

# **End Semester Examination, Dec. 2017**

B. Tech. – Second 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**. Each question carries equal marks.

**Q.1** Answer the following question:

- a) What are Semi-monocoque structures?
  - b) What is the importance of strength/weight ratio in aerospace industry?
  - c) What do you mean by compass locator?
  - d) How is pneumatic system different from hydraulic system?
  - e) What are gyro based instrument?
  - f) What do you mean by centre of pressure?
  - g) How does stalling of an aeroplane occur?
  - h) How are shear modulus and Young's modulus different?
  - i) What are different propellants of rockets? Write one advantage of each.
  - j) What are V/STOL aircraft?
- 2×10**

### **PART-A**

**Q.2** a) Define a flight vehicle. Write the difference between an aerostatic craft and an aerodynamic craft with examples. **10**

b) List the differentiating features of a transport aircraft, a fighter aircraft, a helicopter and a spacecraft. **10**

**Q.3** a) Draw the flow pattern (streamlines) for flow resulting from superposition of uniform flow, source and sink. **5**

b) What do you mean by pressure coefficient? What will be the value of  $C_p$  at a port sensing total pressure? **5**

c) What are high lift devices? Draw  $C_L$  Vs  $\alpha$  curve for wing having aileron and leading edge slat. Explain diagrammatically why the curve shifts in presence of these devices. **10**

**Q.4** a) What are centrifugal compressor engines? Write its advantages over axial compressor engines. **5**

b) Write a note on importance of jet engine in taking aeroplane forward, incorporating effect of