxiliary carry flag for 8086 microprocessor.
c) What are assembler directives? Explain DD and END directive.
d) Differentiate between maskable and non-maskable interrupt.
e) Explain how the data is transferred from the even addressed bank (low addressed) and odd addressed bank (high addressed)?
f) Calculate the physical address from the following logical address:
i) EFO1:0001 H
ii) 010A : 2EDB H
g) Write control word for 8255 PPI in BSR mode to rest bits PC1, PC2 and PC5.
h) What is the difference between single P1C and cascaded P1C? How 8259 can be operated in cascaded mode?
i) What is the difference between hardware triggered strobe and software triggered strobe mode of operation of 8253/8254?
j) Explain the function of AEN and ADSTB pin in DMA controller 8237. **2×10**

PART-A

- Q.2 a) Explain the following pins of 8085 microprocessor:
i) HOLD
ii) INTA
iii) ALE
iv) S0 and S1
v) READY **10**
b) Explain the addressing modes of 8085 microprocessor with example. **5**
c) Draw and explain the timing diagram of MV1 C, 45 H. **5**

- Q.3 a) What is pipelining? How is it achieved in 8086 microprocessor? What are its advantages? **10**
b) How the memory address space of 8086 is organized and how much memory can be active at a given time in 8086 microprocessor? **10**

- Q.4 a) Explain the following instruction of 8086 microprocessor with suitable example and addressing mode:
i) LAHT
ii) XLAT
iii) NOP
iv) DAA
v) ROR **2×5**
b) If $BX = 0158_H$, $D_1 = 10A5_H$, $DISPLACEMENT = IB57_H$, $DS = 2100_H$ and DS is used as the segment register. Compute the physical address using direct, register, register indirect, register relative, based indexed and relative based indexed addressing mode. **10**

PART-B

- Q.5 a) Interface eight DIP switches to the CPU 8085 using 74LS138, 3 to 8 decoder to decode the address bus and 74LS244, a tristate octal buffer to interface these switches to the data bus.
- i) Use Isolated I/O address scheme with port address as 82 H.
ii) Use memory mapped I/O address scheme with port address as fffC H.
Write down the instructions to read this input port using these two schemes. **10**
- b) Differentiate between memory mapped I/O and I/O mapped I/O. **10**
- Q.6 a) Draw and explain architecture of 8255PPI. **10**
b) Describe the various modes of operation of an 8255. How the control word of an 8255 is formatted for different modes? Explain in detail. **10**
- Q.7 a) Draw the functional block diagram of PIC 8259 and describe the various blocks of its interrupt and control logic section. **10**
b) Explain the sequence of operations during an interrupt of 8085 microprocessor using programmable interrupt controller 8259. **5**
c) Explain the process of data transfer from microprocessor to the system memory under the DMA controller. **5**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

ADVANCED POWER SYSTEM (EE-728)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

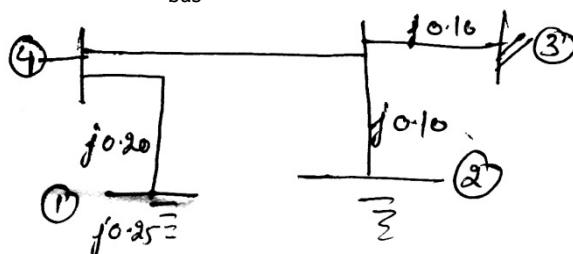
Q.1 Answer the following questions:

- a) Define load bus and give its importance.
- b) State importance of automatic voltage regulator.
- c) What is the effect of mutual coupling?
- d) What are the classification of unsymmetrical fault?
- e) What is contingency analysis?
- f) The Gauss-seidel method has _____ convergence characteristics.
- g) List advantage of N-R and G-S method.
- h) What are positive, negative and zero sequence components in power system.
- i) Define slack bus.
- j) What is sparsity?

2x10

PART-A

- Q.2 a) What do you understand by load frequency control loop? Explain LFC for simple area in detail. **10**
- b) Explain AVR in detail. **10**
- Q.3 a) Explain the representation of synchronous motor and transmission lines in power systems. **16**
- b) List advantages and disadvantages of per unit system. **4**
- Q.4 a) For the network assemble Z_{bus} network:



10

- b) Explain Tinney's optional ordered coupling triangular formulation of bus impedance matrix. **10**

PART-B

- Q.5 a) What are unsymmetrical faults? Find fault current for SLG fault on a power system. **10**
- b) Explain the contingency analysis for power system and what are the approximations in contingency analysis. **10**
- Q.6 a) Explain Newton-Raphson method and write its algorithm. **10**
- b) Derive power flow equation for power system. **10**
- Q.7 a) Explain economic dispatch for a thermal generation station neglecting the loss in power system. **10**
- b) Explain loss coefficient calculation using Y_{bus} . **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

PRINCIPLES OF RADAR SYSTEMS (EC-624)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) If a radar has an average power of 75W, duty cycle of 0.15, what will be its peak power.
b) Define blind speed for an MTI radar.
c) What will happen to the maximum unambiguous range of a radar if its p.r.f is increased?
d) What are second time around echoes?
e) Define Doppler frequency.
f) Mention any two limitations of a CW radar.
g) Define noise figure.
h) If an echo signal is received in a radar after 800 μ sec. What will be its target range?
i) What do you understand by a tracking radar?
j) Why is a large sized antenna preferred in a radar? **2x10**

PART-A

- Q.2 a) Describe in brief the frequencies of operation of a radar. Also discuss the major applications of radar. **10**
b) Explain with a diagram the basic principle of operation of a radar. **10**
- Q.3 a) Explain in detail the various system losses. **10**
b) What are the various factors that help in prediction of range performance of a radar? **10**
- Q.4 a) With the help of a block diagram describe in detail the operation of a FMCW radar. What are its applications? **12**
b) A CW radar is operating at a frequency of 6 GHz when an aircraft is approaching the radar at a radial velocity of 600 km/hr. Find the Doppler shift frequency. **8**

PART-B

- Q.5 a) Explain the principle of operation of a pulsed Doppler radar with the help of a block diagram. **10**
b) Two MTI radar systems are operating at the same p.r.f but different operating frequencies. Blind speeds of these radars are such that second blind speed of first radar is equal to fourth blind speed of second radar. Find the ratio of their operating frequencies. **10**
- Q.6 a) What is range tracking? Explain the process of range tracking in detail. **10**
b) What is the principle of operation of a conical scan tracking radar? Discuss briefly its operation with the help of a block diagram. **10**
- Q.7 Write short notes on:
a) Radar receivers.
b) Radar displays.
c) Low noise front ends.
d) Radar duplexers. **5x4**

End Semester Examination, May 2019
 B. Tech. — Eighth Semester
AUTOMATIC FLIGHT CONTROLS (EE-735)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

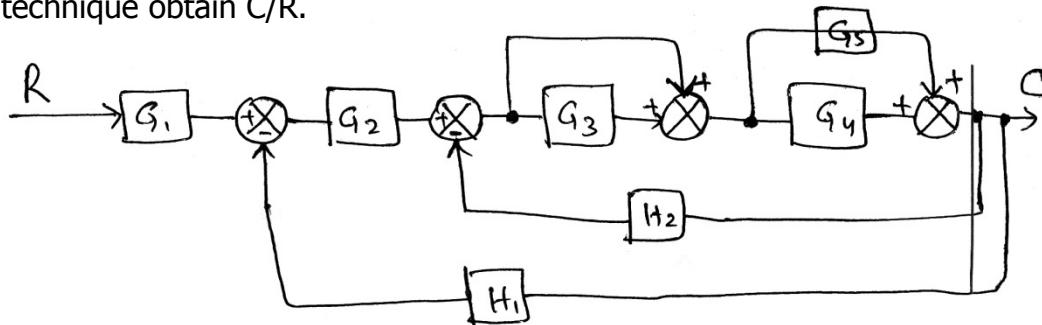
Q.1 Answer the following questions:

- a) Define open loop and closed loop system.
- b) What is a characteristic equation?
- c) Define peak time of a second order system.
- d) What is centroid and how is it calculated?
- e) Define type and order of system.
- f) Name the basic blocks of a simple displacement auto pilot.
- g) What is an accelerometer?
- h) What is pitch, yaw and roll in flight control?
- i) Name the different test signals used in control systems.
- j) What is the necessary condition or stability?

2x10

PART-A

Q.2 a) Consider the block diagram shown in the figure. Using block diagram reduction technique obtain C/R.



10

b) Find the inverse Laplace transform of the following functions:

$$\text{i) } F(s) = \frac{2s+3}{s^2 + 3s + 2}$$

$$\text{ii) } F(s) = \frac{2s^2 + 3s + 2}{(s+1)^3}$$

10

Q.3 a) Obtain the unit step response of a second order system.

10

b) Find the position, velocity and acceleration error constants of the unity feedback control system with $G(s) = \frac{100}{s(1+0.1s)(1+s)}$

10

Q.4 a) Sketch the root locus of the unity feedback system with $G(s) = \frac{K}{s(s+1)(s+3)}$

10

b) Using Routh Criterion determine the location of the roots of the characteristic equation $s^5 + s^4 + 4s^3 + 24s^2 + 3s + 63 = 0$. Comment on the stability of the system.

10

PART-B

- Q.5 a) What are the major functions of a flight control systems? **10**
b) Draw the block diagram of a longitudinal autopilot and explain the components. **10**
- Q.6 a) What is fly by wire system in aircraft control? Discuss its advantages. **10**
b) Explain the components of a lateral auto pilot with a block diagram. **10**
- Q.7 Write short notes on **(any two)**:
a) Self adaptive control system.
b) Yaw orientational control system.
c) Pitch orientational control system. **10x2**

End Semester Examination, May 2019

B. Tech – Sixth Semester

DESIGN OF ELECTRICAL MACHINES (EE-604)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are the various factors that are considered for design of electrical machines?
- b) Enlist the different types of enclosures in machine design.
- c) What is specific magnetic loading?
- d) Name the different types of transformer winding.
- e) Explain the significance of space factor.
- f) Why circular coils are preferred over rectangular coils for winding of a transformer?
- g) Why a machine designed by higher specific loading in electric has poor voltage regulation?
- h) What are the advantages of computer aided design?
- i) How magnetic locking can be avoided in induction motor?
- j) What are the advantages of choosing higher value of magnetic loading of synchronous machine?

2x10

PART-A

- Q.2**
- a) Explain various methods of ventilation in electric machine design. Also explain which method is best suited for induction motors. **10**
 - b) Discuss the different ratings/duties of electrical machines. How the temperature rise affects the selection of machine design? **10**
- Q.3**
- a) Derive the output equation of $1-\phi$ transformer. **10**
 - b) Explain the design of transformer core. What are the advantages of stepped core? **10**
- Q.4**
- a) Calculate the MMF for air gap of a rotating electrical machine. **10**
 - b) Explain the overall design of electromagnetic coil. **10**

PART-B

- Q.5**
- a) Explain the field design of turbo alternators. **10**
 - b) A shunt field coil has to develop an MMF of $9000A$. The voltage drop in the coil is $40N$, and the resistivity of round wire used is $0.021 \Omega/m$ and mn^2 . The depth of winding is $35mm$ approximately and the length of mean turn is $1.4m$. Design a coil so that the power dissipated is $70\omega/m^2$ of the coil surface (i.e. outer, inner, top and bottom). Take the diameter of insulated wire $0.2mm$ greater than of base wire. **10**
- Q.6**
- a) Derive the output equation of synchronous machine and explain the advantages of higher Co (output coefficient). **10**
 - b) Explain the field design of water wheel alternator. **10**
- Q.7**
- a) Derive the output equation of $3-\phi$ induction motor. **10**
 - b) Explain the factors on which the design of stator depends of an induction motor. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester
EMBEDDED SYSTEMS (EC-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Discuss the applications of microcontrollers and microprocessors.
b) Draw the block diagram of Harvard computer architecture.
c) How many ports available in PIC16F877A microcontroller? Name them and list their no. of bits.
d) Explain PCLATH and STATUS register.
e) List and explain the data movement instructions of PIC16F877A microcontroller.
f) Illustrate the working of stack in mid range PIC microcontroller. Also mention the size of stack.
g) Explain the following control directives with example.
 i) #Define ii) EQU
h) What are decoupling capacitors? What are their requirements?
i) List the prescaler factors available for watchdog timer in mid range PIC microcontroller.
j) Explain the power up sequence of PIC16F877A microcontroller. **2x10**

PART-A

- Q.2 a) Explain the following tools of MPLAB IDE.
 i) Editor ii) Assembler iii) Compiler
 iv) Linker v) Simulator vi) Emulator **15**
b) What is Hex file format? Which tool of an IDE convert the source code into a Hex file format? For the following code identify the fields of Hex file format.
 :00000001FF **5**
- Q.3 a) Draw and explain the PIC microcontroller processor architecture with the W register and file register as source and destination for AW operations. **10**
b) Explain the working of program counter in PIC microcontroller. Also list its specifications. **5**
c) What are different reset situations available in PIC microcontroller? List them. **5**
- Q.4 a) What do you understand by the term subroutine? Discuss all 3 ways of passing parameters to the subroutine in the PIC microcontroller. **10**
b) Discuss the following instructions with example.
 i) RETLW ii) INCFSZ iii) RETURN
 iv) COMF v) SLEEP **10**

PART-B

- Q.5 a) Define MACRO in PIC microcontroller. Design a macro for the delay of 50ms and use it in a program which is designed to blink LED connected on port B for every 50ms. **15**
b) Draw and explain the OPTION register. **5**
- Q.6 Explain the block diagram of the following in detail.
i) Timer 1 ii) Timer 2 of PIC Microcontroller **20**
- Q.7 Design the following interfaces for PIC microcontroller.
i) Relay ii) DC Motor **20**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

CONSUMER ELECTRONICS (EC-625)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) State the need of equalizing circuit.
- b) Define persistence of vision.
- c) Explain compatibility of TV receivers.
- d) Illustrate pit and land in reference to compact disc.
- e) Compare frequency bands used by cable TV and Dish TV.
- f) List major components of microwave oven.
- g) State the objective principle of loudspeaker.
- h) Eyes can accommodate the contrast ratio of _____ with ease.
- i) Horizontal scanning trace takes _____ μs us in India TV system.
- j) Compare sampling frequencies of CD and DVD.

2x10

PART-A

- Q.2**
- a) Compare different types of headphones. **10**
 - b) The voltage gain of an amplifier when it feeds a resistive load of $1 \text{ k}\Omega$ is 40 dB. Determine the magnitude of the output signal voltage and the signal power in the load when the input signal is 10mv. **5**
 - c) Explain ideal characteristics of microphone. **5**
- Q.3**
- a) Explain the constituents of composite video signal with a suitable diagram. **10**
 - b) Justify how flicker can be eliminated by making use of interlace scanning. **10**
- Q.4**
- a) Compare NTSC, PAL and SECAM system. **10**
 - b) Explain working of delta gun and In-line gun color picture tube with the help of suitable diagram. **10**

PART-B

- Q.5**
- a) Analyze the block diagram and principle of working of cable TV. **10**
 - b) Compare working and basic structure of VCD and DVD. **10**
- Q.6**
- a) Explain the components and working of office equipment FAX machine. **10**
 - b) State the working principle of scanners and explain different types of scanners. **10**
- Q.7** Write short notes on **(any two):**
- a) Refrigerators.
 - b) Dish washers.
 - c) Digital clock.
- 10x2**

End Semester Examination, May 2019

B. Tech. – Sixth / Seventh Semester

MICROWAVE ENGINEERING (EC-701A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Give two examples of microwave amplifiers.
 b) Mention two properties of s matrixes.
 c) Define frequency pushing with reference to a magnetron.
 d) Show that TEM wave cannot be propagated in a waveguide.
 e) Define 'strip line'.
 f) A rectangular cavity has dimensions
 $a = 4\text{cm}$, $b = 2\text{cm}$ and $d = 6\text{cm}$
 Calculate the resonant frequency of the cavity for the dominant mode.
 g) Define 'negative resistance device'.
 h) Calculate the wavelength of an electromagnetic wave having a frequency of 10 GHz.
 i) Define 'pulse repetition frequency'.
 j) BWO stands for _____.
- 2×10**

PART-A

- Q.2 a) Explain the advantages of microwaves in detail. **10**
 b) Explain the applications of microwaves in detail. **10**
- Q.3 a) Drive the expression for phase velocity of a wave propagating through a waveguide. **8**
 b) An air filled circular waveguide is to be operated at a frequency of 6 GHz and is having dimensions such that $f_c = 0.8f$ for TE_{11} mode. Determine the diameter of the waveguide and guide wavelength. **8**
 c) Define the following:
 i) Dominant mode.
 ii) Wave impedance **4**
- Q.4 a) Drive the scattering matrix of H plane Tee. **10**
 b) Write short notes on (**any two**):
 i) Circulator.
 ii) Microwave Attenuator.
 iii) Slotted line section.
 iv) Matched load. **10**

PART-B

- Q.5 a) What are the limitations of conventional tubes at microwave frequencies? Explain any four in detail. **10**
 b) Describe the construction and working of a travelling wave tube in detail. **10**
- Q.6 Write short notes on (**any two**):
 a) PIN Diode. b) Tunnel Diode. c) GUNN Diode. d) IMPATT Diode. **10×2**
- Q.7 a) Double minima method is used to determine VSWR value on a waveguide. If the separation between two adjacent nulls is 3.5 cm and that between twice minimum power points is 2.5 mm determine the value of VSWR. **5**
 b) Explain the electronic technique for measurement of frequency in brief. **5**
 c) Explain in detail the operation of RADAR with its block diagram. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ANALOG ELECTRONIC CIRCUITS-II (EC-423)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) State merits and demerits of negative feedback in amplifier circuits.
b) Illustrate how gain of an operational amplifier can be stabilized with the help of negative feedback?
c) Why do 3-RC networks are required in RC-phase shift oscillator?
d) Determine resonant frequency of a tank circuit consisting of an inductor of 20m henry and capacitor of $0.001\mu F$.
e) Discuss the significance of Common Mode Rejection Ratio (CMRR) in op-amp based circuits.
f) Compare distinct differential amplifier configurations DIBO, DIUO, SIBO and SIUO.
g) For a monostable multivibrator, the external components are $R = 10\text{ k}\Omega$ and $C = 0.05\mu F$. Calculate ON time of the waveform.
h) Discuss various applications of Schmitt trigger.
i) Differentiate between active and passive filters.
j) Design a peak detector circuit. **2×10**

PART-A

- Q.2 a) Design a transconductance (current series) feedback amplifier. Derive an expression to analyze the effect of negative feedback on input and output impedance of designed feedback amplifier. **10**
b) Determine voltage gain, input and output impedance off a designed amplifier in part (2a) with open loop gain, $A = 200$, input impedance without feedback, $R_i = 1.5\text{ k}\Omega$, output impedance without feedback $R_o = 2.5\text{ k}\Omega$ and feedback factor $\beta = 1/25$. **6**
c) Discuss the effect of negative feedback on bandwidth of an amplifier. **4**
- Q.3 a) Describe the designing of oscillator circuits from transistor amplifiers with the help of a block diagram. Enlist various application areas of oscillators. **6**
b) Design a colpitt oscillator with capacitor C_1 , C_2 and inductor L . Explain its working. **6**
c) Determine the frequency of oscillation of a transistor based colpitt oscillator with $C_1 = 100\text{ pF}$, $C_2 = 80\text{ pF}$ and $L = 10\text{ mH}$. **8**
- Q.4 a) Design a dual input balanced output differential amplifier. Derive an expression for voltage gain of the same using ac analysis. **10**
b) Draw the block diagram of an operational amplifier. Describe the role of each stage in detail. **10**

PART-B

- Q.5 a) Design a practical differentiator circuit to differentiate an input signal that varies in frequency from 10 Hz to 1 KHz. **10**
b) Write notes on (**any two**) along with relevant circuit diagram.
i) Voltage to current converter.
ii) Voltage follower.
iii) Instrumentation amplifier.
iv) Summing amplifier. **5×2**
- Q.6 a) Design a circuit using operational amplifier that provides logarithm of an input signal. **10**

b) Illustrate the operation of op-amp as full wave precision rectifier. Justify with the help of suitable waveform. **10**

- Q.7 a) Classify filters on the basis of their frequency response. Explain the following terms:
i) Passband
ii) Stopband
iii) Cut-off frequency
iv) Attenuation **2x4**
- b) Design a widebandpass filter with lower cut-off frequency of 10 Hz and higher cut off frequency of 10 KHz. The passband gain of a filter is 6. Also compute the quality factor of designed filter, analyze your results. **12**

End Semester Examination, May 2017

B. Tech. – Fourth Semester

ELECTRONIC INSTRUMENTATION (EE-402B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are the various types of transducers used to measure temperature?
- b) What is LVDT?
- c) Define Electromagnetic deflection.
- d) List the types of electrodes used in ECG measurement.
- e) What is the purpose of delay in CRO?
- f) What do you understand by aquadag coating in CRO?
- g) What do you mean by signal conditioning?
- h) Give the basic principle of operation of digital multimeters.
- i) What are the essential functional operations of a digital data acquisitions system?
- j) Explain decode counting assembly.

2×10

PART-A

- Q.2**
- a) Explain the construction and principle of working of a linear voltage differential transformer (LVDT). Explain how the magnitude and direction of the displacement of core of an LVDT detected. **12**
 - b) Describe the construction, theory and working of thermocouples. Describe the different types of compensations used and also the methods of measurement of their output voltage. **8**
- Q.3**
- a) Draw and explain block diagram of EMG measurements. **10**
 - b) Describe in brief the three leading systems used in ECG. **10**
- Q.4**
- a) Derive an expression for vertical deflection of an electron beam in a CRT. **10**
 - b) Describe the principle of working and circuit diagram of a digital oscilloscope. **10**

PART-B

- Q.5**
- a) Explain the working of spectrum analyzer with a block diagram. **10**
 - b) Define harmonic distortion and give a method for its determination. **10**
- Q.6**
- a) Draw and describe Data Acquisition System with its block diagram. **10**
 - b) What do you understand by PLL? Draw and explain its block diagram and Pin diagram. Also give its applications. **10**
- Q.7**
- a) Describe, the working of a frequency counter for frequency measurement with the help of a block diagram. **10**
 - b) Write a short note on 'Decade Counting Assembly'. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

VLSI DESIGN (EC-724)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Write the difference between bipolar and MOS Ic's.
b) Define 'Mealy's law'.
c) What is thermal oxidation?
d) Why polysilicon gate is preferred over metal gate?
e) Define how inversion layer is formed in MOS capacitor?
f) Define 'body effect and drain punch through'.
g) Define 'transmission gate'.
h) Define 'various methods of latch up'.
i) Define 'stick diagram'. Also draw it for NOT gate.
j) Why EPROM is better than PROM? **2x10**

PART-A

- Q.2 a) Draw VLSI design flow and explain it. **10**
b) Explain various trends and development method for the IC technology. **10**
- Q.3 a) Explain Chzochralski technique principle and process for formation of single crystal silicon. **10**
b) Discuss and draw steps followed for fabrication of CMOS inverter. **10**
- Q.4 a) Derive current equation for all the three regions of MOSFET. **10**
b) What is channel length modulation? Explain its impact on different region in MOSFET. **5**
c) What is scaling? Describe constant field effect on constant voltage scaling concept. **5**

PART-B

- Q.5 a) Discuss and explain various forms of pull-ups for the inverter. **10**
b) Explain basic implementation of BiCMOS inverter. **10**
- Q.6 a) Implement a half-adder circuit using NMOS technology. Also explain its truth table. **10**
b) Discuss the implementation of MOD-3 counter. **10**
- Q.7 a) Implement a 6 transistor static RAM cell. **10**
b) Implement a BCD to excess-3 code converter using PAL. **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

BASIC ELECTRICAL ENGINEERING (ESC-EE-101)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Draw the impedance triangle of RL series circuit.
- b) Define power factor.
- c) State Kirchhoff's voltage law.
- d) Write down the expression for slip of induction motor.
- e) Name two types of batteries.
- f) Define 'admittance'.
- g) List two difference between state and delta connected system.
- h) What is coercive force?
- i) Draw the speed torque characteristic of dc shunt motor.
- j) What is a commutator in dc machine?

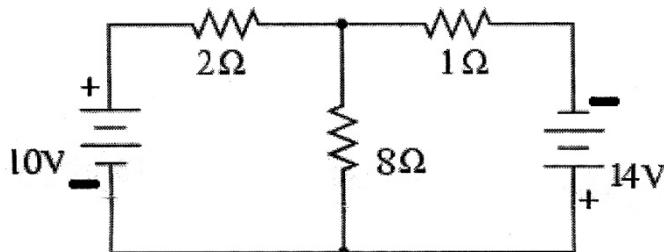
2x10

PART-A

Q.2 a) Explain Thevenin's theorem.

10

b) Obtain the current in the 8Ω resistor using Superposition's theorem.



10

Q.3 a) A coil of resistance 20Ω and an inductance of 150 mH is connected in series with a capacitance of $85\mu\text{F}$ across $225 \sin 314 t$ ac supply. Calculate:

- i) Magnitude of current.
- ii) Power factor.
- iii) Voltage across coil.
- iv) Voltage across the capacitance.
- v) Power dissipated in the network.

10

b) State the advantages of three phase system over single phase system.

5

c) Explain the phenomena of resonance in a RLC series circuit.

5

Q.4 a) Discuss the different losses in a transformer.

4

b) Derive the condition of maximum efficiency in transformer.

6

c) Explain the equivalent circuit of an actual transformer.

10

PART-B

Q.5 a) Draw and explain the parts of dc machine.

8

b) Explain the different methods of speed control of dc shunt motor.

12

Q.6 a) Explain the generation of rotating magnetic field in a 3-Φ induction motor.

8

b) Explain two types of single phase Induction motor.

12

Q.7 a) What is earthing? Why is it necessary?

6

b) Explain the working of lead acid battery.

8

c) Write short note on Power factor improvement.

6

End Semester Examination, May 2019

B. Tech. – Eighth Semester

FACTS DEVICES AND ITS APPLICATIONS (EE-831)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Why reactive power is called a byproduct of alternating current (AC) system?
b) Enumerate the importance of slope in the SVC dynamic characteristics.
c) State how the SVC prevents the reactive power rating to reach its limit too frequently?
d) Discuss how transient stability is enhanced by using STATCOM?
e) Distinguish between load compensation and system compensation.
f) List the different modes of TCSC operation.
g) Draw VI characteristics of STATCOM.
h) Compare synchronizing torque with damping torque.
i) List the various possible combination for the study of controller interaction.
j) Compare STATCOM with SVC on basis of their basic configuration. **2×10**

PART-A

- Q.2 a) Discuss with proper diagram how active and passive compensation on power transmission line is done? **10**
b) Derive the expression for power in active power compensation. **10**
- Q.3 a) State basic principle of SVC control and show the voltage profile at the receiving end of a loaded line with a varying power factor load. **10**
b) Outline different rating of static Var compensation. **10**
- Q.4 a) Outline the areas at which STATCOM can improve power system performance. **5**
b) Discuss how power exchange is done between STATCOM and the ac system? **15**

PART-B

- Q.5 a) Elaborate different modes of operation of Thyristor Controlled Series Capacitor (TCSC). **15**
b) Explain how power system stability limit is improved by using TCSC? **5**
- Q.6 Discuss the control scheme for static synchronous series compensator (SSSC) with proper block diagram and also describe its each component in detail. **20**
- Q.7 Discuss the effect of electrical compiling and short circuit level for SVC-SVC interaction for
a) Uncoupled SVC buses.
b) Coupled SVC buses. **10×2**

End Semester Examination, May 2019
B. Tech. — Eighth Semester
WIND ENERGY CONVERSION SYSTEMS (EE-833)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) State the principle of wind energy extraction.
- b) What do you mean by aerodynamics?
- c) Define "Thrust-Efficiency".
- d) List different types of pitch control.
- e) Differentiate between synchronous and asynchronous wind turbine generator (WTG).
- f) Draw the basic circuit diagram of asynchronous induction generator.
- g) Explain principle of Magnus effects.
- h) What are the advantages of wind energy conversion system over other generating system?
- i) Compare mono blade, twin blade and three blade HAWT generators.
- j) What are the advantages of Savonius type (VAWT) generator?

2×10

PART-A

- Q.2** a) Explain the principle of wind energy extraction. **5**
b) Derive the expression for power obtained from wind-simple momentum theory. **15**
- Q.3** Describe different types of horizontal axis wind turbine (HAWT) generator. **20**
- Q.4** a) Explain constant speed constant frequency system with diagram. **10**
b) Differentiate between steady state and transient state stability analysis used for the generator modeling. **10**

PART-B

- Q.5** a) Describe different types of permanent magnet synchronous generator with diagrams. **10**
b) List the essential factors for variable speed wind energy conversion system. **10**
- Q.6** a) Explain the concept of grid connected system. **15**
b) What are the current practices and industrial trends used for grid connected system. **15**
- Q.7** Write short notes on the following:
 - a) Wind diesel hybrid system.
 - b) Wind thermal hybrid system.**10×2**

End Semester Examination, May 2019
B. Tech. — Eighth Semester
ELECTRONIC COMPONENTS AND MATERIALS (EC-839)

Time: 3 hrs. Max Marks: **100**
 No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 Answer the following questions: **2×10**
- What is superconductivity?
 - What are the basic properties of magnetic material?
 - Differentiate between active and passive components.
 - Give classification of inductors.
 - What are the different shapes and sizes of connectors?
 - Explain is electric contact phenomenon in relay?
 - What is an electric switch? How it works?
 - What are different types of PCB's?
 - Discuss PCB fabrication process.
 - Give two advantages of SMD's.

PART-A

- Q.2 a) How the materials are classified on the basis of energy bands? **10**
 b) What is hysteresis loop? Explain soft and hard magnetic materials. **10**
- Q.3 a) With the help of neat diagram explain the working of metal film resistors. **10**
 b) What is a MOSFET? Discuss the MOSFET fabrication process with suitable diagram. **10**
- Q.4 a) Discuss the connector terminations in detail. **10**
 b) Explain RF connectors in detail. Discuss the advantages and limitations of using RF connectors. **10**

PART-B

- Q.5 a) Explain the types, construction and applications of following switches:
 i) Toggle switch.
 ii) Push button switch. **5×2**
 b) What is the principle of relay? Discuss the construction of electromagnetic relay with the help of suitable diagram. **10**
- Q.6 a) What are the advantages and disadvantages of using PCB? Explain in detail. **10**
 b) Discuss the manufacturing process of double sided PCB. **10**
- Q.7 a) What is surface mount technology? Explain the limitations of SMD's. **10**
 b) Write short notes on 'SMD sizes' and 'dimensions'. **10**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

ADVANCE MICROPROCESSOR AND MICROCONTROLLER (EC-824A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

- Q.1 a) What are segment registers? Name any two segment registers. **10**
b) Describe the function of ARDY signal of 80186.
c) Differentiate between direct and indirect addressing modes.
d) What do you understand by task switching?
e) What is the function of lock pin of 80186?
f) Discuss the function of GDTR in 80386.
g) What is address width of 80386?
h) What are level-1 and level-2 cache memory systems? Explain with examples.
i) Differentiate 8051 and 80196 microcontrollers.
j) Give additional features of 80486 which are not there in 80386. **2×10**

PART-A

- Q.2 a) Differentiate real mode memory addressing and protected mode memory addressing. **10**
b) Write a note on memory paging. **10**
- Q.3 a) Explain the architecture of an 80186 microprocessor with the help of suitable diagram. **12**
b) Illustrate and explain the format of relocation word register of PCB of 80186. **8**
- Q.4 a) Briefly explain the protocol mode addressing. **10**
b) Draw the architectural block diagram of 80286 and explain its working. **10**

PART-B

- Q.5 a) What is virtual 8086 mode operation of an 80386 microprocessor? **8**
b) With the help of suitable diagram, explain the programming model of 80486 microprocessor. **12**
- Q.6 a) Explain the features of CPU of 80196 microcontrollers. Which architecture is followed in 80196 and what are its advantages? **10**
b) Explain I/O ports in single chip mode and port multiplexing signals in expanded mode. **10**
- Q.7 a) List down maskable and non-maskable interrupts in 80196 microcontrollers. Explain how software timer interrupts work. **10**
b) Demonstrate how pulse width modulation (PWM) output is obtained using programmable timers. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ENERGY CONSERVATION AND MANAGEMENT (EE-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is total quality management?
- b) What is energy efficiency?
- c) Discuss the significance of energy audit.
- d) What is need of energy conservation?
- e) What is meant by decamping?
- f) What is meant by electrical load analysis?
- g) What is payback in case of energy management?
- h) List the method used for calculating rate of return.
- i) What is meant by financial evaluation of energy project?
- j) What is meant by power planning?

2x10

PART-A

- Q.2** a) Explain the concept of efficient energy use. **5**
b) Explain GDP coupling with energy intensity. **5**
c) Write short notes on:
i) Establishing energy database.
ii) Energy intensity. **5x2**
- Q.3** a) What is energy audit? Discuss the concept of establishing energy database. **10**
b) Discuss the various ways and instruments used for energy auditing. **10**
- Q.4** a) Explain the laws of thermodynamics in energy conservation. **10**
b) Explain the energy saving opportunities in an air condition system. How would you calculate the net load for a room to be air conditioned? **10**

PART-B

- Q.5** a) Discuss the general principle of electrical energy management. **10**
b) Explain the process of electrical load analysis in detail. **10**
- Q.6** a) How 'total life cycle' cost can be determined? Also write its uses. **10**
b) Differentiate between:
i) Average rate of return method and internal rate of return method. **5**
ii) Payback method and present value method. **5**
- Q.7** Write short notes on the following:
a) DEFENDUS strategy. **10**
b) Co-generation of electricity. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

COMPUTER APPLICATION IN POWER SYSTEM (EE-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define 'short circuit capacity of a bus'.
- b) Give criterion for selection of a circuit breaker.
- c) Differentiate between 'voltages controlled bus' and 'swing bus'.
- d) The inertia constant 'H' of a 200 MVA machine is 2pu. Find its value for 400 MVA.
- e) Define 'power quality'.
- f) List advantages of per unit system.
- g) State importance of AVR.
- h) On what factors does maximum power transfer depend?
- i) What do you understand by dynamic stability?
- j) Define 'primitive network'.

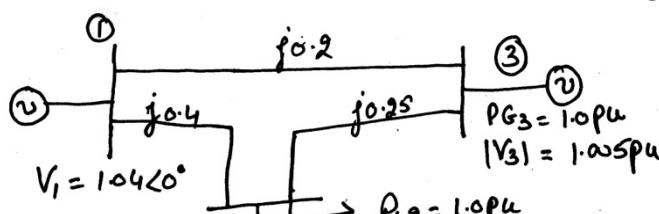
2x10

PART-A

- Q.2** a) Explain the speed governing system used for automatic load frequency control and hence derive the transfer function for the same. **10**
- b) Discuss automatic generation control in detail. **10**
- Q.3** a) Explain symmetrical component transformation as used in analysis of power system. **6**
- b) Discuss representation of:
 - i) Synchronous machine. **7**
 - ii) Over-head transmission lines. **7**
- Q.4** a) Prove that in bus admittance matrix, each diagonal element is equal to the sum of all admittance connected at node 'i' and off diagonal element is equal to negative of admittance connected between node 'i' and 'j'. **10**
- b) Formulate bus impedance matrix for elements without mutual coupling. **10**

PART-B

- Q.5** a) Derive expression for *LLG* fault. **10**
- b) A 6.9KV, 10 MVA alternator has $x'' = x_2 = 0.15 \text{ pu}$ and $x_0 = 0.05 \text{ pu}$. Its neutral is grounded through a reactor of 0.397 ohm . The alternator is operating at rated voltage without load and is disconnected from the system when a single line to ground fault occur at its terminals. Find the sub-transient current in the faulty phase. **10**
- Q.6** a) Write down the flow chart for fast decoupled load flow method. **10**
- b) For the power system shown below; compute the bus voltage using *GS* method. Bus1 is slack bus and Bus 2 and Bus 3 are load and voltage control bus respectively.



- Q.7** a) Derive transmission loss formula for transmission line without loss. **10**

10

b) The operating characteristics of three plants with total capacity of 700 MW are given as:

$$F_1 = 0.8P_1^2 + 30P_1 + 100; \quad 50 \leq P_1 \leq 250$$

$$F_2 = 0.10P_2^2 + 32P_2 + 125; \quad 50 \leq P_2 \leq 250$$

$$F_3 = 0.12P_3^2 + 35P_3 + 150; \quad 50 \leq P_3 \leq 200$$

Determine economic dispatch if plants are scheduled for a load of 500 MW.

10

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADVANCES IN SATELLITE COMMUNICATION (EC-836)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) List major difference between active satellite and passive satellite.
 b) A satellite in low earth elliptical orbit with semi-major axis of 6969 km and eccentricity of 0.00402, find the apogee and perigee heights of the satellite.
 c) List the factors on which free space loss depends.
 d) State the meaning of term “threshold in FM detector”.
 e) Judy why FDMA systems have poor spectral efficiency.
 f) What is LASER satellite communication system?
 g) Differentiate between ‘noise temperature’ and ‘noise figure’.
 h) Explain the basic difference between and geostationary satellite and a geosynchronous satellite.
 i) Find the orbital time period of a geostationary satellite. (Take R = 42000 km)
 j) List advantage of SCPC system. **2×10**

PART-A

- Q.2 a) Describe various elements of a satellite communication system in detail. **10**
 b) List the frequency bands designated for specific satellite services. Justify the basis on which the satellite frequencies are selected. **10**

- Q.3 a) Prove that orbital velocity and time period of satellite is given by

$$v = \sqrt{\frac{\mu}{r}} \text{ and } T = \frac{2\pi r^{\frac{3}{2}}}{\mu^{v_2}}$$

where $\mu = GM_E$ = kepler's constant

G = Gravitational constant

M_E = mass of earth

r = radius of orbit

10

- b) Explain the terms:

- i) Look angle
- ii) Semi Major axis
- iii) Sub-satellite point
- iv) Mean anomaly
- v) Ascending and descending node.

2×5

- Q.4 a) A geosynchronous satellite has an EIRP of 32dB W and transmits the signals at 4GHz in the downlink. The figure of merit of the receiver earth station is 26dB/K. Find $\left(\frac{C}{N}\right)_0$ available at the demodulator input for this system. Assume the system margin required to be 2dB. **10**

- b) Derive general link design equations. Find out expression for $\frac{C}{N}$ and $\frac{G}{T}$ ratios and explain the importance of these ratios on satellite link design. **10**

PART-B

- Q.5 a) Explain the different types of digital modulation techniques. Justify popularity of QPSK in satellite communication. **10**
- b) Describe the impact of loading factor on FM/FDM signal transmission compare the performance of FM/FDM SCPC and CSSB systems. **10**
- Q.6 a) Explain the principle of time division multiple access. Describe the structure of TDMA frame in detail. **10**
- b) What is CDMA technique? In what way is it superior to TDMA? Mention the potential application of CDMA. **10**
- Q.7 Write short notes on the following:
a) VSAT
b) MSAT
c) DBS
d) Earth sensing satellite. **5×4**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

ADHOC AND SENSOR NETWORKS (EC-840)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Why MAC protocol be free from the hidden and exposed terminal problem?
b) List the major issues in adhoc wireless networks.
c) What are the major requirements of a routing protocol in adhoc wireless network?
d) Describe the main objective of the transport layer.
e) Explain the term quality of service with the help of an example.
f) How central coordination and shared wireless medium are the security concern for an adhoc wireless network?
g) Define energy management in adhoc wireless network.
h) Explain the hidden and exposed terminal problem in adhoc wireless network.
i) What are the tradeoffs to be considered in the design of power management schemes?
j) What are the factors that affect the topology of the adhoc wireless network? **2x10**

PART-A

- Q.2 a) Explain the need of Medium Access Control (MAC) protocol in adhoc wireless network. Also discuss the issues in designing a MAC protocol for adhoc wireless network. **10**
b) Classify the MAC protocols and explain each classification in detail. **10**

Q.3 Discuss the following routing protocols.

- a) Distance vector routing protocol.
b) Dynamic source routing protocol.
c) Fish eye state routing protocol.
d) Zone routing protocol.

5x4

- Q.4 a) What is split-TCP approach of transport layer protocol in adhoc wireless network? Explain in detail. **10**
b) Discuss the issues and challenges in security provisioning of adhoc wireless network. **10**

PART-B

Q.5 What are the factors that affect the quality of service of an adhoc wireless network? Compare flow control and congestion control mechanism of adhoc wireless network. **20**

- Q.6 a) Suggest a few metrics that can be associated with battery aware routing techniques. **10**
b) Discuss the device dependent battery management schemes in detail. **10**

Q.7 Write short notes on the following:

- a) Sensor network architecture.
b) Quality of sensor network.
c) Location discovery.

20

End Semester Examination, May 2019

B. Tech. – Fourth Semester

PRINCIPLES OF COMMUNICATION (EE-404)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- Define signal. What is the difference between deterministic and random signals?
- What is aliasing error? How can it be avoided?
- What is the percentage of the power saving in SSB modulation?
- Define selectivity and sensitivity of a receiver.
- What is the bandwidth required for an FM signal whose modulating frequency is 3 kHz and the maximum deviation is 18 kHz?
- How do you get FM from PM and vice versa?
- How do you generate PPM from PWM?
- State sampling theorem. A bandpass signal has a spectral range that extends from 200 Hz to 64 kHz. Determine the acceptable range of sampling frequency.
- Explain PSK modulation scheme.
- Four stages of amplifiers are connected in cascade. Each stage has the same S/N ratio? If S/N ratio is 55 db, calculate the output S/N ratio of the entire system. **2x10**

PART-A

Q.2 a) What are the advantages of digital communication over analog communication? **5**
 b) Explain the need for modulation. **8**
 c) Write a short note on impulse function $\delta(t)$ and its properties. **7**

Q.3 a) How is SSB signal generated by the phase shift method? Explain in detail with a block diagram and necessary equation. Give the advantages and disadvantages of this method. **7**
 b) With a block diagram, explain the functioning of a synchronous detector. Derive an expression for the output voltage. Hence show that any shift in phase or frequency of the locally generated carrier from that of the transmitter carrier results in phase distortion or delay. **7**
 c) Explain vestigial sideband transmission. **6**

Q.4 a) An angle modulated wave with a carrier frequency $W_C = \pi \times 10^5$ is

$$f(t) = 5 \cos(W_C t + 3 \sin 2000t)$$

Find:

- Frequency deviation Δf
- Modulation index, β
- Phase deviation $\Delta\phi$ and
- The bandwidth. **8**

- Explain the direct method for FM generation. **6**
- What is the advantage of ratio detector over the slope detector and foster seelay detector? Explain it in detail. **6**

PART-B

- Q.5 a) Explain the process of conversion of an analog signal to digital. What is quantization error? How can it be reduced? **7**
- b) A PCM system has the following parameters. Minimum dynamic range of 35 dB, minimum analog frequency of 5 kHz, and a maximum decoded voltage of 3V at the output. Find out the following:
- Minimum sampling rate.
 - Minimum number of bits used.
 - Resolution.
 - Quantization error. **8**
- c) Explain Adaptive delta modulation technique. What are its advantages over PCM? **5**
- Q.6 a) Explain with block diagram, BFSK type of modulator and demodulator. **8**
- b) What is M-ary phase shift keying? Derive a mathematical expression for it. **5**
- c) Explain spread spectrum technique. **7**
- Q.7 a) What is noise? Explain different types of internal noise. **12**
- b) Define noise figure. What is its value for a noiseless system? An amplifier has a noise figure of 12 dB. Calculate the equivalent amplifier input noise for a bandwidth of 5 MHz. **8**

End Semester Examination, May 2019

B. Tech. — Eighth Semester

ENVIRONMENTAL ENGINEERING (EE-836)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define "Ecosystem".
- b) What is the need for development of an environment?
- c) From where do we obtain groundwater?
- d) How can we prevent water borne disease?
- e) What are the advantages of surface water over groundwater?
- f) Why testing of sewers are necessary?
- g) List the disadvantages of separate sewerage system.
- h) Explain the tertiary treatment method for sewage treatment.
- i) How sand filter purifies the water?
- j) What strategies should be adopted for exposure to radiation reduction at workplaces?

2×10

PART-A

Q.2 Which acts and regulatory laws has already been implemented in the direction of adopting pollution control strategies. Also explain the function of main bodies for enforcement of these laws. **20**

Q.3 a) Explain in detail the process of desalination and fluoridation for water treatment. **10**
b) What are the various forms of underground sources and describe which activities are leading to their over exploitation in detail. **10**

Q.4 a) Discuss the types of sewerage systems with their advantages and disadvantages. **15**
b) What components of sewerage systems are necessary for successfully conveying wastewater to the treatment plant? **5**

PART-B

Q.5 a) Describe the process of sewage treatment with a neat block diagram labeling all the processes. **15**

b) Give the process description of trickling filters used to remove organic matter from wastewater with its advantages and disadvantages. **5**

Q.6 a) Classify the health hazards which give rise to occupational diseases or adversely affect health through work. **15**
b) What do you understand by personal protective equipment? Name them. **5**

Q.7 a) State the quality management benefits with respect to the principles used by organizations management for improved performance approaches. **15**
b) Write a short note on occupational health and safety management system. **5**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ELECTRIC POWER APPLICATIONS AND TRACTION (EE-721A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) Derive relationship between luminance, illumination and luminance intensity.
b) Why AC is more suitable for resistance welding?
c) Why AC single phase series motors are not suitable for urban and suburban services.
d) What are the factors which affect the schedule and speed of train?
e) Why thermostat is used in domestic refrigerator?
f) Why is tungsten selected as the filament material?
g) State the difference between plastic and fusion welding?
h) What are the causes of failure of heating elements?
i) What are the applications of high frequency eddy current heating?
j) What is practical unit of refrigeration? Define it. **2×10**

PART-A

- Q.2 a) A class room of size $30\text{ m} \times 30\text{ m}$ is to be illuminated with 75 lux. The lamps are required to be hung 5 m above the work bench. Assume a space-height ratio of 0.9-1, utilization factor = 0.5, Lamp efficiency = 15 lumen/watt, candle power depreciation of 20%. Estimate the number rating and disposition of lamps. **10**
b) Describe the working of filament lamp and compare it with fluorescent lamp. **10**
- Q.3 a) Give classification of various electric heating methods along with brief account of their working principles.. **15**
b) What do you mean by 'Salt-bath heating'? **5**
- Q.4 a) Give comparison between resistance and arc welding. **10**
b) Explain the principle of electric spot welding. **5**
c) What are the qualities of good weld? **5**

PART-B

- Q.5 a) If 18.258 gm of nickel is deposited by 100A flowing for 10 minutes, how much copper would be deposited by 50A for 6 minutes? Atomic weight of nickel = 58.6 and that of copper is 63.18. Valency of both = 2. **10**
b) What is electroplating and what for is it done? Describe various operations involved in electroplating. **10**
- Q.6 a) An electric train has an average speed of 42 kmph on a level track between stops 1400 m apart. It is accelerated at 1.7 kmphps and braked at 3.3 kmphps. Draw the speed time curve for the run and also indicate different time period. **10**
b) Discuss different types of current collectors used for over-head system. **10**
- Q.7 a) Draw the electric circuit of refrigerator and explain its working in details. **15**
b) Differentiate between comfort air conditioning and industrial air conditioning. **5**

End Semester Examination, May 2019

B. Tech. — Sixth Semester

VLSI DESIGN (EC-724)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1** Answer the following questions:

 - a) What are the limitations of assembling the circuit by using discrete components?
 - b) Draw y-chart use in designing of VLSI circuits.
 - c) What is ion-implantation technique?
 - d) What is base width modulation?
 - e) Define pass transistor and draw its symbolic diagram.
 - f) Draw PMOS and NMOS inverter circuit.
 - g) Implement half adder using PAL.
 - h) Name different types of ROMs. Also differentiate them.
 - i) Write rules for drawing stick diagram in brief.
 - j) Define 2-phase clocking system.

PART-A

- | | | |
|-----|--|-------------|
| Q.2 | a) Discuss transport phenomenon for CZ crystal growth technique.
b) Compare diffusion with ion implantation.
c) Define resolution. List various lithographic techniques and explain any one of them. | 8
5
7 |
| Q.3 | a) Derive expression for drain current of MOSFET for different regions of operation.
b) Define figure of merit of MOS transistor and find its mathematical expression. | 10
10 |
| Q.4 | a) Explain band bending for MOSFET with the help of energy band diagram.
b) What do you mean by latch-up problem in CMOS circuit? How can it be avoided. | 10
10 |

PART-B

- | | | |
|-----|--|----|
| Q.5 | a) Implement NOR gate using PMOS. | 6 |
| | b) What are the steps followed for design of logic gates using CMOS technology. Explain with examples. | 7 |
| | c) Explain dynamic logic structure for CMOS circuits. | 7 |
| Q.6 | a) Implement 3-bit adder circuit using PMOS technology. Also explain its truth table. | 10 |
| | b) Implement the circuit of T-flip-flop at circuit level. | 10 |
| Q.7 | a) Design the following function using PLA: | |
| | $F_0 = \sum m(0,1,4,6)$ | |
| | $F_1 = \sum m(2,3,4,6,7)$ | |
| | $F_2 = \sum m(0,1,2,6)$ | |
| | $F_3 = \sum m(2,3,5,6,7)$ | 10 |
| | b) Design a BCD to excess 3-code converter counter using PAL and PLA. | 10 |

End Semester Examination, May 2019

B. Tech. – Third / Fourth Semester

ELECTRO MAGNETIC FIELD AND WAVES (EC-304A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1

 - a) State uniqueness theorem.
 - b) If $\phi(x, y, z) = 3x^2y - y^3z^2$, find $\nabla\phi$ at the point $(1, -2, -1)$
 - c) What is VSWR?
 - d) Explain the significance of pointing vector.
 - e) What is surface impedance?
 - f) Define the term 'Brewster angle'.
 - g) Explain Faraday's law.
 - h) Draw the field lines for two equal and opposite charges.
 - i) Convert point $P(-2, 6, 3)$ from cartesian to spherical co-ordinates.
 - j) Define input impedance of a transmission line.

2x10

PART-A

- Q.2 a) Two point charges of equal mass m , and charge Q are suspended at a common point by two threads of negligible mass and length ℓ . Show that at equilibrium the inclination angle α of each thread to the vertical is given by:

$$Q^2 = 16\pi \epsilon_0 mg\ell^2 \sin^2 \alpha \tan \alpha$$

If α is very small, show that $\alpha = 3\sqrt{\frac{Q^2}{16\pi \epsilon_0 mg \ell^2}}$ 10

b) State Gauss's law and prove that $\nabla \cdot \vec{D} = \rho_v$ where \vec{D} is the electric flux density vector and ρ_v is the volume charge density. 10

- Q.3 a) Show that the flux density \bar{B} at a distance R from a thin linear conductor of infinite length with constant current I is given by $\bar{B} = \left(\frac{\mu I}{2\pi R} \right)$. **10**

- Q.4 a) Verify that the vector field given by $\vec{A} = yz \hat{a}_x + zx \hat{a}_y + xy \hat{a}_z$ is irrotational and solenoidal. **10**

b) Express the vector $\vec{B} = \frac{10}{r} \hat{a}_r + r \cos \theta \hat{a}_\theta + \hat{a}_\phi$ in Cartesian coordinates. **10**

PART-B

- Q.5** a) Derive an expression for Poynting vector and explain its significance. **10**
b) Give the physical interpretation of Maxwell's equation. **7**
c) Distinguish between conduction and displacement currents. **3**

- Q.6** a) Discuss the electromagnetic wave propagation in good dielectric. **8**
b) Define axial ratio, tilt angle of polarization ellipse for all types of polarization. **8**
c) Define transmission coefficient with reference to traveling waves. **4**

- Q.7** a) Discuss the solution of transmission line equations. **8**
 b) What is Smith chart? What are its applications? **5**

c) Derive an expression for the input impedance of transmission line.

7

End Semester Examination, May 2019

B. Tech. – Eighth Semester

UTILIZATION OF ELECTRIC POWER AND TRACTION (EE-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Why is tungsten selected as the filament material?
- b) Compare the metal filament lamp with discharge lamps.
- c) List the properties of good heating element.
- d) Mention the advantages of dielectric heating.
- e) What are the limitations of resistance welding?
- f) Write the full form of TIG and MIG welding?
- g) The process of depositing a coating of one metal over another metal or non-metal electrically is called _____.
- h) What are the applications of electrolysis?
- i) Write the factors on which the quantity of electroplating depends.
- j) What are the requirements of an ideal traction system? **2×10**

PART-A

- Q.2** a) Explain with a neat sketch, the construction and working of a sodium vapour lamp. **10**
b) An office $25\text{ m} \times 12\text{ m}$ is illuminated by 40W incandescent lamps of lumen output 2700 lumens. The average illumination required at a workplace is 200 lux. Calculate the number of lamps required to be fitted in the office. Assume utilization and depreciation factors as 0.65 and 1.25 respectively. **10**
- Q.3** Explain different methods of induction heating. Give some applications of induction heating. **20**
- Q.4** a) Compare AC and DC welding in detail. **8**
b) Describe the following types of welding:
i) TIG welding.
ii) MIG welding. **6×2**

PART-B

- Q.5** a) State law's of Faraday of electrolysis and explain it in detail. **10**
b) Calculate the thickness of copper deposited on a plate area of 2.2 cm^2 during electrolysis if a current of 1A is passed for 90 minutes. ECE of copper = 32.95×10^{-8} and density of copper = 8900 kg/m^3 . **10**
- Q.6** a) Describe different systems of track electrification? **8**
b) Explain speed-time curve of a train running on main line. **12**
- Q.7** a) Draw electric circuit of a refrigerator and explain its working. How can temperature inside the refrigerator be adjusted? **10**
b) Explain the working of central air-conditioning system. How is air from microorganism, gaseous contaminant and odours purified? **10**

End Semester Examination, May 2019

B. Tech.—Sixth Semester

WIRELESS COMMUNICATION (EC-506)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is the role of HLR, VLR and AUC in GSM system?
- b) What is EIRP?
- c) What does ARFCN stand for in GSM system? How many users are supported by one ARFCN?
- d) Define forward channel, reverse channel, downlink and uplink in mobile communication.
- e) List various types of 2 G and 2.5 G standards.
- f) Write the expression for power received in a two ray ground reflection model.
- g) What are the factors affecting small-scale fading?
- h) What are the various modes of propagation in communication channel?
- i) If 50 MHz spectrum is allocated from the band of 800 MHz of a cellular operator, with channel bandwidth 60 KHz for communication. Calculation total number of channels available.
- j) Differentiate 3G and 4 G standards.

2x10

PART-A

- Q.2** a) Explain signal processing in GSM system with a labeled diagram. **10**
b) Explain in brief: i) paging system ii) Cordless systems. **10**

Q.3 Write short notes on:

- a) EDGE. b) 4G/LTE. c) WCDMA. d) WLAN.

5x4

- Q.4** a) Explain various types of fading channels in detail for doppler speed and multipath propagation. **10**
b) Derive an expression for free-space path loss propagation model. **7**
c) Find the far field distance for an antenna with maximum dimension 3m and operating frequency of 800 MHz. **3**

PART-B

- Q.5** a) What do you understand by diversity techniques? Explain them in detail. **10**
b) Define equalization. List its various types. Also, explain the fundamentals and role of equalization in communication receivers. **10**

- Q.6** a) Explain briefly the concept of frequency reuse. Prove that $C=MS$ where 'M' is number of times the cluster is replicated and 'S' is the number of duplex channels available for use. **6**
b) If a total of 40 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses 30 KHz simplex channels to provide full duplex channels (Voice and control channels), compute the number of channels available per cell if a system uses i) 4-cell reuse ii) 7-cell reuse. **4**
c) Derive an expression for signal-to-interference ratio and system capacity between co-channel cells in a cellular system. **10**

Q.7 Write short notes on:

- a) Spread spectrum access techniques.

End Semester Examination, May 2019

B. Tech. – Sixth Semester

NEW AND RENEWABLE ENERGY SOURCES (EE-625A)

Time: 3 hrs.

Max Marks: **100**No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) List various non-conventional energy sources.
 b) What is the scenario of the total power generation in India?
 c) Define solar azimuth angle.
 d) What is photovoltaic effect?
 e) Explain the term wind energy pattern factor?
 f) What is pitch angle?
 g) What are the limitations of using biomass?
 h) What are the advantages of Tidal power?
 i) What is the efficiency of OTEC?
 j) What is nuclear fusion? **2x10**

PART-A

- Q.2 a) Discuss briefly the “Angstrom equation” used for estimation of average solar radiation. **10**
 b) How do you design and fabricate a flat plate collector? **10**
- Q.3 a) Explain the working of photovoltaic cell. What are the different ways of using PV cells to provide power? **10**
 b) Explain the working of the devices used for measuring of solar radiations. **10**
- Q.4 a) What is the classification of windmills? Describe them in detail. **10**
 b) What are the parameters to be considered while selecting a windmill? Also write the design considerations of wind turbine. **10**

PART-B

- Q.5 a) Classify and explain the tidal power plants on the basis of basins. **10**
 b) Derive the relation for yearly power generation from a tidal project. **10**
- Q.6 a) What is the selection criteria for the site of hydro-electric plant? **10**
 b) Explain the construction and working of different types of turbines used in small hydro plants. **10**
- Q.7 a) List the various component of fuel cell and explain it in detail. **10**
 b) Write short notes on:
 i) Power from nuclear fusion.
 ii) Geothermal energy. **5x2**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

HIGH VOLTAGE ENGINEERING (EE-621A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) What are different forms of high voltage?
b) What is a voltage doubler?
c) Define 'basic impulse level'.
d) What is an impulse generator?
e) What is the significance of over voltage?
f) What is switching over voltages?
g) What is meant by insulation coordination?
h) What is insulation breakdown?
i) What are the environmental aspects in EHV and UHV line design?
j) What are the principles of common live line maintenance? **2×10**

PART-A

- Q.2 a) Explain the working of Van de Graff generator with diagram. **10**
b) Write a short note on 'voltage multiplier circuits'. **10**
- Q.3 a) Briefly explain any multistage impulse generator. **10**
b) Write a short note on 'generation of switching surges'. **10**
- Q.4 a) Discuss the phenomenon of lightning discharge in detail. **10**
b) Briefly explain surge diverter. **10**

PART-B

- Q.5 a) Briefly explain the methods of reducing switching over voltages. **10**
b) Explain the principle of insulation coordination. **10**
- Q.6 a) Briefly explain the concept of insulation breakdown. **10**
b) Briefly explain conduction and breakdown in gases. **10**
- Q.7 Explain principle of line maintenance and also write about the tools used in line maintenance. **20**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

SWITCH GEAR AND PROTECTION (EE-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

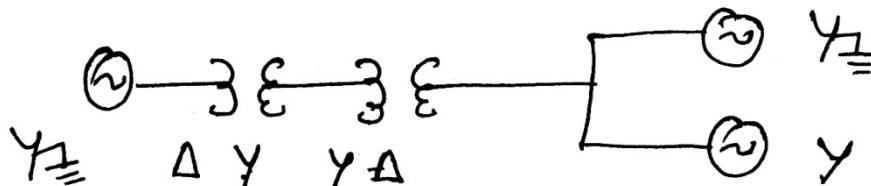
Q.1 Answer the following questions:

- a) Why do we prefer to analyze unsymmetrical faults by symmetrical components method?
- b) Draw the sequence network for one conductor open fault on power system.
- c) What is the purpose of resistance switching?
- d) Why current interruption easier in an AC circuit than in DC circuit?
- e) List the reasons for generation of overvoltages.
- f) What is surge absorber?
- g) Sketch typical time / P.S.M. curve.
- h) What is meant by time grading of relays?
- i) How ground wire provide protection against direct stroke?
- j) Name some important fault occurring on alternators.

2x10

PART-A

Q.2 a) Draw the negative and zero sequence network for the given network:



10

b) Derive an expression for three phase power in terms of symmetrical components. **10**

Q.3 a) Derive an expression for fault current for single line to ground fault by symmetrical component method. **10**

b) Three impedances of $5-j10$, $6+j5$ and $3+j15\Omega$ are connected in star to red, yellow and blue lines of $3300V$, $3-\phi$, 3 wire supply. The phase sequence is RYB. Calculate the line current I_R . **10**

Q.4 a) Explain the construction and working of SF₆ circuit breaker. **10**

b) A circuit breaker is rated as 2500A, 1500MVA, 33KV, 3 sec, 3-phase oil circuit breaker. Determine:

- i) rated normal current.
- ii) breaking current.
- iii) making current.
- iv) short-time rating-I.

10

PART-B

Q.5 a) Explain the following terms as applied to protective relaying:

- | | |
|------------------------------|------------------------------|
| i) Pick up value | ii) Current setting. |
| iii) Plug-setting multiplier | iv) Time setting multiplier. |

10

b) Explain the construction and the principle of operation of distance relays. **10**

- Q.6 a) Explain with diagram the application of Merz-price circulating current principle for protection of alternator. **10**
b) Describe the construction and working of a Buchholz relay. **10**
- Q.7 a) What is the difference between direct and indirect stroke and also discuss streamers? **10**
b) Explain the construction and working of:
i) Rod gap lightning arrestor.
ii) Horn arc lightning arrestor. **10**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

POWER SYSTEM ENGINEERING (EE-406)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- What factors are taken into account while selecting the site for a steam power plant?
- What is the function of economisers in thermal power plant?
- What is the importance of load factor?
- A generating station has a connected load of 43 MW and a maximum demand of 20 MW . The units generated being 61.5×10^6 per annum. Calculate: i) the demand factor ii) Load factor.
- What should be the main characteristics of tariff?
- Discuss why string efficiency in an DC system is low?
- What are the advantages of 3-curve distribution over 2-wire distribution?
- Why skin effect is absent in DC system?
- What is meant by transposition of line conductor?
- Differentiate between grounding and earthing.

2x10

PART-A

Q.2 a) Draw a neat schematic diagram of hydroelectric plant and explain function of various components. **15**
b) Discuss the various parts of nuclear reactor. **5**

Q.3 a) The maximum demand of a consumer is 20A at 220V and his total energy consumption is 8760 kWh . If the energy is charged at rate of 20 paise per unit for 500 hours use of the maximum demand per annum plus 10 paise per unit for additional unit calculate i) annual bill ii) equivalent flat rate. **10**
b) A power supply is having the following loads:

Types of load	Base demand	Diversity of group	Demand factor
Domestic	1500	1.2	0.8
Commercial	2000	1.1	0.9
Industrial	10,000	1.25	1

If the overall system diversity factor is 1.35 determine i) the maximum demand ii) connected load of each type. **10**

Q.4 a) Why are insulators used with overhead lines? Discuss the desirable properties of insulators **10**
b) Explain the following:
i) Critical disruptive voltage
ii) Visual critical voltage
iii) String efficiency.
iv) Power loss due to corona. **10**

PART-B

Q.5 a) What do you understand by constants of an overhead transmission line? Derive an expression for inductance per phase for a three phase overhead transmission line when conductors are symmetrically placed. **10**

b) Deduce an expression for voltage regulation of short transmission line. Also, draw its vector diagram. **10**

Q.6 a) Derive an expression for the voltage drop for a uniformly loaded distributor fed at one end. **10**

b) Write short notes on:
i) System of ac distribution.
ii) Ring main distribution. **5x2**

Q.7 What is neutral grounding? Explain in details different methods of neutral grounding. **20**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ELECTRICAL DRIVES (EE-602B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the advantages of electric drive?
- b) List the types of electric braking.
- c) What are circulating currents?
- d) What is pole pitch in stepper motors?
- e) Differentiate between active and passive loads.
- f) List the methods of speed control of induction motor.
- g) Enumerate the applications of synchronous motor drive.
- h) Compare VSI and CSSI.
- i) What is plugging in dc motor drives?
- j) What is duty cycle?

2×10

PART-A

Q.2 a) Describe the block diagram of electric drive. What are the application and advantages of electric drives? **10**
b) Explain the multi-quadrant operation of electric drives with suitable example. **10**

Q.3 a) Discuss the operation of single phase fully controlled rectifier fed dc separately excited motor in discontinuous mode of operation. Derive the appropriate expression of speed and draw the waveform of load voltages and current. **12**
b) Describe the working of the dual converters fed dc drives. **8**

Q.4 a) Discuss how motoring and braking operation can be achieved in chopper fed dc drives. **10**
b) A 230V, 690 rpm and 200A separately excited dc motor has an armature resistance of 0.02Ω . The motor is fed from a chopper for braking and motoring operations. The source has a voltage of 230V. Assuming continuous conduction.
i) Calculate duty ratio of the chopper for motoring operation at rated torque of 350 rpm.
ii) If the maximum duty ratio of chopper is limited to 0.95 and maximum permissible current is twice the rated, calculate the maximum permissible motor speed obtainable without field weakening. **10**

PART-B

Q.5 a) Discuss how the speed of induction motor can be controlled by employing voltage source inverters. **10**
b) Explain slip power recovery scheme in detail. **10**

Q.6 a) What is true synchronous mode of synchronous drive? Discuss the block diagram of variable frequency control of multiple synchronous motors. **10**
b) Explain self-controlled synchronous motor drive employing load commutation. **10**

Q.7 a) Discuss the working of variable reluctance stepper motor. List its features and applications. **10**

b) Explain the BLDC motor in detail. Enumerate its advantages over conventional DC motors. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

SMART GRID TECHNOLOGY (EE-834A / EE-834)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is the need of smart grid?
b) Differentiate between resilient and self-healing grid.
c) Briefly explain outage management system.
d) State the role of cyber security in smart grid.
e) List the advantages of automatic meter reading.
f) Give the concept of DMS in distribution system.
g) Write down the applications of microgrid.
h) Classify power quality conditioners.
i) Illustrate substation automation.
j) Define: vehicle to grid. **2×10**

PART-A

- Q.2 a) Do the comparison of conventional grid and smart grid. **10**
b) How electric grid evolved into smart grid? Explain with all stages. **10**
- Q.3 a) Describe how centralised Fault Location, Isolation and Service Restoration (FLISR) system can work under fault conditions. **12**
b) Illustrate the concept of PHEVs with their benefits and types. **8**
- Q.4 a) What do you understand by AMI? How its functionality benefit for the utilities and customers? **10**
b) List different smart appliances and describe an integration of smart appliances into grid for home and building automation. **10**

PART-B

- Q.5 a) Explain the concept of power quality and Electromagnetic Compatibility (EMC) in smart grid. **10**
b) Describe power quality issues of grid connected renewable energy sources. **10**
- Q.6 a) Describe the concept and formation of microgrid. **10**
b) State and explain the issues of inter connecting the microgrid with the utility grid. **10**
- Q.7 a) Demonstrate the importance and role of cloud computing in smart grid. **10**
b) Explain HAN and NAN with their advantages and disadvantages. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

ELEMENTS OF ELECTRICAL ENGINEERING (EE-101B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

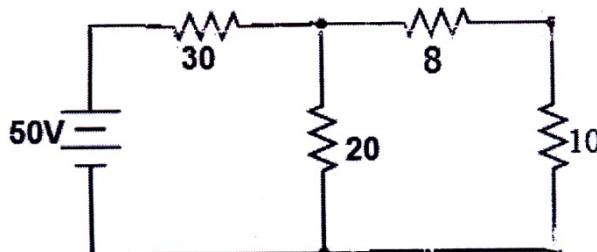
Q.1 Answer the following:

- Find the impedance of a coil with resistance 9Ω and reactance 16Ω .
- State Kirchoff's current Law.
- What is wattles power? Write its unit also.
- An ideal voltage source should possess _____ source resistance.
- Write an expression for synchronous speed in terms of frequency and number of poles.
- What are the basic requirements of a measuring instrument?
- List two differences between shell type and core type transformer.
- What is an auto transformer?
- For a star connected system line voltage is _____ times phase voltage.
- What are different types of excitation of a dc machine?

2×10

PART-A

Q.2 a) Explain superposition theorem. **10**
b) Obtain the current in 20 ohm resistor using mesh analysis of the network in the figure. All the resistances are in ohms.



10

Q.3 a) A voltage $e = 250\sin 314t$ is applied to a resistance $R = 100\text{ ohm}$ and a capacitance $C = 55\text{ }\mu\text{F}$. Find the expression for the current and also determine the power taken by the circuit. **10**
b) Derive the expression for resonant frequency for a series RLC circuit. **4**
c) State the advantages of three phase system over single phase system. **6**

Q.4 a) Explain construction of induction type wattmeter. **12**
b) What are the advantages of moving iron meters? **8**

PART-B

Q.5 a) Derive the emf equation of a transformer **10**
b) Discuss the different losses in a transformer. **10**

Q.6 a) Explain the working principle of dc generator. **5**
b) Draw and explain the parts of dc machine. **10**
c) Write short notes on brushless dc motor. **5**

Q.7 a) Explain the working of a synchronous generator. **5**
b) Explain the working principle of three phase induction motor. **10**
c) Explain any one type single phase induction motor. **5**

End Semester Examination, May 2019

B. Tech. – First Semester

ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING (EE-102A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

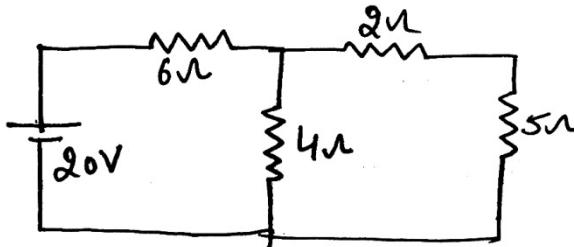
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) The power consumed in a pure inductive circuit is zero. Why?
b) What is power factor? What is its significance?
c) State and explain superposition theorem. How is it applied for solving a network?
d) Can three phase induction motor run at synchronous speed? Justify the statement.
e) What are the advantages of three phase supply over single phase?
f) On what principle does the transformer operate?
g) Differentiate between Zener and Avalanche breakdowns.
h) Convert the binary number 10.111 to decimal.
i) Develop the truth table for a NOR gate with two inputs.
j) Common collector configuration is commonly used for _____.

2×10

PART-A

- Q.2 a) Explain thevenin's theorem, illustrate the application of thevenin's theorem. **10**
b) Obtain the current in the 5Ω resistor in the following circuit by using Norton's theorem.



10

- Q.3 a) What do you mean by series resonance? Derive the condition for resonance in a series R-L-C circuit. **10**
b) A coil of resistance 20Ω and an inductance of 200mH is connected in series with a capacitance of $40\mu\text{F}$ across $200\sin 314t$ ac supply. Calculate:
i) Impedance:
ii) Magnitude of current.
iii) Voltage across each element.
iv) Power factor
v) Phasor diagram of the circuit. **10**

- Q.4 a) Explain the working principle and construction of transformer. **10**
b) Describe the principle of operation and construction detail of dc machine. **10**

PART-B

- Q.5 a) Explain various breakdown mechanisms occurring in P-N junction diode. **10**
b) Explain working principle of:
i) Schottky diode.
ii) Photo diode with their applications. **5×2**
- Q.6 a) Draw and explain with input and output characteristics, circuit of common base configuration. **10**
b) Write short notes on:

- i) FET
- ii) Oscilator

5×2

Q.7 a) Draw the diagram of J-K flip-flop and give the truth table.

10

b) Convert:

$$\text{i) } (F \cdot E \cdot F \cdot F)_{16} = (?)_2$$

$$\text{ii) } (77654)_8 = (?)_2$$

5×2

End Semester Examination, May 2019

B. Tech. – Sixth Semester

RADAR ENGINEERING (EC-721)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Which radar parameter determines its range resolution?
b) A radar has a duty cycle of 0.2 and peak power of $100W$, what will be its average power?
c) List any two remedial measures to overcome blind speed problem in an MTI radar.
d) What is the effect on maximum unambiguous range of a radar, when its p.r.f. is reduced.
e) Write any two limitations of a CW radar.
f) If an echo signal is received in a radar after $800 \mu\text{sec}$, what will be target range?
g) If the received echo signal has higher frequency than transmitted signal, the target is moving away from radar. (**True or False**)
h) Mono pulse tracking radar has better accuracy. (**True or False**)
i) Define noise figure.
j) What is the advantage of using staggered frequency in MTI radar? **2x10**

PART-A

- Q.2 a) Briefly explain the operation of a pulse radar with the help of a block diagram. **10**
b) How is range of a target and angular position determined in a radar? Which parameter determines maximum unambiguous range? **10**
- Q.3 a) Starting from fundamentals, derive radar range equation. What are its various forms? **10**
b) Two aircrafts are flying at same radial range of 30 km and at same elevation angle. The aircrafts are separated in azimuth by a distance of 1 km . Determine, what will be maximum permissible HPBW (Half Power Beam Width) of the radar, if these aircraft are to be resolved in azimuth. **10**
- Q.4 a) Describe the operation of a FMCW radar with the help of a block diagram. What are its applications? **10**
b) What are the limitations of a CW radar? Explain in detail the operation of a multi frequency CW radar. **10**

PART-B

- Q.5 a) What is a mono-pulse tracking radar? How does it operate? What are its features? Comment on its accuracy. **10**
b) What are the salient features of Single Target Tracking Radar and Automatic Detection And Track (ADT)? Make a comparison between the two. **10**
- Q.6 a) Two MTI radar systems are operating at the same p.r.f, but at different operating frequencies. Blind speeds of these radars are such that second blind speed of first radar is equal to fourth blind speed of second radar. Find the ratio of their operating frequencies. **10**
b) With the help of a block diagram, discuss the operation of MTI radar, which uses power amplifier as transmitter. **10**

- Q.7 a) What is a radar duplexer and what are its types? Explain the operation of a balanced duplexer. **10**
- b) Write short notes on **(any two):**
- i) SONAR.
 - ii) Receiver Protectors.
 - iii) Synthetic Aperture Radar. **5x2**

End Semester Examination, May 2019

B. Tech. – Fourth Semester
POWER SYSTEM-I (EE-304A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following:

- a) Define 'base-load' and 'peak-load'.
- b) What do you mean by GMD?
- c) What is depreciation?
- d) Why grading of cables are done?
- e) What factors are taken into account while selecting the site for a steam power plant?
- f) The max demand on a power station is 100 MW. If annual load factor is 40%. Calculate the total energy generated in a year.
- g) What is skin effect?
- h) Why string efficiency of dc is 100%?
- i) What are desirable characteristics of tariff?
- j) Why suspension type insulators are preferred over pin type insulators?

2x10

PART-A

Q.2 a) Draw a schematic diagram of hydro power plant and explain the function of each components in detail. **15**
b) Discuss the factors for choice of site for a nuclear power plant. **5**

Q.3 An electric supply company having a maximum load of 50 MW generators 18×10^7 units per annum and the supply consumers have an aggregate demand of 75 MW . The annual expenses including capital cost are:

For fuel = Rs. 90 lakhs.

Fixed charges concerning generation = Rs. 28 lakhs.

Fixed charges concerning transmission = Rs.32 lakhs.

Assuming 90% of the fuel cost is essential to running charges and the loss in transmission and distribution as 15% of KWh generated, deduce a two part tariff to find the actual cost of supply to the consumer. **20**

Q.4 a) Explain different types of insulators in details. **10**
b) What is sag? Derive an expression to calculate sag when supports are at equal levels. **10**

PART-B

Q.5 Derive an expression for the inductance per phase of a 3-phase line with:
a) Equilateral spacing.
b) Unsymmetrical spacing. **20**

Q.6 Explain different connection schemes of a distribution system in detail. **20**

Q.7 Write short notes on:
a) Reactance grounding.
b) Resistance grounding.
c) Equipment grounding.
d) Peterson coil grounding. **5x4**

End Semester Examination, May 2019

B. Tech. — Seventh / Eighth Semester

ADVANCED TELEVISION ENGINEERING (EC-801A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

- Q.1 a) Define the term ‘flicker’.
 b) Why is FM preferred for sound signal transmission?
 c) Calculate and interlace error if 2nd field start with a delay of 32 μ sec.
 d) Define deflection angle with reference to a picture tube.
 e) What is a composite video signal?
 f) Why is the e-beam given a cycloidal motion before it hits the target plate?
 g) Calculate the transmitted power for a system with modulation index of 50% and a carrier power of 10 watts.
 h) Define ‘compatibility’.
 i) What is the function of aquadag coating on the inner side of tube bell?
 j) Write any two advantages of a digital TV. **2×10**

PART-A

- Q.2 a) Draw the block diagram of a TV transmitter system and explain its each block in brief. **10**
 b) Justify the choice of 625 lines for TV transmission. Why is the total number of lines kept odd in all television system? **10**
- Q.3 a) Show that in the 625 B-system a total channel bandwidth of 11.25 MHz would be necessary if both the sidebands of the amplitude modulated picture signal are fully radiated along with frequency modulated picture signal. **10**
 b) What is VSB and why is it used for transmission of TV picture signals? **10**
- Q.4 a) Discuss the merits of electromagnetic deflection over electrostatic deflection in TV picture tubes. **10**
 b) Explain the two photoelectric effects taking place in a monochrome camera tube. **10**

PART-B

- Q.5 a) Explain the terms:
 i) Primary colours.
 ii) Hue.
 iii) Additive colour mixing.
 iv) Luminance.
 v) Saturation. **2×5**
 b) Define astigmatism and coma errors with reference to a PIL tube and describe the field distribution which must be obtained to overcome such distortion in the reproduced picture. **10**
- Q.6 a) Discuss the merits and demerits of positive and negative amplitude modulation in TV systems. **10**
 b) Describe the factor that influence the choice of picture IF = 38.9 MHZ and sound IF = 33.4 MHz in the 625 B monochrome TV system. **10**
- Q.7 Write short notes on (**any four**):
 a) Cable TV. b) CCTV. c) Remote control. d) HDTV. e) Plasma TV.
5×4

End Semester Examination, May 2019

B. Tech. – Sixth Semester

COMMUNICATION SYSTEM-II (EC-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define autocorrelation function. Write its properties.
 b) Cite the difference between PAM and PTM.
 c) For a signal of bandwidth 3 KHz and SNR of 15dB. Calculate the channel capacity.
 d) How to convert an analog signal into digital signal?
 e) A source generates one of five possible messages Q_1 to Q_5 having probabilities $\frac{1}{2}, \frac{1}{2}, \frac{1}{8}, \frac{1}{8}, \frac{1}{16}$ respectively, every microsecond. Calculate the information rate.
 f) Prove that : $H(xy) = H(x) + H\left(\frac{y}{x}\right)$
 g) Define information one of four possible messages Q_1, Q_2, Q_3 & Q_4 having probabilities 0.4, 0.3, 0.2 and 0.1 respectively is transmitted. Calculate the average information per message.
 h) Define probability density function (PDF).
 i) List the advantages and disadvantages of digital communication.
 j) Why is clock recovery required in a BPSK demodulator circuit? **2×10**

PART-A

- Q.2 a) What is sampling? State and prove sampling theorem. **5**
 b) Why compounding is needed? Discuss the various laws of compounding. **8**
 c) In a PCM system, the signal to noise ratio is to be held to a minimum of 40 dB. Determine the number of quantization levels needed. **7**

- Q.3 a) Draw and explain QPSK modulator and demodulator. Determine the bandwidth requirement for QPSK signal. **12**
 b) Give the performance comparison of BPSK and DPSK. **8**

- Q.4 What is an optimum filter? Derive the expression for probability of error, P_e and transfer function, $H(f)$ of optimum filter. **20**

PART-B

- Q.5 a) What is entropy? Consider a binary memory less source x with two symbols x_1 and x_2 . Show that entropy, $H(x)$ is maximum when both x_1 and x_2 are equiprobable. Also find out the maximum value of $H(x)$. **8**
 b) A source x has five equally likely symbols:
 i) Construct shannon-Fano code for x and calculate the efficiency of the code.
 ii) Repeat for the Huffman code and compare the results. **6×2**

- Q.6 a) Let Z be a random variable with PDF $f(z) = \frac{1}{2}$ in the range $-1 \leq z \leq 1$. Let the random variable $x = z$ and the random variable $y = z^2$. Show that x and y are correlated. **10**
 b) Find the mean and variance of random variable x which is uniformly distributed between a and b , $a < b$. **10**

- Q.7 a) Explain the term power spectral density, $S_{xx}(f)$. Show that the power spectrum of a (real) random process is real, i.e. $S_{xx}(-f) = S_{xx}(f)$. **8**
- b) Let $x(t)$ and $y(t)$ be defined by $x(t) = A \cos \omega t + B \sin \omega t$
 $y(t) = B \cos \omega t - A \sin \omega t$
Where ω is constant and A and B are independent random variables both having zero mean and variance σ^2 . Find the cross correlation of $x(t)$ and $y(t)$. **12**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ELECTRIC POWER APPLICATIONS AND TRACTION (EE-721A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Derive relationship between luminance, luminance intensity and illumination.
b) Why sodium vapour discharge lamps are not used for general lighting?
c) How stroboscopic effect is eliminated in fluorescent tube light?
d) What are the factors to be considered while designing lighting scheme?
e) State the difference between dead weight and accelerating weight of a locomotive.
f) Why AC is found most suitable for resistance welding?
g) What causes failures of heating elements?
h) Outline the principle of seam welding.
i) Identify the relationship between chemical equivalent, atomic weight and valency of substance.
j) Enumerate the factors on which quality of electro deposit depends? **2×10**

PART-A

- Q.2 a) A class room 30×15 m with a ceiling height of 5 m is to be provided with a general illumination of 120 lumen/m². The utilization factor = 0.5 and depreciation factor = 1.4. Determine the number of lamps required, their spacing and total wattage. Take efficiency of Lamp as 40 lumen/watt for 80 watt lamp. **10**
b) Give comparison between incandescent lamp and fluorescent lamp. **5**
c) Discuss the arrangement of fluorescent lamp on DC supply. **5**
- Q.3 a) A 27 kW, 3-φ, 400V resistance oven employ, nickel chrome strip 0.25 mm thick for 3-star connected heating element. If the temperature of strip is 1000°C and that of charge is 600°C. Estimate a suitable width of the strip. Assume emissivity = 0.9 and radiating efficiency = 0.5 and resistivity of strip material is $101.6 \times 10^{-8} \Omega\text{m}$. **10**
b) Demonstrate the working of Ajax Wyatt furnace with proper diagram. **10**

- Q.4 a) Write short notes on:
i) Submerged arc welding.
ii) Carbon arc welding. **5×2**
b) What is the fundamental difference between electric arc and resistance welding? **5**
c) Explain basic principle of resistance welding. **5**

PART-B

- Q.5 a) If 18.258 gm of nickel is deposited by 100A flowing for 10 min, how much copper would be deposited by 50A for 6 minutes? Atomic weight of nickel = 58.6 and that of copper = 63.18. valency of both is 2. **10**
b) What is electroplating? Why it is done for? Also describe the various operations involved in electroplating. **10**
- Q.6 a) Explain the mechanism of train-movement. **10**
b) A train is required to run between two stations 2 Km apart at a schedule speed of 36 km/hr, the duration of stops being 20 sec. The braking retardation is 2.7 km/h/s. Assuming a trapezoidal speed-time curve, calculate the acceleration if the ratio of maximum speed to average speed is 1.2. **10**

- Q.7** a) Explain vapour compression refrigeration system with proper diagram. **10**
 b) Draw the electric circuit of refrigerator and explain its working. **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

DIGITAL ELECTRONICS AND CIRCUITS (EC-202)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1**
- a) Define 'modulus of a counter'. Differentiate ring and Johnson counter in terms of modulus
 - b) Draw XOR gate by using only four NAND gates.
 - c) What is priority encoder? How is it different from an ordinary encoder?
 - d) What are alphanumeric codes? Give its example.
 - e) What is the difference between toggling and race around condition? How race around condition is avoided?
 - f) What are the advantages of digital signal over analog signal?
 - g) Differentiate between 'synchronous' and 'asynchronous' counters with examples.
 - h) What is the requirement of A/D and D/A converters? Explain with examples.
 - i) What are the characteristics of digital ICs?
 - j) What is the need of interfacing between TTL and CMOS and how is it implemented?
- 2×10**

PART-A

- Q.2**
- a) Perform the following using BCD addition:
 - i) $(39)_{10} + (12)_{10}$.
 - ii) $(45)_{10} + (67)_{10}$.
 - b) Convert:
 - i) $(ABCD \cdot FFF)_{16} = (?)_2$.
 - ii) $(4356 \cdot 421)_8 = (?)_2$.
 - iii) $(4FB7 \cdot C)_{16} = (?)_8$.
 - iv) $(45)_{10} = (?)_{Excess-3}$.
 - c) Prove that:
 - i) $(A + \overline{B} + \overline{C})(A + \overline{B}C) = A + \overline{B}C$.
 - ii) $(\overline{A}B + \overline{A}\overline{B} + \overline{B}) = \overline{A} + \overline{B}$.
 - iii) $\overline{(A + C) \cdot (B + D)} = A\overline{C} + \overline{B}D$.
- 6** **8** **6**

- Q.3**
- a) Minimize the following using QM method:

$$F(A, B, C, D) = \sum m(1, 4, 5, 10, 12, 14).$$
 - b) Design 32:1 multiplexer using 8:1 multiplexer and some additional circuits. if required.
- 12** **8**

- Q.4**
- a) Do the following flip flop conversions?
 - i) JK to T.
 - ii) D to SR.
 - iii) JK to SR.
 - b) What is the difference between toggling and race around condition? What are the remedies to remove race around condition? Draw and explain the working of JK flip flop with its truth table.
- 8** **12**

PART-B

- Q.5**
- a) Design synchronous decade counter using T Flip-Flop.
- 10**

- b) Draw and explain the working of bidirectional shift register. **10**
- Q.6 a) What is the major advantage of R-2R ladder type DAC as compared to weighted resistor type DAC? Draw and explain 4 bit R-2R ladder type DAC. **14**
b) Draw and explain dual slope type analog to digital converter. **6**
- Q.7 a) Why ECL is called emitter coupled logic? Explain it's working as NOR/OR logic. **10**
b) Explain the following characteristics of digital ICs:
i) Propagation delay time. ii) Noise margin.
iii) Operating temperature. iv) Power dissipation. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

OPTICAL COMMUNICATION (EC-723A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Define intensity modulation.
b) Sketch the initial and final energy states showing:
i) Absorption.
ii) Stimulated emission.
c) Define the term refractive index. Describe the function of core and cladding in optical fibre.
d) Write two requirements of photodetectors.
e) If the refractive index of an optical fibre core is 1.40 and the relative refractive index difference is 1%, determine the refractive index of cladding.
f) Sketch the attenuation spectra for intrinsic loss in pure GeO_2 and SiO_2 .
g) A p-n photodiode has a quantum efficiency of 50% at a wavelength of $0.9 \mu m$. Calculate its responsivity at $0.9 \mu m$.
h) Derive the relationship between n_1 , n_2 and Q_a .
i) Define dispersion.
j) Define the term population inversion. **2x10**

PART-A

- Q.2 a) Write the advantages of optical communication system. **12**
b) Draw and explain the block diagrams of optical transmitter circuit and optical receiver circuit. **8**
- Q.3 a) Describe the complete mechanism of intermodal dispersion in a multimode step index fiber. **8**
b) A typical relative refractive index difference for an optical fiber designed for long distance transmission is 1%. Estimate the NA and solid acceptance angle in air for the fiber when the core index is 1.46. Further calculate the critical angle at the core-cladding interface within the fiber. **12**
- Q.4 a) What are internal and external quantum efficiencies? Derive an expression for internal quantum efficiency showing its relationship with power generated internally P_{int} to LED. **10**
b) Outline the common LED structures for optical fibre communications discussing their relative merits and demerits. **10**

PART-B

- Q.5 a) Briefly explain the working of distributed feedback lasers with a suitable diagram. **10**
b) Write short notes on:
i) Fabry Perot laser.
ii) Quantum well laser. **5x2**
- Q.6 a) Explain the principle construction and working of APD. **10**
b) What are phototransistors? Derive an expression for the responsivity of an intrinsic photodetector in terms of quantum efficiency. **10**

- Q.7 a) Write short notes on:
- i) Intensity modulation.
 - ii) Power budgeting of optical systems.
 - iii) Fibre couplers.
 - iv) Fibre connectors. **10**
- b) The following parameters are established for a single mode fibre at wavelength of $1.3 \mu m$.
- Mean power launched = $-3 dBm$ Cabled loss = $0.4 dB/km$
Splice loss = $0.1 dB/km$ Connector loss = $1 dB$ each
Mean power at APD receiver = $-55 dBm$ Safety margin = $7 dB$
Estimate maximum possible link length operating at $35 M/bits$. **2½x4**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

CONTROL SYSTEM ENGINEERING (EE-606/EE-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A**. and any **TWO** questions from **PART-B**. Marks are indicated against each question.

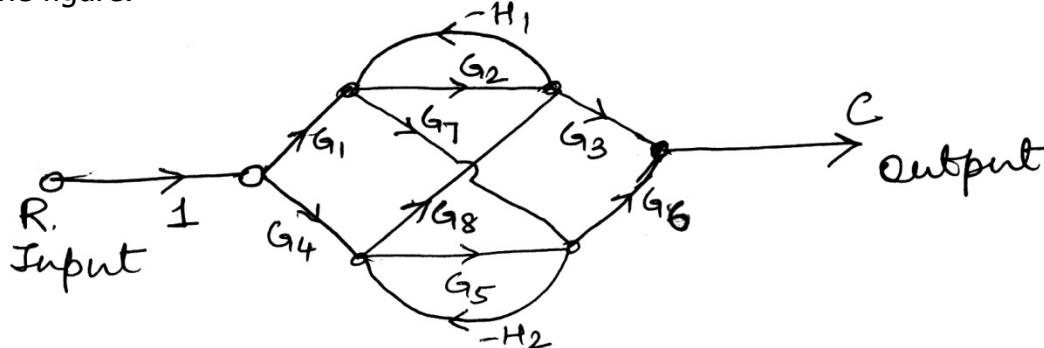
Q.1 Answer the following:

- Define 'transfer function'.
- What is characteristic equation?
- Classify various types of control systems?
- What is the difference between type and order of a system?
- Explain Mason's Gain formula?
- List the factors on which the steady state error of a control system depends.
- State necessary and sufficient conditions for stability.
- Discuss the effect of adding zeros to open loop transfer function.
- What is gain cross over frequency?
- What is the significance of feedback in control system?

2x10

PART-A

Q.2 a) Obtain the transfer function relating output and input for the signal flow graph given in the figure.



10

- b) Compare open loop and closed loop systems. **5**
 c) What is meant by self loop, non-touching loop and transmittance in relation to signal flow graph? **5**

Q.3 a) Draw and define the following specifications pertaining to transient response of a second order system:

- rise time
- Maximum overshoot
- Peak time

Also draw an expression for maximum overshoot for second order system subjected to unit step input. **10**

- b) Determine the position, velocity and acceleration error constants of a unity feedback control system with forward path gain given as

$$\frac{100(s+1)}{s^2(s+2)(s+5)}$$

10

Q.4 a) The open loop transfer function of a feedback control system is prescribed by the relation

952/5

$$G(s)H(s) = \frac{K}{s(s^2 + 4s + 8)}$$

Sketch the root locus for the system and comment on stability. **10**

- b) From the characteristic equation $S^4 + 20KS^3 + 5s^2 + 10s + 15 = 0$ for a feed-back control system determine the limiting value of parameter K for stability. **10**

PART-B

- Q.5 a) Applying Nyquist stability criterion determine the closed loop stability for the following open loop transfer function.

$$G(s) = \frac{1}{s(1+s)(1+2s)} \quad \textbf{10}$$

- b) Explain the procedure of drawing polar plot and how the stability can be analyzed using it. **10**

- Q.6 a) Discuss phase lag compensation with the help of circuit diagram and also find transfer function. **10**

- b) Write short note on proportional, derivative and integral control action. **10**

- Q.7 a) What is the function of servomotor in a control system. Also draw neat sketch of DC servomotor and describe its construction and operation. **10**

- b) Sketch and explain the working of synchros. **10**

End Semester Examination, May 2019

B. Tech. – Second Semester

ANALOG ELECTRONICS (EC-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define conductor, insulator and semiconductor with energy band diagram.
- b) State principle of emission of light in LED.
- c) Differentiate between Emitter, Base and Collector.
- d) Draw circuit diagram of voltage doubler.
- e) Tabulate difference between centre-tap and bridge type full wave rectifier.
- f) Derive relation between α and β .
- g) Explain active, saturation and cut-off regions of transistor in brief.
- h) Give two points of difference between Bipolar Junction transistor and field effect transistor.
- i) Discuss FET as VVR.
- j) Draw block diagram of a regulated power supply.

2x10

PART-A

- Q.2** a) Derive the diode current equation. **12**
 b) Illustrate the V-I characteristic of PN Junction diode and explain in detail. **8**
- Q.3** a) Evaluate ripple factor and efficiency of full wave rectifier. **10**
 b) State role of clipping circuit in electronic circuit. Explain biased clipper with the help of derivation and a circuit diagram. **10**
- Q.4** a) Draw input and output characteristics of common emitter configuration of a PNP Transistor and explain in detail. **12**
 b) Discuss transistor as emitter follower. **8**

PART-B

- Q.5** a) Derive expression for stability factor for the potential divider configuration. **10**
 b) Justify DC and AC load line. **5**
 c) Explain transistor as a switch. **5**
- Q.6** a) Explain the static characteristics of field effect transistor. **10**
 b) Sketch the transfer curve defined by $I_{DSS} = 20mA$ and $V_p = -6V$. Also identify type of JFET. **10**
- Q.7** a) Demonstrate the transistor series voltage regulator circuit. **8**
 b) Discuss performance parameter of IC voltage regulator. **6**
 c) Design a +12V IC voltage regulator with suitable assumptions. **6**

End Semester Examination, May 2019

B. Tech. – Second Semester

INTERNET OF THINGS - II (EC-2001)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

- Q.1 a) Name atleast two examples of devices which act as both a sensor and a transducer?
b) How input-output characterization of sensor and transducer is different?
c) LVDT is primary transducer or secondary. Give justification.
d) Explain the term sensitivity and selectivity by sensor.
e) A sensor measured output value is 5.3 V, while the actual value of voltage is 4.9 V. Calculate the accuracy of sensor.
f) What are the commonly used liquids for vapour pressure thermometers?
g) What are the different types of thermal sensors?
h) Differentiate between tree and hybrid topology.
i) If bandwidth of a channel is 2000 Hz and number of levels required is 4, calculate bit rate.
j) Which sensor is used for temperature measurement in medical diagnosis? **2×10**

PART-A

- Q.2 a) Why do IOT system have to be self-adapting and self-configuring? **10**
b) "Each sensor have a different working principle". Support the statement with suitable explanation. **10**
- Q.3 a) Explain primary and secondary transducer with the help of example. **10**
b) How is a 'bathtub' curve associated with failures of transducers? **10**
- Q.4 a) How is the output voltage of resistive potentiometer affected due to movement of jockey? **10**
b) Differentiate between bonded and unbonded resistive strain gauge. **10**

PART-B

- Q.5 a) For gas thermometric sensors, prove that $T = T_r \left(\frac{P}{P_r} \right)^{\frac{1}{n}}$. **10**
b) On what factors and parameters of the sensor does the hall voltage output depend for a given field condition? Describe in detail. **10**
- Q.6 a) Compare and contrast the various guided transmission media. **10**
b) What are the different communication modes between two nodes? Explain with example. **5**
c) How serial and parallel communication take place between two nodes? **5**
- Q.7 a) Draw a block diagram to show, how sensors interact with the automated manufacturing process? **10**
b) Describe on what principles do the microsensors work in bio-medical system? Explain the role of radiation and electromagnetic variables in detail. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

EMBEDDED SYSTEM DESIGN (EC-822A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1 a) Write any two logical instructions used in PIC16FXX.
b) Draw the block diagram of Harvard architecture.
c) Explain the need of ROM in microcontrollers.
d) Explain the basic operation of interrupts.
e) What is the role of stack upon generation of interrupts?
f) How many register banks are used in 8051? Which register bank is default register bank?
g) Name different modes of accessing data in 8051 microcontroller.
h) Name the method to control the speed of DC motor.
i) Explain pre and post scaling used in microcontroller.
j) What do you understand by response time? 2x10

PART-A

- Q.2**

 - a) Differentiate microprocessor and microcontroller on the basis of:
i) Applications ii) ROM iii) Hardware iv) Clock. 8
 - b) What do you understand by embedded system? Explain the need of following peripherals in embedded systems:
i) I/O pins ii) Timers 6
 - c) What is the difference between Harvard and Princeton architectures? Explain their advantages and disadvantages. 6

Q.3

 - a) Write a program in assembly language to add first 20 natural numbers. Also draw the flow chart. 10
 - b) Write down the process to create and run the project using KEIL software. 10

Q.4

 - a) What is the need of timers in microcontrollers? What are the various modes of operation in 8051 microcontrollers? Explain in detail. 8
 - b) Write assembly language program to generate a 10 KHz square wave using mode 1 on pin P0.1 using i) timers ii) interrupts.
Assume XTAL=12 MHz. 12

PART-B

End Semester Examination, May 2019

B. Tech. – Fourth Semester

POWER ELECTRONICS (EE-502A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) What is power electronics? Enumerate application of power electronics.
b) Define latching current.
c) What is snubber circuit?
d) What is meant by phase control?
e) What is dual converter?
f) What are line commutated inverters?
g) What are the various control strategies used in chopper?
h) What are circulating current?
i) What are the application of AC voltage controllers?
j) Define duty cycle of chopper. **2x10**

PART-A

- Q.2 a) Explain construction in detail and working of N channel MOSFET. Also enumerate its application. Compare MOSFET and BJT. **12**
b) Explain the types of power diodes.
- Q.3 a) What do you mean by forced commutation? Explain any one in detail with proper circuit diagram and waveforms. **10**
b) SCR with rating of 1000 V and 200 A are available to be used in a string to handle 6 kV and 1 kA. Calculate number of series and parallel units required if derating factor is 0.2. **10**
- Q.4 a) Explain the working of dual converter. What are the causes of circulating current? **10**
b) Explain the working of single phase full wave converter with suitable waveform for R-L-E load. **10**

PART-B

- Q.5 a) Discuss the working of a three phase 120° bridge inverter with appropriate circuit diagram and voltage waveforms of phase and line. **15**
b) Compare between a voltage source inverter and a current source inverter. **5**
- Q.6 a) Explain the working of type E chopper. **10**
b) A step up chopper has input voltage of 220 V and output voltage of 660 V. If the conducting time of thyristor chopper is $100 \mu s$, compute the pulse width of output voltage. In case output voltage pulse width is halved for constant frequency operation, find the average value of new output voltage. **10**
- Q.7 a) Describe the working principle of single phase to single phase step up cycloconverter with the help of midpoint configuration. Illustrate the answer with appropriate circuit and waveform. **10**
b) Describe the working of single phase AC voltage controller with R-L load. Draw the waveform required. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MICROCONTROLLER AND APPLICATIONS (EC-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1

 - a) What is the most appropriate criterion for choosing the right microcontroller of our choice?
 - b) Differentiate Data Memory and Code Memory.
 - c) Describe the need of Addressing Modes? Name the addressing modes used in 8051 microcontroller.
 - d) Why microcontrollers are not called general purpose devices?
 - e) What is the difference between Bit addressable and Byte addressable RAM? Mention some instruction for accessing Bit addressable and Byte addressable RAM.
 - f) Write an assembly program to multiply two 16-bit numbers for 8051 controller.
 - g) List the interrupts available in 8051 on the basis of their priority. Also write their default addresses for ISR.
 - h) Draw the following registers with their respective bits.
 - i) IE register
 - ii) IP Register
 - iii) SCON Register
 - iv) TCON Register
 - i) What voltage levels are used for binary 1 and binary 0 in RS-232?
 - j) For the XTAL = 11.0592MHz, what frequency is used by the timer to set the baud rate?

PART-A

- Q.2 a) Illustrate and explain architecture of 8051 microcontroller using suitable block diagram. **10**
b) Explain the function of ALE, EA and PSEN pin of 8051 microcontroller. **10**

- Q.3 Develop a program to copy 44H into RAM location 40H to 50H using:
a) Direct addressing mode.
b) Register Indirect Addressing Mode. **10×2**

- Q.4 a) List the available timers in 8051. Write the steps for generating delay using timers in 8051. **10**
b) Explain the fields of following registers of timers:
i) TOMD
ii) TCON **5×2**

PART-B

- Q.5 a) What is the difference between UART and USART communication? **10**
b) Explain different mode for serial communication for 8051 Microcontroller. **10**

- Q.6 a) Explain operation of timer in mode 1. Discuss programming steps to generate time delay using mode 1. **10**
b) Write program to generate delay of 1 second using timer 0 in mode 1. **10**

- Q.7 Draw and explain interfacing of LCD with 8051 controller. Write a program to display "ECE Department" on LCD. **20**

End Semester Examination, May 2019

B. Tech. – Second Semester

ELEMENTS OF ELECTRONICS ENGINEERING (EC-101A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Differentiate between conductors, semiconductors and insulators.
 b) Compare JFET and BJT.
 c) What does Bipolar mean incase of BJT?
 d) Define peak inverse voltage.
 e) Draw the V-I characteristics of ideal diode.
 f) What is diffusion capacitance?
 g) What are the specifications of A/D converter?
 h) Draw the truth table of JK and SR Flip-Flop.
 i) What is microprocessor?
 j) Differentiate between combinational and sequential circuits.

2x10

PART-A

- Q.2 a) Explain the working principle of:
 i) Varactor diode.
 ii) LED.
 with their applications. **5x2**
 b) Explain various breakdown mechanisms in P-N junction diode. **5**
 c) Draw and explain working of a bridge rectifier. **5**
- Q.3 a) Draw and explain the input and output characteristics of a transistor in common emitter configuration. **10**
 b) Draw and explain working of n-channel MoSFET. **10**
- Q.4 a) Prove that:
 i) $A+AB = A$
 ii) $A+\overline{AB} = A+B$
 iii) $(A+B)(A+C)(B+C) = AB+AC+BC$
 iv) $AB+ABC+ABCD+ABCDE = AB$
 v) $AB\overline{C}D + \overline{A}B\overline{C}D + B\overline{C}\overline{D} = BC$ **2x5**
 b) Draw and explain with truth table:
 i) NoR Gate. **2**
 ii) XoR Gate. **2**
 iii) S-R Flip-Flop. **6**

PART-B

- Q.5 a) Draw the block diagram of an op-amp and list its ideal characteristics. **6**
 b) Explain the working of an op-amp as a:
 i) Adder ii) Differentiator . **5x2**
 c) Explain the working of voltage follower. **4**
- Q.6 a) What are the specifications of D/A converter? Draw and explain 4 bit weighted resistor type DAC. **10**
 b) Explain in detail successive approximation type A/D converter. **10**
- Q.7 Write short notes on (**any two**):
 a) Architecture of 8085 microprocessor.
 b) Comparison between microprocessor and microcontroller.

- c) Working principle of photodiode and LED.
- d) Zener diode as a voltage regulator.

10x2

End Semester Examination, May 2019

B. Tech. – Sixth Semester

DIGITAL SIGNAL PROCESSING (EC-502A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Plot the signal $y(n) = u(-n + 2)$.
 b) Calculate z-transform of $x(n) = u(n) + u(n + 1)$.
 c) Find linear correlation between $x(n) = \{1, 2, 3\}$ and $x_2(n) = \{-1, 2\}$.
 d) Find DTFT of $x(n) = a^n u(n - 1)$.
 e) State and prove periodicity property of phase factor W_n .
 f) What is finite word length effect in DSP?
 g) Write expression for Hanning window function.
 h) Differentiate between FIR and IIR digital filters.
 i) What is frequency warping?
 j) Draw the block diagram of interpolator. **2x10**

PART-A

- Q.2 a) Determine $x(n)$ if $X(z) = \frac{z + 2}{2z^2 - 7z + 3}$ when ROC is given as:
 i) $|z| > 3$ ii) $|z| < \frac{1}{2}$ **10**
 b) Find $y(n)$ by using convolution property of z-transform when $x(n) = [1, 2, 3, 1, -1, 1]$ and $h(n) = [1, 1, 1]$. **10**
- Q.3 a) Find 4-pt DFT of the sequence $x(n) = \cos\left(\frac{n\pi}{4}\right)$. **10**
 b) Find circular convolution of following sequences:
 $x(n) = [1, 2, 1, 2]$ and $h(n) = [2, 3, 2, 4]$ **10**
- Q.4 a) Find out 8-pt. DFT of following sequence using DIT –FFT algorithm
 $x(n) = [1, 1, 1, 0, 0, 1, 1, 1]$. **12**
 b) Explain DIF-FFT butterfly algorithm. **8**

PART-B

- Q.5 a) The desired response of a low pass filter is:

$$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega}, & -3\pi/4 \leq \omega < 3\pi/4 \\ 0, & 3\pi/4 < |\omega| < \pi \end{cases}$$
 Determine $H(e^{j\omega})$ for $n = 5$ using Hamming window function. **15**
 b) Explain the term Gibbs phenomenon. **5**
- Q.6 a) What is bilinear transformation? Derive mapping formula. **10**
 b) Describe butterworth filter and comment on their passband and stopband characteristics. **10**
- Q.7 a) How can sampling rate be altered by a fraction number. **10**
 b) Explain the working of multistage decimator and interpolator using block diagram. **10**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

ELECTRICAL MACHINES II (EE-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

- Q.1 a) Which electrical machine has minimum air gap and why?
b) List the important conditions for parallel operations of three phase alternators.
c) What is torque (power) angle δ ?
d) Explain synchronous condenser.
e) How many windings are there in the stator of 1-phase induction motor and how they are placed?
f) What happens to the terminal voltage of an alternator with increase in load?
g) Draw the short circuit characteristics of an alternator.
h) What is a universal motor?
i) List various types of permanent magnet brushless motors.
j) What are the disadvantages of induction generator? **2×10**

PART-A

- Q.2 a) Derive an expression for the torque developed in a three phase induction motor and find the condition for maximum torque. **15**
b) Draw the circle diagram by labeling each term in it neatly. **5**
- Q.3 a) Why starters are necessary for starting of a 3-phase induction motors? List the different starting methods for the 3-phase induction motor and explain anyone with a neat sketch. **12**
b) Explain the slip-power recovery control method of speed control of 3-phase induction motor. **8**
- Q.4 a) Describe in detail cross-field theory and draw the representative equivalent circuit diagram. **10**
b) Explain principle and working of capacitor start single phase induction motor with circuit diagram. Also state its applications. **10**

PART-B

- Q.5 a) What do you mean by voltage regulation? List the various methods for determining voltage regulation and describe potier triangle method in detail. **10**
b) Derive the emf equation of 3-phase alternator. **6**
c) Explain the following terms:
i) Leakage reactance.
ii) Synchronous impedance. **2×2**
- Q.6 a) Derive the commonly used expression for power developed by a synchronous motor. **10**
b) Why the three phase synchronous motor is not self-starting? Describe the arrangement to make it self-starting. **10**
- Q.7 a) Describe in detail the working principle and constructional features of permanent magnet brushless motors. **10**
b) Write a note on: 'reluctance motors'. **10**

End Semester Examination, May 2019

B. Tech. – Fourth / Fifth Semester

COMMUNICATION ENGINEERING-II (EC-508)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) What are different pulse modulation techniques? What is the difference between PAM and PTM?
 b) What is aliasing effect? Suggest methods to eliminate it.
 c) Explain FSK modulation scheme.
 d) What do you mean by M-ary signaling? List any two advantages of QPSK over BPSK.
 e) Give the expression for probability of error P_e for integrator and dump receiver.
 f) Consider a random variable x defined by:

$$f(x) = \begin{cases} \frac{1}{b-a}, & a \leq x < b \\ 0, & \text{otherwise} \end{cases}$$

Find the corresponding CDF.

- g) Explain autocorrelation function. Write its various properties.
 h) Find the differential entropy $H(x)$ of the uniformly distributed random variable x whose pdf is given by:

$$f(x) = \begin{cases} \frac{1}{4}, & 0 \leq x < 4 \\ 0, & \text{otherwise} \end{cases}$$

- i) Define entropy. A source generates one of five possible messages Q1 to Q5 having probabilities $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{16}$ respectively, every microsecond. Calculate the information rate.
 j) Explain cross spectral density.

2×10

PART-A

- Q.2 a) State and prove sampling theorem. Find the Nyquist rate for the signal, $g(t)$ given by:

$$g(t) = 10\sin^2 5000\pi t + 5\cos 1000\pi t$$

7

- b) Derive the expression for signal to quantization noise ratio for a PCM system that employs linear quantization technique. Assume that input to the PCM system is a sinusoidal signal.
 c) What is delta modulation? Explain the drawbacks of delta modulation.

7

6

- Q.3 a) Draw the block diagram of DPSK modulator and explain how synchronization problem is avoided for its detection.
 b) Write a short note on GMSK technique. List its advantages and applications.

10

10

- Q.4 a) What is a matched filter? Derive expression for probability of error of matched filter.
 b) Explain in detail baseband signal receiver.

12

8

PART-B

- Q.5 a) The joint pdf $f_{xy}(x, y)$ of two random variables x and y is given by:

$$f(x, y) = k e^{-(x+y)} u(x) u(y)$$

- i) Find K. 6
- ii) Find $f_x(x)$ and $f_y(y)$. 7
- iii) Are x and y independent. 7
- b) State and explain central limit theorem. 7
- c) Let z be a random variable with pdf $f(z) = \frac{1}{2}$ in the range $-1 \leq z \leq 1$. Let the random variable $x = z$ and the random variable $y = z^2$. Show that x and y are uncorrelated. 7

- Q.6 a) The autocorrelation function of a wss process $x(t)$ is given by:

$$R_x(\tau) = a^2 e^{-b|\tau|}, b > 0$$

- Find the power spectral density of the process. 12
- b) A voltage $v(t)$ which is a Gaussian random process with a mean of zero and a variance of 4 square volts, is measured by a dc meter, a true rms meter and a meter that first squares $v(t)$ and then reads its dc component. Find the output of each meter. 8

- Q.7 a) Define mutual information. Derive the following relationship:

$$I(x, y) = H(x) - H(x/y)$$

- b) State and prove Shannon Hartley theorem. Show that the channel capacity of an ideal AWGN channel with infinite bandwidth is given by $C = 1.44 S/\eta$. 7
- c) A source x has five equally likely symbols.
 - i) Construct Shannon Fano Code for x and calculate the efficiency of the code.
 - ii) Repeat for the Huffman code and calculate code efficiency. 7

End Semester Examination, May 2019

B. Tech. – Fourth Semester

POWER SYSTEM PROTECTION (EE-521)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A**. and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Give the consequences of short circuit.
- b) What are unit system and non unit system?
- c) Prove that $1 + \alpha + \alpha^2 = 0$, α = symmetrical component operator.
- d) Mention any two applications of differential relay.
- e) What are unsymmetrical faults?
- f) What are the various faults that would affect an alternator?
- g) Give two methods of arc interruption?
- h) Differentiate between direct and indirect stokes.
- i) Write the advantages of air blast circuit breaker over oil circuit breaker.
- j) What are demerits of MoCB?

2x10

PART-A

- Q.2** a) Explain Fortsque's theorem? Explain the method of finding symmetrical components for a set of unbalanced voltage phases. **10**
b) How transients occur on transmission line and synchronous machines? Explain. **10**
- Q.3** a) Derive an expression for fault current for single line to ground fault by symmetrical components method and also draw the sequence impedance network for same. **10**
b) A 3-phase, 11 Kv, 25 MVA generator with $X_0 = 0.05\text{pu}$, $X_1 = 0.2\text{pu}$, $X_2 = 0.2\text{pu}$ is grounded through a reactance of 0.3Ω calculate the fault current in am ampere for a L-G fault. **10**
- Q.4** Write the classification of circuit breakers on the medium used for arc extinguish? Also explain any two circuit breakers in detail. **20**

PART-B

- Q.5** a) What are different types of electromagnetic relays? Discuss their field of applications using operation and construction of relays. **10**
b) Derive the torque equation for the induction type relay. **10**
- Q.6** a) Describe a directional over-current relay. Explain where and why these relays are preferred. **10**
b) Distinguish between over current relay, directional relay and differential relay. **10**
- Q.7** a) Explain the phenomena of lighting and the travelling waves caused by it on transmission lines. **15**
b) Explain the various arrester ratings. **5**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

ELECTRICAL MACHINES-II (EE-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is cogging of an induction motor?
b) What is the use of shading ring in a pole motor?
c) Why is the efficiency of a 3-phase induction motor less than that of a transformer?
d) Write the expression for concatenated speed of the set.
e) State the effect of rotor resistance on starting torque.
f) Define direct axis reactance 'Xd'.
g) Define SCR.
h) Why short pitch winding is preferred over full pitch winding?
i) List essential features of synchronous machine.
j) Why is synchronous impedance method of estimating voltage regulation is considered as pessimistic method? **2x10**

PART-A

- Q.2 a) Starting from the first principles, develop the equivalent circuit of 3-phase induction motor. **10**
b) Draw the slip-torque characteristics for a 3-φ induction motor and explain in detail. **10**
- Q.3 a) Explain the various techniques of speed control of induction motor. **10**
b) Why starter is necessary for induction motor? Discuss the theory of star-delta starter. **10**
- Q.4 a) Explain the working of 1-φ induction motor with the help of cross field theory. **10**
b) What is an universal motor. Explain construction, working and application in detail. **10**

PART-B

- Q.5 a) Discuss two reaction theory as applicable for salient pole synchronous machine. **10**
b) What is armature reaction? Discuss in detail at different power factors for alternator. **10**
- Q.6 a) What is meant by hunting in a synchronous motor? Why is it undesirable? What is done to minimize it? **10**
b) Describe the effect of varying the excitation on the armature current and power factor of a synchronous motor when input power to the motor is maintained constant. **10**
- Q.7 a) Discuss the constructional details of permanent magnet DC motor list its main features and application also. **10**
b) Explain permanent magnet brushless Dc motor drive. Also derive the torque and emf equation of permanent magnet brushless DC [PMBLDC] motor. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MICROWAVE DEVICES AND CIRCUITS (EC-621)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the various bands assigned for microwave communication?
 b) What are the dominant modes for a rectangular waveguide?
 c) Define directivity and coupling factor of directional coupler.
 d) Write 5-matrix for 4-port circulator.
 e) Define density modulation.
 f) Why magnetron is called cross field device?
 g) Interpret the methods used for frequency measurement.
 h) Evaluate the VSWR and return loss measurement through reflectometer method.
 i) Define pulse repetition frequency with reference to RADAR.
 j) What is PPI? **2×10**

PART-A

- Q.2 a) Describe in detail the essential components of a microwave communication system. **10**
 b) Discuss various active and passive microwave components in detail. **10**
- Q.3 a) Calculate the cut-off wavelength in a standard rectangular waveguide operating in TM_{11} mode. **10**
 b) A 4GHz signal is propagated in a rectangular waveguide of dimension 5 cm \times 2.5 cm. Assuming the dominant mode, calculate:
 i) Cut-off wavelength
 ii) Guide wavelength
 iii) Group velocity
 iv) Phase velocity
 v) Characteristic impedance of waveguide **10**
- Q.4 a) Derive the scattering matrix of E-plane tee. **10**
 b) The input power in a two hole directional coupler is 1 mW. Coupler has a coupling factor of 15 dB and directivity of 30 dB. Calculate the power in all the ports. **10**

PART-B

- Q.5 a) A two cavity klystron amplifier has the followings specifications. Beam voltage = 900 V, Beam current = 30 mA, frequency = 8 GHz. Gap spacing in either cavity = 1 mm, spacing between centres = 4 cm, $R_{SH} = 49 \text{ k}\Omega$. Determine:
 i) e-velocity
 ii) dc transit time
 iii) input voltage for maximum output voltage **10**
 b) Explain frequency pushing and pulling in magnetron and give its applications. **10**
- Q.6 a) What is a bolometer? How it is used for measurement of power? **10**
 b) Write short notes on the following:
 i) Varactor diode.
 ii) IMPATT diode. **5×2**
- Q.7 a) What is a RADAR? Derive the simple form of RADAR range equation. **10**
 b) What are the advantages and disadvantages of a microstrip line. **5**

c) Explain various applications of RADAR.

5

End Semester Examination, May 2019
B. Tech. — Fourth Semester
ANALOG ELECTRONIC CIRCUITS (EC-403)

Time: 3 hrs.

Max Marks: 100

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

- Q.1 a) Name possible methods to improve CMRR.
b) What is full power bandwidth of op-amp?
c) Draw circuit diagram of current to voltage converter.
d) Why precision rectifier is known as super diode?
e) Why complementary-symmetry push-pull amplifier is used in output stage of operational amplifier?
f) What is virtual ground concept?
g) Draw circuit diagram of Deboo integrator.
h) What is the need of IC regulator?
i) Why triangular waveform generator does not work efficiently at low frequency.
j) Define ‘Hysteresis’. Why this is developed in Schmitt trigger? 2×10

PART-A

- Q.2**

 - a) Name types of differential amplifier, also draw circuit diagram of each type. Derive expression for I_{CQ} and V_{CQ} for dual input balanced output differential amplifier. **10**
 - b) Draw block diagram of operational amplifier and explain working of its each block. Also write its ideal characteristics. **10**

Q.3

 - a) For inverting amplifier of $R_i = 1k\Omega$, $R_f = 10k\Omega$ and open loop gain $A_v = 2 \times 10^5$. The opamp 741 has the value of $R_i = 2 \times 10^6 \Omega$, $R_o = 75\Omega$ and $f_o = 5Hz$. Calculate the values of A_{vf} , R_{if} , R_{oF} and f_F for the same. **10**
 - b) Derive expression for output voltage of integrator. Also explain its frequency response. **10**

DART B

- Q.5**

 - a) Draw the circuit diagram of 2nd order high pass filter. Derive the expression for transfer function. **10**
 - b) Explain sallen key filter. **10**

Q.6

 - a) List the modes of operation of 555 Timer. Explain any one mode of operation in detail. **10**
 - b) Explain the working of Twin T oscillator. **10**

Q.7

Write short notes on (**any two**) of the following:

 - a) SMPS.
 - b) PLL.
 - c) Mono stable multivibrator.
 - d) Schmitt Trigger. **10x2**

End Semester Examination, May 2019

B. Tech. — First Semester

ELEMENTS OF ELECTRICAL ENGINEERING (EE-101B)

Time: 3 hrs.

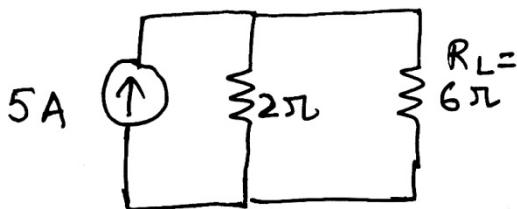
Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- State Kirchhoff's voltage law.
- Draw the Thevenin equivalent circuit of:

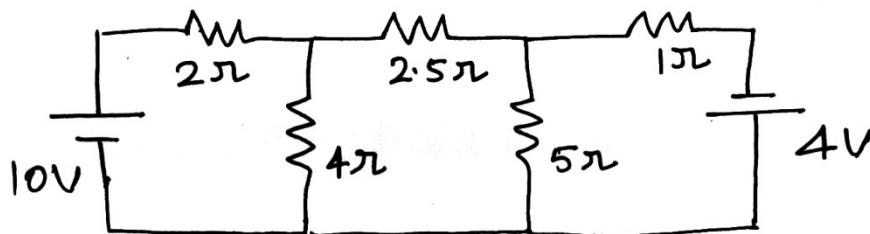


- What is the condition of resonance in a series RLC circuit?
- What is the significance of power factor?
- Draw impedance triangle of RC series circuit.
- Draw phasor diagram of R-L series circuit.
- List three types of torques required for a basic measuring instrument.
- List various types of D.C machines.
- What is the relation between phase current and line current in a delta connected system?
- What is meant by voltage regulation of transformer?

2x10

PART-A

Q.2 a) State and explain Maximum power transfer theorem. **10**
b) Find the current in the 2.5 ohms using superposition theorem.



10

Q.3 a) Explain following terms in relation to A.C circuits:
i) Impedance.
ii) Power factor.
iii) RMS value.
iv) Apparent Power. **10**
b) A coil of resistance 20 ohms and an inductance of 200 mH is connected in series with a capacitance of 40 μ F across 200V, 50Hz supply. Calculate:
i) Magnitude of current.
ii) Power factor.
iii) Voltage across each element. **10**

Q.4 a) With due help of a neat diagram explain the construction and principle of moving Iron Instruments. **12**

b) Distinguish between 'Induction type Watt meter' and 'Dynamometer type Wattmeter'. **8**

PART-B

- Q.5 a) Explain working principle of a transformer. Also distinguish between core types and shell types of the transformer. **10**
b) What are the various types of losses that occur in transformers? How these losses can be reduced? **10**
- Q.6 a) With the help of neat sketch explain various parts of D.C machine. **12**
b) Write short note on D.C shunt generator. **8**
- Q.7 a) Explain the working principle of 3-phase induction motor. Also state its applications. **10**
b) Draw and explain torque-slip characteristics of Induction Motor. **10**

End Semester Examination, May 2019
 B. Tech. — First Semester
MATHEMATICS FOR BT-I (MA-103)

Time: 3 hrs.

Max Marks: **100**
 No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

$$\begin{matrix} 2 & 3 \\ 0 & 5 \\ 0 & 0 \end{matrix}$$

a) If $A = \begin{pmatrix} 2 & 3 \\ 0 & 5 \\ 0 & 0 \end{pmatrix}$, Find Eigen values of A^{-1} .

b) Evaluate determinants of the matrices:
 i) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ii) I_2

c) Represent the complex number in polar form $z = 1 + \sqrt{3}i$.

d) Solve $\tan x = -1$.

e) Find the derivative of $\sin 2x \log e^x$.

f) Test the convergence of $\sum_{n=1}^{\infty} \frac{1}{n^2 + 10}$.

g) If $x = r \cos \theta$, $y = r \sin \theta$, J and J^1 .

h) Evaluate $\int \log x \, dx$.

i) Evaluate $\int \int y \, dx \, dy$ over $x + y \leq 1$; $x \geq 0$, $y \geq 0$.

j) Find degree of $z = \frac{x^2 + y^2}{x^3 + y^3}$.

2×10

PART-A

$$\begin{matrix} 4 & 3 \\ 1 & 1 \\ 0 & 1 \end{matrix}$$

Q.2 a) Find inverse of the matrix using Gauss Jordan method $A = \begin{pmatrix} 4 & 3 \\ 1 & 1 \\ 0 & 1 \end{pmatrix}$ **10**

$$\begin{matrix} 8 & -6 & 2 \\ 6 & 7 & -4 \\ 2 & -4 & 3 \end{matrix}$$

b) Find the Eigen values and Eigen vectors of $A = \begin{pmatrix} 8 & -6 & 2 \\ 6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$ **10**

Q.3 a) Solve for x , $\tan^{-1} \frac{1-x}{1+x} = \frac{1}{2} \tan^{-1} x$. **10**

b) Solve $\sin 2x - \sin 4x + \sin 6x = 0$. **10**

Q.4 a) Solve that the series $\frac{1}{x} + \frac{2!}{x(x+1)} + \frac{3!}{x(x+1)(x+2)} + \dots$ converges for $x > 2$ and diverges for $x < 2$. **10**

b) Test for absolute convergence/conditional convergence of the alternating series $1 - \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} - \frac{1}{4\sqrt{4}} + \dots$ **10**

PART-B

Q.5 a) Expand a^{x+h} in powers of h . **5**
 b) Calculate the value of $\cos 32^\circ$ by Taylor's theorem. **7**

c) Expand $e^{m \sin^{-1} x}$ in powers of x , using Leibnitz's theorem.

8

Q.6 a) If $z = e^{ax+by} \times f(ax - by)$; prove that $bz_x + az_y = 2abz$.

10

b) Find maxima and minima in distance of the point (3, 4, 12) from unit sphere.

10

Q.7 a) Solve the integral $\int\limits_0^1 \int\limits_0^x (x^2 + y^2) dx dy$.

5

b) Change the order of integration and hence evaluate $\int\limits_0^5 \int\limits_{2-x}^{2+x} 1 dx dy dz$.

5

c) Evaluate $\int\limits_0^{\log 2} \int\limits_0^x \int\limits_0^y e^{x+y+z} dx dy dz$.

10

End Semester Examination, May 2019

B. Tech. — Fifth Semester

NUMERICAL METHODS AND OPTIMIZATION TECHNIQUES (MA-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- Find relative and percentage error of the number 8.6, if both the digit are correct.
- State intermediate value property. Write the interval in which the root of the following equation lies $x \log_{10} x - 1.2 = 0$.
- Write normal equation of the curve $y(x) = a + bx + cx^2$.
- Write Normal equation for Runge-Kutta method of 4th order for the equation $\frac{dy}{dx} = f(x, y); y(x_0) = y_0$.
- Write Newton's iterative formula to find \sqrt{N} .
- Using graphical method, maximize $Z = 2x_1 + 3x_2$ subject to the constraints:
 $x_1 + x_2 \leq 30$;
 $x_2 \geq 3; 0 \leq x_2 \leq 12$;
 $x_1 - x_2 \geq 0; 0 \leq x_1 \leq 20$
- Solve $x + y = 2$ and $2x - 3y = 5$ by Gauss-elimination method.
- Prove that $dE^{y_2} = D$.

2½×8

PART-A

Q.2 a) Using Lagrange's interpolation formula, find $y(5)$ for the following table:

$x :$	1	2	3	4	7
$y :$	2	4	8	16	128

10

- a) Fit a straight line by using the principle of least squares to the following data:

$x :$	1	2	3	4	5
$F(x) :$	0.5	2.0	4.5	8.0	12.5

10

Q.3 a) Find a root of $x^3 - x - 11 = 0$ correct to 4 decimal place using bisection method.

10

- b) Find the fourth root of a positive no. N, hence find $\sqrt[4]{32}$.

10

Q.4 a) Solve the following equations by Gauss Seidal method correct to 3 decimal places:

$$-x + 6y + 27z = 85$$

$$-2x + 15y + 6z = 72$$

$$54x + y + z = 110$$

10

- b) Using power method, determine the largest Eigen value and the corresponding Eigen vector of the matrix:

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

10

10×2

974/5

PART-B

Q.5 b) Evaluate the integral $\int_1^8 \frac{e^x + e^{-x}}{2} dx$ by Simpson's 1/3rd rule taking $h = 0.2$. 10

a) Find $f'(10)$ from the following data:

x :	3	5	11	27	34
$f(x)$:	-13	23	899	17315	35606

Q.6 a) Using RK-method of 4th order find $y(0.2)$ given that 10

$$\frac{dy}{dx} = 3x + \frac{y}{2}, \quad y(0) = 1, \quad \text{taking } h = 0.1.$$

b) Compute $y(0.2)$ correct to 4 decimal places from the Taylor's series solution of the equation $yy' = y^2 - 2x; y(0) = 1$. 10

Q.7 Solve the following L.P.P.:

$$\text{Minimize } Z = 3x + 3y$$

Subject to the constraints:

$$-2x + 3y \leq 2$$

$$3x + 2y \leq 5$$

$$x, y \geq 0$$

Manav Rachna International Institute of Research and Studies
Faculty of Engineering and Technology
May. 2019

Subject: MATHEMATICS FOR BIO-TECHNOLOGY - II **Department : Mathematics**

Subject Code: MA-203 **Max. Marks : 100**

Class / Semester: 2nd sem. (BT students only) **Time allowed: 3 hours**

Note: Attempt any 5 questions, Question 1 is compulsory. Attempt any two questions from Part-A and any two questions from Part-B. No supplementary answer sheets will be given.

Q 1.

- a) Solve: $y \, dx - x \, dy + \log x \, dx = 0$
- b) Solve: $(\sec x \tan x \tan y - e^x)dx + \sec x \sec^2 y \, dy = 0$
- c) Find C. F. for the differential equation $y'' + a^2 y = 0$.
- d) Find P.I. for the differential equation $(D^2 - 4D + 3)y = e^x \cos 2x$.
- e) Form the partial differential Equation $f(xy + z^2, x + y + z) = 0$
- f) Solve $xp + yq = z$
- g) Evaluate $\int_0^\infty t^3 e^{-t} \sin t \, dt$
- h) Find the Inverse Laplace transform $\frac{e^{-\pi s}}{s^2 + 1}$
- i) In the Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$, what is the value of b_n
- j) Find the number of words, with or without meaning that can be formed with the letters of the word 'CHAIR'.

2×10 Marks

Part A

Q 2. Solve the following differential equations:

a) $(y^4 + 2y) \, dx + (xy^3 + 2y^4 - 4x) \, dy = 0$ **10 Marks**

b) $\frac{dy}{dx} + x^2 y = \cos x$ **10 Marks**

Q 3.

a) Solve $\frac{d^2 y}{dx^2} + a^2 y = \tan ax$. **10 Marks**

b) Solve $(D^4 - 4D + 4)y = 8x e^{2x} \sin x$. **10 Marks**

Q4.

a) Solve the following differential equations:

$x^2(y - z)p + y^2(z - x)q = z^2(x - y)$ **10 Marks**

b) Solve the following differential equations by the method of separation of variables:

$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$, given $u = 3e^{-y} - e^{-5y}$, when $x = 0$ **10 Marks**

Part B

Q 5.

a) State and prove Convolution theorem for Laplace Transform. **10 Marks**

b) Solve the following differential equation by Laplace Transform.

$\frac{dx}{dt} - y = e^t$, $\frac{dy}{dt} + x = \sin t$, given $x(0) = 1$, $y(0) = 0$. **10 Marks**

Q 6.

a) Prove that $x \sin x = 1 - \frac{1}{2} \cos x - \frac{2}{1.3} \cos 2x + \frac{2}{2.4} \cos 3x + \frac{2}{3.5} \cos 4x + \dots, -\pi < x < \pi$

Hence show that $\frac{\pi}{4} = \frac{1}{2} + \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots$ **15 Marks**

b) Find the Fourier series expansion for $f(x) = \pi x, \quad 0 \leq x \leq 1$ **5 Marks**

Q 7.

a) In a bolt factory machines A,B and C manufacture respectively 25%, 35% and 40% of the total. Of this output 5,4, 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A,B and C? **15 Marks**

b) Find the mean number of heads in three tosses of a coin. **5 Marks**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

HEATING, VENTILATION AND AIR CONDITIONING (M-724)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is use of heat load?
- b) What is aspect ratio of a duct?
- c) What is the function of volume control damper in central HVAC System?
- d) What is use of vibration pad in chilling machine?
- e) Why boilers are used in Central HVAC System?

4x5

PART-A

Q.2 a) In case of heat load estimation what are the roles of glass, walls, roofs, ceiling and ventilation air in terms of heat transfer? **10**

- b) Describe with suitable sectional diagram of a room showing Fan Coil Unit (FCU) and air distribution system showing ducting, grilles and diffusers as applicable. **10**

Q.3 a) Write down stepwise how the static head of a blower in AHU is calculated along with the safety factor. **10**

- b) Write down stepwise how the pump head of a condenser water system is calculated along with the safety factor. **10**

Q.4 a) Describe with suitable fire damper diagram within AHU Room and ducts crossing floors of a multi floor building and also describing how the fire damper stops transmission of fire from AHU Room. **10**

- b) Describe with suitable diagram showing supply air & return air ducting from AHU along with AHU room, volume control damper, diffusers, grilles. **10**

PART-B

Q.5 a) What is pre-filter, micro (fine) filter & HEPA filter? Show the use of these filters with diagram showing AHU, ducting, diffusers as applicable. **10**

- b) Describe with suitable diagram, the HVAC System of operation theatre room within hospital. **10**

Q.6 a) What are the types of cooling towers? Describe functioning of each type with diagrams. **10**

- b) Describe with suitable diagram showing strip heaters in an arrangement of AHU, ducting, grilles and diffusers etc. **10**

Q.7 a) Describe with suitable diagram the HVAC plant room showing chilling machine, chilled water piping, condenser water piping, chilled water pump, condenser water pump, boilers with valve interlocking operation during summer and winter. **10**

- b) Describe with suitable diagram the valve and strainer arrangement for chilled water and condenser water system equipment like chilling machine, pumps, cooling tower and AHU. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

PRODUCTION AND OPERATION MANAGEMENT (M-633)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Briefly explain productivity and its measures.
- b) What is the concept of value engineering?
- c) What do you understand by ‘bill of material’?
- d) Briefly explain the type of costs involved in inventory control.
- e) What are different elements of maintenance management?

2×10

PART-A

- Q.2** a) How would you design a manufacturing process? Explain it with example. **10**
b) What are various techniques of value engineering? **10**
- Q.3** a) Explain the term aggregate planning. **10**
b) How do you arrive at master production schedule and how do you integrate it with MRP-I and MRP-II? **10**
- Q.4** a) Explain the process (different phases) of production planning and control. **10**
b) Discuss the techniques of production control in job shop production, batch production and mass production. **10**

PART-B

- Q.5** a) What are different techniques of inventory control? **10**
b) Explain EOQ, graphically. **10**
- Q.6** a) What are control charts? Explain its importance and also various types of control charts used in industry. **10**
b) Elaborate the three primary technical tools used for quality control and its improvements. **10**
- Q.7** a) What are various planned maintenance strategies used in industry? **10**
b) Describe various elements of total productive maintenance and its key features. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

POWER PLANT ENGINEERING (M-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Briefly answer the following:

- a) What are primary sources of energy?
- b) How conventional energy sources can be classified in brief?
- c) Classify hydro electric plants.
- d) What is basic nuclear reaction?
- e) What is PFBC system?
- f) Define PWR type nuclear reactor.
- g) Explain combination cycle.
- h) Why is the air-cooled condenser not used in power plants?
- i) Explain capacity factor.
- j) Explain the economic load term.

2×10

PART-A

Q.2 a) State the essential elements and components of a hydroelectric power plant in detail. **10**
b) Describe about the catchment areas and dams used for such plants. **10**

Q.3 a) Draw flow-sheet or layout of a steam power station indicating major components and explain. **10**
b) What are the functions of safety valve? **10**

Q.4 a) Explain in detail the setup and working principle of ash handling plant in thermal power station. **10**
b) Why are the super-heater and air-preheater installed in sequence on the hot flue gas side? **10**

PART-B

Q.5 a) What are various types of combined cycle plants? What are the inherent advantages of such a plant? **12**
b) Explain in detail the parameters affecting the thermodynamic efficiency of combined cycle power plant. **8**

Q.6 a) Discuss the advantages and disadvantages of nuclear power plants as compared with conventional power stations. **10**
b) Explain the various parts of a nuclear reactor. **10**

Q.7 Explain in brief:

- a) Load factor.
- b) Economic load sharing.
- c) Operating characteristics of air supply system in Power plant.
- d) Heat rate.

5x4

Manav Rachna International Institute of Research and Studies
Faculty of Engineering and Technology
May. 2019

Subject: MATHEMATICS FOR BIO-TECHNOLOGY - I **Department : Mathematics**

Subject Code: MA-103 **Max. Marks : 100**

Class / Semester: 1st sem. (BT students only) **Time allowed: 3 hours**

Note: Attempt any 5 questions, Question 1 is compulsory. Attempt any two questions from Part-A and any two questions from Part-B. No supplementary answer sheets will be given.

Q 1.

- k) Find the determinant of the Matrix $A = \begin{bmatrix} -1 & 2 & 3 \\ 6 & 2 & 4 \\ 5 & 4 & 7 \end{bmatrix}$
- l) Verify the Cayley Hamilton theorem of the Matrix $A = \begin{bmatrix} 3 & 3 \\ 2 & 4 \end{bmatrix}$
- m) Express the $z = 1 + i$ in polar form.
- n) Find the modulus and amplitude of $z = \tan \alpha + i$
- o) Write the necessary condition for a series to be convergent.
- p) Expand $\cos^{-1}(x)$ in powers of x
- q) If $y = (2x+3)^{10}$, find y_{11}
- r) Find the differentiation of $f(x) = x^2 \sec^{-1} x$
- s) Find Limit of the $\lim_{(x,y) \rightarrow (0,0)} \frac{(1+x^2)\sin y}{y}$
- t) Evaluate $\int x^2 \sin x dx$.

2×10 Marks

Part A

Q 2.

- a) Find the rank of the matrix $A = \begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & 4 & 6 & 2 \\ -1 & 5 & 4 & 6 \end{bmatrix}$ **10 Marks**

- b) Find the eigen values and the corresponding eigen vectors of the matrix

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix} \quad \textbf{10 Marks}$$

Q 3.

- c) Separate into real and imaginary parts: $\sin(x+iy)$ **10 Marks**

- d) Find the general value of $\log(-i)$ **10 Marks**

Q4.

a) Discuss the convergence of the following series: $\frac{1}{2}x + x^2 + \frac{9}{8}x^3 + x^4 + \frac{25}{32}x^5 \dots$ **10 Marks**

b) Show that the series: $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$ is conditionally convergent. **10 Marks**

Part B

Q 5.

c) If $y = e^{m \cos^{-1}(x)}$, calculate $y_n(0)$ by using Leibnitz theorem. **10 Marks**

d) Use Taylor's theorem to express the polynomial $3x^3 + 2x^2 + x - 5$ in terms of $(x - 2)$

10 Marks

Q 6. A) If $u = \log_e \left(\frac{x^4 + y^4}{x + y} \right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$ **10 Marks**

b) If $u = x + y + z$, $uv = y + z$, $uvw = z$, show that $\frac{\partial(x, y, z)}{\partial(u, v, w)} = u^2 v$ **10 Marks**

Q 7.

a) Evaluate $\iint_R y dx dy$ Where R is the region bounded by the $y^2 = 4x$ and $x^2 = 4y$.

10 Marks

b) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} dx dy dz$ **10 Marks**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

APPLIED THERMODYNAMICS (M-419)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define and explain the physical significance of Volumetric Efficiency.
- b) Draw p-V and T-s diagram for the Brayton cycle.
- c) What is calorific value of a fuel? Define Higher Calorific Value (HCV) and Lower Calorific Value (LCV) of fuel.
- d) Explain the difference between steam Nozzles and Diffusers.
- e) What are the factors which affects the efficiency of Rankine Cycle?
- f) Draw the Reheat-Rankine Cycle on T-s and P-v diagram.
- g) How do accessories differ from mountings?
- h) What is the function of boiler Superheater?
- i) What do you mean by degree of reaction in steam Turbine?
- j) What are the parts of steam Condensing plant?

2x10

PART-A

Q.2 a) For an engine working on the ideal dual cycle, the compression ratio is 10 and the maximum pressure limited to 70 bar. If the heat supplied is 1680 kJ/kg, find the pressures and temperatures at various salient points of the cycle and the cycle efficiency. The pressure and temperature of air at the commencement of compression are 1 bar and 100°C respectively. Assume $C_p=1.004 \text{ KJ/Kg}$ and $C_v=0.717 \text{ KJ/Kg}$ for air.

10

- b) Obtain an expression for the air standard efficiency of Otto cycle.

10

Q.3 a) With neat labeled diagram explain the construction and working of Bomb Calorimeter.

10

- b) A sample of coal supplied to a boiler has the following composition by mass: C= 88%; H₂= 5%; O₂= 3 %; N₂=1%; S= 0.5% and rest is incombustible matter. Calculate: (a) Mass of air required for complete combustion of 1 kg of coal, (b) dry analysis both by mass and volume of the products of combustion when 15% excess air is supplied.

10

Q.4 a) Explain with the help of neat sketch a Regenerative Rankine Cycle. Also mention its advantages and disadvantages in comparison to Simple Rankine Cycle.

10

- b) In a Rankine Cycle, The steam at inlet to turbine is saturated at a pressure of 35 bar and exhaust pressure is 0.2 bar. Determine: (i) The pump work (ii) The Turbine work (iii) Rankine efficiency (iv) The Condenser Heat flow (v) The dryness at the end of expansion.

10

PART-B

Q.5 a) What are the differences between High Pressure Boiler and Low Pressure Boiler? Also explain the construction and working details of any one low pressure Boiler. **10**

b) Explain with neat sketch given boiler accessories:

i) Air preheater.

ii) Economiser.

10

Q.6 In a simple impulse steam turbine stage steam enters the nozzle at 15 bar, dry saturated with velocity of 150 m/s. Nozzle angle is 20° and steam leaves nozzle at 8 bar and enters into smooth blades. Considering blade velocity coefficient of 0.90 and blades to be equiangular determine the following for maximum diagram efficiency.

a) The blade angles.

b) The blade efficiency.

c) The stage efficiency.

20

Q.7 Write the differences between Jet and Surface Condenser. Also explain briefly the following types of jet condensers: (i) Parallel flow (ii) Ejector type. **20**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

BIOSTATISTICS (MA-401)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

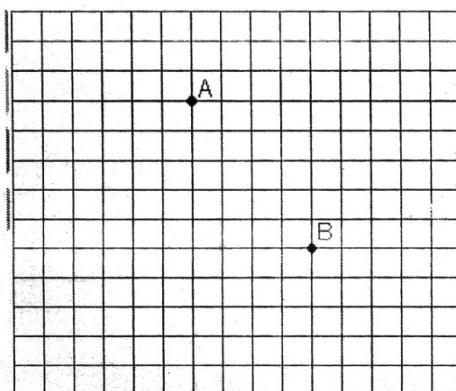
Q.1 Answer the following questions:

- Three faces of a die are painted white such that only the odd number faces remain visible. The die is cast. What is the probability of getting a 1 or a 3 or a 5?
- Classify the following as discrete or continuous: speed of a train, shoe sizes, amount of rain, height of children, time to wake up.
- When should one use ANOVA? Can multiple T tests be carried out in place of ANOVA? Justify.
- What does regression of Y on X and regression of X on Y mean? Give equations for both.
- How is scatter plot different from dot plot? Explain with an example.

4×5

PART-A

Q.2 a) In the graph below, no axes or origin is shown. If point B's coordinates are (10, 3), which of the following coordinates would most likely be A's?



10

- If the random variable X follows a Poisson distribution with mean 3.4, find $P(X=6)$
- Write short notes on the following:
 - Qualitative data.
 - Quantitative data.

5

5

Q.3 a) Find the mean, mean deviation, variance and standard deviation of the following data:

6, 8, 10, 12, 14, 16, 18, 20, 22, 24

12

- What is the difference between frequency graph and frequency polygon? Explain with examples.

8

Q.4 a) What are the rules of subtraction, addition and multiplication of probability?

10

- Consider a computer system with Poisson job-arrival stream at an average of 2 per minute. Determine the probability that in any one-minute interval there will be:

i) 0 jobs.

ii) Exactly 2 jobs.

iii) At most 3 arrivals.

10

PART-B

- Q.5 a) Write short notes on the following:
 i) Stratified sampling.
 ii) Two tailed test.
 iii) Region of rejection.
 iv) Hypothesis.
 v) Critical values. **2x5**
- b) Researchers asked a sample of men and women to categorize 30 cartoons as either "funny" or "not funny". Below are fictional data for 9 people:
 Percentage of cartoons labeled as "funny":
 Women: 84, 97, 58, 90
 Men: 88, 90, 52, 97, 86
 Carry out T test for this scenario, using a two-tailed test and a significant level of 0.05. **10**

- Q.6 a) Explain sign test with an example. **10**
 b) Carry out ANOVA for the following:

Program 1	Program 2	Program 3	Program 4
9	10	12	9
12	6	14	8
14	9	11	11
11	9	13	7
13	10	11	8

10

- Q.7 a) What is the difference between Wilcoxon Rank Sum and Wilcoxon Signed Rank Test? Explain with examples. **6**
 b) Calculate the spearman's rank correlation coefficient for the following data:

X	13	20	22	18	19	11	10	15
Y	17	19	23	16	20	10	11	18

12

- c) What are the equations for covariance? **2**

End Semester Examination, May 2019

B. Tech. – Sixth Semester
TOOL ENGINEERING (M-635)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is the basic composition of HSS tool?
- b) What are silicon nitrides ceramics?
- c) State the disadvantages of brazing tips.
- d) What are the different types of web core types?
- e) What is chisel effect in the drill?
- f) What are form tools?
- g) Name the common material for milling coffers.
- h) Differentiate between peripheral and face milling process.
- i) Broaching is better than milling: Comment.
- j) State Broaching tool.

2x10

PART-A

Q.2 a) Explain following theories of tool failure:

- i) Diffusion theory.
- ii) Abrasion theory.
- iii) Adhesion theory.
- iv) Chemical theory.

3x4

- b) Discuss the various types of cutting tools.

8

Q.3 a) To investigate the tooling problem faced in a machine shop. An orthogonal cutting test of a mild steel has been carried out and the following values have been observed:

Rake angle is 15.26°

Depth of cut is 2mm

Feed is 0.3 mm/rev

Stress is 200 N/mm²

Chip thickness ratio is 0.4

Velocity of cutting is 50 m/min.

14

- b) Classify cutting tools based on cutting point and construction.

6

Q.4 a) Discuss the following design features of a drill:

- i) Lip angle.
- ii) Point angle.
- iii) Helix angle.
- iv) Web thickness.
- v) Chisel angle.
- vi) Margin.

15

- b) State the effect of resharpening/grinding of twist drill.

5

PART-B

Q.5 a) Derive an expression for depth of the circular form tools to be ground measured normal to the front clearance face. (When clearance angle is ' α ' and zero rake angle ' γ ')

15

- b) Draw neat diagrams showing radial feed and tangential feed form tools.

5

Q.6 Discuss following design features of a milling cutter.

- a) Size of the cutter.
- b) Tool angles.
- c) Width of land.
- d) No. of teeth.
- e) Flutes.

4x5

Q.7 A keyway is to be broached in the bore of low alloy steel gear. Design a broach with the following data:

- a) Bore diameter = 36mm
- b) Bore length = 40mm
- c) Width of keyway = 5mm
- d) Depth of keyway = 3.2mm

20

End Semester Examination, May 2019

B. Tech. – Sixth Semester
MECHATRONICS (M-634)

Time: 3 hrs

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define mechatronics with its application in industries.
- b) Explain in short the flip-flops.
- c) Explain the significance of the following information given in the specification of transducers. 'A capacitive linear displacement transducer. Non linearity and hysteresis: $\pm 0.01\%$ full range'.
- d) What is quantization error during analog to digital conversion?
- e) Define a microprocessor with an example.
- f) Define the types of memory system used.
- g) What is the stability and resolution of transducers?
- h) Compare combinational and sequential logic system.
- i) Explain the function of constituents parts of a microprocessor.
- j) How digital signal differ from analog signal?

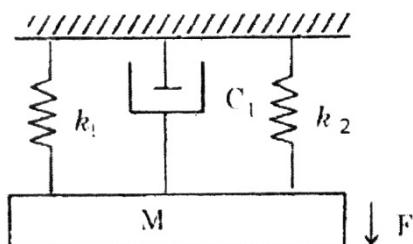
2x10

PART-A

- Q.2** a) Explain what logic gate might be used to control the flowing situations:
i) The issue of tickets at an automatic ticket machine at a railway station.
ii) A safety locks system for the operation of machine tool **3x2**
- b) Explain the working of JK flip in detail. **10**
- c) Convert the following:
i) 10001011 from Binary to Octal.
ii) 213 from Octal to Binary. **4**
- Q.3** a) Explain the following sensors with their applications in industries.
i) LVDT.
ii) Optical encoders. **10**
- b) What are Non-Linearity errors? How can Non-Linearity errors be removed? **6**
- c) A force of 400 N is required to open a process control valve. What is area of diaphragm actuator to open the valve with a control gauge pressure of 70 KPa? **4**
- Q.4** a) Explain the role of buses used in Microprocessors. **4**
- b) Explain the following memory system:
i) RAM
ii) EEPROM **6**
- c) Discuss architecture of 8051 microcontroller. **10**

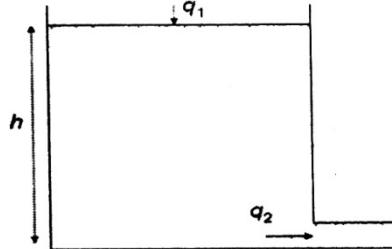
PART-B

- Q.5** a) Explain the building block equation of a Thermal system building block. **8**
- b) Derive an equation relating the input force 'F', with output displacement 'x', for the system described in the figure below.



6
989/5

- c) Find the equation for building up model for a fluid system shown in the figure below:



6

- Q.6** a) Explain AD convertor with Analog to Digital Signal conversion. **10**
b) What is meant by filtering of frequencies? **4**
c) What do you mean by phase change in inverting amplifiers? Explain Summing amplifiers. **6**

- Q.7** Write short notes on **(any four)**:

- a) Bathroom scales.
b) Radiator water level indicator.
c) Pick and Place Robot.
d) Water level indicators.
e) Automatic Camera.

5x4

End Semester Examination, May 2019

B. Tech. – Fourth Semester

KINEMATICS OF MACHINES (M-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

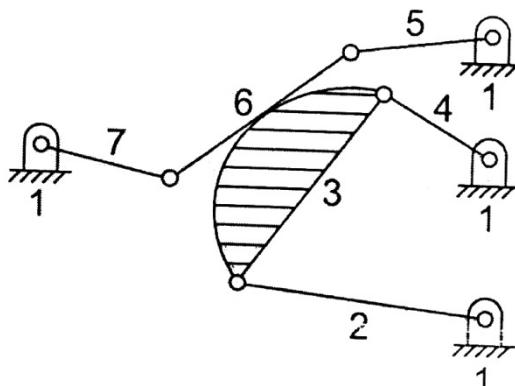
Q.1 Answer the following questions:

- a) Define constrained motion.
- b) What is Stoch Yoke Mechanism?
- c) Define Circular pitch of a gear.
- d) Define Involute profile of gear.
- e) Discuss the various types of gear trains.
- f) Define epi-cyclic gear train.
- g) Define angle of ascent and descent in a cam.
- h) Radial and cylindrical cam.
- i) What is synthesis of a mechanism?
- j) What is Axode?

2×10

PART-A

Q.2 a) Find degree of freedom of given linkage.



8

- b) Explain any two Inversion of double slider chain mechanism.

12

Q.3 The following data relate to a pair of 20° involute gears in mesh: Module = 6 mm, Number of teeth on pinion = 17, Number of teeth on gear = 49; Addenda on pinion and gear wheel = 1 module. Find:

- a) The number of pairs of teeth in contact;
- b) The angle turned through by the pinion and the gear wheel when one pair of teeth is in contact, and 3. The ratio of sliding to rolling motion when the tip of a tooth on the larger wheel
 - i) is just making contact,
 - ii) is just leaving contact with its mating tooth, and
 - iii) is at the pitch point.

20

Q.4 In an epicyclic gear train, the internal wheels A and B and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. E gears with A and C and F gears with B and D. All the wheels have the same module and the number of teeth are: $T_C = 28$; $T_D = 26$; $T_E = T_F = 18$.

- a) Sketch the arrangement;
- b) Find the number of teeth on A and B;
- c) If the arm Q makes 100 r.p.m. clockwise and A is fixed, find the speed of B; and
- d) If the arm G makes 100 r.p.m. clockwise and wheel A makes 10 r.p.m. counter

PART-B

Q.5 A cam is to give the following motion to a knife-edged follower:

- a) Outstroke during 60° of cam rotation;
- b) Dwell for the next 30° of cam rotation;
- c) Return stroke during next 60° of cam rotation, and
- d) Dwell for the remaining 210° of cam rotation.

The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with simple harmonic motion during outstroke and uniform acceleration and retardation during return stroke. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft. 20

Q.6 A four bar mechanism is to be designed, by using three precision points, to generate the function $y = x^{1.5}$, for the range $1 \leq x \leq 4$. Assuming 30° starting position and 120° finishing position for the input link and 90° starting position and 180° finishing position for the output link, find the values of x, y, θ and ϕ corresponding to the three precision points. 20

Q.7 PQRS is a four bar chain with link PS fixed. The lengths of the links are $PQ = 62.5$ mm; $QR = 175$ mm; $RS = 112.5$ mm; and $PS = 200$ mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle QPS = 60° and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of links QR and RS. 20

End Semester Examination, May 2019

B. Tech. – Fourth / Fifth Semester

FLUID MACHINES AND TURBOMACHINERY (M-402A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define impulse momentum equation?
- b) Define jet propulsion?
- c) Differentiate between 'impulse turbine' and 'reaction turbine'.
- d) Differentiate between 'radially inward flow' and 'radially outward flow'.
- e) Briefly explain draft tube.
- f) Define multistage centrifugal pump and its purpose.
- g) What is priming and why is it necessary?
- h) Briefly explain indicator diagram.
- i) How you will classify the reciprocating pump?
- j) Briefly explain torque converter.

2x10

PART-A

- Q.2**
- a) Show that the angle of swing of a vertical hinged plate is given by $\sin \phi = \rho a V^2 / W$. **10**
 - b) A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected through an angle of 165°. Assuming the plate smooth find:
 - i) Force exerted on the plate in the direction of the jet.
 - ii) Power of the jet.
 - iii) Efficiency of the jet.

10

- Q.3**
- a) Explain the construction and working detail of a Pelton turbine with a neat sketch. **10**
 - b) A pelton wheel is to be designed for a head of 60 m when running at 200 rpm. The pelton wheel develops 95.65 KW shaft power. The velocity of the buckets = 0.45 times the velocity of the jet. Overall efficiency = 85% and $C_v = 0.98$ Determine:
 - i) **Velocity of the jet**
 - ii) **Diameter of the jet**
 - iii) **Width of the bucket**
 - iv) **Depth of the bucket**
 - v) **Number of the buckets on the wheel**

10

- Q.4**
- a) **Explain the construction and working detail of a Kaplan turbine with a neat sketch.**
 - b) **A Francis turbine works at 450 rpm under a head of 120 m. Its inlet diameter is 120 cm and the flow area is 0.4 m². The angles made by absolute velocity and the relative velocity at inlet are 20° and 60° respectively with the tangential velocity. Assume whirl at outlet to be zero. Determine:**
 - i) **Volume flow rate**
 - ii) **Power developed**
 - iii) **Hydraulic efficiency** **10**

PART-B

- Q.5**
- a) **Define 'cavitations'. What are the effects of cavitation? Give the necessary precautions against cavitation.**

10

- b) A centrifugal pump delivers water against a head of 14.5 m and a design speed of 1000 rpm. The vanes are curved back to an angle of 30° with the periphery. The impeller diameter and width at outlet are 300 mm and 50 mm respectively. Determine the discharge of the pump if manometric efficiency is 95%. 10

Q.6 a) Explain the construction and working detail of a Reciprocating pump with a neat sketch.

10

- b) The cylinder bore diameter of a single acting reciprocating pump is 150 mm and its stroke length is 300 mm. The pump runs at 50 rpm and lifts water through a height of 25 m. The delivery pipe is 22 m long and 100 mm in diameter. Find the theoretical discharge and theoretical power required to run the pump. If the actual discharge is 4.2 litres/s, find the percentage slip. Also determine the acceleration head at the beginning of the delivery stroke. 10

Q.7 Explain in detail with neat sketches the following:

- a) Hydraulic Press.
b) Hydraulic Crane.

10x2

End Semester Examination, May 2019

B. Tech. (Industry Integrated) — Sixth Semester

CAD-II (MII-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

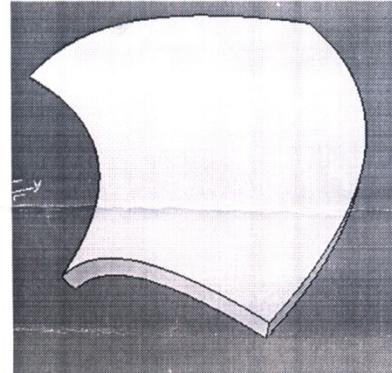
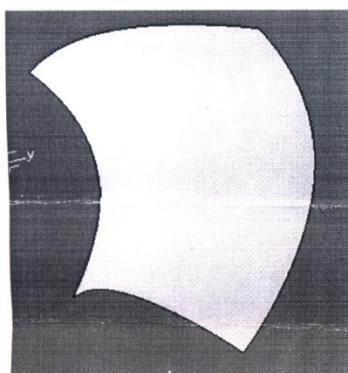
- a) What is the purpose of porcupine analysis curves?
- b) How can you join two curves with another curve?
- c) What is coon's patch?
- d) What is a planar curve?
- e) How can you extend a surface from one edge by 50mm?
- f) How can you join two curves with a surface?
- g) How can you change the size of mesh in FEA?
- h) How can you change the material in FEA e.g. Steel to Zinc?
- i) What is a ball nose cutter?
- j) What does the dia of cutter in finish in operation depend upon?

2x10

PART-A

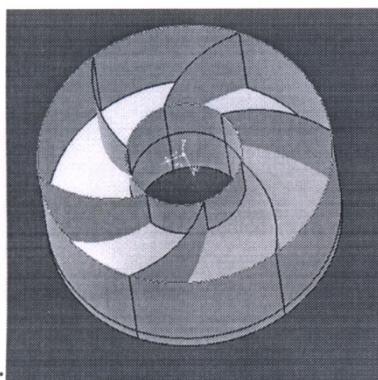
Q.2 Describe the method of following steps:

- a) Surface making.
- b) Expanding the surface.
- c) Giving Thickness on upper side = 10mm.



20

Q.3 Describe the method of making the following model.



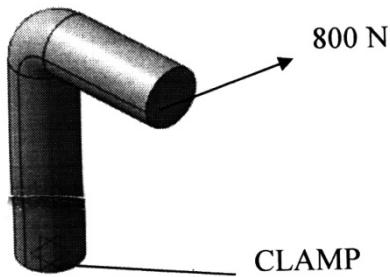
20

Q.4 What is the role of FEA in industry? What process is followed in FEA?

20

PART-B

Q.5 Explain the different steps in analyzing the following case for deflection.



20

Q.6 What are the cutting strategies that are followed in CAM milling for manufacturing? **20**

Q.7 Make the block diagram of a CNC machine and explain its different system functions.

20

End Semester Examination, May 2019

B. Tech. – Sixth Semester

OPERATIONS RESEARCH (M-601A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1** Answer the following questions:

- a) How do you classify the OR models based on nature of environment?
 - b) How does EVPI helps on decision making?
 - c) What is the significance of slack variable and artificial variable?
 - d) What is economic interpretation of Dual?
 - e) What is degeneracy in transportation problem? How it is resolved?
 - f) Give examples of finite and infinite population for a waiting line model.
 - g) Explain the terms:
 - i) Optimistic time
 - ii) Pessimistic time.
 - h) What are the advantages of simulation?
 - i) What is the role of dummy activity in network diagram?
 - j) Differentiate between basic and non-basic variable.

2x10

PART-A

- Q.2 a) A dairy wants to determine the quantity of butter it should produce. Past records have shown the following demand:

Quantity (KG)	15	20	25	30	35	40	50
No of days	6	14	20	80	40	30	10

Cost of butter is Rs 40 and it is sold for Rs 50. Determine the action alternative associated with maximization of expected profit. **14**

- b) Explain the different methods useful for decision making under uncertainty.

- 0.3 a) Discuss the various relations regarding primal and dual problems.

- 6

- b) Use simplex method to solve following LPP.

$$Max Z = 2x_1 + 5x_2$$

Sub to

$$x_1 + 4x_2 \leq 24$$

$$3x_1 + x_2 < 21$$

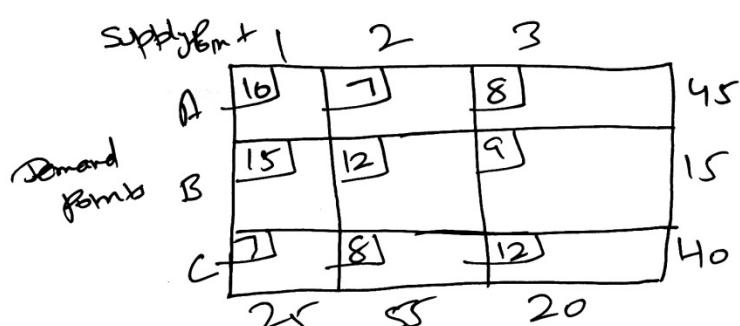
$$x_1 + x_2 \leq 9$$

$$x_1 - x_2 \geq 0$$

14

- Q.4 a) Assignment problem is special case of transportation problem, but still a different algorithm is used. Why? 5

- b) Find the optimum transportation schedule and minimum cost of transportation.



15

PART-B

- Q.5 a) Explain Kendall notation for waiting line model. **7**
b) Customers at one window drive according to Poisson distribution with a mean of 10 minutes. Service time per customer is exponential with a mean of 6 minutes. Determine:
i) Probability that arriving customer doesn't have to wait.
ii) Expected Length of System.
iii) Average waiting time in system. **13**
- Q.6 a) What are the main differences between CPM and PERT? What are the similarities? **8**
b) The data for a network is given below. Find total, free and independent float.
- | Activity | 0-1 | 1-2 | 1-3 | 2-4 | 2-5 | 3-4 |
|----------|-----|-----|-----|-----|-----|-----|
| Duration | 2 | 8 | 10 | 6 | 3 | 3 |
-
- | Activity | 3-6 | 4-7 | 5-7 | 6-7 |
|----------|-----|-----|-----|-----|
| Duration | 7 | 5 | 2 | 8 |
- 12**
- Q.7 a) What is simulation? What are the reasons for suing simulation? **6**
b) A company manufactures 30 items per day. The sales depend on demand which has following distribution.
- | Sales | 27 | 28 | 29 | 30 | 31 | 32 |
|-------------|-----|------|------|------|------|------|
| Probability | 0.1 | 0.15 | 0.20 | 0.35 | 0.15 | 0.05 |
- Using following random nos simulate the demand for next 10 days.
10, 99, 65, 99, 01, 79, 11, 16, 20. **14**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

MANUFACTURING TECHNOLOGY-II (M-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Briefly describe the types of chips formed during metal cutting.
- b) What do you understand by the term tool signature?
- c) What types of cutting fluids are used for different tool materials?
- d) Distinguish between crater and flank wear of the tool.
- e) What is meant by machinability index?
- f) What are the operations which can be performed on a lathe?
- g) Differentiate between shaper and slotter.
- h) What is the need for boring?
- i) Distinguish between up milling and down milling.
- j) Classify the types of broaching machines.

2×10

PART-A

- Q.2** a) Develop an expression for shear angle in relation to the Rake angle using the Merchant Circle theory of metal cutting. Also state the assumptions of the theory. **14**
b) In an orthogonal turning operation, cutting speed = 20 m/min, Cutting force = 20 N, Feed force = 80N, Back rake angle = 15°, Feed = 0.2 mm/rev, chip thickness = 0.4 mm, calculate the shear angle and the shear strain. **6**
- Q.3** a) A tool life of 80 min is obtained at cutting speed of 30 m/min and 8 min at 60 m/min. find tool life constant and cutting speed for 4 min tool life. **12**
b) Discuss the properties of various types of cutting tool materials used. **8**
- Q.4** a) Derive an expression for optimum cutting speed and tool life using criteria of minimum production cost. **14**
b) What does "total cost of machining" mean? **6**

PART-B

- Q.5** a) Explain the parts of a lathe machine with a detailed diagram. **10**
b) What is the working principle of a shaper machine? List its applications. **10**
- Q.6** a) Explain any two methods of taper turning possible on lathe with neat diagrams. **10**
b) Write short notes on the various drilling operations possible on a lathe machine. **10**
- Q.7** a) At what speed a 15mm diameter drill will run to drill a hole through a brass plate 20 mm thick, in order to cut the material at a surface speed of 60 m/min. Also calculate the feed used per revolution if the total time taken to make a hole is 1 Minute. **10**
b) Explain the various milling operations with a neat diagram. **10**

End Semester Examination, May 2019

B. Tech. (Mechanical Engg. Industry Integrated) – Sixth Semester

PRESS TOOLS – I (MII-601)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are the various ways in which presses can be classified?
- b) What factors should be considered for selecting an appropriate press for a given job?
- c) What is bending?
- d) Distinguish between shedder and stripper.
- e) When is the primary stop used?
- f) What is spring back and how is it controlled in bending Die?
- g) What is the function of back gauge in Press Brake?
- h) Why air bend are preferred over other type?
- i) Discuss in brief the basic quality of tool material.
- j) What is clearance in sheet metal operations?

2x10

PART-A

Q.2 a) What is a Press? Discuss various types of presses. **10**
b) The mechanically operated presses have clutches for engaging the drive with the reciprocating Mechanism. How are they actuated? **10**

Q.3 Sketch and design a progressive die to make a steel washer 30mm outside diameter with 15mm hole from 1.6mm thick steel sheet. The ultimate shear strength of the material is 32kg/mm². **20**

Q.4 Write short notes on the following:

- a) Split dies.
- b) Types of punches.
- c) Types of strippers.
- d) Die plate.

5x4

PART-B

Q.5 What are the various consideration in press tool design? Describe the design proceducer for blanking Die. **20**

Q.6 a) Differentiate between compound die and progressive die. **10**
b) Sketch the various method of applying shear to the punch and die. **10**

Q.7 a) What are the various methods of bending? Explain. **10**
b) Write short notes on the following:

- i) Bending force.
- ii) Spring back phenomenon in bending.

10

End Semester Examination, May 2019

B. Tech. – Second Semester

MATHEMATICS FOR BIOTECHNOLOGY-II (MA-203)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Solve: $y \, dx - x \, dy + x^2 \, dx = 0$.
- b) Solve: $(\sec x \tan x \tan y - e^x) \, dx + \sec x \sec^2 y \, dy = 0$.
- c) Find C. F. for the differential equation $y'' + 4y = 0$.
- d) Find P.I. for the differential equation $(D^2 - 4D + 3)y = e^x \sin 2x$.
- e) Form the partial differential equation: $xyz = \phi(x + y + z)$.
- f) Solve: $p - q = x - y$.
- g) Evaluate $\int_0^\infty \frac{e^{-1} - e^{-3t}}{t} \, dt$.
- h) Find the inverse Laplace transform $\frac{e^{-\pi s}}{s^2 + 1}$.
- i) In the Fourier series expansion of $f(x) = x^3$ in $(-\pi, \pi)$, what is the value of a_n .
- j) Find the number of words, with or without meaning that can be formed with the letters of the word 'SWIMMING'? **2×10**

PART-A

- Q.2 Solve the following differential equations:

a) $\left(xy^2 - e^{\frac{1}{x^3}} \right) \, dx - x^2 y \, dy = 0$

b) $\frac{dy}{dx} + x^2 y = \sin x$ **10×2**

Q.3 a) Solve $\frac{d^2 y}{dx^2} + a^2 y = \sec ax$. **10**

b) Solve $(D^4 - 4D + 4)y = 8x^2 e^{2x} \sin x$. **10**

- Q.4 a) Solve the following differential equations:

$(x^2 - y^2 - z^2)p + 2xyq = 2xz$ **10**

- b) Solve the following differential equations by the method of separation of variables:

$3 \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} = 0$, give $u(x, 0) = 4e^{-x}$. **10**

PART-B

- Q.5 a) State and prove convolution theorem for Laplace transform. **10**

- b) Solve the following differential equation by Laplace transform.

$\frac{d^2 x}{dt^2} + 2 \frac{dx}{dt} + 5x = e^{-t} \sin t$, where $x(0) = 0$ and $x'(0) = 1$. **10**

- Q.6 a) Find the Fourier series to represent the function $f(x) = |\cos x|$, $-\pi < x < \pi$. **15**
b) Find the Fourier series expansion for $f(x) = \pi x$, $0 \leq x \leq 1$. **5**
- Q.7 a) A restaurant serves two special dishes, A and B to its customers consisting of 60% men and women. 80% of men order dishes A and the rest B. 70% of women order B and rest A. In what ratio of A to B should the restaurant prepare the two dishes? **15**
b) Find the mean number of heads in three tosses of a coin. **5**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MACHINE DESIGN-II (M-607)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define the term endurance limit?
- b) Define fatigue failure.
- c) What is a closed coil helical spring?
- d) What is Wahl's stress factor?
- e) Define dynamic equivalent load.
- f) What is L_{10} life?
- g) Explain beam strength of gear.
- h) State any two advantages of gear drive over other types of drives.
- i) What is elastic and plastic deformation?
- j) What is the function of gasket?

2x10

PART-A

Q.2 a) A rotating bar of 45C8 steel with $S_{ut} = 630 \text{ N/mm}^2$ is subjected to a completely reversed bending stress. Calculate the fatigue strength of the bar for a life of 90000 cycles. Mention the suitable assumptions taken. The corrected endurance limit is 315 N/mm^2 . **12**
b) Illustrate how the stress concentration in a component can be reduced. **8**

Q.3 a) Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5. **15**
b) What is the function of transmission shafts? Define equivalent torsional moment and equivalent bending moment. **5**

Q.4 a) It is required to design a helical compression spring subjected to a force of 500 N. The deflection of the spring corresponding to this force is approximately 20 mm. The spring index should be 6. The spring is made of cold-drawn steel wire with ultimate tensile strength of 1000 N/mm^2 . The permissible shear stress for the spring wire can be taken as 50% of the ultimate tensile strength ($G = 81370 \text{ N/mm}^2$). Design the spring and calculate:
i) Wire diameter.
ii) Mean coil diameter.
iii) Number of active coils.
iv) Total number of coils.
v) Free length of the spring.
vi) Pitch of the coils. **15**
b) What is the objective of nipping of leaf spring? **5**

PART-B

Q.5 a) A single-row deep groove ball bearing has a dynamic load capacity of 40500 N and operates on the following work cycle:

- i) Radial load of 5000 N at 500 rpm for 25% of the time;
- ii) Radial load of 10000 N at 700 rpm for 50% of the time; and
- iii) Radial load of 7000 N at 400 rpm for the remaining 25% of the time.

Calculate the expected life of the bearing in hours.

15

- b) State any four desirable properties of a good bearing material.

5

- Q.6** A pair of spur gears with 20° pressure angle, consists of a 25 teeth pinion meshing with a 60 teeth gear. The module is 5 mm, while the face width is 45 mm. The pinion rotates at 500 rpm. The gears are made of steel and heat treated to a surface hardness of 220 BHN.

Assume that dynamic load is accounted by means of the velocity factor. The service factor and the factor of safety are 1.75 and 2 respectively. Calculate:

- a) wear strength of gears;
- b) the static load that the gears can transmit without pitting; and
- c) rated power that can be transmitted by gears.

20

- Q.7** Write a note on the following:

- a) Design considerations for Casting.
- b) Design considerations for Forging.

10

10

End Semester Examination, May 2019
B. Tech. (Industry Integrated) — Sixth Semester
WELDING TECHNOLOGY (MII-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Sheet Metal.
- b) What do you understand by "gauge" in sheet metal?
- c) Define Roller straightening.
- d) What are the disadvantages of shearing process?
- e) Write down applications of Ultrasonic welding.
- f) What is the working principles of TIG welding?
- g) Define Throat crack.
- h) What are the advantages of GTAW?
- i) Define Marginal Pitch.
- j) Define Soldering process.

2x10

PART-A

- Q.2 a) Differentiate between blanking and punching operations. **5**
- b) Explain Water jet cutting process. Discuss its advantages and disadvantages. **15**
- Q.3 Explain Oxy-fuel cutting process with neat sketch. Discuss its advantages and disadvantages and also its applications. **20**
- Q.4 Explain submerged arc welding process with neat sketch. Discuss its advantages and limitations. **20**

PART-B

- Q.5 a) Write short note on Resistance Seam welding and its advantages. **5**
- b) Explain working and application of GMAW welding with a neat diagram. **15**
- Q.6 Discuss the various Non-Destructive methods of testing of welds. **20**
- Q.7 Explain Ultrasonic welding with a neat sketch along with its advantages, disadvantages and also its applications. **20**

End Semester Examination, May 2019

B. Tech – Fourth Semester

IC ENGINES AND GAS TURBINES (M-621)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions in brief:

- a) In what respects four stroke cycle CI engine differ from that of an SI engine?
- b) How temperature affects the carburetion and power output?
- c) What are the main requirements of ignition system?
- d) Which lubrication system is mainly employed in two stroke cycle engines, and why?
- e) Describe with neat sketches the working of a simple constant pressure open cycle gas turbine.

4x5

PART-A

Q.2 A four stroke, four cylinder diesel engine running at 2000 rpm develops 65kW. Brake thermal efficiency is 28% and calorific value of fuel is 42 MJ/Kg. Engine has a bore of 120 mm and stroke of 100mm. take density of air 1.15 kg/m^3 , air fuel ratio= 15:1 and mechanical efficiency 80%. Calculate fuel consumption, air consumption and indicated thermal efficiency. **20**

Q.3 a) What are the basic components of Magneto Ignition System? Explain their working. **10**
b) What are the factors which effect the ignition timing? **10**

Q.4 a) What is delay period? Discuss the variables affecting the delay period. **10**
b) With the help of a graph between rate of heat release and crank angle, explain the stages of combustion in CI engine. **10**

PART-B

Q.5 a) What is the effect of viscosity on lubricating oil in terms of power produced and fuel consumption? **10**
b) What are the various types of lubricating oils and what is the role of additives in lubricating oils? **10**

Q.6 a) A gasoline engine works on Otto cycle. It consumes 6 litres of gasoline per hour and develops power at the rate of 25 kW. The specific gravity of gasoline is 0.8 and its calorific value is 44000 kJ/kg. Find the indicated thermal efficiency of the engine. **10**
b) Find the air-fuel ratio of a 4-stroke, 1 cylinder, air cooled engine with fuel consumption time for 10cc, as 20.0 sec, and air consumption time for 0.1 m^3 , as 16.3 sec. the load is 16 kg at speed of 3000 rpm. Also find brake specific fuel consumption in g/kWh and thermal brake efficiency. Assume the density of air as 1.175 kg/m^3 and specific gravity of fuel to be 0.7. The lower heating value of fuel is 44 MJ/kg and the dynamometer constant is 5000. **10**

Q.7 a) In the design of a gas turbine, the criterion is to get maximum work rather than maximum efficiency, why? Explain with analysis of gas turbine. **10**
b) In a simple Brayton cycle, the pressure ratio is 8, temperatures at the entrance of compressor and turbine are 300 K and 1400 K respectively. The compressor and turbine have the isentropic efficiency as 80%. Assume $C_p=1$ and specific heat ration as 1.4. Calculate power required by compressor in kW/kg of gas flow rate and, thermal efficiency of the cycle? **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

VEHICLE BODY ENGINEERING (MII-605)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer following questions in brief:

- a) What is the purpose of body and suspension?
- b) What are the features of 'estate car'?
- c) What are the causes of 'rolling' and 'pitching' moments?
- d) Classify the passenger based on distance travelled by them.
- e) What are various types of jigs used in body structure design?

4×5

PART-A

Q.2 How will you improve the *space and visibility* of a car? **20**

Q.3 List and explain various *aerodynamic drags* and their significance on vehicle stability. **20**

Q.4 What are the *body and safety considerations* of a vehicle? **20**

PART-B

Q.5 With the aid of sketches, explain different *layouts for passenger buses.* **20**

Q.6 With the help of neat sketch, explain *driver's cab design* for a commercial vehicle. **20**

Q.7 What do you mean by *body trimming* and what are the various items required in body trimming? **20**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

HEAT TRANSFER (M-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

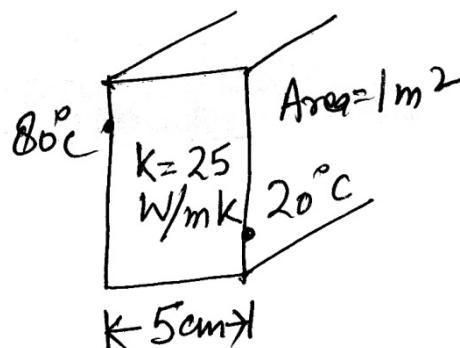
Q.1 Answer the following questions:

- Why does fouling happen in heat exchangers?
- What is thermal conductivity?
- What is Biot No.? State its significance.
- What is convection heat transfer? Which law is the basic law used for calculating convection heat transfer?
- What is overall heat transfer coefficient?
- What do you understand by emissivity?
- Write the expression of thermal diffusivity.
- Differentiate between parallel and counter flow heat exchanger. Which one is more efficient?
- State the importance of fin with at least two applications?
- Differentiate between filmwise and dropwise condensation.

2x10

PART-A

Q.2 a) Explain fourier's law of heat conduction. Derive the expression for one dimensional steady state heat conduction through a rectangular slab. **12**
 b) A steel slab is shown in the figure. Calculate the heat transfer rate.



8

Q.3 Derive the expression for heat transfer rate through an infinitely long fin. Also state the assumptions. **20**

Q.4 What is lumped system analysis? Derive the expression:

$$\frac{T_i - T_\infty}{T - T_\infty} = e^{\left(\frac{hA}{JVCp}\right)\tau}$$

20

PART-B

Q.5 a) What do you understand by black body? Give the characteristics of black body. **10**
 b) Explain the following terms:
 i) Shape factor.
 ii) Absorptivity, Reflectivity, Transmissivity.
 iii) Emissive power and emissivity.
 iv) White body and Grey body. **2½x4**

1008/5

- Q.6**
- a) Differentiate between natural and forced convection. **10**
 - b) State the expression and physical significance of the following dimensionless numbers:
 - i) Nusselt No.
 - ii) Prandtl No.
 - iii) Reynold's No.
 - iv) Grashoff's No. **10**
- Q.7**
- a) Derive the expression of LMTD for parallel flow heat exchanger. **10**
 - b) In a double pipe counter flow heat exchanger, 10,000 kg/h of an oil having a specific heat of 2.095 kj/kg k is cooled from 75°C to 50°C by 8000 kg/ hr of water entering at 25°C . Determine the heat exchanger area for an overall heat transfer coefficient of 0.3 kw/m²k. Take C_p of water as 4.18 kj/kg K. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester
HEAT TRANSFER (M-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) What is thermal diffusivity?
- b) Why does fouling happen in heat exchangers?
- c) What is Biot No.?
- d) What do you understand by thermal resistance?
- e) Discuss Fourier's law of heat conduction.
- f) What is radiation heat transfer? Does radiation require any material medium for its propagation?
- g) What is Stefan Boltzmann law of radiation?
- h) What is LMTD? Write its expression.
- i) What are different types of heat exchangers? Only name them.
- j) What is critical radius of insulation?

2×10

PART-A

Q.2 a) Derive the expression for 1 dimensional, steady state heat transfer through a hollow cylinder. Also state the assumptions. **10**

b) **Fig.**

Two slabs are shown in the figure. Calculate the heat transfer rate for 1 dimensional steady state heat conduction. Neglect the thermal contact resistance at the interface of the two slabs. **10**

Q.3 Derive an expression for the heat transfer rate through a fin of finite length, insulated at the tip. Also state the assumptions. **20**

Q.4 In transient heat conduction, derive the following expression

$$\frac{T_i - T_\infty}{T - T_\infty} = e^{\left(\frac{hA}{JVG}\right)\tau}$$

20

PART-B

Q.5 a) What do you understand by convection heat transfer? Differentiate between natural and forced, convection. **10**

b) State the expression and physical significance of following dimensionless numbers:

- i) Reynold's number
- ii) Nusselt No.
- iii) Prandtl No.
- iv) Grashoff No.

2½×4

Q.6 Discuss the following:

- a) Absorptivity reflectivity, transmissivity.
- b) Shape factor.
- c) Kirchoff's law of thermal radiation.
- d) Surface resistance and space resistance in radiation heat transfer.
- e) Characteristics of black body.

4×5

- Q.7 a) Derive an expression for LMTD in case of parallel flow heat exchanger. Also draw the temperature profile. **10**
- b) Light lubricating oil ($C_p = 2090 \text{ J / Kgk}$) is cooled by allowing it to exchange heat with water in a small heat exchanger, the oil enters and leaves the heat exchanger at 375K and 350K respectively. The flow rate of oil is 0.5 kg/s. Water ($C_p = 4177 \text{ J / Kgk}$) is available at 280K in sufficient quantity to allow 0.201 kg/s to be used for cooling purpose. Determine heat transfer area for counter flow operation. The overall heat transfer coefficient, $U = 250 \text{ W / m}^2\text{k}$. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

HEAT TRANSFER (M-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What is thermal diffusivity?
- b) Why does fouling happen in heat exchangers?
- c) What is Biot No.?
- d) What do you understand by thermal resistance?
- e) Discuss Fourier's law of heat conduction.
- f) What is radiation heat transfer? Does radiation require any material medium for its propagation?
- g) What is Stefan Boltzmann law of radiation?
- h) What is LMTD? Write its expression.
- i) What are different types of heat exchangers? Only name them.
- j) What is critical radius of insulation?

2×10

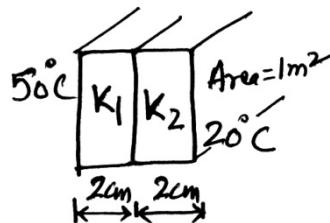
PART-A

Q.2 a) Derive the expression for 1 dimensional, steady state heat transfer through a hollow cylinder. Also state the assumptions. **10**

b)

$$K_1 = 20 \text{ W/mK}$$

$$K_2 = 40 \text{ W/mK}$$



Two slabs are shown in the figure. Calculate the heat transfer rate for 1 dimensional steady state heat conduction. Neglect the thermal contact resistance at the interface of the two slabs. **10**

Q.3 Derive an expression for the heat transfer rate through a fin of finite length, insulated at the tip. Also state the assumptions. **20**

Q.4 In transient heat conduction, derive the following expression:

$$\frac{T_i - T_\infty}{T - T_\infty} = e^{\left(\frac{hA}{JVG}\right)\tau}$$

20

PART-B

Q.5 a) What do you understand by convection heat transfer? Differentiate between natural and forced convection in detail. **10**

b) State the expression and physical significance of following dimensionless numbers:

- i) Reynold's No.
- ii) Nusselt No.
- iii) Prandtl No.
- iv) Grashoff No.

2½×4

Q.6 Discuss the following:

- a) Absorptivity, reflectivity, transmissivity.

1012/5

- b) Shape factor.
- c) Kirchoff's law of thermal radiation.
- d) Surface resistance and space resistance in radiation heat transfer.
- e) Characteristics of black body.

4×5

Q.7 a) Derive an expression for LMTD in case of parallel flow heat exchanger. Also draw the temperature profile. **10**

b) Light lubricating oil ($C_p = 2090 \text{ J / Kgk}$) is cooled by allowing it to exchange heat with water in a small heat exchanger, the oil enters and leaves the heat exchanger at 375K and 350K respectively. The flow rate of oil is 0.5 kg/s. Water ($C_p = 4177 \text{ J / Kgk}$) is available at 280K in sufficient quantity to allow 0.201 kg/s to be used for cooling purpose. Determine heat transfer area for counter flow operation. The overall heat transfer coefficient, $U = 250 \text{ W / m}^2\text{k}$. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

IC ENGINE AND GAS TURBINES (M-621)

Time: 3 Hours

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define bore and stroke of an IC engine.
- b) What is "Compression Ratio"? Explain briefly.
- c) What is meant by carburetion?
- d) Draw PV and TS diagram of ideal Otto cycle.
- e) What do you understand by knocking?
- f) What is flash and fire point?
- g) Classify different types of cooling systems.
- h) Define the following (i) BSFC (ii) ISFC.
- i) List various methods available for finding friction power of an engine.
- j) State the merits and demerits of gas turbines over I.C. Engine.

2x10

PART-A

Q.2 An air standard dual cycle has a compression ratio of 10. The pressure and temperature at the beginning of compression are one bar and 27°C . The maximum pressure reached is 42 bar and maximum temperature is 1500°C .

Determine:

- a) The temperature at the end of constant volume heat addition.
- b) Cut off ratio
- c) Work done per kg of air
- d) The cycle efficiency.

Assume: $C_p = 1.004 \text{ KJ/kg K}$ and $C_v = 0.717 \text{ KJ/kg K}$ of air.

20

Q.3 With neat sketch explain the battery ignition system.

20

Q.4 a) What is ignition lag? Describe the effect of engine variables on Ignition lag.
b) Explain the stages of combustion in an S.I. Engine.

10

10

PART-B

Q.5 a) Explain the splash and pressure lubrication system with a neat sketch.

10

b) Explain the following:

i) Thermosyphon cooling system.

ii) Forced circulation cooling system.

5x2

Q.6 A six cylinder, gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume in each cylinder is 70 cc. At a speed of 4000 rpm the fuel consumption is 20 kg/h. The torque developed is 150 N-m .

Calculate:

- i) The brake power.
- ii) The brake mean effective pressure.
- iii) Brake thermal efficiency if the calorific value of the fuel is 43000 kJ/kg.
- iv) The relative efficiency on a brake power basis assuming the engine works on the constant volume cycle. $Y = 1.4$ for air.

20

Q.7 A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610 °C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output in kilowatts of an electric generator geared of the turbine when the air enters the compressor at 15 °C at the rate of 16 kg/s, Take $c_p = 1.005 \text{ KJ/kg K}$ and $\gamma = 1.4$ for the compression process and take $c_p = 1.11 \text{ KJ/kg K}$ and $\gamma = 1.333$ for the expansion process. **20**

End Semester Examination, May, 2019

B. Tech – Sixth Semester

INTRODUCTION TO ROBOTICS (M-631)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Robotics.
- b) What are networked robots?
- c) Define impactive grippers.
- d) Name the types of end effectors used in robots.
- e) Name any two light sensors used in robots.
- f) What are the elements of actuation system?
- g) Write expression of velocity and force in linear actuators.
- h) Give two limitations and advantages of hydraulic actuators.
- i) What is a voxel?
- j) What is a robotic manipulator?

2x10

PART-A

Q.2 a) Write an essay on the different generations of the robots and highlight their evolution with respect to applications. **10**

- b) Explain five important robotic configurations with suitable schematic illustrations. Also explain the work envelope by specifying horizontal and vertical reach in each case. **10**

Q.3 Write short notes on the following with reference to robotic programming:

- a) Teach pendant.
- b) Online robotic programming.
- c) Offline robotic programming.
- d) VAL and AML.

5x4

Q.4 a) It is said that economics of industry need to be thoroughly studied before implementing robots. Justify the statement. **10**

- b) Explain in detail the various kinds of end effectors used in robotics. **10**

PART-B

Q.5 a) Using suitable block diagram, explain in detail the different elements of a robotic actuation system. **10**

- b) Highlight the issues in choice of actuation system. Further, explain the various types of actuation system based upon primary power source. **10**

Q.6 a) Explain the different kind of feedback system used in robotics. **10**

- b) Using suitable figure, explain in detail the electric motors used in robotics. **10**

Q.7 a) What are the differences between sensors and transducers? Explain in detail the various sehsors used in robots. **10**

- b) What is robotic vision? **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

APPLIED MATHEMATICS-III (MA-302)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) If $z = x + iy$, find the real and imaginary part of?
- b) State the Cauchy Reimann Equation in polar form.
- c) Write Cauchy's integral formula.
- d) Expand $f(z) = \cos z$ about $z = \frac{\pi}{4}$ using Taylor's series.
- e) Write the complex form of Fourier transform.
- f) Find the Fourier Sine transform of $f(t) = \cos t$.
- g) A speaks truth in 75% cases and B in 80% cases. In what percentage of cases are they likely to contradict each other in stating the same fact?
- h) Five men in a company of 20 are graduates. If 3 men are picked out of 20 at random. What is the probability that they all are graduates?
- i) Define the Type-1 and Type-2 error.
- j) A bag contains defective article, the exact number of which is not known. A sample of 100 from the bag gives 10 defective articles. Check whether to accept or reject the null hypothesis.

2×10

PART-A

- Q.2 a) If $f(z) = u + iv$ is an analytic function of z and $u - v = e^x (\cos y - \sin y)$ then find $f(z)$. **10**

- b) Show that the function $f(z) = \sqrt{|xy|}$ is not regular at the origin, although Cauchy-Reimann equations are satisfied. **10**

- Q.3 a) Expand the function in Laurent's Series $f(z) = \frac{1}{z^2 - 4z + 3}$, for $1 < |z| < 3$. **10**

- b) Evaluate: $\int_C \frac{e^{2z}}{(z-1)(z-2)} dz$ where $C: |z|=3$. **10**

- Q.4 a) Using the Fourier Integral Representation show that:

$$\int_0^\infty \frac{\lambda \sin \lambda x}{\lambda^2 + k^2} d\lambda = \frac{\pi}{2} e^{-kx}, \quad x > 0, k > 0 \quad \text{10}$$

- b) State and prove convolution theorem. **10**

PART-B

- Q.5 a) Data was collected over a period of 10 years, showing number of deaths from horse kicks in each of the 200 army corps. The distribution of deaths was as follows:

x	0	1	2	3	4
f(x)	109	65	22	3	1

Fit a Binomial distribution to the data and calculate the theoretical frequencies. **10**

- b) In a bolt factory, there are four machines A, B, C, and D manufacturing 20%, 15% 25% and 40% of the total output. Of their outputs 5%, 4%, 3% and 2% in the

same order, are defective bolts. A bolt is chosen at random from thy factory's production and is found defective. What is the probability that the bolt was manufactured by machine A or machine D. **10**

- Q.6 a) A set of 5 coins are tossed 32,000 times and the number of heads appearing each time is notes. The results are given below:

No. of heads	0	1	2	3	4	5
Frequency	80	570	1100	900	500	50

Test the Hypothesis that coins are unbiased.

(Hint: for $\nu = 5$, $\chi^2 = 11.070$ at 5% *level of significance*) **10**

- b) The average mark in English of sample of 100 students was 51 with a S.D. of 6 marks. Could this have been a random sample from a population with average marks 50? (Hint: $|z_a| = 1.966$ at 5% *level of significance*) **10**

- Q.7 a) Ten students got the following percentage of marks in Economics and Statistics. Calculate the coefficient of correlation.

Marks in Economics	78	36	98	25	75	82	90	62	65	39
Marks in Statistics	84	51	91	60	68	62	86	58	53	47

- b) Fit a straight line to the following data:

x	12	15	21	25
y	150	70	100	120

10

10

End Semester Examination, May 2019

B. Tech (M.E.) (Industry Integrated) – Sixth Semester
DIE DESIGN (MII-606)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What is the function of non return valve in Injection mould?
- b) What is the minimum thickness of Injection mold that can be clamped on an injection molding machine?
- c) What is the role of hardener in compression molding?
- d) What is the difference between cold forging and warm forging?
- e) Name four parts, which are made by forging?
- f) Why are the forged parts stronger than machine parts?
- g) Name four parts made by HPDC of Aluminium.
- h) Name the material that is used to make guide pillar and guide bush in HPDC molds.
- i) What is the purpose of swaging process?
- j) Why is the strength of roll forming parts more than sheet metal?

2x10

PART-A

Q.2 Explain the construction of a Injection Mold with diagram. What is the purpose of Cam Mold? **20**

Q.3 Explain the compression molding machine quality problems and solutions. Explain the compression molding briefly. **20**

Q.4 Explain the different steps in belt drop forging machine and process. **20**

PART-B

Q.5 Explain the process of LPDC. What are the quality problems in HPDC? **20**

Q.6 a) Explain the working of head coining operation. **10**
b) Give four examples of common steels that are used in Molds with their material compositions. **10**

Q.7 Explain the application and working of roll forming process. Also, explain the common quality problems in roll forming. **20**

End Semester Examination, May 2019

B. Tech (Industry Integrated) – Sixth Semester

AUTOMATION (MII-604)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Define production rate
- b) What are fixed costs?
- c) What do you understand by WIP?
- d) What are automated flow lines?
- e) State the disadvantages of Buffer storage.
- f) What is the function of part feeding devices?
- g) What do you understand by acceptance sampling?
- h) State the various points at which inspection can be done?
- i) Name any four CMM machine types.
- j) Name the components of CMM machine.

2x10

PART-A

Q.2 a) Explain the USA principle.

5

- b) What are the various strategies used in Automation?

15

Q.3 Explain various transfer mechanisms.

20

Q.4 a) Discuss selector and orienter in part feeding devices.

5

- b) What are the various types of automated assembly systems?

15

PART-B

Q.5 a) Describe On-line inspection process.

5

- b) Explain three major areas for Statistical Methods for Quality Control and Improvement.

15

Q.6 a) Explain automated performance Measurement/evaluation.

5

- b) Explain CMM and its components. What are the advantages and applications of CNM?

15

Q.7 Explain automated Guided vehicle, its types, components and advantages associated with these.

20

End Semester Examination, May 2019

B. Tech. (Industry Integrated) — Fifth Semester

PRODUCT DESIGN AND PROCESS PLANNING (MII-501)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Cite one example of a multi-purpose product.
- b) Name two Auto parts that are made by forging.
- c) Name four auto parts that are made from Zinc.
- d) What type of cost is the cost of BOP? Fixed or recurring.
- e) Why is the draft given in forging parts?
- f) Why are forged parts stronger than the machined parts?
- g) What is meant by thermoplastics?
- h) Name machining processes in increasing sequence of accuracy.
- i) What is meant by toughness?
- j) What is T-kanban?

2x10

PART-A

- Q.2** a) Describe four examples where new ideas resulted in new products. **10**
b) What are the various stages of product design? **10**
- Q.3** a) Describe the various stages of a product with the help of a curve. **10**
b) What is the difference between MTBF and MTTF? How will you improve the reliability of a product? **10**
- Q.4** a) A businessman manufacture Nuts. The fixed cost is Rs 20 lacs. Variable cost per nut is Rs 2/- and Price per nut is Rs 5/-. Calculate the break even volume. **10**
b) Explain fixed cost and variable cost with help of examples. Classify the following terms as fixed cost or variable cost:
i) EMI
ii) Material Cost
iii) Packing cost
iv) Machinery cost
v) Jigs and Fixtures cost
vi) Salaries. **10**

PART-B

- Q.5** a) What are the advantages of making car seats in Zinc castings as compared to the sheet metal steel parts? **10**
b) What is Value Engineering? Describe the steps of Value Engineering. **10**
- Q.6** a) What are the ergonomic considerations in designing a machine? **10**
b) What is a process sheet? What details are included in it? **10**
- Q.7** a) Describe one process of Rapid prototyping. **10**
b) Describe just in Time production and its advantages. **10**

End Semester Examination, May 2019

B. Tech. – First Semester

ELEMENTS OF MECHANICAL ENGINEERING (M-101C)

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What are the conditions for a system to be in thermodynamic equilibrium?
- b) Define the term Refrigeration.
- c) What are gear trains? Give their application.
- d) Define the term heat capacity.
- e) Define Poisson's Ratio.
- f) What is the angle of lap in belt.
- g) Write down carbon percentage in steel and cast iron.
- h) Write down the classification of cast Iron.
- i) Define ductility and brittleness.
- j) What is the use of spark Plug in Petrol Engines?

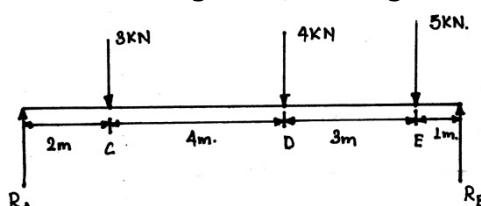
2x10

PART-A

- Q.2 a) State First Law of Thermodynamics. In addition, explain the corollaries of first law of thermodynamics. **10**
- b) Explain the two statements of second law of thermodynamics. **10**
- Q.3 a) Explain the working of 4-stroke petrol engine with the help of neat sketch. Also write the difference between petrol and diesel engine. **10**
- b) Explain with block diagram the working of:
i) Refrigerator
ii) Air conditioner **10**
- Q.4 a) Derive an expression for the length of belt for open-belt system.
b) Explain with neat diagram:
i) Reverted Gear train.
ii) Epicyclic Gear train. **5x2**

PART-B

- Q.5 a) Draw the stress-strain curve for mild steel and explain its salient points.
b) Define the following terms:
i) Stress
ii) Hooke's Law
iii) Volumetric Strain
iv) Modulus of Elasticity
v) Bulk Modulus **10**
- Q.6 Draw the shear force and bending moment diagram for the following system: **20**



Q.7 Write short notes on the following:

1022/5

- a) Soldering.
- b) Brazing.
- c) Gas Welding
- d) Arc Welding.

5x4

End Semester Examination, May 2019

B. Tech. – Fifth Semester
MACHINE DESIGN-I (M-508)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

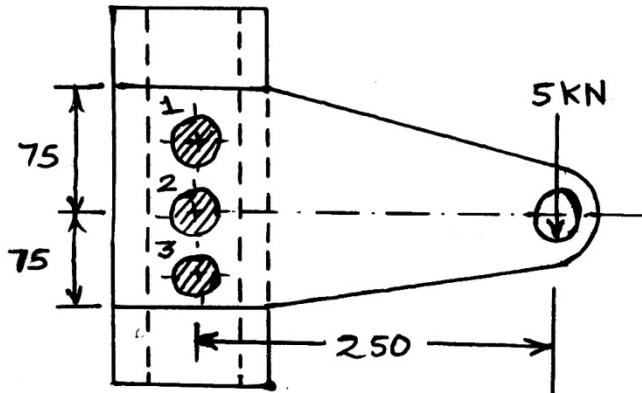
Q.1 Answer the following questions:

- a) Define 'machine design'.
- b) What is meant by shaft basis system?
- c) Define the following properties of a material:
 - i) Elasticity
 - ii) Plasticity.
- d) Define bolt of uniform strength.
- e) What are the applications of square threads?
- f) What are the various permanent and detachable fastenings?
- g) What is an eccentric loaded welded joint?
- h) What are the materials used for lining of friction surfaces.
- i) Why it is necessary to dissipate the heat generated when clutches operate?
- j) How does the function of a brake differ from that of a clutch?

2x10

PART-A

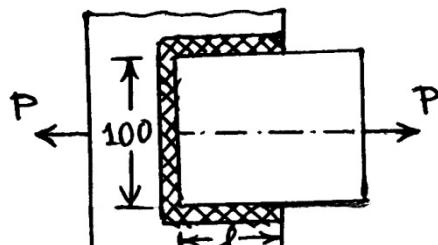
- Q.2 a) What is brain storming? Explain the procedure, advantages and disadvantages of brain storming? **10**
- b) Describe the various factors influencing the value of factor of safety. **10**
- Q.3 a) A steel plate subjected to a force of 5 kN and fixed to a channel by means of three identical bolts is shown in the figure. The bolts are made of plain carbon steel 30C8 ($S_{yt} = 400 N / mm^2$) and the factor of safety is 3. Determine the diameter of the shank.



10

- b) A screw jack carries a load of 22 kN. Assuming coefficient of friction between screw and nut as 0.15, design the screw and nut. Neglect collar friction and column action. The permissible compressive and shear stresses in the screw should not exceed 42 MPa and 28 MPa respectively. The shear stress in the nut should not exceed 21 MPa. The bearing pressure on the nut is 14 N/mm². **10**
- Q.4 a) Find the efficiency of the following riveted joint: Double riveted lap joint of 6mm plates with 20mm diameter rivets having a pitch of 65mm. For permissible stresses; Assume: $\sigma_t = 120 MPa$; $\tau = 90 MPa$; $\sigma_c = 180 MPa$ **10**
- b) A steel plate, 100 mm wide and 10 mm thick, is joined with another steel plate by means of single transverse and double parallel fillet welds as shown in figure. The

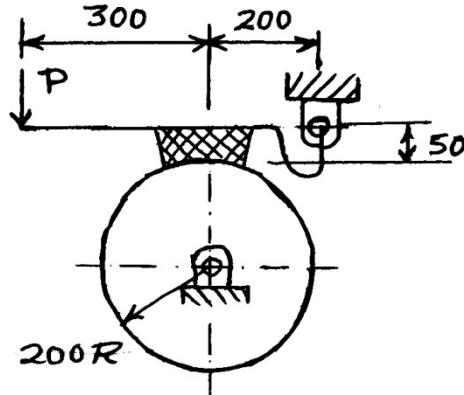
strength of the welded joint should be equal to the strength of the plates to be joined. The permissible tensile and shear stresses for the weld material and the plates are 70 and 50 N/mm² respectively. Find the length of each parallel fillet weld. Assume the tensile force acting on the plates as static.



10

PART-B

- Q.5 a) Derive an expression for length of cross belt drive with a suitable diagram. **10**
 b) It is required to select a V-belt drive to connect a 15 KW, 2880 rpm normal torque A.C. motor to a centrifugal pump, running at approximately 2400 rpm, for a service of 18 hours per day. The centre distance should be approximately 400 mm. Assume that the pitch diameter of the driving pulley is 125 mm. **10**
- Q.6 a) Derive an expression for the frictional torque transmitted by a cone clutch. **10**
 b) A centrifugal clutch, transmitting 20 KW at 750 rpm consists of four shoes. The clutch is to be engaged at 500 rpm. The radius of the centre of gravity of the shoes is 140 mm, when the clutch is engaged. The coefficient of friction is 0.3, while the permissible pressure on friction lining is 0.1 N/mm². Calculate:
 i) The mass of each shoe; and
 ii) The dimensions of friction lining. **10**
- Q.7 a) What is self-energizing brake and when does brake become self-locking? **5**
 b) A single block brake with a torque capacity of 250 N-m is shown in figure. The brake drum rotates at 100 rpm and the coefficient of friction is 0.35. Calculate:
 i) The actuating force and the hinge-pin reaction for clockwise rotation of the drum.
 ii) The actuating force and the hinge-pin reaction for anticlockwise rotation of the drum.
 iii) The rate of heat generated during the braking action.



All dimensions in mm

15

End Semester Examination, May 2019

B. Tech – Seventh Semester

REFRIGERATION AND AIR-CONDITIONING (M-821A)

Time: 3 Hours

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the term "tone of refrigeration."
- b) If the refrigerant is designated as R-11 and R-718. Find the chemical formula.
- c) Explain difference between VCRS and VARS.
- d) Plot a graph of VCRS on p-h and T-s diagrams considering following processes:
 - i) Sub-cooling.
 - ii) Superheating.
- e) What is difference between a refrigerator and heat pump?
- f) Define specific humidity and relative humidity.
- g) What do you understand by air-conditioning?
- h) Define sensible heat factor.
- i) What is sensible heat load and latent heat load?
- j) What is apparatus Dew Point?

2x10

PART-A

- Q.2** a) Derive an expression for COP for an air refrigeration system working on Reverse Brayton cycle. **10**
- b) Describe with a schematic diagram and draw the T-s representation of the process of Boot Strap Evaporative type aircraft refrigeration system. **10**
- Q.3** a) Describe with a neat schematic arrangement the working of a simple vapor Compressor refrigeration cycle. Represent the cycle on p=v and T-s plots. **15**
- b) Prove (CDP) ideal VARS = $(COP)_{carnot} \times n_{carnot}$. **5**
- Q.4** a) Draw a neat diagram of 'Electrolux Refrigerator' and explain its working principle. **10**
- b) Explain with a sketch a Cascade refrigeration system. Show the cycle on p, h and T-s Diagram. **10**

PART-B

- Q.5** Explain following Psychrometric processes in detail with schematic diagrams with respect to Psychrometric chart:
- a) Sensible cooling.
 - b) Sensible heating.
 - c) Cooling and dehumidification.
 - D) Heating and humidification.
- Q.6** The following data is available for designing on air conditioning system for a hall:
Inside conditions – 23°C DBT, 65% RH
Outdoor conditions - 37°C DBT, 28°C WBT
Sensible heat load in room – 45.5 kW
Latent heat load in room- 11.5kW
Total infiltration air – $1150 \text{ m}^3/\text{h}$
Apparatus dew point – 90°C
Quantity of recirculated air from hall- 60%

If the quantity of recirculated air is mixed with the conditioned air after cooling coil, determine:

- a) The condition of air before entering the hall.
- b) The bypass factor of cooling coil.
- c) The refrigeration load on the cooling coil in tones of refrigeration.

20

- Q.7 a) Describe types of condensers and its functions in detail. **10**
- b) What do you mean by evaporator? What are the types of evaporators? **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester
MACHINE DESIGN (M-503)

Time: 3 hrs

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

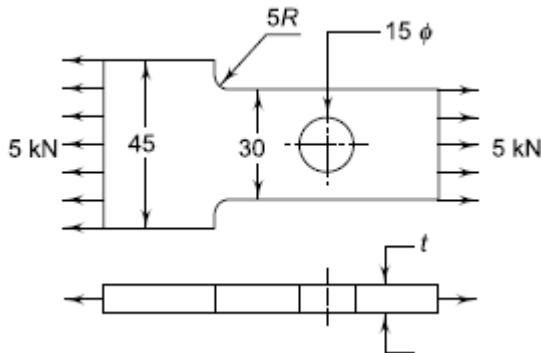
Q.1 Answer the following questions:

- a) What is *S-N* curve?
- b) Define surface finish factor?
- c) What is the function of a transmission shaft?
- d) Explain advantages of hollow shafts over solid shafts?
- e) Explain the term 'spring index'.
- f) State the importance of Wahl stress factor in the design of a helical spring.
- g) What is rolling-contact bearing?
- h) Define tangential component of gear tooth force.
- i) Why is the pinion weaker than the gear made of same material?
- j) Define 'standardization'.

2x10

PART-A

Q.2 a) A flat plate subjected to a tensile force of 5 kN is shown in Fig. The plate material is grey cast iron FG 200 and the factor of safety is 2.5. Determine the thickness of the plate.



12
8

- b) What are the causes of stress concentration?

Q.3 a) It is required to design a helical compression spring subjected to a maximum force of 1250 N. The deflection of the spring corresponding to the maximum force should be approximately 30 mm. The spring index can be taken as 6. The spring is made of patented and cold-drawn steel wire. The ultimate tensile strength and modulus of rigidity of the spring material are 1090 and 81 370 N/mm² respectively. The permissible shear stress for the spring wire should be taken as 50% of the ultimate tensile strength. Design the spring and calculate:

- i) Wire diameter
- ii) Mean coil diameter
- iii) Number of active coils
- iv) Total number of coils.

b) Explain Surging phenomenon in spring.

12
8

Q.4 a) A propeller shaft is required to transmit 50 kW power at 600 rpm. It is a hollow shaft having an inside diameter 0.8 times of the outside diameter. It is made of steel

$(S_{yt} = 380 \text{ N/mm}^2)$ and the FOS is 4. Calculate the inside and outside diameter of the shaft. Assume $(S_{sy} = 0.5 S_{yt})$. 15

- b) Explain two theories of failure applicable for shaft design. 5

PART-B

- Q.5 a) A ball bearing is operating on a work cycle consisting of three parts—a radial load of 3000 N at 1440 rpm for one quarter cycle, a radial load of 5000 N at 720 rpm for one half cycle, and radial load of 2500 N at 1440 rpm for the remaining cycle. The expected life of the bearing is 10 000 h. Calculate the dynamic load carrying capacity of the bearing. 10
- b) Explain the procedure followed in designing a journal bearing. 10
- Q.6 a) Derive an expression for beam strength of a gear teeth. 10
- b) Explain the design procedure of spur gears. 10
- Q.7 a) Explain ergonomic consideration in designs. 10
- b) Explain the design considerations of machining. 10

End Semester Examination, May 2019

B. Tech. – Seventh Semester

ROBOTICS (MII-701)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are pitch, roll and yaw motions?
- b) Give one example each of an external and internal gripper.
- c) Define robot and robotics.
- d) What is body arm configuration of robot?
- e) Give the expression of fundamental rotation matrix.
- f) Name any two force sensors.
- g) Name components of vision system.
- h) What is trajectory of a manipulator?
- i) Name any two external robotic sensors.
- j) Define the meaning of robotic configuration.

2x10

PART-A

Q.2 a) What is manipulator anatomy? Also write short notes on:

- i) Arm configuration.
- ii) Work Space.

10

b) Explain fixed and flexible automation. Also state the various laws of robotics.

10

Q.3 a) What do you understand by sensors and visions in reference to robotic manipulators?

10

b) Discuss (**any five**) each of the following robotic applications:

- i) Industrial applications.
- ii) Material handling applications.
- iii) Processing applications.
- iv) Assembly applications.

10

Q.4 a) Discuss the use of robots in palletizing applications of material handling.

10

b) Write short notes on the following:

- i) Design and control issues of a robot.
- ii) Manipulation and control issues of robot.

5x2

PART-B

Q.5 a) Describe force sensors and proximity sensors in brief.

10

b) Explain various functions of sensors in robots in detail.

10

Q.6 a) Define charge coupled device (CCD). Also, draw the architecture of robotic vision system.

10

b) Discuss industrial application of vision controlled robotics system in detail.

10

Q.7 a) Discuss and differentiate between joint space versus criterion space trajectory planning.

10

b) Explain linear control scheme in detail.

10

End Semester Examination, May 2019

M. Tech. – First Semester

CONSTRUCTION CONTRACT MANAGEMENT (PC-CM-M-102 /CMC-103)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Explain the following:

- a) Technical affect of tender.
- b) Elements of contracts.
- c) Power of arbitrator.
- d) Industrial dispute.
- e) Labour laws.

3×5

PART-A

Q.2 a) Write about Indian contract Act 1872 and its evolution since then. **7½**
b) What is the necessity of contract document and its requirements? **7½**

Q.3 a) How many types of contracts are there explain in detail? **7½**
b) What are conditions of contract, explain in detail? **7½**

Q.4 a) How many aspects are there in tender evaluation, explain in detail? **7½**
b) Explain the procedure of judging the qualification of bidder. **7½**

PART-B

Q.5 a) Elaborate the features of arbitration and conciliation act 1996. **7½**
b) Write about the appointment of an arbitrator. **7½**

Q.6 a) What are the functions of dispute review board? **7½**
b) What are salient features of minimum wages act? **7½**

Q.7 a) Explain industrial dispute Act. **7½**
b) Explain value engineering in detail. **7½**

End Semester Examination, May 2019

B. Tech – Fourth Semester

KINEMATICS OF MACHINES (M-405A)

Time: 3 Hours

Max Marks: **100**

No. of pages: 3

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any **TWO** questions from **PART-B**. Marks are indicated against each question.

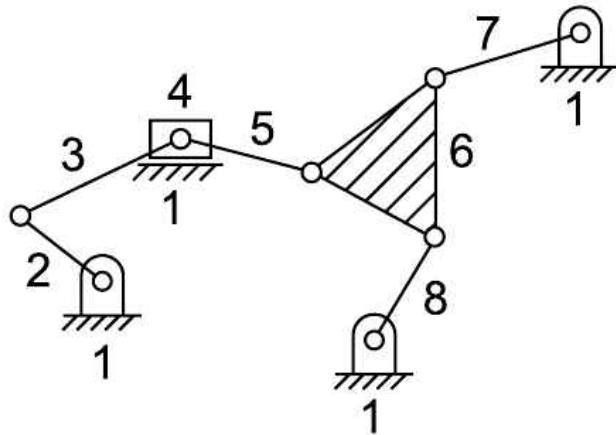
Q.1 Short answer the following questions:

- a) What is Oldham's coupling mechanism?
- b) Define 'Grashof's law for four bar chain'.
- c) Define 'cycloidal profile of gear'.
- d) What is pressure angle in a gear?
- e) What is torque in epicyclic gear train?
- f) Define 'SHM'.
- g) What is function generation?
- h) What is precision point for function generation?
- i) What is centrode?
- j) Define Kennedy's Theorem.

2x10

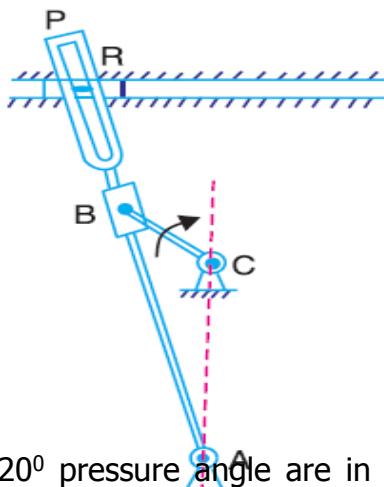
PART-A

Q.2 a) Find DOF of a given mechanism:



8

- b) As shown in the figure the layout of a quick return mechanism of the oscillating link type, for a special purpose machine. The driving crank BC is 30 mm long and time ratio of the working stroke to the return stroke is to be 1.7. If the length of the working stroke of R is 120 mm, determine the dimensions of AC and AP.



12

Q.3 a) Two involutes' gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5mm and the

pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module;

Find: i) The angle turned through by pinion when one pair of teeth is in mesh; and

ii) The maximum velocity of sliding.

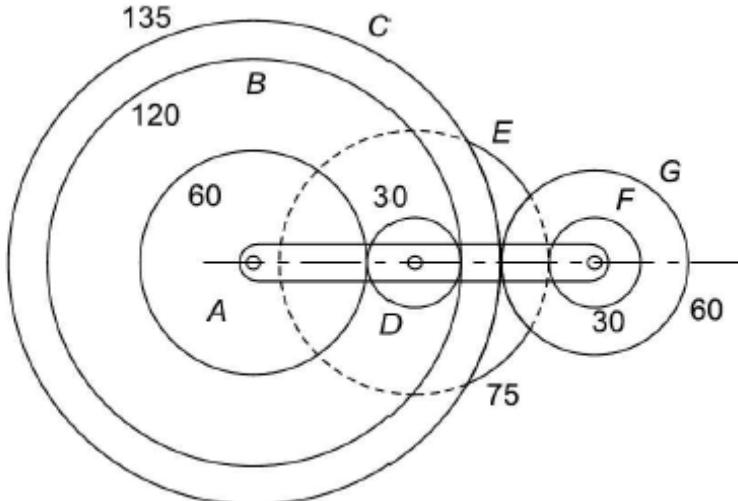
12

b) State and prove the law of gearing.

8

- Q.4** As shown in figure, a gear train in which gears D-E, F-G are compound gears. D gears with A B and E gears with F; and G gears with C. the no. of teeth of each gear are A=60, B=120, C=135, D=30, E=75, F=30, G=60. If he wheel A is fixed and arms makes 20 revolutions clockwise, find the revolutions of B & C.

If the arm is applied a turning moment of 1kN-m, determine the turning moment on the shaft supporting the wheel C.



20

PART-B

- Q.5** A cam, with a minimum radius of 50 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below:
- to move outwards through 40mm during 100° rotation of the cam;
 - to dwell for next 80° ;
 - to return to its starting position during next 90° , and
 - to dwell for the rest period of a revolution i.e. 90° .

Draw the profile of the cam

When the line of stroke of the follower is off-set by 15mm?

The displacement of the follower is to take place with uniform acceleration and uniform retardation. Determine the maximum velocity and acceleration of the follower when the cam shaft rotates at 900 r.p.m.

20

- Q.6** Design a four bar mechanism to co-ordinate the input and output angles as follows: Input angles = 15° , 30° and 45° . Output angles = 30° , 40° and 55° .

20

- Q.7** The dimensions and configuration of the four bar mechanism, as shown in the figure. are as follows:

$P_1A=300\text{mm}$, $P_2B = 360\text{mm}$, $AB = 360\text{mm}$, and $P_1P_2 = 600\text{mm}$. The angle $AP_1P_2 = 60^\circ$, the crank P_1A has an angular velocity of 10 rad/s and angular acceleration of 30 rad/s^2 , both clockwise.

Determine the angular velocities and angular accelerations of P^2B and AB and the velocity and acceleration of the joint B.

End Semester Examination, May 2019

B. Tech. – Third Semester

STRENGTH OF MATERIAL (M-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

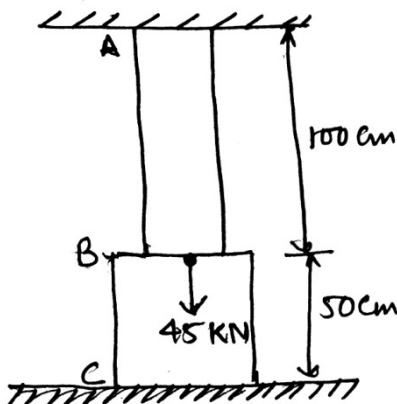
Q.1 Define (**any five**) of the following:

- Conventional or Engineering strain.
- Shear strain.
- Modulus of rigidity v/s Bulk modulus.
- Pure shear.
- Bonding with uniform curvature.
- Strain energy due to torsion.

4×5

PART-A

Q.2 a) A rod rigidly clamped as shown in the figure at both end has a cross sectional area of 10cm^2 for its upper parts and 40 cm^2 for its lower part. Determine the stress in each part of the rod? $E = 200\text{GPa}$.

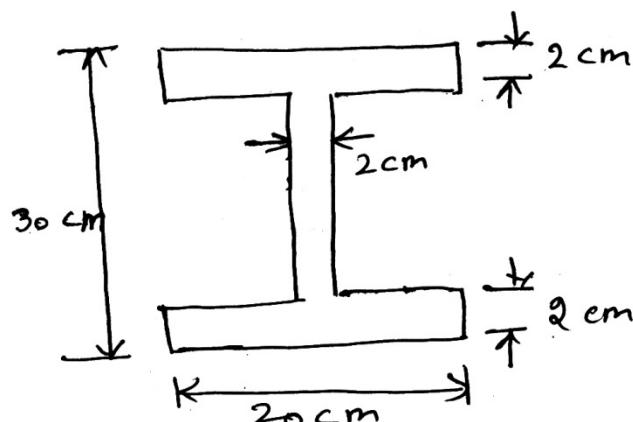


12

b) The principle stresses at a point in a strained material are 126 MPa and 63 MPa both tensile. With the help of circular diagram of stress find, the magnitude and direction of resultant stress on a plane inclined at 30° to the direction of smaller principal stress and perpendicular to the plane across which the stress is zero. **8**

Q.3 a) Derive an equation for bending with uniform curvature? **8**

b) A steel beam having an I-section as shown in the figure is 4m long and is simply supported at the ends. If the safe stress in tension for the beam is 30 MPa, determine the permissible uniformly distributed load acting on the whole span of the beam.



12

- Q.4 a) Derive the torsion formula applied to circular shaft and also write its assumption. **12**
b) A solid steel shaft is to transmit 75kW at 200rpm. Taking allowable shear stress as 70MPa, find suitable diagram of the shaft if the maximum torque transmitted in each revolution exceeds the mean by 30%. Also find the outer diameter whose inside diameter is 0.7 of the outside which can replace the solid shaft. **8**

PART-B

- Q.5 a) a hammer weighing 100N falls 1.25m on a 5cm cube iron block before coming to rest. Find the distance the block will be compressed and instantaneous stress induced in it. Also determine the velocity with which the hammer will strike the block. $E = 200\text{GPa}$. **12**
b) A steel specimen 1.5cm^2 in cross section stretches 0.005cm over a 5cm gauge length under an axial load of 30kN. Calculate the strain energy stored in the specimen at this point. If the load at the elastic limit is 50kN, calculate the elongation at elastic limit and proof resilience. **8**
- Q.6 a) A thin cylindrical pressure vessel has a diameter of 2m and its wall thickness is 10mm calculate the hoop stress and longitudinal stress in the cylindrical wall caused by an internal pressure of 0.8MPa and determine the change in diameter of the cylinder caused by pressurization take $E = 200\text{GPa}$ and $V = 0.25$. **10**
b) Define Lame's theory and derive expression for thick cylinder pressure vessel. **10**
- Q.7 a) A railway wagon weighing 6.5kN and moving with a speed of 10km/hr is to be stopped by 4 buffer springs in which the maximum compression allowed is 20cm. Calculate the number of turns in each spring in which diameter of the wire is 2cm and that of the coils 20cm. Take $G = 84\text{GPa}$. **10**
b) Derive an expression for buckling load of a column fixed at both ends. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

ENGINEERING MECHANICS (M-301A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Explain (**any five**) terms in detail:

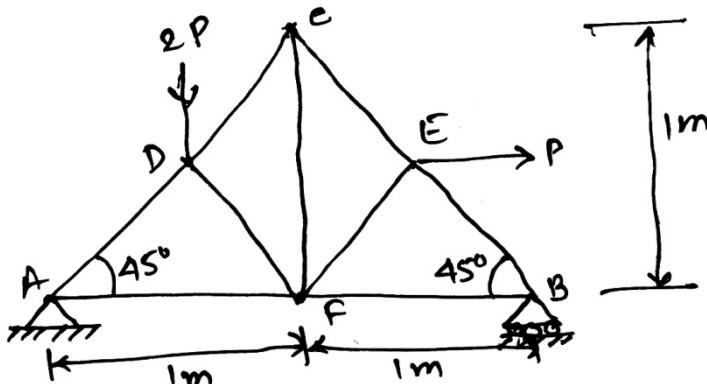
- a) Principle of transmissibility.
- b) Resolution of force into components.
- c) Free body diagram.
- d) D' Alemberts principle.
- e) Work of the force of gravity.
- f) Principle of impulse and momentum.

4x5

PART-A

Q.2 A body acted upon by three forces F_1 , F_2 and F_3 is in equilibrium. If the magnitude of the force F_3 is 500N, find the forces F_1 and F_2 ? **20**

Q.3 Find the force in member CF of the truss loaded and supported as shown in the figure.



20

Q.4 a) Find the moment of inertia of a solid cylinder about its centroid axes. **14**

b) Write formulas for M.I of following figures:

- i) Sphere.
- ii) Box rectangular.
- iii) Thin Disc.

2x3

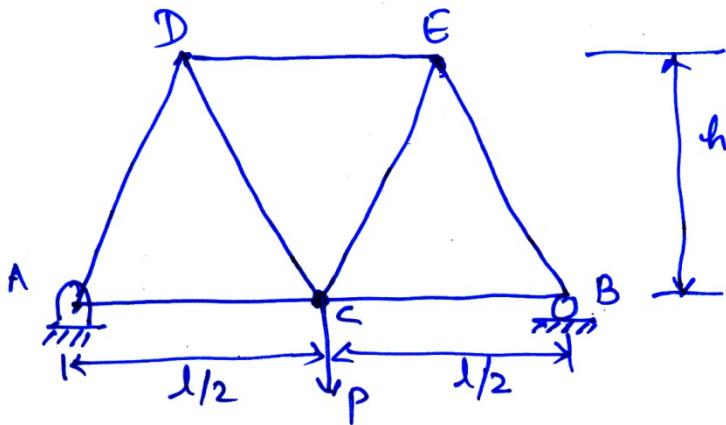
PART-B

Q.5 A motorist is travelling on a curved road of radius 20m at a speed of 72 km/hour. Find the normal and tangential components of acceleration. If he applies brakes to slow down his car uniformly to a speed of 36 km/hour in 10 seconds, find the normal and tangential components of deceleration just after the brakes are applied. **20**

Q.6 A bob weighing IN suspended by a cord from the ceiling of a rail ways carriage was found to make an angle $\theta = 8^\circ$ with vertical when the railway carriage was negotiating a curve of 100 m. Find the speed of the carriage and the tension in the cord. **20**

Q.7 a) Describe principle of impulse and momentum. **5**

- b) Using the principle of virtual work find the axial force in member DE of the simple truss loaded and supported as shown in the figure.



15

End Semester Examination, May 2019

B. Tech. – Fifth Semester

MEASURING TECHNIQUES AND COMPUTER AIDED INSPECTION (MII-502)

Time: 3 hrs.

Max. Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the use of surface gauge?
- b) What is the use of Taper scale?
- c) Discuss the principle of sine bar and its uses.
- d) Write benefits of no-contact type instruments.
- e) Define 'hole base system'.
- f) Discuss the use of GO and NO-Go gauge.
- g) Define 'shaft base system'.
- h) Define 'photo diode'.
- i) Define 'sensors'.
- j) What do you understand by sensitivity and deviation of a sensor? **2x10**

PART-A

- Q.2** a) Discuss slip gauges and their uses. **5**
b) Explain the construction and working of a Micrometer with neat sketch. **15**

- Q.3** a) Describe Calibration process. **5**
b) Describe various methods for measurement of effective diameter with neat sketch. **15**

- Q.4** Discuss surface roughness measurement Methods with neat sketch. **20**

PART-B

- Q.5** a) Discuss principle and applications of optoelectronic devices. **10**
b) Explain off line and online inspection procedures. **10**

- Q.6** a) Discuss integration and evaluation of data in CMM. **10**
b) Discuss principle of non-contact sensors. **10**

- Q.7** Explain proximity sensors. Discuss different types of proximity sensors and their applications. **20**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

CAD/CAM (M-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain the CAD tools available for the design process. **2**
- b) What is transformation? Explain refection and rotation in 2D with example. **4**
- c) What are the important properties of curve designing? **2**
- d) Explain CSG approach for the creation of solid model. **2**
- e) Explain the types of automation with their application. **4**
- f) Discuss open loop and closed loop system used in NC Machines. **2**
- g) Explain the following G and M codes. (**any four**):
 i) G00
 ii) G04
 iii) G90
 iv) G98
 v) M00
 vi) M02
 vii) M09
 viii) M30 **2**
- h) What is CAPP? **2**

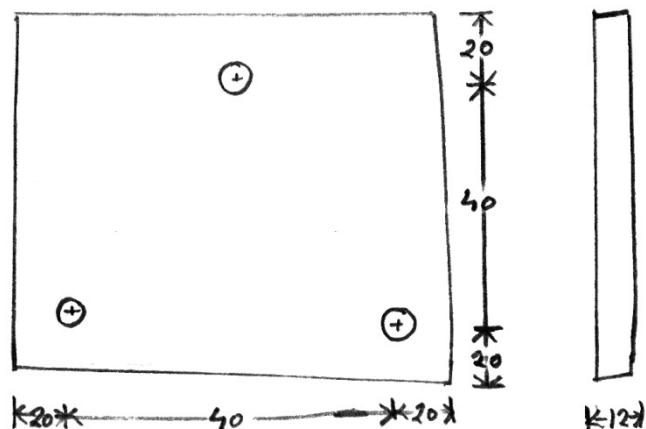
PART-A

- Q.2** a) A line having end points (3,3) and (5,5) is reflected about a line with equation $y = 2x + 3$. Find the final position of the line. **12**
- b) Explain the different types of transformation and derive their Mathematical Matrix Rotations. **8**
- Q.3** a) Four vertices of Bezier Polygon are $P_0(1,1), P_1(2,3), P_2(4,3)$ and $P_3(3,1)$. Determine seven points on the Bezier Curve. **10**
- b) Generate a Bezier curve using the following control points (1,2), (3,4), (6,-6) and (10,8), Compute at least six point on curve. **10**
- Q.4** a) Make a comparative analysis of the wire frame, surface and solid modeling. **8**
- b) Explain in detail:
 i) Sweep Representation.
 ii) B-Rep.
 iii) Cell Decomposition.
 iv) CSG. **12**

PART-B

- Q.5** a) Explain the function of MCU in NC machine tools. What is the role of PLC in CNC system? **10**
- b) Write short notes on the following:
 i) Absolute Coordinate System.
 ii) Incremental Coordinate System. **10**

Q.6 a) Write a manual NC part program to drill holes in a plate of thickness 12 MM. Use the appropriate speed and feed rate.



15

- b) Briefly explain the concept of:
i) Drive Surface.
ii) Part Surface.

5

Q.7 Write short notes on the following:

- a) BOM.
b) MRPI and MRPII
c) Part classification and coding.
d) MPS.

5x4

End Semester Examination, May 2019

B. Tech. – Fifth Semester

FLUID MACHINES AND TURBOMACHINERY (M-402A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What do you understand by impact of jet?
- b) Define jet propulsion.
- c) Define Gross head and net head of turbines.
- d) Differentiate between radially inward flow and radially outward flow.
- e) Define the terms: Jet ratio and speed ratio.
- f) Define Manometric head of centrifugal pump.
- g) What is priming and why is it necessary?
- h) Explain the term: slip and the conditions for negative slip.
- i) How you will classify the reciprocating pump?
- j) Briefly explain the working of gear oil pump.

2×10

PART-A

Q.2 a) Derive an expression for the force exerted by a jet of water on the inclined plate moving in the direction of the jet. **10**

- b) A jet of water of 30 mm diameter strikes a hinged square plate at its centre with a velocity of 20 m/s. The plate is deflected through an angle of 20°. Find the weight of the plate. If the plate is not allowed to swing, what will be the free force required at the lower edge of the plate to keep the plate in vertical position. **10**

Q.3 a) With a neat sketch, explain the construction and working detail for Governing of a Pelton turbine. **10**

- b) A pelton wheel is to be designed for the following specifications:
Shaft power = 11772 KW Head = 380 m Speed = 750 rpm
Overall efficiency = 86% jet diameter is not to exceed the 1/6th of the wheel diameter
 $C_v = 0.985$ $K_u = 0.45$

Determine:

- i) Wheel diameter
- ii) Jet diameter
- iii) Number of jets

10

Q.4 a) Explain the construction and working detail of a Francis turbine with a neat sketch. **10**

- b) A Kaplan turbine working under a head of 20 m develops 11772 KW shaft power. The outer diameter of the runner is 3.5 m and the hub diameter is 1.75 m. The guide blade angle (α) is 35°. The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine:
i) Runner vane angles at inlet and outlet at the extreme edge of the runner
ii) Speed of the turbine **10**

PART-B

Q.5 a) Explain the construction and working detail of a Centrifugal pump with a neat sketch. **10**

- b) A 0.40 m diameter centrifugal pump, is discharging 0.03 m³/s of the water against a total head of 20 m.

- The pump is running at 1500 rpm. Find the head, discharge and ratio of powers of a geometrically similar pump of diameter 0.25 m when it is running at 3000 rpm. **10**
- Q.6 a) Define 'indicator diagram'. What is the effect of friction in suction and delivery pipes on indicator diagram? **10**
- b) A single acting reciprocating pump, running at 50 rpm, delivers 0.01 m³/s of the water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine:
- Theoretical discharge of the pump
 - Co-efficient of the discharge
 - Slip and percentage slip of the pump
- Q.7 Explain in detail with neat sketches the following:
a) Hydraulic Lift.
b) Hydraulic Ram. **10×2**

End Semester Examination, May 2019

B. Tech. – Third Semester

FLUID MECHANICS (M-304A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer briefly:

- a) Define the term 'No slip condition'.
- b) Define compressibility. How is it related to bulk modulus of elasticity?
- c) What do you understand by the terms convective acceleration and local acceleration?
- d) State the limitation of the Bernoulli's theorem.
- e) What is the relationship between the average velocity and maximum velocity in case of parallel flow between two fixed parallel plates?
- f) Write down the formula of shear stress in turbulent flow according to prandtl.
- g) Define the terms displacement thickness and momentum thickness.
- h) Define the terms model analysis and weber number.
- i) What is water hammer and how it can be prevented?
- j) What are the factors affecting the boundary layer thickness?

2×10

PART-A

- Q.2**
- a) A square plate $5\text{m} \times 5\text{m}$ hangs in water from one of its corner. The centre of gravity of the plate is at a depth of 10 m from the water surface. Find the position of the centre of pressure. **10**
 - b) Name the different types of manometer and explain with a neat sketch how the pressure is measured by a differential manometer. **10**

- Q.3**
- a) Define and distinguish between streamline, pathline and streakline. **8**
 - b) A 2-D flow is described by the velocity components, $u = 5x^3$; $v = -15x^2y$. Evaluate the velocity, stream function and acceleration at point $P(1, 2)$. **12**

- Q.4**
- a) What is impulse momentum theorem? Derive the expression for force exerted by a flowing fluid on a pipe bend. **10**
 - b) A horizontal venturimeter $20\text{cm} \times 10\text{cm}$ is used to measure the flow of oil of specific gravity 0.75. Determine the deflection of the oil mercury gauge if the discharge of the oil is 58 L/S. Assume coefficient of discharge = 1.0 if the deflection of mercury gauge is 0.25m. Find the coefficient of the venturimeter. **10**

PART-B

- Q.5**
- Two fixed parallel plates kept 8cm apart have a laminar flow of oil between them with a maximum velocity 1.5 m/s, taking dynamic viscosity of oil to be 2 NS/m^2 . Calculate:
- a) The discharge per meter width
 - b) the shear stress at the plates
 - c) the pressure difference between two points 25m apart
 - d) velocity at 2m from the plate, and
 - e) the velocity gradient at the plate end. **20**

- Q.6**
- a) Discuss the prandtl's mixing length theory and derive the relation

$$\tau_{tur} = \rho \left(l_m \frac{du}{dy} \right)^2$$

8

- b) Derive Von Karman momentum integral equation.

12

- Q.7 a) Consider a partially submerged long, thin body being towed in water, resistance R , encountered by the body is a function of the length ' l ' of the body, density ' ρ ' and dynamic viscosity ' μ ' of the liquid, the velocity ' v ' with which the body is towed and acceleration due to gravity g . obtain the expression for R . use Buckingham's π theorem.
- b) What do you understand by equivalent length? Obtain an expression for an equivalent pipe.

12

8

End Semester Examination, May 2019

B. Tech. (Industry Integrated) — Seventh Semester
PRESS TOOLS-II (MII-702)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) How much clearance is provided between the die and punch in Draw operation?
- b) What are the reason of thinning in drawing operation?
- c) What is the purpose of pressure pad in drawing a cup?
- d) What is the usual reduction for the first and the succeeding draws?
- e) What is the purpose of giving wear plates in draw tools?
- f) What is the purpose of restriking operation?
- g) What is clearance in draw operation?
- h) How do hydraulic drives compare with mechanical drives for presses?
- i) What types of components can be made by drawing operations?
- j) Discuss the factor affecting drawing.

2x10

PART-A

- Q.2** a) Sketch and describe single action drawing tool. **10**
b) Sketch and describe a drawing tool using spring loaded pressure pad. **10**
- Q.3** a) Discuss the procedure for a design of draw dies. **10**
b) Discuss forming using Rubber in drawing operation. **10**
- Q.4** A cup without flanges and the height 10cm and dia 5cm is to be made from sheet metal 2.5mm thick. Find the suitable number of draws. **20**

PART-B

- Q.5** Write short notes on the following:
a) Analysis of Die operations.
b) FEA softwares.
c) Materials of restriking Dies. **20**
- Q.6** What are the different steps involved in stamping simulation? **20**
- Q.7** What are the design standards of a restriking tool? **20**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

MECHANICAL VIBRATIONS (M-721)

Time: 3 hrs.

Max Marks: **100**

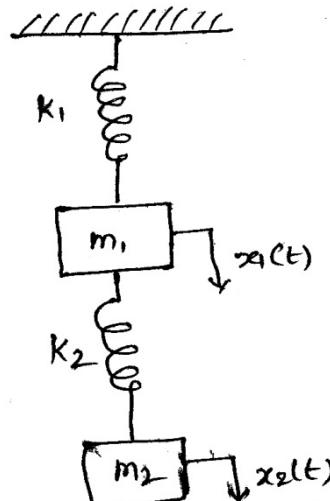
No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What are the three elementary parts of a vibrating system? Show a system with a suitable example.
b) Why is it important to find natural frequency of a vibratory system?
c) A constant force on vibrating mass has no effect on the steady state vibration. Comment.
d) What are principal coordinates? What are their use?
e) What is a generalized mass matrix? **4×5**

PART-A

- Q.2 a) Define these terms: Cycle, amplitude, phase angle, linear frequency, period and natural frequency. **10**
b) Derive the equation of resultant motion for two harmonic motions having different frequencies. **10**
- Q.3 a) What is critical damping and state is its importance? **8**
b) A spring-mass system has a natural frequency of 0.21 sec. What will be the new period if the spring constant is:
i) increased by 50 percent
ii) decreased by 50 percent. **12**
- Q.4 a) Why is damping considered only in the neighbourhood of resonance in most cases? What happens to the response of an undamped system at resonance? **8**
b) Find the natural frequencies of the system as shown in figure if $m_1 = 20 \text{ kg}$, $m_2 = 40 \text{ kg}$
 $k_1 = 1000 \text{ N/m}$, $k_2 = 2000 \text{ N/m}$
Also determine the response of the system if initial values of displacements of the masses m_1 and m_2 are 1 and -1 respectively.



12

PART-B

1046/5

- Q.5 a) Derive equations of motion of multi-degree of freedom system in matrix form using the stiffness matrix. **14**
b) State Lagrange's equation. What is a mode shape? **6**

- Q.6 a) Differentiate between a vibration isolator and a vibration absorber. **6**
b) A simply supported shaft having a disc of mass 5 kg is mounted mid-way between bearings. Following are the given parameters:

Diameter of the shaft = 10 mm

Bearing span = 500 mm

Eccentricity = 2 mm

Viscous damping at the centre of the disc shaft = 50 N sec/m

Speed of shaft = 750 rpm

$E = 2 \times 10^{11} \text{ N/m}^2$

Find the maximum stress in the shaft and power required to drive the shaft.

14

- Q.7 Write short notes on (**any four**) of the following:

- a) Whirling of shaft.
- b) Two plane balancing.
- c) Vibration measurement.
- d) Vibration control.
- e) Flexibility influence coefficient.

5x4

End Semester Examination, May 2019
M. Tech. (Mech. Industrial Engineering) — Third Semester
SUPPLY CHAIN MANAGEMENT (MIE-322 / MIE-322A)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. **Q.1 is compulsory.** Marks are indicated against each question.

- | | | |
|-----|---|-------------|
| Q.1 | Discuss the role of inventory in creating strategic fit between the supply chain strategy and the competitive strategy. | 15 |
| Q.2 | What are the trades-offs in comparing centralized distribution system with decentralized distribution system? | 15 |
| Q.3 | What are the obstacles with respect to coordination in supply chain? | 15 |
| Q.4 | Discuss the transportation and inventory cost trade-off in transportation design. | 15 |
| Q.5 | Discuss the impact of supply uncertainty and aggregation on safety inventory. | 15 |
| Q.6 | What role does forecasting play in supply chain of build-to-order manufacturers? | 15 |
| Q.7 | Write short notes on:
a) Role of IT in supply chain.
b) E-business frame work. | 7½×2 |

End Semester Examination, May 2019

B. Tech. – Seventh Semester

SOLAR ENERGY AND ITS APPLICATIONS (M-626)

Time: 3 hrs

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1 a) What do you understand by 'scattered radiation'?
b) Define the "term solar constant".
c) What is ETIR model?
d) Name different modes of heat transfer.
e) Give the names of different types of solar collectors.
f) Why the solar constant is not a constant?
g) Explain thermal inertia.
h) Discuss two stages evaporative cooling.
i) Define the expression for declination angle.
j) Explain air-mass ratio.

2x10

PART-A

- Q.2 a) Calculate declination angle (δ) for March 30. **10**
b) Describe the Spectrum distribution of Solar Radiation with neat leveled graph. **10**
- Q.3 a) What factors does optimum capacity of energy storage system depend on? Define them briefly. **14**
b) Differentiate between 'average flux' and 'peak flux'. **6**
- Q.4 a) Discuss the difference between flat plate solar collectors using water as heat transfer medium and air as heat transfer medium. **12**
b) Explain the constructional details of an instrument to measure the direct radiations with a neat sketch. **8**

PART-B

- Q.5 a) Compare between solar pond and natural pond. **10**
b) Explain the difference between liquid heating and air heating flat plate collectors. **10**
- Q.6 a) Classify different types of solar energy storage. **10**
b) Explain difference between connective and non-connective solar ponds. Also give applications of solar ponds. **10**
- Q.7 a) Describe in detail combined solar heating and cooling system with help of a neat sketch. **10**
b) Explain solar gas absorption refrigeration. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

PRODUCTION ENGINEERING (M-504B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

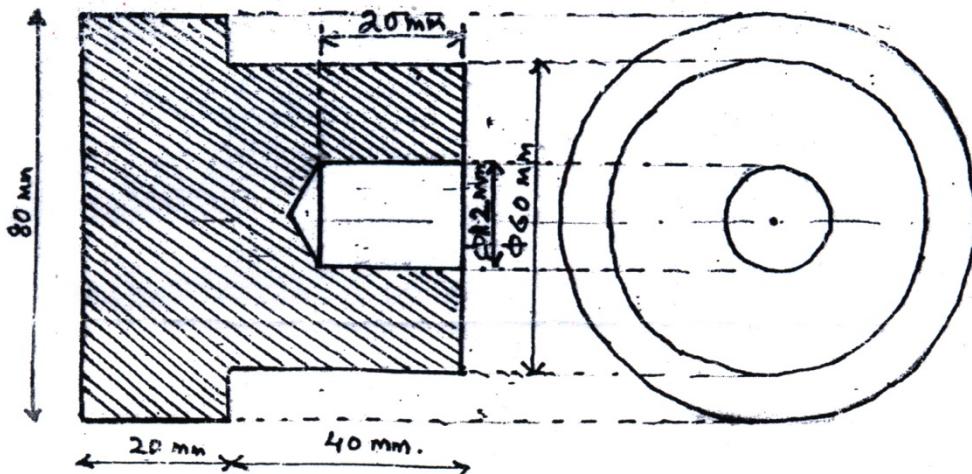
Q.1 Answer the following questions:

- a) State difference between Jigs and Fixtures.
- b) How the grain size is specified for grinding wheel?
- c) Why the three sets of taps are required to cut the threads of particular thread size.
- d) State the significance of truing and dressing.
- e) Enlist various methods to manufacture threads.
- f) Define part print analysis.
- g) What does M16x1.5 stands for thread designation?
- h) State the difference between punching and blanking.
- i) Difference between single point and multipoint cutting tool.
- j) Differentiate between roughness and waviness.

2x10

PART-A

Q.2 A batch of 1000 pieces of Mildsteel components is to be manufactured from $\phi 82\text{mm} \times 72\text{mm}$ long blank. Generate a process sheet.



20

Q.3 a) Explain the 3-2-1 principle for locating a component with help of neat sketches. **10**
b) Explain different type of clamps (at least five) with help of neat sketches. **10**

Q.4 a) Explain with help of neat sketches various types of dies used in press working. Also differentiate between a cutting die and forming die. **10**
b) A hole of 60mm diameter is to be produced in a steel plate of 3.00mm thickness. The ultimate shear strength of the plate material is 450 N/mm. Take percentage penetration as 40% of the thickness of sheet. Estimate:
i) Punching force.
ii) Punch diameter.
iii) Work done. **10**

PART-B

- Q.5 a) Explain each term in detail for following specification of grinding wheel.
51A36L5V23. **15**
b) Explain the meaning of 'wheel structure' and 'wheel grade' used in grinding. **5**
- Q.6 Differentiate with help of neat sketches between:
a) Thread cutting and thread forming. **6**
b) Mechanism of rolling of external screw threads by flat dies and circular dies. **7**
c) Gear Hobbing and Gear milling. **7**
- Q.7 a) Calculate the machining time to drill a hole of 15mm and 70mm deep in a plate of brass.
Cutting speed is 75 meter/minute and feed = 0.175 mm/revolution. **15**
b) Explain the purpose of cost estimation. **5**

End Semester Examination, May 2019

B. Tech. (Industry Integrated) — Fifth Semester

VEHICLE ENGINEERING (MII-506)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define "Camber".
- b) Describe riding height.
- c) What are the requirements of a steering system?
- d) What is function of panhard rod?
- e) What do you understand by over steer and under steer?
- f) Define "Transaxle".
- g) Describe "ABS".
- h) Write down advantages of disc brakes.
- i) Define "Suspension system".
- j) Define "Leaf spring".

2×10

PART-A

Q.2 a) Discuss advantages of full floating axle. **5**
b) Explain the steering linkages in Independent suspension system with neat sketch. **15**

Q.3 a) Describe "Davis's steering system". **5**
b) Describe various types of steering gear box. **15**

Q.4 a) What is the function of propeller shaft? **5**
b) Explain the construction and working of a differential. **15**

PART-B

Q.5 a) What are the factors which affect brake performance? **5**
b) Explain the working and construction of drum brakes. **15**

Q.6 a) Discuss radial ply tyres and their advantages. **5**
b) Explain construction and working of McPherson strut suspension system **15**

Q.7 a) Describe "Catalytic convertor". **5**
b) Explain exhaust gas re-circulation system with neat sketch. **15**

End Semester Examination, May 2019

M. Tech. – First Semester

PROJECT PLANNING AND CONTROL (PC-CM-M-101 / C-MC-101)

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) A construction material trading company receives a total 200t as annual demand for steel reinforcement. The annual cost of carrying per unit t of reinforcement is ₹2000 and the cost to place an order is ₹25,000. What is the economic order quantity?
- b) Define time-cost trade off.
- c) What is the difference between CPM and PERT?
- d) Line of balance techniques is useful for planning the construction of a number of similar structures. Explain.
- e) What are the advantage and disadvantage of early and late procurement? **3×5**

PART-A

Q.2 a) What is WBS? How is this helpful in planning monitoring and controlling the program of projects? **10**
b) What do you mean by work study and time estimates in project planning? **5**

Q.3 a) The mean time for project completion using PERT method of time estimation is 25 weeks with a standard deviation of 3 weeks. What is the duration beyond which the project completion is not likely to extend? **10**
b) What are the applications of CPM? **5**

Q.4 How resource planning, leveling and allocation affect a project? Explain with suitable example. **15**

PART-B

Q.5 Differentiate between resource based networks and master networks with example. **15**

Q.6 a) Explain ABC analysis with item type 'A', Item type 'B' and Item type 'C'. **10**
b) What do you mean by inventory control? **5**

Q.7 Write step by step with explanation about computer applications in preparing schedule, resource leveling, tracking the project and reporting. **15**

End Semester Examination, May 2019
B. Tech. (Industry Integrated) – Seventh Semester
SURFACE ENGINEERING (MII-703)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define 'Lays'.
- b) Define 'Induction Hardening'.
- c) Define 'hexagonal close packed crystal structure'.
- d) Define 'Carbonitriding'.
- e) Define 'Electroless plating process'.
- f) Define 'Plasma.'
- g) Define 'HVOF spraying'.
- h) Name various thermal spraying processes.
- i) What are the applications of Metal Flame Spraying?
- j) What is Pickling process?

2x10

PART-A

- | | | |
|------------|--|-----------|
| Q.2 | a) Define surface roughness and method to measure. | 5 |
| | b) Explain Induction Hardening process and its applications. | 15 |
| Q.3 | a) Discuss Nitriding process for hardening. | 5 |
| | b) Explain Case hardening, methods and applications. | 15 |
| Q.4 | a) What are Explosion cladding coatings? | 5 |
| | b) Explain in detail Hot Dip coating process. | 15 |

PART-B

- | | | |
|------------|--|-----------|
| Q.5 | a) Describe Metal Flame spray coating process. | 5 |
| | b) Explain physical vapor deposition method, advantages, disadvantages and its applications. | 15 |
| Q.6 | a) Describe plasma spray coating. | 5 |
| | b) Explain with neat sketch, Electron beam hardening technique and its advantages. | 15 |
| Q.7 | a) What are the applications of thin coatings? | 5 |
| | b) What are the methods for tool coatings? Explain Diamond coating and its advantages. | 15 |

End Semester Examination, May 2019

B. Tech. – Third Semester

MANUFACTURING TECHNOLOGY-I (M-303A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) List the various pattern allowances provided in the mould.
- b) What is the function of a core prints in casting?
- c) State the types of gating systems.
- d) Classify the defects in casting process.
- e) State the types of forging methods.
- f) What do you understand by swagging?
- g) Which are the various flame settings in oxy acetylene welding?
- h) What are the factors responsible for selecting an electrode for welding?
- i) State the purpose of Shielding gases in electric arc welding.
- j) Enlist various welding joints.

2×10

PART-A

- | | | |
|------------|---|-----------|
| Q.2 | a) State and elaborate various types of patterns that are used in casting process. | 12 |
| | b) What are the tests conducted on moulding sand to identify sand properties? | 8 |
| Q.3 | a) Explain the elements of gating system with a neat diagram. | 10 |
| | b) Elaborate the process of centrifugal casting and its types. | 10 |
| Q.4 | a) What do you understand by hot extrusion process? Explain the forward and backward hot extrusion. | 12 |
| | b) Explain the working of press forging with a neat sketch. | 8 |

PART-B

- | | | |
|------------|---|-----------|
| Q.5 | a) Explain the working of progressive dies and comment how it is better than compound dies. | 10 |
| | b) Explain the function of punches. In addition, elaborate various types of punches. | 10 |
| Q.6 | a) With the help of a neat sketch, explain the working principle of Oxy fuel gas Welding stating the list of equipments needed. | 12 |
| | b) What is the need for edge preparation? Sketch the different edges prepared for welding. | 8 |
| Q.7 | a) Explain the working of tungsten inert gas welding process. List its applications as well. | 10 |
| | b) What is the principle behind resistance welding? Explain the working of spot resistance welding. | 10 |

End Semester Examination, May 2019

B. Tech. – Fifth Semester

INDUSTRIAL ENGINEERING (M-501A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between production and productivity.
- b) Give objectives of inventory control.
- c) Distinguish between fixed and variable costs.
- d) What are various functions of Production Planning and Control (PPC)?
- e) Explain chance causes and assignable causes in SQC.

4×5

PART-A

Q.2 Explain work study with its two main components. What are THERBLIGS? When they are used? Give advantages of micro motion study. **20**

Q.3 a) How do you arrive at per unit selling price of a manufactured item in terms of various costs associated in a manufacturing company? **10**
b) ABC company plans to sell an article at a local market. The articles are purchased at ₹5. The rent of factory is ₹2000. The article selling price is ₹9. Determine quantity required to break even, also quantity required to earn profit of ₹400. **10**

Q.4 a) What is economic order quantity? Derive it graphically and mathematically. **10**
b) A company requires 50,000 units per year. The ordering cost is ₹3 per-order inspection cost is ₹12 per order. Interest cost is 0.06 per unit per year. Obsolescence is 0.004 per unit. Storage cost is ₹1000/yr. Calculate:
i) EOQ
ii) No of orders
iii) Total variable cost of inventory. **10**

PART-B

Q.5 a) Explain the process of Production Planning and Control (PPC). What are its main objectives? **10**
b) Five jobs are to be processed on two machines M1 and M2 in the order M1-M2. Processing times are given as under.

JOB	1	2	3	4	5
M1	5	1	9	3	10
M2	2	6	7	8	4

Determine the sequence that minimizes total elapsed time. Find total elapsed time and also idle time on M2. **10**

Q.6 a) Explain the concept of quality control with its functions and objectives. **10**
b) What are control charts? Distinguish between control charts for attributes and variables. **10**

Q.7 Write short notes on (**any four**):

- a) Principles of 5's'.
- b) Kaizen.
- c) Taguchi techniques.
- d) Total Quality Management (TQM).
- e) Just In Time (JIT).

5×4

10565

End Semester Examination, May 2019

B. Tech. – Seventh Semester

INDUSTRIAL ENGINEERING (M-501B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is Industrial Engineering?
- b) Explain the basic functions of Industrial Engineering.
- c) Is it essential to keep inventories? Why
- d) Write down any four objectives of Material Handling.
- e) Differentiate between production and productivity.
- f) What is work sampling?
- g) Differentiate between the Fixed Cost and Variable Cost in the manufacturing context.
- h) Is it essential to rate the worker performance in an industry?
- i) Explain the requisites of work measurement process in the industries.
- j) Differentiate between 100% inspection and random sampling inspection process. **2x10**

PART-A

Q.2 What do you mean by Method Study in an industry? Detail the list of steps used for applying the method study on the production process. **20**

Q.3 a) A company manufactures mobile phones. The monthly expenditure is as follows:

Direct material cost = Rs 10,000

Direct labour cost = Rs 1,500

Factory overheads = 10% of prime cost

Other overheads = 10% of work cost

Profit = 20% of total cost

No. of units produced per month = 20

Estimate the unit selling price. **12**

b) What do you mean by term cost in any industry? Explain the various types of costs involved in industries. **8**

Q.4 a) ABC Corporation has got a demand for particular part at 10000 units per year. The cost per unit is Rs.2 and it costs Rs. 36 to place an order and to process the delivery. The inventory carrying cost is estimated at 9 percent of average inventory investment. Determine

- i) EOQ.
- ii) Optimum number of orders to be placed per annum.
- iii) Minimum total cost of inventory per annum. **12**

b) Explain in detail role and procedure of ABC Analysis in Inventory Control. **8**

PART-B

Q.5 a) Describe the production planning and production control in detail. **10**

b) Write down the various functions of PPC in detail. **10**

Q.6 a) Discuss the difficulties in carrying out the job evaluation. **10**

b) How does Merit rating methods works? Explain in detail. **10**

- Q.7 a) The manager of XYZ Hotel having the 500-rooms capacity to serve the customers wants to achieve the highest level of service. For 7 days, the data regarding readiness of 200 rooms is collected and summarized in below table:

<u>Day</u>	<u># Rooms</u>	<u># Not Ready</u>
1	200	16
2	200	7
3	200	21
4	200	17
5	200	25
6	200	19

Based on the data collection, find out whether the process is in control or not? **15**

- b) What do you mean by Assignable Causes of Quality Variation? Explain with suitable example. **5**

End Semester Examination, May 2019

B. Tech.–Seventh Semester

INDUSTRIAL ENGINEERING (M-501B)

Time: 3Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any two from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between product control and process control.
- b) Distinguish between method study to time study.
- c) Explain Routing as used in PPC.
- d) Explain significance of breakeven point.
- e) Explain the term 'Total Quality Management'.

4x5

PART-A

Q.2 a) Explain the term work measurement and the process to arrive at standard time. **10**
b) What is motion economy? Write down the various principles of motion economy. **10**

Q.3 a) Explain in detail various costs like variable cost, fixed cost, direct cost, indirect cost and derive relationship between them. **10**
b) A manufacture plans to sell an article in local market. The articles are purchased at Rs. 5. The rent of factory is 2000/. The article selling price is Rs 9. Determine the quality required to breakeven. **10**

Q.4 a) Derive Economic order Quantity for gradual replacement model of inventory. **10**
b) A company requires 3200 parts per year. The unit cost is Rs. 6 and inventory carrying charges are estimated as 25% per annum. If the cost of one procurement is Rs 150, find:
i) Economic Order Quantity.
ii) No. of orders per year. **10**

PART-B

Q.5 a) Explain various functions of production planning and control in detail. **10**
b) Seven Jobs are processed on Machines M₁ and M₂ processing time is given in hours.

Job	A	B	C	D	E	F	G
M ₁	6	24	30	12	20	22	18
M ₂	16	20	20	13	24	2	6

Find the optimal sequence and total elapsed time. Also compute idle time on Machine M₂. **10**

Q.6 a) Explain Single, Double and Multiple sampling plans in detail. **10**
b) The values of the certain dimensions of manufactured part are measured in mm. Subgroups size is 4 and values of \bar{X} and \bar{R} are computed for 20 subgroups.
 $\sum \bar{X} = 412.83$ & $\sum R = 3.39$
PLOT \bar{X} and R chart and comment on the results.
[for $n = 4$, $d_2 = 2.059$, $D_4 = 2.28$, $D_3 = 0$] **10**

Q.7 Write short notes:

- a) Strategies for improving productivity. **7**
- b) Methods of Merit rating. **7**
- c) Sampling Inspection. **6**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

FACILITY PLANNING AND PLANT LAYOUT (MII-503)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Single Facility and Multi Facility Problems.
- b) Define cost contours.
- c) Define fixed position layout.
- d) Define product layout.
- e) Define chain type structure for part coding.
- f) What is the principle of gravity in material handling?
- g) Define screw feeders.
- h) What are the advantages of a unit load?
- i) Define Screw conveyors.
- j) Define Chute conveyors.

2x10

PART-A

- Q.2** a) What are the characteristics of a good facility layout? **5**
b) A warehouse has to serve five outlets located at (0, 0), (3, 16), (18, 2), (8, 18) and (20, 2) is to be set up. The number of goods transported per day between the new warehouse and the outlets is 5, 22, 41, 60 and 34 respectively. What location for the warehouse will minimize the distance goods are transported per day? **15**
- Q.3** a) Define process layout. Discuss its advantages. **5**
b) Describe facility layout. Discuss its significance and objectives. **15**
- Q.4** a) What do you understand by Group technology and how it is beneficial? **5**
b) Discuss various grouping techniques. **15**

PART-B

- Q.5** a) Write down characteristics of a good flow pattern. **5**
b) Classify the various material handling Equipments. **15**
- Q.6** Describe the principles and functions of material handling. **20**
- Q.7** Explain the following with their applications:
a) AGV.
b) Bucket Elevators.
c) EOT.
d) Palletization. **5x4**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

PRODUCTION AND OPERATION MANAGEMENT (M-633)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following:

- a) Distinguish between production and productivity.
- b) Explain the concept of value in context to product/service.
- c) What do you understand by 'scheduling' in PPC?
- d) What is 'safety stock'? Why it is important?
- e) What are the objectives of maintenance management?

4×5

PART-A

Q.2 a) What are different technical methods to improve productivity? **10**
b) Explain the term 'value engineering' and its effectiveness. **10**

Q.3 a) Explain the term aggregate planning. **8**
b) How do you arrive at master production schedule and its integration with material requirement planning MRP? **12**

Q.4 a) What are different production systems? Explain different techniques to control these systems. **10**
b) Explain the process of Production Planning and Control (PPC). **10**

PART-B

Q.5 a) What are different inventory control methods? **10**
b) Explain EOQ (Economic Order Quantity) graphically and algebraically. **10**

Q.6 a) What do you understand by Statistical Quality Control (SQC)? Explain other technical tools for quality control. **10**
b) Explain the significance of control charts in quality control. Also explain various types of control charts. **10**

Q.7 a) What are the objectives of good maintenance management? Also explain various maintenance strategies. **10**
b) What do you understand by Total Production Maintenance (TPM)? Explain its key features. **10**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

REFRIGERATION AND AIR CONDITIONING (M-821 / M-821A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is function of compressor in vapour compression system?
- b) What is refrigeration?
- c) What do you mean by wet bulb temperature?
- d) What is dry bulb temperature?
- e) What is occupancy load?

2x10

PART-A

Q.2 a) Describe simple air evaporative cooling system with circuit diagram and T-S diagram.

10

b) Write down merits and demerits of refrigerant used in air refrigeration system. **10**

Q.3 a) Draw pressure-volume (P-V) diagram of vapour compression refrigeration system indicating different processes.

10

b) Describe vapour compression system with circuit diagram of the same. **10**

Q.4 a) Describe electrolux system with cycle diagram.

10

b) Describe **two** stage cascade system with pressure-enthalpy (P-H) diagram.

10

PART-B

Q.5 a) Describe sensible heating and cooling process.

10

b) What is sensible and latent heat transfer? Describe with diagram.

10

Q.6 Write short notes on:

- a) Condenser.
- b) Expansion valve.
- c) Comfort air conditioning.
- d) Industrial air conditioning.

5x4

Q.7 a) What do you mean by sensible heat load in air conditioning? Describe with examples.

10

b) What do you mean by latent heat load in air conditioning? Describe with examples. **10**

End Semester Examination, May 2019

B. Tech. — Seventh Semester

ALTERNATIVE FUELS AND ADVANCES IN IC ENGINES (M-824)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is "high energy and power density batteries"?
- b) Define the "Thermal efficiency of CI engine".
- c) How is a LHR engine different from conventional engine?
- d) Define the compression ratio level of a SI Engine.
- e) Describe the effect of decreasing air fuel ratio on the emission characteristics.
- f) What are the advantages associated with using alcohol as a fuel?
- g) What are the disadvantages offered by using bio diesel as an alternative fuel?
- h) What is a hybrid vehicle?
- i) What do you mean by Swirl in reference to Combustion Chamber Designing?
- j) What do you mean by combustion stoichiometry?

2×10

PART-A

Q.2 Explain the following:

- a) Lean burn engine.
- b) Operation of air standard cycle along with the assumptions involved in it.

10×2

Q.3 Explain the following in detail:

- a) Simulation of engine performance.
- b) Automatic control of engine parameters for pollution control and better efficiency.

10×2

Q.4 a) What do you mean by CI Engine modeling? Draw a neat sketch to show the various processes involved in combustion modeling. **10**
b) Explain the comparison of fuel air cycle and the actual cycle along with the assumptions involved in each. **10**

PART-B

Q.5 Explain the following:

- a) Blending.
- b) Pyrolysis.
- c) Octane number.
- d) Cetane Number.

5x4

Q.6 a) Explain clearly the important qualities of engine fuel with respect to CI engine fuels. **10**
b) Write the important properties of a SI Engines fuels. **10**

Q.7 a) Discuss the various properties and advantages of using CNG. **10**
b) Discuss about the performance and emission characteristics of LPG. **10**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

MODERN MACHINING METHODS (M-835A)

Time: 3 Hours

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and any two from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Distinguish between traditional and non-traditional machining methods.
- b) Write the factors that affect the performance of WJM process.
- c) Write the function of acoustic head system used in USM.
- d) What is self-adjusting feature of an ECM?
- e) What are the applications of chemical milling?
- f) State the disadvantages of a relaxation circuit used in EOM.
- g) What is the function of water muffler in PAM?
- h) Compare EBM and LBM.
- i) What are the reasons for the use of deionized water as dielectric system in wire EDM?
- j) What is the usual feed rate in case of electrochemical deburring? **2x10**

PART-A

Q.2 What are the various types of advanced machining processes? Enumerate the differences between them in respect of types of energy, mechanism of material removal transfer media and energy source. **20**

Q.3 a) With a neat sketch, explain the working principle of USM process and discuss the various process parameters that control MRR in USM process. **10**
b) During AJM, the mixing ratio used is 0.2. Calculate mass ratio if the ratio of density of abrasive and density of carrier gas is equal to 20. **10**

Q.4 a) Explain the photo-chemical blanking. **10**
b) Derive an equation for computing inter electrode gap during both zero feed rate as well as finite feed rate during ECM. **10**

PART-B

Q.5 a) Explain with sketches the different feasible dielectric flushing techniques applicable in case of EDM. **8**
b) Explain the following in EDM with neat sketches:
i) Electrodes feed control system.
ii) Factors to be considered for EDM machine tool selection. **12**

Q.6 a) Describe with the help of a neat sketch the constructional features of an electron gun used for generating an electron beam in EBM. **8**
b) Explain various effects of the process parameters of PAM process. State the application of PAM process. **12**

Q.7 Write short notes on:

- a) Electro-chemical sparks machining.
- b) Shaped tube electro machining.

10x2

End Semester Examination, May 2019

B. Tech. – Seventh Semester

QUALITY ENGINEERING (MII-704)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Quality and reliability.
- b) Write down the dimensions of quality.
- c) Define Probability.
- d) Write down various symbols used in flow chart and their significance.
- e) Define Histogram.
- f) Define MTBF.
- g) Define Acceptance sampling.
- h) Define TQM.
- i) Draw Maslow's Hierarchy of Needs.
- j) What do you understand by Quality management systems?

2x10

PART-A

- Q.2 a) Explain PDCA Cycle. **5**
b) What do you understand by Quality and what are dimensions of quality? **15**
- Q.3 Explain applications of Probability concepts in QC. **20**
- Q.4 a) What is significance of a flow chart? What symbols used in a flow chart? **5**
b) Explain 7QC tools. **15**

PART-B

- Q.5 a) Discuss Bath Tub Curve. **5**
b) Explain Life Testing and types of test used for this along with some examples. **15**
- Q.6 a) How can we differentiate between Total Quality Management and Total Quality Control? **10**
b) How Employee Involvement can contribute towards TQM. **10**
- Q.7 a) Write a short note on OHSAS. **5**
b) Explain basic steps for successful implementation of Total quality management system in an organization. **15**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

DYNAMICS OF MACHINES (M-502A)

Time: 3 hrs

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is condition of static and dynamic balancing?
- b) What do you mean by balancing of rotating masses?
- c) State the problem caused due to partial balancing of unbalanced forces in a single cylinder engine.
- d) Variation of tractive force in a single cylinder engine.
- e) Define the device used to control inter cycle fluctuation.
- f) What is the effect of gyroscopic couple on rolling and pitching of naval ship?
- g) Write an expression for sensitiveness of the engine and governor.
- h) Write an expression for angle of heel for stability of two wheelers.
- i) What is D'Alembert's principle statement?
- j) What is applied and constraint forces?

2x10

PART-A

- Q.2** a) Four masses $m_1, m_2, m_3,$ and m_4 are 200kg, 300kg, 240kg, and 260kg respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m and 0.3m respectively and the angles between successive masses are $45^\circ, 75^\circ$ and $135^\circ.$ Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2m **10**
- b) A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600mm apart and the mass of B, C and D are 10kg, 5kg, and 4kg respectively. Find the required mass A and the angular settings of the four masses so that the shaft shall be in complete balance. **10**
- Q.3** a) Derive an expression for primary and secondary unbalance forces for single slider crank machine. **10**
- b) Explain the complete balancing of inline six cylinder four stroke engines. Assume F.O.-1-5-3-6-2-4. **10**

- Q.4** a) Effect of gyroscopic torque on a naval ship. (i) Steering (ii) Pitching. **8**
- b) A four wheeler of mass 2000kg has a wheel base 2.5m, track width 1.5m and height of centre of gravity 500mm above the ground level and lies at 1m from the front axle. Each wheel has an effective diameter of 0.8m and a moment of inertia of $0.8\text{kg-m}^2.$ The drive shaft, engine fly wheel and engine transmission are rotating at 4 times the speed of road wheel, in a clockwise direction when viewed from the front, and is equivalent to a mass of 75 kg having a radius of gyration of 100mm. If the car is taking a right turn of 60m radius at 60 Km/hr. find the load on each wheel. **12**

PART-B

- Q.5** a) Each arms of 200 mm, hinged at a distance 40mm from the axis of rotation. $m = 1.5\text{kg}, M = 25\text{kg}.$ When links are 30° to the axis of sleeve begin to rise at 260 rpm assuming friction to be constant. Find the min. and max. speed of rotation, when angle of arm is 45° from vertical. **12**
- b) Derive an expression of height of a proell governor using suitable figure. **8**

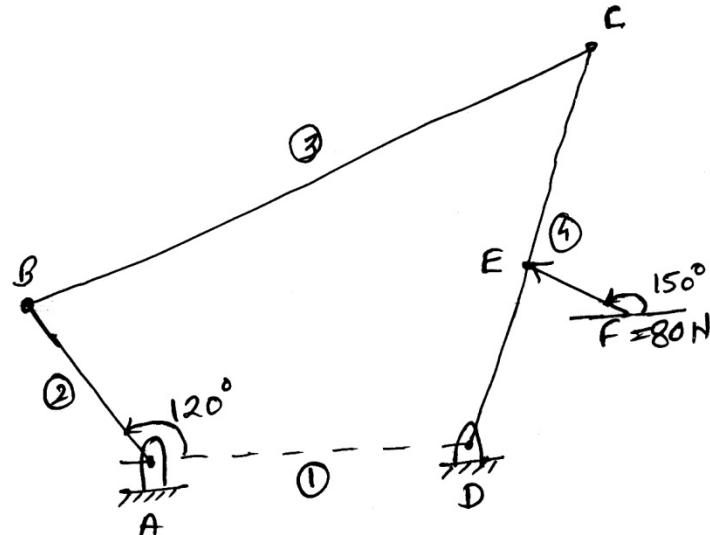
- Q.6 a) A four link mechanism with the following dimensions is acted upon by a force $80\angle 150^\circ N$ on the link DC as shown in figure.

$$AD = 500mm, AB = 400mm$$

$$BC = 1000mm, DE = 350mm$$

$$DC = 750mm$$

Find the input torque T on the link AB for the static equilibrium of the mechanism.



15
5

- b) Principle of virtual work.

- Q.7 A horizontal gas engine running at 210 rpm has a bore of 220mm and a stroke of 440mm. The connecting rod is 924mm long and the reciprocating parts weigh 20kg. When the crank has turned through an angle of 30° from the inner dead centre, the gas pressure on the cover and the crank sides are 500 KN/m^2 and 60 KN/m^2 respectively. Diameter of the piston rod is 40mm. Determine:

- a) Turning moment on the crank shaft.
- b) Thrust on the bearings.
- c) Acceleration of the flywheel which has a mass of 8kg and radius of gyration of 600mm while the power of the engine is 22kw.

20

End Semester Examination, May 2019

B. Tech. – Third Semester

METROLOGY (M-308)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Cite the reason for recommending hole based system.
- b) Illustrate unilateral and bilateral tolerance.
- c) List the various instruments for angle measurements.
- d) State why comparators are used in engineering practices.
- e) What do you mean by Lay?
- f) Explain symbols for designing surface finish on drawing.
- g) Interpret M20×2 screw.
- h) What do you mean by best size wire?
- i) Define "Straightness and Flatness".
- j) Define module and pressure angle of a gear.

2×10

PART-A

Q.2 a) Explain hole base and shaft base system with examples. **5**
b) Calculate dimensions, tolerances and allowances for a 200mm shaft and hole pair designated H8d9. Fundamental deviation for "d" shaft is $-16D^{0.44}$. Diameter range is 18-30mm.

$$IT8 = 25i$$

$$IT9 = 40i$$

15

Q.3 a) Differentiate between line standard and end standard. **5**
b) Describe the working principle, construction and advantages of any one mechanical comparator. **15**

Q.4 a) Explain the following terms with neat sketch.

- i) Sampling length.
- ii) CLA method.
- iii) Ten point height average method.
- iv) RMS value.
- v) Primary texture.

1×5

b) Describe with neat sketch Taylor-Hobson Talysurf instrument. **15**

PART-B

Q.5 a) Describe various kinds of errors found in screw threads. **5**
b) Describe three wire methods for finding the effective diameter of a screw thread. **15**

Q.6 a) Explain the working principle of autocollimator. **10**

b) Describe commonly used method for measurement of roundness. **10**

Q.7 a) Explain pitch errors and their effects on gears. **5**

b) Explain with diagram the construction, working and applications of Parkinson gear roller tester. **15**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

COMPUTER AIDED DESIGN-I (MII-504)

Time: 3 hrs.

Max Marks: **100**

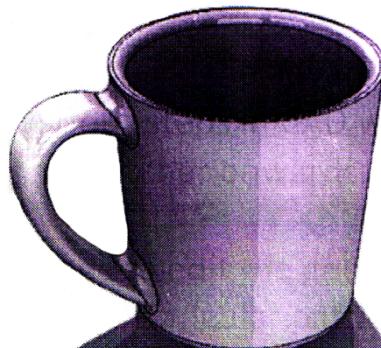
No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is meant by .igs format?
b) What is rotation command?
c) What is meant by CAM?
d) What is meant by quick trim function?
e) What is meant by symmetry command?
f) What is meant by over constrained geometry?
g) How can you double the size of a part?
h) What is an isometric view?
i) What is the difference between pad and rib commands?
j) What is meant by edge chamfer command? **2×10**

PART-A

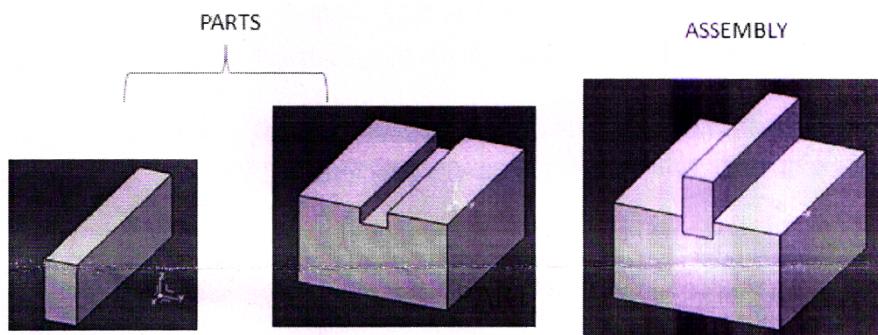
- Q.2 a) What is CAM? What are the advantages of CAM? **10**
b) What are the various steps in CAD working? Describe the workflow from sketcher onwards. **10**
- Q.3 a) What are commands to edit the geometry in sketcher module? **10**
b) What is meant by rectangular pattern in sketcher? Give examples. **10**
- Q.4 Give method of making the following model.



20

PART-B

- Q.5 Define the method of making the following assembly using top down approach:



20

- Q.6 How will you make the above assembly of (Q.5) using bottom up approach? How can you find interference in assembly? **20**

**Q.7 How do you make various views in drawing file from a 3D model? How do you
dimensions of the drawing.**

20

End Semester Examination, May 2019

B. Tech. – Seventh Semester

MECHATRONICS (M-634)

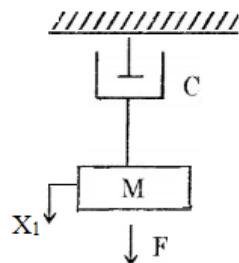
Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) Define mechatronics.
 b) Explain in short passive and active electronics elements.
 c) Explain the significance of the following information given in the specification of transducers. A piezoelectric accelerometer. Non linearity: + 0.5% full range.
 d) What is quantization levels and its error during analog to digital conversion?
 e) Define a microcontroller with an example.
 f) Classify the address mode of 8085.
 g) Derive an equation relating the input force 'F' with the output, displacement x_1 , for the system described in the figure.



- h) What is the range and span of transducers?
 i) What is signal conditioning in a system?
 j) How digital signal differ from analog signal?

2×10

PART-A

- Q.2 a) Explain what logic gate might be used to control the following situations:
 i) A locker has been rented in the bank. Express the process of opening the locker in terms of digital operations.
 ii) A boiler shut down switch when the temperature reaches say 80°C and the circulating pump is off. **2×3**
 b) Explain the working of master slave flip in detail. **10**
 c) Convert the following:
 i) 10001011 from binary to base 10.
 ii) 8B from Hexadecimal to Binary. **2×2**

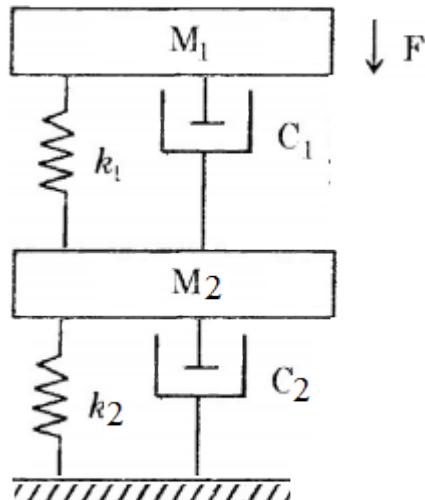
- Q.3 a) Explain the following sensors with their applications in industries.
 i) Diaphragm pressure gauge.
 ii) Bimetallic strips. **12**
 b) What are capacitive elements? **4**
 c) A electric resistance strain gauge with a resistance of 100Ω and a gauge factor of 2.0. What is the change in resistance of the gauge when it is subjected to a strain of 0.001? **4**

- Q.4 a) Explain types of buses used for digital signals. **4**
 b) Explain the following:
 i) Shift registers
 ii) EEPROM **6**
 c) Discuss architecture of 8085 microprocessor. **10**

PART-B

Q.5 a) Explain the building block equation of a mechanical system and fluid system building block. 12

b) Explain the governing equations of the following mechanical systems used in vehicle suspensions shown in the figure.



8

Q.6 a) Explain DA convertor with DA conversion. 10

b) What is meant by filtering of frequencies? 4

c) What do you mean by phase change in inverting amplifiers? Explain Non Inverting amplifiers. 6

Q.7 a) Explain the design process for a system. 8

b) Write short notes on:

- i) Wind screen wiper motion.
- ii) Radiator water level indicator. **6×2**

End Semester Examination, May 2019

B. Tech. – Third Semester

THERMAL ENGINEERING-I (M-302A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

- Q.1 a) What is meant by intensive and extensive property?
 b) State the zeroth law of thermodynamics.
 c) Write down the expression for the first law of thermodynamics applied to a process.
 d) What is internal energy?
 e) What is heat pump? How does it differ from a refrigerator?
 f) State the importance of second law of thermodynamics.
 g) Differentiate between the 'saturated liquid' and 'saturated vapour'.
 h) What is meant by subcooling and superheating?
 i) What is an ideal gas? How does it differ from a perfect gas?
 j) Define the 'coefficient of Isothermal compressibility'. **2×10**

PART-A

- Q.2 a) Derive the equation for the work done in adiabatic process. **10**
 b) To a closed system 150 kJ of work is supplied. If the initial volume is 0.6 m^3 and pressure of the system changes as $p = 8 - 4v$, where p is in bar and v is in m^3 , determine the final volume and pressure of the system. **10**
- Q.3 a) Derive the expression for steady flow energy equation and simplify when applied for the nozzle. **10**
 b) Air enters a compressor at 10^5 Pa and 25°C having volume of $1.8 \text{ m}^3/\text{kg}$ and is compressed to $5 \times 10^5 \text{ Pa}$ isothermally. Determine:
 i) Work done.
 ii) Change in internal energy.
 iii) Heat transferred. **10**
- Q.4 a) Derive an expression for increase in unavailable energy when heat is transferred through a finite temperature difference. **10**
 b) A reversible heat engine operates between 600°C and 40°C . This engine drives a reversible refrigerator operating between 40°C and -18°C . Still there is network output of 370 kJ. The heat received by the engine is 2100 kJ. Determine the desired effect of the refrigerator. **10**

PART-B

- Q.5 a) Describe with a neat sketch tank or bucket calorimeter for measuring the dryness fraction of steam. **10**
 b) Steam enters an engine at a pressure 10 bar absolute and 400°C . It is exhausted at 0.2 bar. The steam at exhaust is 0.9 dry. Find:
 i) Drop in enthalpy
 ii) Change in entropy **10**
- Q.6 a) Derive the Maxwell relation and explain their importance in thermodynamics. **10**
 b) Explain clapeyron equation and obtain in the clausius- clapeyron equation from it. **10**
- Q.7 Write short notes on:
 a) Avagarro's law.
 b) Equation of state.
 c) Vander waal's equation. D Compressibility chart. **5×4**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

METROLOGY, MEASUREMENT AND CONTROL (M-505)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define linear metrology and explain its application areas.
- b) Briefly describe basic vibration measurement system.
- c) Describe the electro-mechanical sensors used in metrology.
- d) What are systematic and random errors?
- e) Explain Routh-Hurwitz criteria of stability of a control system.

4x5

PART-A

- Q.2** a) With a neat sketch, explain the working of vernier caliper. **10**
b) Describe the measurement process of internal thread. **10**
- Q.3** a) Describe the diaphragm pressure gauge with the help of neat figures. **10**
b) List the common types of load cells and explain any one with neat sketch. **10**
- Q.4** Discuss the classification of transducer and explain LVDT with the help of neat sketch to measure the displacement. State its advantages and limitations. **20**

PART-B

- Q.5** a) What do you mean by zero, first and second order response system? Derive expression for first order response system. **15**
b) Describe statistical analysis of test data in metrology. **5**
- Q.6** a) What are the elements of a control system? Explain servo-mechanism. **10**
b) Describe the overall transfer-function of a multi-loop control system with suitable example. **10**
- Q.7** Write short notes on (**any four**):
a) Shielding and Grounding.
b) DAC converter.
c) Noise Problems.
d) Voltage recording device.
e) Amplifier. **4x5**

End Semester Examination, May 2019

B. Tech. – Third Semester

MATERIALS AND HEAT TREATMENT (M-307)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the effects of different alloying elements on cast iron?
- b) Write the properties of composite materials.
- c) Differentiate between failure of material due to fatigue and creep.
- d) What is the purpose of heat treating a metal or alloy?
- e) What is tempering? Why is it done?

4×5

PART-A

Q.2 a) What are non-ferrous metals? What advantages are expected from their use in engineering work? Write the properties and uses of aluminum. **12**
b) Explain the properties and applications of free cutting steels. **8**

Q.3 a) How the ceramics are different from metal? List some unique characteristics of ceramics over metals. Explain how ceramics can be made tougher. **10**
b) Describe the functions of matrix and reinforcing fibers. What fundamental differences are there in the characteristic of the two materials? **10**

Q.4 a) Describe the procedure used to measure the toughness properties of a material. Explain the meaning of toughness, hardness and stiffness. **12**
b) Explain the procedure of "tensile test" of metal. **8**

PART-B

Q.5 a) Briefly describe the difference among pearlite, bainite, and martensite relative to microstructure and mechanical properties. **10**
b) Discuss the phase transformation in steel on heating and cooling. **10**

Q.6 a) What is hardening process? How does the carbon content effect on the hardness of plain carbon steel? **7**
b) What is sub-zero treatment of steel and why is it done? **6**
c) What are the various causes of defects in heat treatment of a component? **7**

Q.7 What is surface hardening? How does it differ from case hardening? Explain different methods of surface hardening? **20**

End Semester Examination, May 2019

B. Tech. – Third Semester
MATERIAL SCIENCE (M-305)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer (**any five**) questions:

- a) What is a crystal? In what patterns do formations of crystals take place?
- b) What do you understand by solid solution? Name each type of solid solution with suitable example.
- c) State the effect of heat treatment on mechanical properties of steel.
- d) Compare elastic and plastic materials when they are subjected to tensile loads?
- e) Define creep. Write the impact of time and temperature on creep.
- f) Write the basic steps in processing of ceramic products.

4×5

PART-A

- Q.2 a) Explain edge and screw dislocation with the help of neat sketches. **10**
b) Define atomic packing factor and obtain its expression for simple cubic. **10**
- Q.3 a) What are the different factors, which govern the formation of substitutional solid solutions? **10**
b) Describe the allotropic transformations in iron and discuss their importance in practical applications. **10**
- Q.4 a) What are the objectives of annealing? Describe process annealing and full annealing briefly. **12**
b) Describe martensitic transformation in steel. **8**

PART-B

- Q.5 a) Define fatigue failure in metals. State the factors of fatigue failure? What measures can be taken to increase the resistance to fatigue of a metal. **12**
b) Which type of fracture is important for engineering design point of view and why? **8**
- Q.6 a) Describe the various means for prevention and control of corrosion. **10**
b) Explain the mechanism of creep. **10**
- Q.7 a) Differentiate between thermoplastics and thermoset. **8**
b) What are fibrous composites? How are they classified? Explain their properties. **12**

End Semester Examination, May 2019

B. Tech. – Seventh Semester

RAPID PROTOTYPING (M-834)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following:

- a) What do you mean by product prototyping?
- b) Differentiate between FMS and CIL.
- c) Name the factors contributing to the growth of productivity.
- d) What is surface skin fills?
- e) List the file exchange errors while transferring CAD data.

4x5

PART-A

Q.2 Classify the RP techniques based on raw material and layering techniques. **20**

Q.3 a) What are the principles behind SLS process? **8**
b) Narrate laminated object manufacturing with neat sketch. **12**

Q.4 What is rapid tooling and explain about evaporative pattern casting process? **20**

PART-B

Q.5 Explain 3D printing process with neat sketch. **20**

Q.6 a) Discuss on STL files and define slicing relevant to CAD. **8**
b) Explain in detail the common information workflow indicating the main stages of RP system workflow. **12**

Q.7 a) How surface generation is done from point cloud data? **14**
b) What are heterogeneous objects? **6**

End Semester Examination, May 2019

B. Tech. – Fifth Semester

JIGS AND FIXTURE DESIGN (MII-505)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is mean by slide fit?
- b) What is a dowel?
- c) What is meant by press fit?
- d) What is meant by fool proofing?
- e) What is a toggle clamp?
- f) What is the material of drill bush?
- g) Why are the sliding elements hardened?
- h) Which machine is used for grinding a cylindrical part?
- i) What is the role of indexing fixtures?
- j) What is a diamond pin?

2x10

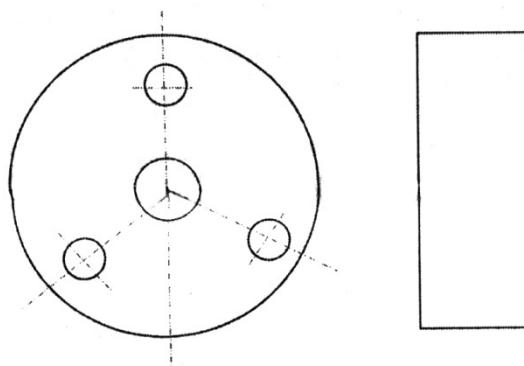
PART-A

Q.2 a) Describe the roles of the following machines very briefly:

- i) Milling Machine.
- ii) Electro Discharge Machine.
- iii) Cylindrical Grinding Machine.
- iv) Radial Drilling Machine.

10

b) Make the process plan for the following part.



10

Q.3 a) Describe the main purpose of a Jig/Fixture. What are the advantages of Jigs and Fixtures?

10

b) What is the difference between cycle time and takt time? Calculate the takt time for a part. Data is as follows:

Yearly production = 50,000 No of working days = 289

No of shift = 1 Working time = 8 hrs per shift. Assume 20% surge in demand in peak time and 85% efficiency.

10

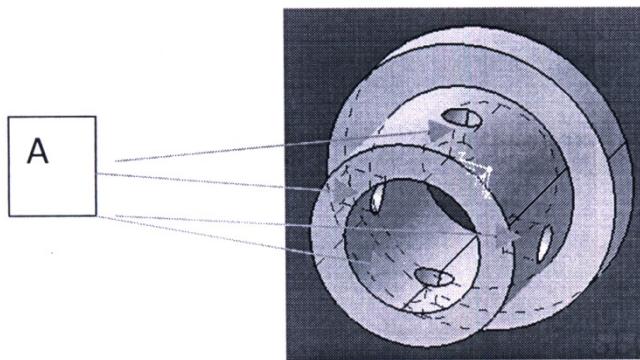
Q.4 Design a Drill Jig for the following part:

Hole A is to be drilled in the part on the Jig. The vertical hole are predrilled.



1078/5

Q.5 Design locating system for the following part:
Hole A (4nos, equispaced at 90deg) to be drilled. Central hole is predrilled.



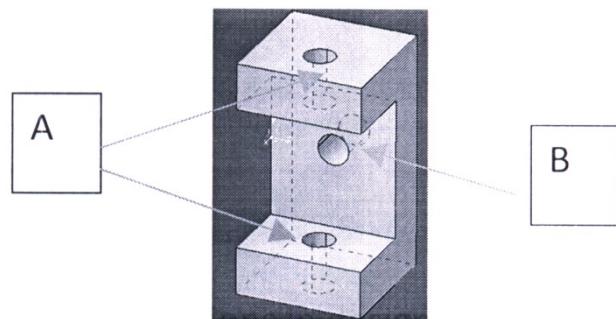
20

- Q.6** a) Describe the considerations in design of a welding fixture.
b) Describe the various steps in the manufacturing a welding fixture.

10

10

- Q.7** Design a Turning Fixture for drilling holes A in the following part.
Hole B is predrilled.



20

End Semester Examination, May 2019

B. Tech. — Seventh Semester

COMPUTATIONAL FLUID DYNAMICS (M-843)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is upwind and downwind scheme?
- b) What is conservation form?
- c) What is a mesh?
- d) Define unstructured mesh/grid.
- e) What is meant by divergence of a velocity vector?
- f) Differentiate between integral form and differential form.
- g) What do you understand by geometric transformations?
- h) What is no slip condition?
- i) What do you understand by a boundary condition?
- h) Define multiphase modeling.

2×10

PART-A

Q.2 a) Derive 3-D continuity equation for fluid flow. Also, deduce the equation for steady and incompressible flow. **10**
 b) State and prove Reynolds's transport theorem for a fixed control volume. **10**

Q.3 a) Convert the partial differential equation $\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = 0$ to a finite difference equation. **10**

b) Show that the second order wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ is a hyperbolic equation. **10**

Q.4 a) Discuss the differences in Lagrangian and Eulerian approach for the analysis of fluid flow. **10**
 b) Discuss about explicit and implicit methods and their advantages and disadvantages. **10**

PART-B

Q.5 a) What do you understand by multi-phase flow model? What are its applications? **10**
 a) Explain the two fluid theory in detail. **10**

Q.6 Explain about Reynolds stress model in detail. **20**

Q.7 a) What is parametric representation of curves? **10**
 b) What do you understand by geometric transformation of a point? **10**

End Semester Examination, May 2019

B. Tech. (Industry Integrated) — Sixth Semester

CAD-II (MII-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is C⁰ continuity?
- b) How many nodes a hexahedral element have?
- c) Does surfaces have control points? (T/F)
- d) What is the purpose of Join Command in surface modeling?
- e) What is approximation with reference to curves?
- f) What is Pencil Milling?
- g) What is an implicit model?
- h) Write formula for tensile stiffness.
- i) What is relief angle in single point turning tool?
- j) What is process planning?

2x10

PART-A

- Q.2 a) What are the advantages of B-Spline surface over Bezier surface and Bi-Cubic surface in context of control and continuity? Explain with the help of parametric and blending function. **10**
- b) How surface modeling is different from wireframe and solid modeling? Explain briefly with examples. **10**
- Q.3 a) What is shape function in FEM? Write shape function for hexatiedral element. **10**
- b) Differentiate FEM from Classical Method and Finite Difference Method. **10**
- Q.4 a) Explain top-down approach for making an assembly. **10**
- b) Explain following terms clearly: Local coordinates global coordinated, natural coordinates and area coordinates. **10**

PART-B

- Q.5 a) Briefly discuss FEM as an essential Part of CAD. with the help of relevant example. **10**
- b) State and explain principle of minimum potential energy. **10**
- Q.6 a) What is meshing? How meshing is an important part of FEM? Differentiate Structured and Un-structured mesh. **10**
- b) Discuss Continuous, Mass and Batch productions with help of relevant examples. **10**
- Q.7 a) Discuss various Motion Control Systems in a CNC system. **10**
- b) What are the various factors as the part of geometry of an insert? Also explain various angles which are important for design of cutting tool's edge of an insert. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

IC ENGINES AND GAS TURBINES (M-621)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer following questions in brief:

- a) What is air standard efficiency and relative efficiency?
- b) What are the factors that affect the process of carburetion?
- c) What are the general conditions necessary for combustion?
- d) Why engine cooling is required?
- e) What are the merits and demerits of gas turbines over I.C. engine?

4×5

PART-A

Q.2 Compare Otto, Diesel and Dual cycles for the following parameters

- a) Same compression ratio and heat input.
- b) Same maximum pressure and heat input.
- c) Same maximum pressure and temperature.

20

Q.3 How solid injection system is classified? With the help of neat sketches, explain the working of Common Rail System and Distributor system. **20**

Q.4 a) What are the various factors which affect flame speed in combustion in SI engines? Explain in detail. **10**

- b) With the help of a graph, show the relationship of average flame speed in combustion chamber of an SI engine as a function of air fuel ratio. **10**

PART-B

Q.5 a) Classify lubrication system. Compare wet sump and dry sump lubrication system. **10**
b) How a lubricating oil is rated by SAE and what are the commonly viscosity grades? **10**

Q.6 a) A gasoline engine works on Otto cycle. It consumes 8 litres of gasoline per hour and develops power at the rate of 30 kW. The specific gravity of gasoline is 0.8 and its calorific value is 44000 kJ/kg. Find the indicated thermal efficiency of the engine. **10**

- b) A diesel engine consumes fuel at the rate of 5.5 gm/sec. and develops a power of 75 kW. If the mechanical efficiency is 85%. Calculate bsfc and isfc. The lower heating value of the fuel is 44 MJ/kg. **10**

Q.7 a) What are the methods which can be employed for improvement of thermal efficiency of open cycle gas turbine plant? **10**

- b) An ideal Brayton cycle, operating between the pressure limits of 1 bar and 6 bar, has minimum and maximum temperatures as 300 K and 1500 K respectively. Specific heat ratio is 1.4. What will be the final temperatures in °C at the end of compression and expansion processes? **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester

CAD/CAM (M-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Explain translation and scaling with their matrix in 2D and 3D.
 - b) What are the different phases of product development cycle?
 - c) What do you understand by interpolation and approximation spline?
 - d) Explain the important properties of curve designing.
 - e) Explain solid modeling with example.
 - f) Explain under what conditions each of the following technology should be implemented:
 - i) NC
 - ii) CNC
 - iii) DNC
 - iv) Adaptive control.
 - g) Discuss the open loop and closed loop system used in NC machines.
 - h) What is part programming? Discuss the procedure for developing manual parts program.
 - i) What is group technology?
 - j) Describe the purpose of process planning.
- 2×10**

PART-A

- Q.2**
- a) Find the reflection matrix when axis of reflection is $y = 3x + 2$. **12**
 - b) A line having end points (3,3) and (5,5) is scaled by 3 units in a x direction and 4 units in y direction . Find the transformation matrix and final coordinates of the line. **8**

- Q.3**
- a) Write a Parametric Equation for a circle having end points of diameter as $P_1 (2, 3, 6)$ and $P_2 (8, 7, 6)$. Calculate the coordinates of points on circle. **12**
 - b) Draw the Bezier curve with following control points:
(1,2), (3,4), (6,-6) and (10,8) **8**

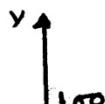
- Q.4**
- a) What is CSG? Explain the Boolean operation used in constructive solid geometry for solid modeling. **10**
 - b) Explain the following:
 - i) B-rep
 - ii) Sweep representation. **5×2**

PART-B

- Q.5**
- a) Explain the different types of automation. What are levels of automation? **10**
 - b) Write short notes on the following:
 - i) Absolute coordinate system.
 - ii) Incremental coordinate system. **5×2**

- Q.6**
- a) For the work piece shown in the figure below, perform the end milling operation to smoothen its edges (remove burrs from edges). Use end milling cutter of 25 mm diameter. Take feed rate 30 mm/min. Assume target point to be located at $x = -30$ mm, $y = -30$ mm and $z = +10$ mm.

Note: The holes are used for locating and positioning the work piece.



b) Briefly explain the concept of the following:

- i) Part surface.
- ii) Check surface.

2½×2

Q.7 a) Discuss the various inputs required for material requirement planning. Compare MRP with MRP-II. **10**

b) Write short notes on the following:

- i) CAPP.
- ii) BOM.
- iii) MPS.
- iv) DNC.

2½×4

End Semester Examination, May 2019

B. Tech. – Sixth / Eighth Semester

REFRIGERATION AND AIR-CONDITIONING (M-821 / M-821A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following:

a) Write down the chemical formula for the following refrigerants.

R-134, R729 R22 R11

b) What are the advantages of compound compression with intercooler over single stage compression?

c) Draw the neat diagram of practical vapor absorption refrigeration system.

d) What do you mean by dew point temperature and ADP of cooling coil?

e) List the types of refrigerating compressor.

4×5

PART-A

Q.2 A refrigerator storage is supplied with 3600 kg of a substance at a temperature of 27°C. The substance has to be cooled to -23°C. The cooling takes place in 10 hours. The specific heat of the substance is 2 kJ/kg-K above freezing point and 0.5 kJ/kg-K below freezing point. The freezing point of the substance is -3°C, the latent heat of freezing 230 kJ/kg. Then find the power required to dry the plant if the actual C.O.P. is $\frac{1}{2}(C.O.P.)_{\max}$.

20

Q.3 a) Draw the T-S and h-S diagram for the steam jet refrigeration system and write the expression for the Entrainment efficiency and Nozzle efficiency.

10

b) Explain briefly with a neat diagram 'practical vapour absorption system'.

10

Q.4 a) In a bell-Coleman refrigeration plant air is drawn from the cold chamber and the pressure and temperature at the inlet to compressor are 1 bar and 10°C. Air is compressed to 5 bar. The air is then cooled to 25°C in a cooler, determine theoretical C.O.P of the plant and refrigeration effect per kg assuming compression and expansion to be isentropic.

10

b) Describe with a neat sketch a regenerative air-refrigeration system.

10

PART-B

Q.5 a) Write short notes on:

- i) Cooling and dehumidification.
- ii) Heating and humidification.

10

b) Derive the following relation.

$$\text{Degree of saturation } \mu = \frac{P_v}{P_s} \left[\frac{\left(1 - \frac{P_{vs}}{P_t} \right)}{\left(1 - \frac{P_v}{P_t} \right)} \right]$$

Where:

P_v = Partial pressure of vapour.

P_t = Total pressure of moist air.

P_{vs} = saturation pressure of vapour in moist air.

10

Q.6 Explain briefly:

- a) Hermetically sealed type compressor.
- b) Forced air circulation condenser.
- c) Flooded type evaporator.
- d) Thermostatic expansion valve.

5×4

Q.7 An office for seating 30 occupants is to be maintained at 22°C DBT and 55% RH. The outdoor conditions are 36°C DBT and 27°C WBT. The various loads in the office are:

Solar heat gain — 8500W

Sensible heat gain per occupant — 83W

Latent heat gain per occupant — 100W

Lighting load — 2500W

Sensible heat load from other sources — 12000W

Infiltration load — 15m³/min.

Assuming 40% fresh air and 60% of recirculated air passing through the evaporator coil and the bypass factor of 0.12, determine.

i) Dew point temperature of the coil.

ii) Capacity of the plant.

20

End Semester Examination, May 2019

B. Tech. (Industry Integrated) — Sixth Semester
WELDING TECHNOLOGY (MII-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is stretch forming?
- b) What is deep drawing?
- c) What is HAZ?
- d) What is soldering?
- e) What is Spot Welding?
- f) What is Nick break test?
- g) What is stud welding?
- h) What is weld spatter?
- i) What is bending operation?
- j) What is formability?

2x10

PART-A

Q.2 Write short note on the following:

- a) Tube bending.
- b) Brazing.
- c) Spinning.
- d) Roll bending operation.

5x4

Q.3 a) Explain in brief about various types of material handling equipment used in industry along with schematics, working principles, limitations and advantages. **15**
b) Explain Plasma arc cutting. **5**

Q.4 a) Explain MIG welding with its applications. **10**
b) Explain electroslag welding with its applications. **10**

PART-B

Q.5 a) Explain TIG welding with a neat sketch and discuss its advantages and limitation. **5**
b) Briefly explain adhesive bonding. **5**

Q.6 Explain various types of welding defects and its remedies with proper illustrations. **20**

Q.7 Write short notes on the following:
a) Laser beam welding. **10**
b) Friction welding. **10**

End Semester Examination, May 2019

B. Tech. — Fourth Semester

DYNAMICS OF MACHINES (M-502A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) State static balancing condition of a rotating mass.
- b) State D'e Alembert's principle.
- c) What is principle of virtual work?
- d) What is hammer blow in locomotives?
- e) Write the importance of sensitiveness of a governor.
- f) What is angle of heel?
- g) What is gyroscopic couple?
- h) What is offset inertia force?
- i) What is hunting of governor?
- j) What is swaying couple?

2×10

PART-A

Q.2 a) Derive the expressions for primary and secondary unbalanced inertia force for a single slider crank mechanism. **6**
b) In a balanced disc 8 kg, 12 kg, and 15 kg are attached at radical distances of 80 mm, 100 mm and 60 mm respectively. Determine the angular positions of 12 kg and 15 kg relative to 8 kg. **14**

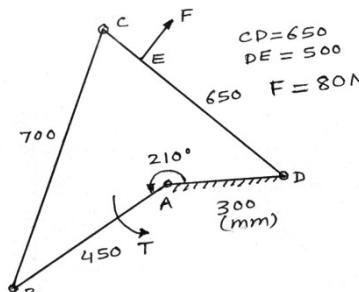
Q.3 a) Derive the expressions for variations of tractive force and swaying couple in locomotives. **6**
b) Explain the complete balancing of inline six cylinder four stroke engines. **14**

Q.4 a) Derive the expression of gyroscopic couple as $C_G = IW \cdot W_P$. **6**
b) An aero plane runs at 600 km/h, the rotor weighs 4000 N with radius of 1 meter. The speed of rotor is 3000 rpm in clockwise direction viewed from front. If the plane turns left with a radius of 100 meter, find gyroscopic couple and its effects. **14**

PART-B

Q.5 a) Describe classifications of governors. **6**
b) In a porter governor, each of the four arms is 400 mm long. The upper arms are pivoted on the axis of rotation whereas the lower arms are attached to the sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of rotation of 250 mm and 300 mm of governor balls? **14**

Q.6 a) Explain the principle of virtual work with an example. **5**
b) Find the torque required to be applied to link AB of the linkage shown in the figure to maintain by the static equilibrium.



- Q.7 a) Explain D'Alembert's principle. 5
 b) The turning moment diagram for a petrol engine is drawn to a vertical scale of $1 \text{ mm} = 500 \text{ N-m}$ and a horizontal scale of $1 \text{ mm} = 3^\circ$. The turning moment diagram repeats itself after every half revolution of the crank shaft. The areas above and below the mean torque line are 260, -580, 80, -380, 870 and -250 mm^2 , the rotating parts have a mass of 55 kg and radius of gyration of 2.1 m. If the engine speed is 1600 rpm, determine the coefficient of fluctuation of speed. 15

End Semester Examination, May 2019

B. Tech. – Fourth Semester

FLUID MECHANICS (M-304A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer briefly:

- a) Define surface tension and capillarity.
- b) State the condition for stable, unstable and neutral equilibrium for floating bodies.
- c) Define 'steady' and 'unsteady flow'.
- d) Name few devices to measure volume flow rate.
- e) What is momentum correction factor and kinetic energy correction factor?
- f) What is velocity potential function?
- g) Conclude whether the flow of crude oil of viscosity 0.97 poise and relative density 0.9 is flowing with a velocity of 0.5 m/s through horizontal circular pipe of diameter 100 mm and of length 10 m is laminar or turbulent?
- h) What is hydraulic gradient line and total energy line?
- i) Define Weber's number and Mactis number.
- j) What is laminar sub-layer?

2×10

PART-A

Q.2 a) Determine the intensity of shear of an oil having viscosity = 1 poise. The oil is used for lubricating the clearance between a shaft of diameter 10 cm and its journal bearing. The clearance is 1.5 mm and the shaft rotates at 150 rpm. **5**

- b) Derive the expression for excess pressure inside:
 - i) Liquid droplet.
 - ii) Soap bubble. **5**
- c) A rectangular plane surface 3m wide and 4m deep lies in water in such a way that its plane makes an angle of 30° with the free surface of water. Determine the total pressure force and position of centre of pressure when the upper edge is 2m below the free surface. **10**

Q.3 a) Derive the expression for Bernoulli's equation with assumption. **10**

- b) A horizontal venture meter with inlet and throat diameter 30cm and 15cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20cm of mercury. Determine the rate of flow take $C_d = 0.98$. **10**

Q.4 a) Define the following terms:

- i) Stream line.
- ii) Streak line.
- iii) Path line.
- iv) Circulation.
- v) Vorticity. **2×5**

- b) Water flows through a pipe AB 1.2m diameter at 3m/s and then passes through a pipe BC 1.5m diameter. At C, the pipe branches. Branch CD is 0.8m in diameter and carries one third of the flow in AB. The flow velocity in branch CE is 2.5m/s. Find the volume rate of flow in AB, the velocity in BC and CD and the diameter of CE. **10**

PART-B

- Q.5 a) Determine i) the pressure gradient ii) the shear stress at the two horizontal parallel plates and iii) the discharge per metre width for the laminar flow of oil with a maximum velocity of 2 m/s between two horizontal parallel fixed plates which are 100 mm apart. Given $\mu = 2.4525 \text{ NS} / \text{m}^2$. **10**
 b) Define the terms: kinetic energy correction factor and momentum correction factor. **10**
- Q.6 a) Obtain an expression for the co-efficient of friction in the terms of shear stress. **10**
 b) Define the terms:
 i) Boundary layer.
 ii) Boundary layer thickness.
 iii) Drag.
 iv) Lift.
 v) Momentum thickness. **2x5**

- Q.7 a) Three pipes of lengths 800 m, 500 m and 400 m and of diameters 500 mm, 400 mm and 300 mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700 m. Find the diameter of the single pipe. **10**
 b) The frictional torque T of a disc of diameter D rotating at a speed N in a fluid of viscosity μ and density ρ in a turbulent flow is given by:

$$T = D^5 N^2 \rho \phi \left[\frac{\mu}{D^2 N \rho} \right]$$

Prove this by the method of dimensions. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

FLUID MACHINES AND TURBOMACHINERY (M-402A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Define the term: impact of jet.
- b) Find the force exerted by a jet of water of diameter 75mm on a stationary flat plate, when the jet strikes the plate with a velocity of 20 m/s.
- c) Differentiate between turbine and pump.
- d) What do you mean by hydraulic efficiency and mechanical efficiency of a turbine?
- e) State the purpose of draft tube in a reaction turbine.
- f) Define 'cavitation'.
- g) Define 'specific speed of a pump'.
- h) Explain the term: slip and the conditions for negative slip.
- i) Explain in brief the functioning of air-vessel.
- j) Briefly explain Hydraulic Press.

2x10

PART-A

Q.2 a) A jet of water of diameter 75 mm moving with a velocity of 25 m/s, strikes a fixed plate inclined at an angle of 60° with the direction of motion of jet. Find the force exerted by the jet on the plate:

- i) In the direction normal to the plate.
- ii) In the direction of jet.

10

b) A small ship is fitted with jets of total area 0.65 m^2 . The velocity through the jet is 9 m/s and speed of the ship is 18 km/hr. The efficiencies of the engine and pump are 85% and 65% respectively. If the water is taken amid ships, determine the propelling force and overall efficiency, assuming pipe losses to be 10% of kinetic energy of the jets.

10

Q.3 a) Explain with neat sketch governing of Pelton Turbine.

10

b) A single jet pelton wheel runs at 300 rpm under a head of 510 m. The jet diameter is 200 mm and is deflected by an angle of 165° . The relative velocity is reduced by 15% due to friction. Find:

- i) Shaft power considering 3% mechanical losses.
- ii) Overall efficiency.

Assume $C_v = 0.98$ and $K_u = 0.46$.

10

Q.4 a) Briefly explain the characteristic curves of reaction turbine.

6

b) With the help of neat sketch, explain the constructional details of Kaplan turbine.

8

c) A turbine is to operate under a head of 25 m at 200 rpm. The discharge is $9 \text{ m}^3/\text{s}$. If the efficiency is 90%, determine the power, speed and discharge for the turbine under a head of 20 m.

6

PART-B

Q.5 a) Define cavitation. Why does it occur and what are its effects?

10

b) The outer diameter of an impeller of a centrifugal pump is 400mm and outer width is 50mm. The pump is running at 800 rpm and is working against a total head of 15m. The outlet vane angle is 40° set backwards and manometric efficiency is 75%. Determine:

1092/5

- i) Velocity of flow at the outlet.
 - ii) Absolute velocity of water at the outlet.
 - iii) Angle made by absolute velocity at the outlet.
 - iv) Discharge.
- 10**

- Q.6 a) Explain with neat sketch the constructional details and working principle of single acting reciprocation pump. **10**
- b) The length and diameter of a suction pipe of a single acting reciprocating pump are 5m and 10cm respectively. The pump has a plunger of diameter 15cm and stroke length of 35cm. The centre of the pump is 3m above the water surface in the pump. The atmospheric pressure head is 10.3m of water and speed is 35 rpm. Determine:
i) Pressure head due to acceleration at the beginning of suction stroke.
ii) Maximum pressure head due to acceleration. **10**
- Q.7 Explain in detail with neat sketch the following:
a) Hydraulic Lift. **10**
b) Hydraulic Ram. **10**

End Semester Examination, May 2019

B. Tech. — Fifth Semester
INDUSTRIAL ENGINEERING (M-501A / M-501B)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

- Q.1 a) Differentiate between ‘partial’ and ‘total productivity measures’.
 b) Distinguish between ‘fixed’ and ‘variable costs’.
 c) Explain the importance of “work study”.
 d) What do you understand by ‘inventory control’?
 e) Explain “total quality management”. **4×5**

PART-A

- Q.2 a) Give the process of method study and work measurement in detail. **12**
 b) Explain the process of work sampling and PMTS in detail. **8**
- Q.3 a) What do you understand by the term “cost”? How do you classify different types of cost? **10**
 b) Explain BEQ graphically and algebraically. **10**
- Q.4 a) Calculate economic batch quantity (EBQ) graphically and algebraically. **10**
 b) ABC corporation has got a demand of part A at the rate of 10,000 units per year. The cost per unit is ₹2, it costs ₹36 to place an order. Inventory carrying cost is 9%.
Determine:
 a) Economic order quantity (EOQ).
 b) Optimum number of orders. **5×2**

PART-B

- Q.5 a) What do you understand by the term ‘production system’? Explain various types of production systems used in industry. **10**
 b) Given below are jobs and the processing time in hrs. on machine M1 and M2:

Job	1	2	3	4	5
M1	5	1	9	3	10
M2	2	6	7	8	4

Calculate:

- i) The elapsed time after determining the optimum sequence of operation.
ii) The ideal time on machines. **5×2**

- Q.6 a) What are control chart? Explain different types of control charts and how they are used to control the quality of product. **10**
 b) Determine the control limits for \bar{X} and R charts if $\sum \bar{X} = 357.50$ and $\sum R = 9.90$. Number of subgroups = 20. It is given that $A_2 = 0.18$, $D_3 = 0.41$, $D_4 = 1.59$ and $d_2 = 3.735$. **10**

- Q.7 Write short notes on (**ANY FOUR**):
 a) Just in time (JIT).
 b) ISO 9000 quality system.
 c) Kaizen.
 d) Deming awards.
 e) TQM. **5×4**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

MANUFACTURING TECHNOLOGY-II (M-404A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) What do you understand by orthogonal and oblique cutting?
- b) What are the functions of chip control and breakers?
- c) State the purpose of coated tools.
- d) How do you define tool life?
- e) What is meant by Machinability index?
- f) Which are the various attachments on a lathe machine?
- g) What are different operations performed on a milling machine?
- h) What is known as the incorrect setting of turning tool and also show the correct setting?
- i) Briefly explain the twist drill?
- j) Which materials are commonly used for manufacturing broaches? **2×10**

PART-A

Q.2 a) In an orthogonal cutting if the feed is 1.25mm/rev. and chip thickness after cutting is 2mm, the tool bit has rake angle 10° , Shear strength = 6000kg/cm^2 , Width of cut = 10mm, Cutting speed = 20 m/min,
Coefficient of friction=0.9.Calculate the following:
 i) Shear force.
 ii) Friction angle,
 iii) Shear angle,
 iv) Cutting force,
 v) Power of the cutting tool **14**

b) Which are the heat affected zones in turning operations? Briefly explain them. **6**

Q.3 a) During a turning tool test the following data was generated for tool A and B having the same tool life exponent. Find the tool life exponent and the tool life of another Tool C having the same exponent at a cutting speed of 175 m/min.

Tool name	Cutting speed (m/min)	Tool life (min)
A	200	20
B	150	58

14

- b) What do you mean by cutting fluids? Which are the various types of cutting fluids used? **6**

Q.4 a) Derive an expression for optimum cutting speed and tool life in turning of cylindrical work piece for maximum production rate. **15**
 b) Explain the term "total cost of machining". **5**

PART-B

Q.5 a) Make a neat sketch of a milling machine and describe its constructional features. **10**
 b) Explain briefly the various lathe accessories and work holding devices. **10**

Q.6 a) Explain step turning, taper turning, eccentric turning and form turning with neat diagrams. **10**

b) A hollow work piece of 60 mm outside diameter and 150 mm length is held on a mandrel between centres and turned all over in 4 passes. If the approach length = 20 mm, over travel = 12 mm, average feed = 0.8 mm/rev., cutting speed = 30 m/min, calculate the estimated machining time. **10**

- Q.7 a) Calculate the machining time for drilling 4 holes of 16 mm diameter each on a flange from the following data. Flange thickness = 30 mm, cutting speed = 22 m/min, feed = 0.2 mm/rev. **10**
- b) Explain the working of broaching along with a neat diagram and explaining the broach geometry. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

HEAT TRANSFER (M-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

Q.1 Answer the following:

- a) What is the mechanism of conduction of heat in solids?
- b) What is thermal diffusivity?
- c) What is Newton's law of cooling?
- d) What is radiation shape factor?
- e) What do you mean by lumped capacity analysis?
- f) What is Nusselt number?
- g) What is critical radius of insulation?
- h) What is LMTD?
- i) Draw the temperature profile for a parallel flow heat exchanger.
- j) What is reflectivity?

2×10

PART-A

Q.2 a) Derive an expression for heat transfer rate under one dimensional steady state conduction through a hollow cylinder. **10**

b) The temperature on the faces of plane wall 15 cm. thick and 375°C and 85°C. The wall is constructed of special glass with the following properties:

$$K = 0.78 \text{ W/m}^{\circ}\text{C}, \rho = 2700 \text{ kg/m}^3, G = 0.84 \text{ KJ/Kg}^{\circ}\text{C}.$$

What is the heat flow through the wall at steady state condition? **10**

Q.3 a) Explain the following:

- i) Fin efficiency. **4**
- ii) Fin effectiveness. **4**
- iii) Fin parameter (m). **2**

b) A steel rod ($K = 50 \text{ W/m}^{\circ}\text{C}$) with rectangular cross section with breadth and thickness 5 mm and 2 mm respectively is attached to a plane wall which is maintained at a temperature of 250°C. The surrounding temperature is 35°C and heat transfer coefficient is $90 \text{ W/m}^2\text{C}$. Calculate the heat dissipated by the rod. **10**

Q.4 a) State the assumptions of lumped system analysis. Also, derive the expression:

$$\frac{T_i - T_{\infty}}{T - T_{\infty}} = e^{\left(\frac{hA}{\rho' C_p}\right)\tau}. \quad \text{10}$$

b) A steel ball [$C_p = 0.46 \text{ KJ/Kg}^{\circ}\text{C}, K = 35 \text{ W/m}^{\circ}\text{C}$] 5 cm, in diameter and initially at a uniform temperature of 450°C is suddenly placed in a controlled environment in which the temperature is maintained at 100°C. The convection heat transfer coefficient is 10 W/m²°C. Calculate the time required for the ball to attain a temperature of 150°C in hours. **10**

PART-B

Q.5 a) Derive energy equation for thermal boundary layer over a flat plate. **10**

b) Explain thermal boundary layer. How is thermal boundary layer different from hydrodynamic boundary layer? What is the significance of Prandtl No. with reference to boundary layer? **10**

- Q.6 a) Differentiate between black body and gray body. Also, state and explain Stefan-Boltzman law of radiation. **10**
- b) A vertical plate 60 cm high and 30 cm wide is maintained at a temperature of 95°C in a room where the air is 20°C and 1 atm. The walls of the room are also at 20°C . Assume that $\epsilon = 0.8$ for the plate. How much radiant heat is lost by the plate? **10**
- Q.7 a) Derive the expression for LMTD in case of parallel flow heat exchanger. **10**
- b) Water at the rate of 68 kg/min is heated from 35 to 75°C by an oil having a specific heat of 1.9 kJ/kg $^{\circ}\text{C}$. The fluids are used in a counter flow double pipe heat exchanger and the oil enters at 110°C and leaves at 75°C . The overall heat transfer coefficient, $U = 320\text{W/m}^2\text{C}$. Calculate the heat exchanger area. **10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

KINEMATICS OF MACHINES (M-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

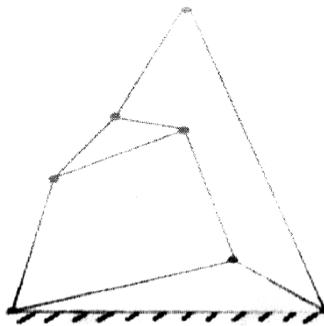
Q.1 Answer the following questions:

- a) Define mobility.
- b) What is higher pair?
- c) Define a link.
- d) What is pitch circle of a gear?
- e) What is interference?
- f) What is reverted gear train?
- g) Define a cam.
- h) Define virtual centre of rotation.
- i) Define function generation.
- j) Define synthesis of a mechanism.

2×10

PART-A

Q.2 a) Find degree of freedom of given linkage.



10

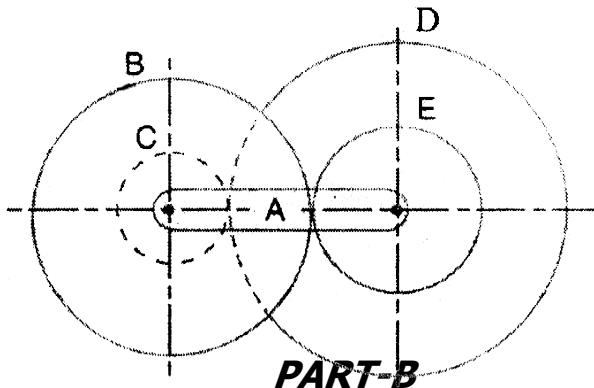
b) Sketch and explain watts indicator mechanism.

10

Q.3 Find the length of path of contact, arc of contact and the contact ratio. For given data, pinion: no. of teeth 30, pitch circle radius 180 mm, Radius of addendum circle 190 mm gear: no. of teeth 80, pitch circle radius 480 mm, Radius of addendum circle 490 mm module 10 mm and pressure angle 20°.

20

Q.4 In a reverted epicycle gear-train, the arm A carries two gears B and C and a compound gear D-E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise.



20

PART-B

- Q.5 Steps and scaled diagram of displacement, velocity and acceleration diagrams when the follower moves with simple harmonic motion. **20**
- Q.6 Classifications of synthesis problem and also define precision points for function generation. **20**
- Q.7 In a pin jointed four bar mechanism, dimension of links are as under, AB = 50 mm, BC = 66 mm, CD = 56 mm, and AD = 100 mm. The angle BAD = 60° . The link AB has an angular velocity 10.5 rad/s in the counter clockwise direction. Determine:
a) Velocity of point C
b) Angular velocity of link BC and CD. **20**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

KINEMATICS OF MACHINES (M-405A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

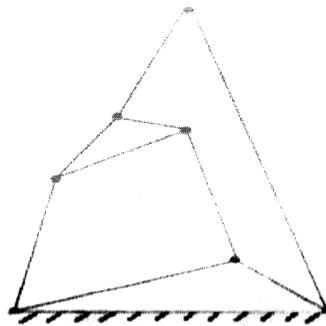
Q.1 Answer the following questions:

- a) Define mobility.
- b) What is higher pair?
- c) Define a link.
- d) What is pitch circle of a gear?
- e) What is interference?
- f) What is reverted gear train?
- g) Define a cam.
- h) Define virtual centre of rotation.
- i) Define function generation.
- j) Define synthesis of a mechanism.

2×10

PART-A

Q.2 a) Find degree of freedom of given linkage.



10

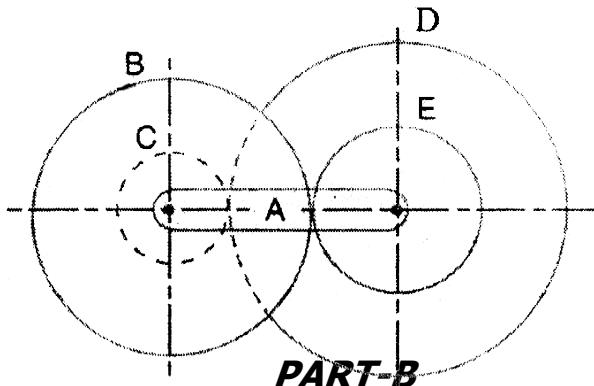
b) Sketch and explain watts indicator mechanism.

10

Q.3 Find the length of path of contact, arc of contact and the contact ratio. For given data, pinion: no. of teeth 30, pitch circle radius 180 mm, Radius of addendum circle 190 mm gear: no. of teeth 80, pitch circle radius 480 mm, Radius of addendum circle 490 mm module 10 mm and pressure angle 20°.

20

Q.4 In a reverted epicycle gear-train, the arm A carries two gears B and C and a compound gear D-E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise.



20

PART-B

- Q.5 Steps and scaled diagram of displacement, velocity and acceleration diagrams when the follower moves with simple harmonic motion. **20**
- Q.6 Classifications of synthesis problem and also define precision points for function generation. **20**
- Q.7 In a pin jointed four bar mechanism, dimension of links are as under, AB = 50 mm, BC = 66 mm, CD = 56 mm, and AD = 100 mm. The angle BAD = 60° . The link AB has an angular velocity 10.5 rad/s in the counter clockwise direction. Determine:
a) Velocity of point C
b) Angular velocity of link BC and CD. **20**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

VEHICLE BODY ENGINEERING (MII-605)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define Active safety features in a car.
- b) What is the effect of panoramic windshield?
- c) Define oil method in Flow Visualization techniques.
- d) What are the characteristics of touring coaches?
- e) Define active safety features in a car.
- f) What is Yawing?
- g) Define monocoque bus body.
- h) Classify Bus bodies based on the capacity of the vehicle.
- i) Define commercial vehicle.
- j) Classify truck based upon the maximum load carrying capacity of the truck. **2x10**

PART-A

Q.2 a) Write about the following terms related to card body:

- i) Centre pillar ii) Centre console iii) Nerf Bar
 - iv) A glove compartment. v) Back Fender. **10**
- b) What are various methods to improve visibility? **10**

Q.3 a) Write down Evaporating suspension in Flow Visualization techniques. **5**

b) What are the various forces and moments acting on a vehicle? **15**

Q.4 a) Discuss the various types of metals sections used in bus manufacturing. **5**

b) Explain the following:
i) Mini bus ii) Town bus iii) Suburban bus
iv) Long distance coaches v) Touring coaches. **15**

PART-B

Q.5 Differentiate between conventional and integral type frame manufacturing. **20**

Q.6 a) Write down the design consideration of driver's cab design. **5**

b) Explain construction of commercial vehicle body. **15**

Q.7 a) Write down various factors which govern the selection of a tractor. **5**

b) Write down the classification of the tractors. **15**

End Semester Examination, May 2019
B. Tech. (ME-Industry Integrated) — Sixth Semester
DIE DESIGN (MII-606)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is meant by locking force in injection modeling?
- b) What is the function of return pins in injection mold?
- c) What is the reason of weld line defect in injection molding?
- d) Name two parts made by Compression molding.
- e) Name four parts made by forging.
- f) Why is closed die forging followed by trimming operation?
- g) Why are forged parts stronger than machined parts?
- h) What is the function of sprue spreader in HPDC?
- i) What are the reasons of flash in HPDC castings?
- j) Name two parts made by roll forming.

2x10

PART-A

- Q.2 Explain the different parts of a Injection Mould with a neat diagram. Explain the injection mechanism also. **20**
- Q.3 a) Explain the compression molding cycle with diagram. **10**
b) Explain the different parts of a Compression Mold. **10**
- Q.4 a) Explain the working of a Induction heating in Forged parts briefly. **10**
b) Explain the working of a Belt hammer in Forging. **10**

PART-B

- Q.5 Draw the diagram of a Cold Chamber HPDC Die and explain its working. **20**
- Q.6 a) Explain the working of a coining operation. **10**
b) Explain the working of upset forging. **10**
- Q.7 Explain the working of a roll forming machine with diagram. **20**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

HEATING, VENTILATION AND AIR CONDITIONING (M-724)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is the use of Psychometric chart?
- b) Write two differences between split AC and VRV system.
- c) Why supply air duct insulation thickness is more than return air duct insulation thickness?
- d) What is requirement of air filters in central HVAC system?
- e) Why strip heaters are used in central HVAC system?

4×5

PART-A

Q.2 a) What are different components taken during heat load estimation? Describe utility of each component during heat load estimation. **10**

- b) Describe with a suitable sectional diagram of a corridor showing Condenser and Chilled water piping with insulation as per requirement, supply and return duct with insulation specifying thickness, cable tray, clear false ceiling height and clearance spaces between each component above false ceiling. **10**

Q.3 a) Describe with suitable diagram water cooled vapour compression system along with cooling tower and required pipe connections of cooling tower with vapour compression system. **10**

- b) Write down stepwise how the pump head of a chilled water system is calculated along with the safety factor to be taken? **10**

Q.4 a) Describe with a suitable diagram the fire damper within AHU Room describing how the fire damper operates during fire in AHU Room? **10**

- b) Describe a volume control damper within AHU Room and grilles and diffusers in air conditioned room with proper diagram. **10**

PART-B

Q.5 a) Draw AHU within AHU Room showing its location in mm and justify with reasoning the dimensioning of each location. **10**

- b) Describe with suitable diagram the HVAC System of operation theatre room within the hospital. **10**

Q.6 Describe with suitable diagram a central heating system showing two nos. of boilers, two nos. of chilling machine, two numbers of necessary pumps and valve arrangement with all the necessary pipe lines along with a three floor building consisting of AHUs and FCUs. Also describe interlocking of valves arrangements in boilers and chilling machine during summer and winter. **20**

Q.7 a) Draw a vertical shaft layout showing chilled water and condenser water pipes with insulation where necessary, supply and return air duct with required insulation, fire fighting pipes etc in a vertical shaft. Also explain why vertical shafts are used in a multi floor building? **10**

- b) Write short notes:

- i) Utility of plant room.

ii) Necessity of Insulation requirement in ducting and piping.

5×2

End Semester Examination, May 2019

B. Tech. – Eighth Semester

POWER PLANT ENGINEERING (M-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) What are secondary sources of energy?
b) How non-conventional energy sources can be classified in brief?
c) Classify hydro-electric plants.
d) What is basic nuclear reaction?
e) What is PFBC system?
f) Define BWR type nuclear reactor.
g) Explain Brayton cycle.
h) Where the air-cooled (in place of water-cooled) condenser used in power plants?
i) Explain plant load factor.
j) Define the concept of De-aeration. **2×10**

PART-A

- Q.2 a) A hydroelectric station is to be designed for a catchment area of 200 sq.km, run off 75% and the average rain as 135 cm. the head available is 410 m. What power in MW can be developed if the overall efficiency of the plant is 85%. **14**
b) Describe about the catchment areas and dams used for such plants. **6**
- Q.3 a) What are the main steps involved in the design of a steam power station/plant? **15**
b) What are the functions of magnets in coal handling plant? **5**
- Q.4 a) Explain in detail the setup and working principle of coal handling plant in thermal power station. **12**
b) Why are the economizer and air-preheated installed in sequence on the hot flue gas side? **8**

PART-B

- Q.5 a) Explain in detail the parameters affecting the thermodynamic efficiency of combined cycle power plant. **12**
b) What are combination cycles and why have these been developed? **8**
- Q.6 What is a nuclear reactor? Explain in detail the basic nuclear reactor with a neat sketch, principles of nuclear energy and working of a nuclear power plant. **20**
- Q.7 Explain in brief:
a) Demand factor.
b) Cost of electrical energy.
c) Operating characteristics of water supply system in power plant.
d) Heat rate. **5×4**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

SOLAR ENERGY AND ITS APPLICATIONS (M-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) What do you understand by 'scattered radiation'?
b) Why solar radiations are treated as mono directional radiations?
c) Define 'zenith angle'.
d) Define 'transfer efficiency coefficient'.
e) Explain air – mass ratio.
f) Differentiate between 'focusing and non – concentrating types of solar collectors'.
g) What properties should the materials used for manufacturing flat plate collectors possess?
h) Why is the storage of solar energy essential?
i) Define 'energy efficiency'.
j) Name a few applications of solar energy. **2x10**

PART-A

- Q.2 a) Calculate declination angle (δ) for December 15. **10**
b) Calculate zenith angle, solar azimuth angle for a place with latitude of 43° at 9:00 AM solar time on February 11. **10**
- Q.3 a) Explain different types of solar collectors classified on the basis of orientation with the sun. **14**
b) Differentiate between 'peak flux' and 'average flux'. **6**
- Q.4 a) Name and explain various terms in L/D equation. Give significance of each term. **8**
b) Explain difference between flat plate solar collectors using water as heat transfer medium and air as heat transfer medium. **12**

PART-B

- Q.5 a) Explain different types of collector configurations with the help of diagrams. **10**
b) Describe in detail the non-convective salt gradient solar pond with the help of a neat sketch. **10**
- Q.6 a) Discuss the process of sensible heat storage in water in detail. **10**
b) Discuss latent heat storage. Mention materials used. **10**
- Q.7 a) Describe community heating and cooling system using solar cookers in detail. **10**
b) Explain solar gas absorption refrigeration scheme in detail. **10**

End Semester Examination, May 2019

B. Tech. (Industry Integrated) – Sixth Semester

PRESS TOOLS – I (MII-601)

Time: 3 hrs

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all. **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

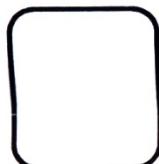
- Q.1 a) What is mean by microinching function in press?
b) What is meant by press tonnage?
c) How do you calculate the stripping force in blanking?
d) What is meant by crown in presses?
e) What is meant by angular clearance in Dies?
f) Why is the function of a spring guiding pin?
g) Why is the side thrust created in punches?
h) What is the role of pilot punches?
i) What is the role of fixed stoppers in Press Tools?
j) What is the function of back gauges in Press Brake?

2x10

PART-A

- Q.2 a) Explain the different parts of a Mechanical Press. **10**
b) Explain how does the power move from motor to flywheel in press? **10**

- Q.3 a) Design a Blanking Die for the following part:



Size - 120 x 150

Thickness = 1.2 mm

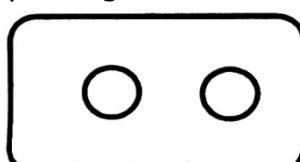
Material Steel

10

- b) What is the strip width and advance in the above figure? **10**

- Q.4 a) What is the function of a stripper in Dies? How much force does a stripper provide? **10**

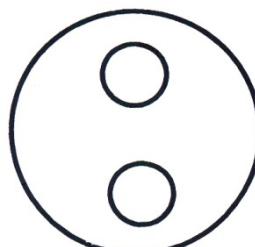
- b) Make the sketch of a piercing tool for the following part:



10

PART-B

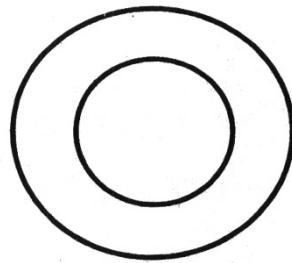
- Q.5 a) What is progressive tool? Describe advantages of it? **5**
b) Draw a progressive tool for the following part.



15

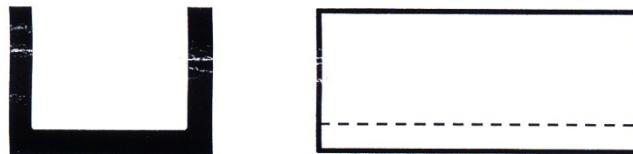
- Q.6 a) What are the differences between a progressive tool and compound tool? **5**

b) Draw a Compound tool for the following part:



15

Q.7 Draw the design of U-Bending tool for the following part:



20

End Semester Examination, May 2019

B. Tech. – Sixth Semester

ENERGY MANAGEMENT (M-625)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Differentiate between renewable energy and non-renewable energy.
- b) Define the natural resources and minerals.
- c) Define the Power Factor.
- d) Define energy audit.
- e) Define Co-generation.
- f) What is the fossil energy?
- g) What is compressor's automation by pressure settings?
- h) What do you mean by Superheated steam?
- i) Distinguish contact demand and billing demand.
- j) Define the "instrument" and "Lux level" used in lighting audit.

2x10

PART-A

- Q.2** a) Define the preliminary energy audit and detailed energy audit with example. **7**
b) What are the similarities and dissimilarities of heat and work? **6**
c) Define the water tube boiler, fire tube boiler and evaporation rate. **7**
- Q.3** a) i) What is the gross calorific value and net calorific value?
ii) Define the potable instrument and online instrument.
iii) Define specific heat and heat capacity.
iv) What is meant by flash steam utilization?
v) Define the saturation temperature. **2x5**
b) What are the functions of steam traps? Describe three types of steam traps used in the steam distribution systems in industry. **10**
- Q.4** a) What are the technical steps involved in available two methods for assessing the boiler efficiency? **10**
b) What are the classifications of energy conservation measures in industry? Explain technically. **10**

PART-B

- Q.5** a) Define the ways for power factor improvement and its benefit. What are the tariff structure components? **10**
b) Explain all the categories of energy savings opportunities in compressed air system. What is the "Receiver"? **10**
- Q.6** a) Describe the energy saving opportunities in the lighting system. **10**
b) Describe the factors that affect the energy saving in motors. **10**
- Q.7** a) Define the basic terms used in Lighting System and Features. **8**
b) What is Enthalpy? Define the "steam quality" and "pressure reduction valve". Define the cogeneration and bottoming cycle. **7**
c) Describe the methodology of Lighting System energy audit study. **5**

End Semester Examination, May 2019

B. Tech. – Fourth / Sixth Semester

HEAT TRANSFER (M-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

Q.1 Answer the following questions:

- Discuss Fourier's law of conduction heat transfer in brief.
- What do you understand by critical thickness of insulation? Write the expression for critical thickness in case of cylinder.
- What are the assumptions of "lumped system analysis"?
- Define the term thermal conductivity. Why is it important in heat transfer?
- Discuss the mechanism of heat conduction in gases.
- Differentiate between natural and forced convection with the help of an example.
- What do you understand by the term shape factor? Discuss its importance.
- Explain Stefan-Boltzmann law briefly?
- What do you understand by thermal boundary layer?
- What are the characteristics of a black body?

PART-A

Q.2 a) Derive an expression for steady state heat transfer rate through radial conduction for a hollow cylinder. **15**

- b) A rod of 25 cm diameter and 100 cm length is maintained at 175°C at one end and 40°C at the other end. These temperature conditions are attained when there is heat flow rate of 40 watts. If cylindrical surface of the rod is completely insulated, determine the thermal conductivity of the rod material. **5**

Q.3 a) Derive the expression for heat transfer rate through an infinitely long rectangular fin under steady state conditions. **14**

- b) Discuss the advantages of fins in heat transfer and give any two practical applications of fins. **6**

Q.4 What do you understand by lumped system analysis? Derive the expression.

$$\frac{T_i - T_\infty}{T - T_\infty} = e^{\frac{hAt}{\rho V C_p}}$$

20

PART-B

Q.5 a) What is the mechanism of heat transfer through natural convection? **10**

- b) Explain the following:
- Nusselt Number
 - Prandtl Number
- 5×2**

Q.6 Explain the following:

- Characteristics of black body, emissivity and Emissive power
 - Absorptivity, Transmissivity and Reflectivity
- 10×2**

Q.7 a) Define the term LMTD. What is the significance of LMTD? **5**

- b) Derive an expression for logarithmic mean temperature difference (LMTD) for parallel flow heat exchanger. **15**

End Semester Examination, May 2019

B. Tech. – Sixth Semester
AUTOMATION (MII-604)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What are the basic elements of Automation?
- b) Define Production capacity.
- c) What is takt time?
- d) What do you understand by WIP?
- e) What are the objectives of automated flow lines?
- f) Define CAM transfer mechanism.
- g) What is the function of Orientor?
- h) What is limit switch?
- i) State the various points at which inspection can be done.
- j) Name various CMM machine used in automated inspection?

2x10

PART-A

- Q.2** a) What do you understand by margin of safety? **5**
b) Explain Break Even Analysis and how it is estimated. **15**
- Q.3** Explain various transfer Mechanism. **20**
- Q.4** a) Discuss selector and orientor in part feeding devices. **5**
b) What are the various type of automated assembly system? **15**

PART-B

- Q.5** a) Define sensor and its application in automated lines. **5**
b) Explain three major areas for statistical Methods for Quality Control and improvement. **15**
- Q.6** a) Discuss about CMM probes and types of probes. **5**
b) Explain CMM and its components. What are the advantage and application of CMM? **15**
- Q.7** a) Write a short note on "Human Workers in automated factory". **5**
b) What are the various types of material handling equipments used in man production? **15**

End Semester Examination, May 2019

B. Tech – Seventh / Eighth Semester

SOLAR ENERGY AND ITS APPLICATIONS (M-626)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Define the “term solar constant”.
b) Give relationship of Zenith distance with time w.r.t. latitude.
c) What is meant by equinox?
d) Name different modes of heat transfer.
e) Define Reynold’s number.
f) What do you understand by U-factor?
g) Define ETIR.
h) What factors does optimum capacity of energy storage system depend on?
i) Discuss advantages and limitations of community heating/cooling system.
j) Discuss two stages evaporative cooling. **2x10**

PART-A

- Q.2 a) Explain construction, working and limitations of instruments used for measurement of total solar radiation. **10**
b) What is spectrum? Differentiate between terrestrial and extra-terrestrial spectrum of solar radiation. **10**
- Q.3 a) Draw characteristics of a fully tracking collector. **5**
b) Calculate the angle made by beam radiation with the normal to a flat plate collector, pointing to south location in Delhi ($28^{\circ}38'N, 77^{\circ}17'E$) at 0900 hours solar time on 1st December. Also calculate day length if the collector is fitted at an angle of 36° with the horizontal. **15**
- Q.4 a) Derive basic equation for L/D ratio for solar collector using liquid as heat transfer fluid. **10**
b) Derive the ratio of power generated by the collector to power expended in pumping the heat transfer fluid through collector pipe. **10**

PART-B

- Q.5 a) Explain the difference between liquid heating and air heating flat plate collectors. **10**
b) Explain difference between connective and non-connective solar ponds. Also give applications of solar ponds. **10**
- Q.6 a) Classify different types of solar energy storage. **10**
b) Discuss in detail the process of sensible heat storage in water. **10**
- Q.7 a) Describe in detail combined solar heating and cooling system with help of a neat sketch. **10**
b) Explain solar gas absorption refrigeration. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

PRODUCTION AND OPERATION MANAGEMENT (M-633)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Marks are indicated against each question.

Q.1 Answer the following:

- a) Explain operation management in brief.
- b) Briefly explain the term value engineering.
- c) Briefly explain 'Bill of Materials'.
- d) Briefly explain the significance of control phase in production planning.
- e) Distinguish between strategic and practical decisions.
- f) What are strategic decisions in business environment?
- g) Briefly explain the importance of lead time.
- h) Explain total stocking cost.
- i) Explain briefly the significance of control charts.
- j) What are major maintenance systems? **2×10**

PART-A

- Q.2 a) Explain the process of product design. **12**
- b) Explain the different ergonomic considerations while designing the product. **8**
- Q.3 a) Explain the importance of production planning with objectives. **10**
- b) Discuss the role and importance of MRP and MRPII. **10**
- Q.4 a) Discuss the different phases of production planning and control. **10**
- b) Explain the various types of scheduling techniques and also its importance. **10**

PART-B

- Q.5 a) A company makes 450 motors a month. It buys spindle at the cost of Rs. 20/- per piece. The inventory carrying cost is 15% of cost and ordering cost is Rs. 50/- per order. Calculate:
 - i) EOQ
 - ii) No. of orders per year.
 - iii) Average annual ordering cost.
 - iv) Average inventory.
 - v) Average annual carrying cost
 - vi) Total cost.**12**
- b) Explain the importance of inventory control. **8**
- Q.6 a) Explain the significance of control charts in quality control. Also explain various types of control charts and their usage. **10**
- b) Elaborate the three primary technical tools used for quality control and its improvements. **10**
- Q.7 a) Explain the various planned maintenance strategies in debits. **10**
- b) Describe various elements of total productive maintenance and its key features. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

MECHATRONICS (M-634)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) State the major features of a mechatronics system with the help of a typical example.
 b) What is a transducer? State one with an example.
 c) What is steady state error of control system?
 d) Classify the types of sensors.
 e) What is closed and open loop control system?
 f) Classify the addressing modes of 8085.
 g) What is meant by conversion time?
 h) What is quantization levels and its error during analog to digital conversion?
 i) What are operational amplifiers?
 j) Define 'passive and active electronics element'. **2x10**

PART-A

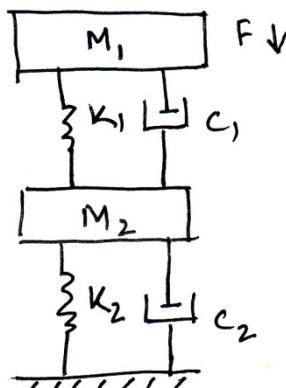
- Q.2 a) What is the use of a logic gate? A locker has been rented in the bank. Express the process of opening the locker in terms of digital operations. **5**
 b) Explain the working of JK flip flop in detail. **10**
 c) i) Convert 11101001 from binary to base 10.
 ii) Convert 100100111 from binary to octal. **5**

- Q.3 a) Explain the following with their applications in industries.
 i) Strain gauge elements ii) Bimetallic strips. **10**
 b) What are pneumatic systems and explain its applications? **5**
 c) Diaphragm actuator to be used to open a control valve if a force of 500N must be applied to the valve. What diaphragm area is required for a control gauge pressure of 100 kPa? **5**

- Q.4 a) Explain the microprocessor system briefly. **5**
 b) Explain types of buses used for digital signals. **5**
 c) Discuss architecture of 8085 microprocessor. **10**

PART-B

- Q.5 a) Explain the building block equation of a rotational system. **10**
 b) Explain the governing equations of the following mechanical systems used in vehicle suspensions shown in the figure.



10

- Q.6** a) Explain DA convertor. **4**
 b) What is meant by filtering of frequencies? **4**
 c) Explain the following terms:
 i) Digital signal processing.
 ii) Data acquisition systems.
 iii) Testing and calibration. **4x3**

- Q.7** a) Explain the design process for a system. **8**
 b) Write short notes on:
 i) Wind screen wiper motion.
 ii) Pick and place robot.
 iii) Radiator water level indicator. **4x3**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

OPERATIONS RESEARCH (M-601A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Define OR. Write three characteristics of operations research.
 b) What is infeasibility in LPP?
 c) What are the decision making environments?
 d) Where do you use artificial variable and why?
 e) When will you call a solution to be initial basic feasible solution in a transportation problem?
 f) Give examples of finite and infinite queue length.
 g) Define:
 i) Event
 ii) Activity
 iii) Looping on an network diagram
 h) What are the limitations of simulation?
 i) What is a critical path? How is it useful?
 j) Though service rate is assumed to be more than arrival rate, still the queue is formed. Why?

2×10

PART-A

- Q.2 a) Explain the various method by which decision can be taken under conditions of risk? **6**
 b) The following matrix gives the pay off of different strategies S_1, S_2, S_3 against the states of nature N_1, N_2, N_3, N_4

	N_1	N_2	N_3	N_4
S_1	4000	-100	6000	18000
S_2	20000	5000	400	0
S_3	20000	15000	-2000	1000

Indicate the decision under following approach:

- i) Pessimistic.
- ii) Optimistic.
- iii) Regret.
- iv) Equal probability.

14

- Q.3 a) Explain the following w.r.t. LPP:
 i) Entering variable.
 ii) Leaving variable.
 iii) Slack variable.
 iv) Artificial variable.

2×4

- b) Solve the following problem by simplex:

$$\text{Min } Z = 12x_1 + 2x_2$$

$$\text{Subject to: } 6x_1 + 8x_2 \geq 100$$

$$7x_1 + 12x_2 \geq 120$$

$$x_1, x_2 \geq 0$$

12

Q.4 a) State the common and distinguishing features of assignment and transportation problem. 8

b) Solve the following assignment problem:

	1	2	3	4	5
A	20	22	35	22	18
B	4	26	24	24	7
C	23	14	17	19	19
D	17	15	16	18	15
E	16	19	21	19	25

12

PART-B

Q.5 a) Explain the following with respect to waiting line models:

- i) Arrival pattern.
- ii) Service discipline.
- iii) Service channel.
- iv) Service distribution.

2x4

b) A tool room clerk takes on an average 5 minutes in checking parts of machine. The machine arrives once in 8 minutes on an average. Determine:

- i) The time server is not busy.
- ii) Average waiting time in system.
- iii) Average waiting time in queue.

12

Q.6 a) Explain the Fulkerson's rule with an example. 6

b) For the following data determine total, free and independent float:

Activity	Duration	Activity	Duration
1-2	4	5-8	9
2-4	36	6-7	9
2-3	2	7-8	9
3-5	15	7-9	8
3-8	10	8-9	20
4-8	2	9-10	20
5-6	4		

14

Q.7 a) What is the need for simulation? Explain the application and methodology of simulation. 8

b) A bakery keeps popular brand of bread. The daily demand based on past experience is given below:

Demand	0	20	40	60	70	80
Prob	0.01	0.15	0.25	0.5	0.12	0.02

- i) Simulate the demand for next 10 days
- ii) The owner keeps 60 breads everyday find the stock situation.
Use following random nos.

61, 22, 47, 62, 82, 52, 18, 63, 14, 32

12

End Semester Examination, May 2019

B. Tech. – Second Semester

APPLIED MECHANICS (M-201)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

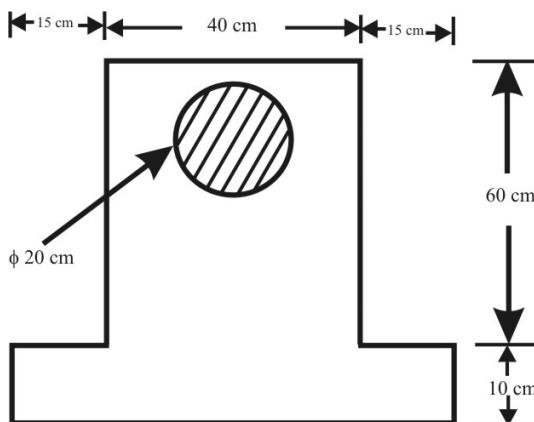
Q.1 Answer the following:

- a) Write the statement for "Transmissibility law".
- b) What is varignon's principle of moments?
- c) Explain the "perpendicular axis theorem".
- d) Derive J_{xx} of a circle with diameter 'd'.
- e) Write down the steps being followed for solving a truss using method of section.
- f) Differentiate between redundant and deficient trusses.
- g) A stone is thrown vertically upwards with a velocity of 40m/s. find its position after 5 seconds.
- h) Obtain an equation between the linear acceleration and angular acceleration of a rotating body.
- i) Describe the phenomenon of combined motion of rotation and translation. Give few examples.
- j) Explain the concept of virtual work.

2x10

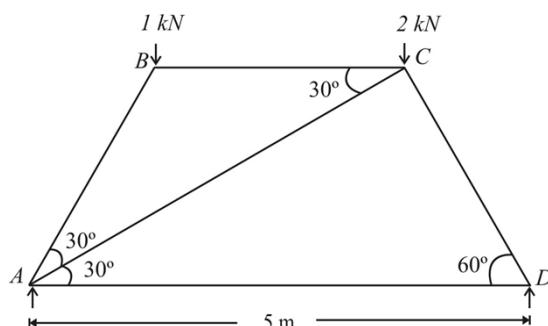
PART-A

- Q.2**
- a) State and prove Varignon theorem. **8**
 - b) The forces 20 N, 30 N, 40 N, 50 N and 60 N are acting at one of the angular points of a regular hexagon, towards the other five angular points, taken in order. Find the magnitude and direction of the resultant force. **12**
- Q.3**
- a) Explain the method of finding out the moment of inertia of a composite section. **6**
 - b) Find the moment of inertia of the given section about centroidal X and Y axis.



14

- Q.4**
- a) The figure shows a framed structure of 5 m span. Find the forces in the members of the structure and also the nature of force.



15

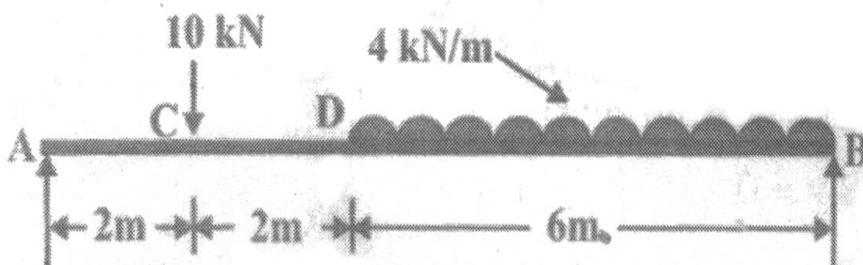
PART-B

- Q.5 a) X and Y are sitting in cars A and B respectively, 300 m apart and are at rest. X starts his car and moves towards B with an acceleration of 0.5 m/sec^2 . After 3 seconds, Y starts his car towards A with an acceleration of 1 m/sec^2 . Calculate the time and point at which two cars meet with respect to A . **10**

- b) A stone is projected from point A with a velocity of 50 m/s at an angle 30° from the horizontal. At the same time another stone is projected in opposite direction with 40 m/s from a point 120 m from A on the same level. Calculate angle of projection of second stone if the two stones collide. **10**

- Q.6 a) A train is moving along a track whose gradient is 1 in 100. The weight of the train is 6000 kN . To avoid an accident, the train is brought to rest applying brakes in 250 m length along the track. The resistance due to friction and air motion is 15 N per kN weight of the train. Find the work done in bringing the train to rest. **15**
- b) Explain general plane motion with suitable diagrams. **5**

- Q.7 a) A simply supported beam AB of span 10 m is loaded as shown in the figure. Calculate the reactions R_A and R_B by the method of virtual work.

**10**

- b) A ball of mass 250 g is moving with a velocity of 15 m/sec and is hit by a bat so that the ball is turned back with a velocity of 25 m/sec . The duration of contact between the ball and bat is 0.02 sec . Find the impulse and the average force exerted on the ball by the bat. **10**

End Semester Examination, May 2019

B. Tech. – Eighth Semester

REFRIGERATION AND AIR-CONDITIONING (M-821)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part A** and **TWO** questions from **Part B**. Each question carries equal marks.

- Q.1 a) Write the designation of the following refrigerants:

CCl_2F , $C_2Cl_3F_3$, CO_2 , H_2O .

- b) Draw Carnot cycle on P-V and T-S diagrams.
 c) Define specific humidity and relative humidity.
 d) What do you understand by refrigeration?
 e) Define sensible cooling and humidification.

4×5

PART-A

- Q.2 a) Derive an expression for C.O.P. of Bel-Coleman cycle. **10**
 b) Explain the desirable properties of refrigerants in detail. **10**

- Q.3 A bootstrap cooling system of 9 tonnes refrigeration capacity is employed in an aeroplane. The ambient air temperature and pressure are $20^\circ C$ and 0.86 bar, respectively. The pressure of air increases to 1 bar due to ramming action of air. The pressure of air discharged from main compressor is 3.2 bar. The discharge pressure of air from auxiliary compressor is 4.2 bar. The isentropic efficiency of each compressor is 82%, while that of turbine is 86%. 45 percent of the enthalpy at air discharged from the main compressor is removed in the first heat exchanger and 32% of the enthalpy of air discharged from auxiliary compressor is removed in the second heat exchanger using rammed air. Assuming ramming action to be isentropic, the required cabin pressure of 0.92 bar and temperature of air leaving the cabin is $21^\circ C$, find:

- a) Power required to operate the system.
 b) C.O.P. of the system.

10×2

- Q.4 a) Briefly explain the working of an ideal vapour absorption system. **10**
 b) Describe the working of a steam jet refrigeration system with a neat sketch. **10**

PART-B

- Q.5 a) Explain the difference between summer air conditioning and winter air conditioning. **10**
 b) Derive an expression for relative humidity and enthalpy of the moist air. **10**

- Q.6 The following data relate to a conference room for seating 80 persons:

Inside condition = $22^\circ C$ DBT, 55% RH.

Outside condition = $38^\circ C$ DBT, 28% WBT.

Sensible and latent heat loads per person = 75W and 45W.

Light and fans load = 12000W.

Sensible heat gain through glass, wall, ceiling etc. = 12000W.

Air infiltration = 18 m³/min.

Fresh air supply = 80 m³/min.

By-pass factor of the coils = 0.1.

If two-third of recirculated room air and one third of fresh air are mixed before entering the cooling coils, determine:

- a) ADP.
 b) Grant total heat load.

c) Effective room sensible heat factor.

20

Q.7 Briefly explain (**any four**) of the following:

- a) Thermostatic expansion valve.
- b) Dry expansion evaporator.
- c) Semi-sealed type compressor.
- d) Shell and tube condenser.
- e) Shell and coil condenser.
- f) Capillary tube.

5×4

End Semester Examination, May 2019

B. Tech (Mechanical) – Sixth Semester

MACHINE DESIGN-II (M-607)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

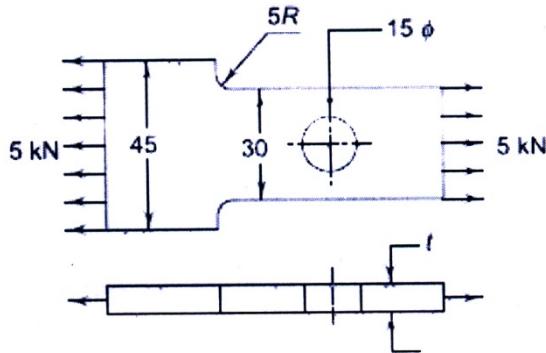
Q.1 Answer the following questions:

- a) Explain mean stress and amplitude stress.
- b) What is the Gerber curve?
- c) Explain torsional rigidity in shaft.
- d) What are the applications of multi-leaf spring?
- e) Define active and inactive coils in spring.
- f) Define static load carrying capacity of ball bearing.
- g) Define rating life of bearing.
- h) Explain wear strength of gear.
- i) Define "Ergonomics".
- j) Define 'Value Engineering'.

2×10

PART-A

Q.2 a) A flat plate subjected to a tensile force of 5 kN is shown in figure. The plate material is grey cast iron FG 200 and the factor of safety is 2.5. Determine the thickness of the plate.



12

- b) What are the factors that affect endurance limit of a machine part? **8**

Q.3 a) A solid circular shaft is subjected to a bending moment of 3000 N-m and a torque of 10,000 N-m. The shaft is made of 45C8 steel having ultimate tensile stress of 700 MPa and an ultimate shear stress of 500 MPa. Assuming a factor of safety as 6, determine the diameter of the shaft using:

- i) Maximum shear stress theory.
- ii) Maximum normal stress theory.

14

- b) What are the advantages of hollow shaft over solid shaft? **6**

Q.4 a) A helical compression spring is required to deflect through approximately 25 mm when the external force acting on it varies from 500 N to 1000 N. The spring index is 8. The spring has square and ground ends. There should be a gap of 2 mm between adjacent coils when the spring is subjected to maximum force of 1000 N. The spring is made of cold drawn steel wire with ultimate tensile strength of 1000 N/mm² and permissible shear stress in the spring wire is 50 % of the ultimate tensile strength ($G = 81370 \text{ N/mm}^2$). Design the spring and calculate:

- i) Wire diameter. ii) Mean coil diameter.
- iii) Number of active coils. iv) Total number of coils.

1124/5

- v) Solid length. vi) Free length.
 vii) Required spring rate. viii) Actual spring rate. 16
 b) Define graduated-length and full-length leaves in semi-elliptic leaf spring with diagram. 4

PART-B

- Q.5 a) A ball bearing operates on the following work cycle:

Element No.	Radial load (N)	Speed (rpm)	Element time (%)
1	3000	720	30
2	7000	1440	50
3	5000	900	20

The dynamic load capacity of the bearing is 16.6 kN. Calculate

- i) the average speed of rotation;
 ii) the equivalent radial load; and
 iii) the bearing life.

3×5

- b) State causes of bearing failure and its remedies. 5

- Q.6 A pair of spur gears consists of a 24 teeth pinion, rotating at 1000 rpm and transmitting power to a 48 teeth gear. The module is 6 mm, while the face width is 60 mm. Both gears are made of steel with an ultimate tensile strength of 450 N/mm². They are heat treated to a surface hardness of 250 BHN. Assume that velocity factor accounts for the dynamic load. Calculate:

- a) Beam strength.
 b) Wear strength.
 c) The rated power that the gears can transmit, if service factor and the factor of safety are 1.5 and 2, respectively. 20

- Q.7 a) Discuss the role of processing in engineering design. Explain the design considerations for machining. 10
 b) Explain Ergonomic considerations in design. 10

End Semester Examination, May 2019

B. Tech. — Second Semester

ELEMENTS OF MECHANICAL ENGINEERING (M-101C)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

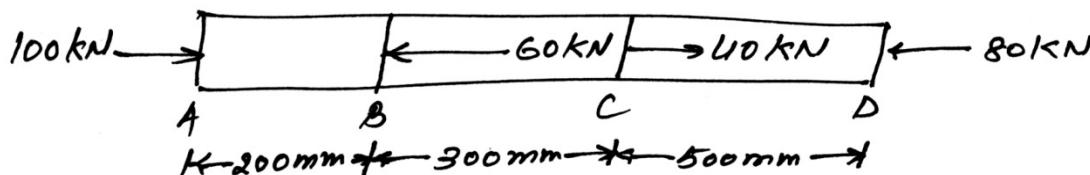
- Q.1 a) Define mechanical, chemical, thermal and thermodynamic equilibrium respectively.
b) Define 'refrigeration'.
c) Differentiate between 'spur gear' and 'helical gear'.
d) Define 'compression ratio'.
e) Define 'angle of contact in belt'.
f) Write down the classification of plain carbon steel.
g) Define 'poisson's ratio'.
h) Define 'mechanical advantages'.
i) What is Hook's law?
j) Define 'strength and hardness'. **2×10**

PART-A

- Q.2 a) Define 'first law of thermodynamics' for a cyclic process. **10**
b) A heat engine produces work equivalent to 80 KW with an efficiency of 40%. Determine heat transfer rate to and from working fluid. **10**
- Q.3 a) Derive an expression for the length of belt for cross-belt system. **10**
b) Explain the gear terminology with the help of suitable diagrams. **10**
- Q.4 a) Explain the working of 4-stroke petrol engine in detail with the help of sketches. **12**
b) Write down the various applications of refrigeration. **8**

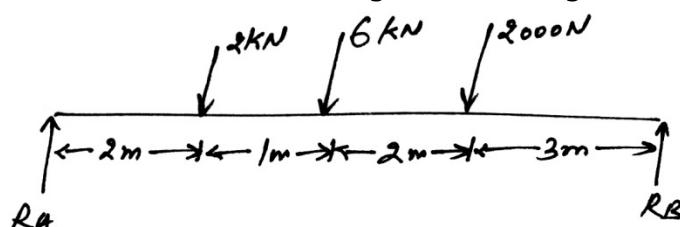
PART-B

- Q.5 a) Draw the stress-strain diagram and explain it. **10**
b) A member ABCD of uniform diameter 200 mm has been subjected to point loads as shown in the figure given below. Determine the net change in the length of the bar. Take modulus of elasticity of the bar material as $E = 200\text{GN/m}^2$.



10

- Q.6 Draw the shear force and bending moment diagram for the following system:



20

- Q.7 a) Explain the classification of engineering materials in detail.

1126/5

b) Explain arc welding process in detail with diagram.

10×2

End Semester Examination, May 2019

B. Tech. – Third Semester

STRENGTH OF MATERIAL (M-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Define (any ten) of the following:

- a) Describe Hooke's Law with a graph.
- b) Differentiate between rigid and deformable bodies.
- c) List the important methods used to find slope and deflection.
- d) Where does the maximum deflection occur in cantilever beam?
- e) Define torsional rigidity of the solid circular shaft.
- f) Quote the expressions for polar modulus of solid and hollow circular shaft.
- g) Tensile load = 30 kN; length = 1m; width = 25 mm; thickness = 20 mm. calculate the stored stain energy. Take E = 200 GPa.
- h) Define modulus of resilience.
- i) Define circumferential stress.
- j) Discuss about wire wound thin cylinder.
- K) Classify springs with example.

2×10

PART-A

Q.2 a) Draw stress strain curve for mild steel and explain about the silent points. 8

- b) A reinforced concrete column 500 mm x 500 mm in a section is reinforced with 4 steel bars of 25 mm diameter; one in each corner, the column is carrying a load of 1000 KN. Find the stress in the concrete and steel bars. Take E for steel = 210×10^3 N/mm² and E for concrete = 14×10^3 N/mm². **12**

Q.3 a) Explain the Macaulay's method for finding the slope and deflection of beams with example. 10

- b) A horizontal beam is freely supported at its ends 8m apart and carries a UDL of 15 kN/m over the entire span. Find the maximum deflection. Take E = 2×10^5 N/mm² and I = 2×10^9 mm⁴. **10**

Q.4 a) Derive the expression for power transmitted by a shaft. 8

- b) A steel shaft is to require to transmit 75kW power at 100 rpm and the maximum twisting moment is 13% greater than the mean. Find the diameter of the steel shaft if the maximum stress is 70 N/ mm². Also determine the angle of twist in a length of 3m of the shaft. Assume the modules of rigidity for steel as 90 kN/ mm². **12**

PART-B

Q.5 a) Derive the expression for strain energy stored in a body when load is applied with impact. 10

- b) A unknown weight falls through a height of 1cm on a collar rigidly attached to lower end of a vertical bar 5000 mm long and 600 mm² in section. If the maximum extension of the rod is to be 0.002m, what is the corresponding stress and magnitude of the unknown weight? Take E = 2×10^5 N/ mm². **10**

Q.6 a) Derive the expressions for change in dimensions of a thin cylinder due to internal pressure. 8

- b) A thin cylindrical shell 3 m long has 1 m internal diameter and 15 mm metal thickness. Calculate the circumferential and longitudinal stresses induced and also the change in the dimensions of the shell, if it is subjected to an internal pressure of 1.5 N/ mm² Take E = 2×10^5 N/ mm² and poison's ratio =0.3. Also calculate change in volume. **12**

- Q.7 a) Derive the expression for stiffness of two closed coil helical springs when connected in series. 10
- b) It is required to design a closed coiled helical spring which shall deflect 1mm under an axial load of 100 N at a shear stress of 90 MPa. The spring is to be made of round wire having shear modulus of 0.8×10^5 MPa. The mean diameter of the coil is 10 times that of the coil wire. Find the diameter and length of the wire. 10

End Semester Examination, May 2019

B. Tech. – Eighth Semester

POWER PLANT ENGINEERING (M-622)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) What is incremental rate theory?
b) Discuss the role of moderator in a nuclear power plant.
c) What is PFBC system?
d) Give working of CANDU-type reactor.
e) Write the principle of electrostatic precipitator.
f) Explain using sketch "Hydrological cycle".
g) What is Rankine cycle?
h) Define 'reserve factor'.
i) How Hydraulic turbines can be classified?
j) Elaborate types of power plants. **2×10**

PART-A

- Q.2 a) Describe the Rankine cycle as applied to a system using super-heated steam. What is the utility of this cycle in the study of steam power plants? **8**
b) Give flow-sheet or layout of 100 MW steam power station indicating major components. What are the main steps involved in the design of a steam power station? **12**
- Q.3 a) Name the various methods of ash handling. Describe the pneumatic system of ash handling. **10**
b) What are the essential elements of hydroelectric plant? Describe the different types of dams used for such plants and discuss the conditions under which each type can be used. **10**
- Q.4 Explain in detail the setup, site location requirement, working and principle of operation with a neat diagram of modern thermal power plants. **20**

PART-B

- Q.5 A 200 MW power house is operating on combined cycle. Suction of air takes place at 2 bar and 300 K. The maximum temperature is 800°C. The pressure ratio is 8. The gas turbine exhaust is further heated to 800°C before entering into the boiler furnace. The steam production is at 50 bar and 600°C. The exhaust temperature is 200°C. The condenser pressure is 0.05 bar. Consider isentropic efficiencies of rotating machine to be 100%. Find out thermal efficiency of power plant. Take $c_p = 1 \text{ kJ/kg K}$, ratio of specific heats = 1.4, calorific value of fuel = $4.2 \times 10^4 \text{ kJ/kg}$. **20**
- Q.6 Explain the working principle of a nuclear power plant with a neat sketch. Also elaborate various nuclear reactions in detail. **20**
- Q.7 a) Explain the operating and performance characteristic of power plants. **10**
b) A power plant has the following annual factors: load factor = 0.75, capacity factor = 0.60 and use factor = 0.65 Max. Demand = 60 MW. Estimate:
i) The annual energy production.

- ii) The reserve capacity over and above the peak load.
- iii) The hours during which the plant is not in service per year.

10

End Semester Examination, May 2019

B. Tech. – Eighth Semester

MODERN MACHINING METHODS (M-835)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Briefly answer:

- a) What is unconventional machining processes?
- b) State the basic function of catcher used in WJM.
- c) What is the function of the abrasive slurry in USM?
- d) Write the differences between ECM and ChM process.
- e) State the principle of photochemical blanking.
- f) What is duty factor?
- g) What are transferred type and non-transferred type plasma arc in PAM?
- h) What are the main applications of EBM?
- i) Define hybrid machining process.
- j) What is rotary ultrasonic machining?

2×10

PART-A

Q.2 Briefly explain modern machining methods on the basis of applicability to materials, machining characteristics, physical parameters and economics of process. List advantages and applications of modern machining methods. **20**

Q.3 a) Explain the functions of a horn and derive an equation of MRR in USM. Sketch any two types of feeding systems used in USM. **10**
b) Sketch and discuss the working principle of WJM. Write the differences between WJM and AJM with respect to principles of material removal, applications, advantages and limitations. **10**

Q.4 a) Derive an equation for computing inter electrode gap during both zero feed rate as well as finite feed rate during ECM. **10**
b) Explain the chemical milling. What are the major applications of chemical milling? **10**

PART-B

Q.5 a) Explain using a neat sketch the principle of material removal in EDM. State the disadvantages of a relaxation circuit used in EDM. **10**
b) What are the main characteristics of a dielectric fluid? Show the different modes of dielectric feeding to the EDM gap. **10**

Q.6 a) Explain the working principle of LBM with a neat sketch. What are the advantages and limitations of LBM? **10**
b) What is plasma arc machining process? Explain the various types of plasma systems.
i) Dual gas plasma system.
ii) Water-injected plasma system. **10**

Q.7 a) Explain the working principle of electro chemical spark machining process. State the major applications of ECSM. **10**
b) Write a short note on: 'electrochemical deburring'. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester
MECHATRONICS (M-634)

Time: 3 hrs.

Max Marks: **100**

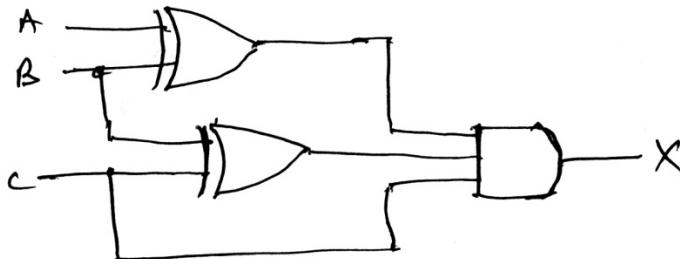
No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) Define mechatronics with its application in product design.
b) Define the types of memory system used.
c) Explain in short passive and active electronics elements.
d) What is the role of actuating system in control system?
e) Define a microcontroller with an example.
f) Explain in short the flip-flops.
g) What is the range and span of transducers?
h) What is dead band / time and resolution of the transducers?
i) Explain the importance of multiplexers.
j) What is quantisations interval and error in analog to digital conversions? **2x10**

PART-A

- Q.2 a) What do you mean by logic gates? A bulb in a staircase has two switches, one switch being at the ground floor and the other one at the first floor. The bulb can be turned ON and also turned OFF by any one of switch irrespective of the state of the other switch. Express the logic of switching of the bulb. **5**
b) Explain the working of SR flip flop in detail. **10**
c) For the logic circuit shown in the figure below, the required input conditions (A, B, C) to make the output (X=1) is.



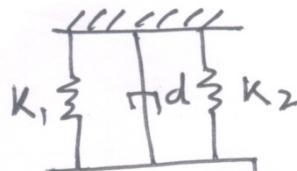
5

- Q.3 a) Explain the following with their applications in industries:
i) Temperature sensor ii) Force sensor. **10**
b) What are hydraulic systems and explain their applications? **5**
c) A force of 400 N is required to open a process control valve. What is area of diaphragm actuator to open the valve with a control gauge pressure of 70 KPa? **5**

- Q.4 a) Differentiate microprocessor and microcontroller. **10**
b) Discuss architecture of 8051 microcontroller. **10**

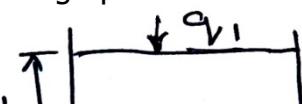
PART-B

- Q.5 a) Derive an equation relating the input force "f", with output displacement 'x", for the system described in the figure below.



10

- b) Find the equation for building up model for a fluid system shown in the figure below.



1133/5

- Q.6 a) Explain DA convertor. 4
b) What is meant by protection of a microprocessor? 4
c) Explain the following terms:
i) Multiplexers.
ii) Magnetic recording.
iii) Pulse modulation. 4x3

Q.7 a) Explain the traditional and mechatronics design approach. 8
b) Write short notes on:
i) Automatic camera.
ii) Bath room scale.
iii) Bar code recorder. 4x3

End Semester Examination, May 2019

B. Tech. — Sixth Semester

CAD-II (MII-602)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

- Q.1 a) What is meant by scallop height?
b) Define CAM.
c) Explain C¹ continuity.
d) What is blending function?
e) What is batch production?
f) Describe 3D spline creation method.
g) What is plunge milling?
h) What is meant by pencil milling?
i) Define implicit model in FEA.
j) What is the formula for tensile stiffness?

2×10

PART-A

- Q.2 a) What is ruled surface? How are they generated? Explain with proper diagram. **10**
b) What are the common modeling methods available for surface design in a surface modeling software? **10**
- Q.3 a) How surface modeling is different from wireframe and solid modeling? Explain briefly with examples. **10**
b) Explain the concept of FEM briefly and outline the procedure. **10**
- Q.4 a) Explain following points clearly:
i) Nodes.
ii) Primary nodes.
iii) Secondary nodes.
iv) Internal nodes. **2½×4**
b) Explain the term 'Shape function'. Why polynomial terms are preferred for shape function in FEM? **10**

PART-B

- Q.5 a) Define stiffness matrix and explain its special features. **10**
b) Explain CNC machine and its features with the help of block diagram. **10**
- Q.6 a) What is roughing, semi-finishing and finishing? What are the cutting methods that are used in these three processes? **10**
b) What is CAM? Discuss its role in industries along with the advantages. **10**
- Q.7 a) By direct stiffness matrix approach, determine stiffness matrix for:
i) Bar element.
ii) Truss element. **5×2**
b) What is process planning? Discuss CAPP in detail. **10**

End Semester Examination, May 2019

B. Tech. – Third Semester

STRENGTH OF MATERIAL (M-403A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

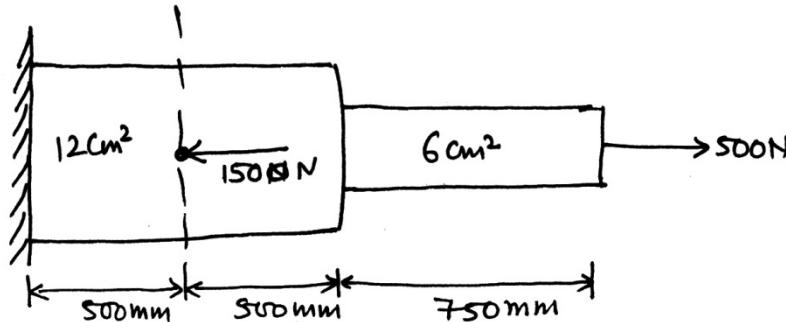
Q.1 Define (**any five**) from below:

- a) Conventional or engineering stress.
- b) Natural Strain.
- c) Bulk modulus vs Yong's modulus.
- d) Principal stress and Principal strain.
- e) Strain energy due to bending.
- f) Torsion of thin hollow circular shaft.

4x5

PART-A

Q.2 a) A stepped bar is loaded as shown in the figure. Calculate stress in each part and Total elongation. $E = 200\text{GPa}$.



12

b) A cast Iron block of 5 cm² c/s carries an axial compressive load of 50 kW. Calculate the magnitude of Normal stress on a plane whose normal is inclined at 30° to the axis of the block? **8**

Q.3 a) Define and Derive Theory simple bending? State assumption also, taken for formulation of bending equation. **12**

b) Calculate the central deflection(s) for a simply supported beam of span 'l' and of uniform section carrying a uniformly distributed load 'w' per unit length. **8**

Q.4 a) Derive the torsion equation applied to circular shaft and also write its assumption. **12**

b) What diameter of shaft will be required to transmit 80 kW at 80 rpm, "if the maximum torque is 30 percent greater than the mean torque and the limit of torsional stress is to be 56 MPa? If the modulus of rigidity is 84 GPa. What is the maximum angle of twist in 3m length? **8**

PART-B

Q.5 a) A trolley of weight 100 KN is descending a slope with a uniform velocity of 2m/s at the end of a steel cable which is wound round a drum. When the length of the cable laid out is 600m, emergency brakes are suddenly applied and the wagon is brought to a halt. If the cross sectional area of the cable 6 cm² and $E = 200\text{GPa}$, find the stress developed in the cable. What would be the stress if the length of the cable laid out is 240m? **10**

b) State and Prove Castiglano's theorem.

10

- Q.6 a) A cylinder is 4m long, 0.95m in diameter and 13.5 mm thick at atmospheric pressure. Calculate the dimension when subjected to an internal pressure of 2 MPa $E = 210GPa$, $\nu = 0.25$ (*Poisson's ratio*). **10**
- b) Define lame's theorem and derive expression for thick cylinder pressure vessel. **10**

- Q.7 a) A close-coiled helical spring is to have a stiffness of 1 kN/m of compression under a maximum load of 4.5 kN and a maximum shearing stress of 45 MPa. The solid length of the spring is to be 4.5 cm. Find the diameter of the wire, the mean diameter of the coils required. Take $G = 42GPa$. **10**
- b) Derive an expression for buckling load of a column hinged at both ends. **10**

End Semester Examination, May 2019

B. Tech. – Sixth Semester

INDUSTRIAL OPERATIONS MANAGEMENT (M-603)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

Q.1 Define the following:

- a) Work measurement.
- b) Continuous review system.
- c) R-charts.
- d) Virtual organization.
- e) VED.
- f) SIMO charts.
- g) ABC classifications.
- h) Types of production.
- i) Standard time calculations.
- j) Performance rating.

2x10

PART-A

Q.2 a) Define management. How does it differ from administration? Give a suitable illustration to support your view point. **10**

b) Explain principles of management. **10**

Q.3 a) Distinguish between line, and staff and functional organisation. **10**

b) Discuss the characteristics of functional organization. What is its relationship with line organisation on one hand and line and staff organisation on the other? **10**

Q.4 a) Describe the factors influencing the plant layout. **8**

b) Explain:

- i) Storage space requirements **5**
- ii) Work station design in connection with plant layout. **7**

PART-B

Q.5 a) Describe the suitable chart when the following situations have to be analyzed by 'Method Study'.

- i) Movement of a petrol engine cylinder head through all machining operations. **7**
- ii) Operators carrying out short cycle repetition work. **6**

b) Bring out the importance of 'critical examination' phase in method study with the help of an example. **7**

Q.6 a) Describe:

- i) Direct inventories with an example.
- ii) Indirect inventories with an example. **4x2**

b) Describe the cost associated with the inventories. **7**

- c) What is safety stock? Why it is needed? **5**

Q.7 a) Define the term: quality and state various factors which affect product quality.

b) Describe various elements of TQM in brief.

**10
10**

End Semester Examination, May 2019

B. Tech. – Fourth Semester

APPLIED THERMODYNAMICS (M-419)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Define and explain the physical significance of cut off ratio.
- b) Draw p-V and T-s for the sterling cycle.
- c) What is calorific value of a fuel? Define Higher Calorific Value (HCV) and Lower Calorific Value (LCV) of fuel.
- d) Classify fuels in detail.
- e) What are the factors which affects the efficiency of Rankine Cycle?
- f) Draw the Rankine Cycle on T-s and P-v diagram.
- g) How do accessories differ from mountings?
- h) What is the function of boiler chimney?
- i) Explain clearly the term "Vacuum". How is it measured?
- j) What is the effect of Air-leakage in condenser?

2×10

PART-A

Q.2 a) A gas engine operating on the ideal Otto cycle has a compression ratio of 6:1. The pressure and temperature at the commencement of compression are 1 bar and 27°C. Heat added during the constant volume combustion process is 1170 kJ/kg. Determine the peak pressure and temperature, work output per kg of air and air standard efficiency. Assuming $C_p = 1.004 \text{ KJ/Kg}$ and $C_v = 0.717 \text{ KJ/Kg}$ for air. **10**
b) Obtain an expression for the air standard efficiency of Diesel cycle. **10**

Q.3 a) What is Orsat Apparatus? Where is it used? Explain its construction and working with neat labeled diagram. **10**
b) A sample of coal supplied to a boiler has the following composition by mass: C = 88%; H₂ = 5%; O₂ = 3%; N₂ = 1%; S = 0.5% and rest is incombustible matter. Calculate:
i) Mass of air required for complete combustion of 1 kg of coal,
ii) dry analysis both by mass and volume of the products of combustion when 15% excess air is supplied **10**

Q.4 a) Describe the different operations of Rankine cycle. Derive also the expression for its efficiency. **10**
b) A steam power plant operates on a theoretical reheat Cycle. Steam at boiler at 150 bar, 550°C expands through the high pressure turbine. It is reheated at a constant pressure of 40 bar to 550°C and expands through the low pressure Turbine to a condenser at 0.1 bar. Draw T-s and h-s diagrams. Find:
i) Quality of steam at Turbine exhaust
ii) Cycle Efficiency
iii) Steam rate in kg/kWh. **10**

PART-B

Q.5 a) What are the differences between boiler accessories and boiler mountings? Also explain the construction and working details of any one high pressure Boiler. **10**
b) Explain with neat sketch given boiler accessories:
i) Air preheater

ii) Economiser 10

- Q.6 a) Define critical pressure ratio for the nozzle of steam turbine. Obtain analytically its value in terms of the index of expansion. 10
- b) The following data refers to a particular stage of 50% Reaction Turbine:
- Speed of the turbine = 1500 rpm
- Mean Diameter of rotor = 1m
- Stage Efficiency = 80%
- Blade Outlet angle = 20°
- Speed Ratio = 0.5
- Determine the available isentropic drop in the stage. 10

Q.7 Write the differences between jet and surface condenser. Also explain briefly the following types of jet condensers:

- a) Parallel flow
- b) Ejector type 20

End Semester Examination, May 2019

B. Tech. – Sixth Semester

TOOL ENGINEERING (M-635)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

Q.1 Answer the following questions:

- a) What is SIALON?
- b) What are the limitations of ceramic inserts?
- c) State the compositions of T-type and M-type HSS tools.
- d) State the function of a chisel edge.
- e) What are the major action taking place at the point of drill?
- f) Draw neat sketch of a flat form tool.
- g) What type of surface can be produced by a milling process?
- h) Distinguish between up-milling and down-milling.
- i) Define broaching allowance.
- j) How do you classify a broaching operation?

2×10

PART-A

Q.2 a) Draw a neat labelled diagram of a tool wear model and explain the following:

- i) Crater wear
- ii) Flank wear
- iii) Notch wear
- iv) Built up edges

14

b) State some important characteristics of the following tool materials:

- i) Cemented carbide.
- ii) CBN
- iii) PCD

2×3

Q.3 a) Draw neat labelled diagram of various types of chip breaker construction. **10**

b) How the tool shank of single point cutting tool is designed? **10**

Q.4 a) Discuss the design features of a twist drill:

- i) Helix angle
- ii) Drill diameter
- iii) Web thickness
- iv) Flute length
- v) Point angle
- vi) Land width
- vii) Margin

15

b) With neat sketches, draw the different types of web core. **5**

PART-B

Q.5 Derive an expression for depth of the flat form tools to be ground measured normal to the point clearance face; when the conditions are,

- a) Clearance angle ' α ' and rake angle (' γ ') 'zero'.
- b) Clearance angle ' α ' and positive rake angle (' γ ').

20

Q.6 Discuss the design features of a milling cutter,

- a) Radial rake angles.
- b) Relief angles.
- c) Width of land.
- d) Flutes.
- e) Size of the cutter.

4×5

Q.7 Discuss the design features of a broach:

- a) Depth of cutting tooth.
- b) Tooth fillet radius.
- c) Tooth length of a broach.
- d) Cutting speeds.
- e) Chip breakers.

4×5

End Semester Examination, May 2019

B. Tech. – Sixth Semester

AUTOMOBILE ENGINEERING (M-624)

Time: 3 hrs.

Max Marks: **100**

No. of pages: 1

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1

 - a) What are the salient features of a hatchback and a coupe?
 - b) Why is clutch required in an automobile?
 - c) What is the function of final drive?
 - d) Mention the various forces and torques experienced by the rear axle.
 - e) Explain the role of propeller shaft in an automobile vehicle.
 - f) Write a short note on catalyst converter.
 - g) Explain the role of wheel balancing in automobile steering.
 - h) What is meant by air bleeding of brakes?
 - i) What are the different types of wheels?
 - j) What is a catalytic converter?

2x10

PART-A

- Q.2 a) Draw a schematic diagram showing the layout of transmission system of a 4-wheel drive vehicle. Also compare 4-wheel drive vehicle to 2-wheel drive vehicle. **10**
b) What is the function of frame? What are the loads acting on frame? **10**

Q.3 a) Explain the various requirements of clutches. **5**
b) Write a short note on 'cone clutch'. **5**
c) Explain the single plate clutch working with neat sketch in an automobile. **10**

Q.4 a) Enlist different types of gear boxes. Describe sliding mesh type gear box with its advantages. **10**
b) Write short notes on:
i) Differential
ii) Transfer case **5x2**

PART-B

- Q.5 a) Enlist different types of suspension systems used in automobiles. Explain MacPherson strut type suspension in detail. **10**

b) Explain the following terms:

 - i) Camber.
 - ii) Castor.
 - iii) Toe-in and Toe-out
 - iv) King pin inclination.
 - v) Combined angle and scrub radius. **2x5**

Q.6 a) What are the advantages and disadvantages of hydraulic brakes compared to mechanical brakes? **5**

b) Write are the difference between Disc and Drum Brakes. **5**

c) Draw a neat sketch of a section of tubeless tyre and then explain the importance of each part. Also mention its advantages over conventional tubed tyre. **10**

Q.7 Write short notes on:

 - a) Lead acid battery (construction and washing).
 - b) Catalyst converter.

- c) Positive crankcase ventilation system.
- d) Evaporative emission control.

5x4

End Semester Examination, May 2019

B. Tech. – Fourth Semester

THERMAL ENGINEERING-II (M-401A)

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) What do you mean by SI and CI engines?
- b) Draw P-V and T-S diagram of Diesel Cycle.
- c) What are the limitations of carburetor?
- d) What are the functional requirements of fuel injection system?
- e) What do you mean by flame front propagation?
- f) Draw T-S diagram of vapor compression cycle.
- g) What do you mean by DBT and DPT?
- h) Enumerate the types of Evaporator.
- i) What do you mean by heating and humidification process?
- j) Define Tonne of refrigeration.

2×10

PART-A

- Q.2**
- a) In what respects four-stroke cycle CI engine differ from that of SI engine? **10**
 - b) An air standard dual cycle has a compression ratio of 10. The pressure and temperature at the beginning of compression are 1 bar and 27°C . The maximum pressure reached is 42 bar and the maximum temperature is 1500°C . Determine:
 - i) The cycle efficiency.
 - ii) The temperature at the various points.
 - iii) Cut off ratio.
 - iv) Work done per kg of air.

10

- Q.3**
- a) Describe D-MPFI and L-MPFI injection system. **10**
 - b) Write short notes on:
 - i) Unit injector system.
 - ii) Common rail injection system.

10

- Q.4**
- a) What is meant by abnormal combustion? Explain the phenomena of knock in SI engines. **10**
 - b) Write down the process of combustion in CI engines and also explain the various stages of combustion. **10**

PART-B

- Q.5**
- a) A refrigerator works between -7°C and 27°C . The vapour is dry saturated at the end of adiabatic compression. Determine
 - i) Coefficient of performance.
 - ii) Power of compressor to remove 180 kJ/min.

Temp ($^{\circ}\text{C}$)	Enthalpy (kJ/kg)		Entropy (kJ/kg k)	
	Liquid (h_f)	Latent (h_{fg})	Liquid (s_f)	Vapour (s_g)
-7	-30	1298	-0.108	4.75
27	115	1173	427	4.33

10

b) Derive an expression for C.O.P. for a system working on Bell-Coleman cycle. **10**

- Q.6 a) A mixture of dry air and water vapour is at a temperature of 22°C under a total pressure of 0.9732 bar and the dew point temperature is 15°C find:
- i) Partial pressure of vapour.
 - ii) Enthalpy of air per kg of dry air.
 - iii) Relative humidity. **10**
- b) Define the following terms:
- i) Specific humidity.
 - ii) Saturated air.
 - iii) Saturation ratio.
 - iv) Dry bulb temperature. **2½×2**

Q.7 Explain the following with neat sketch.

- a) Forced-air circulation condensers.
- b) Vane type rotary compressor.
- c) Dry expansion evaporator.
- d) Automatic expansion valve. **5×4**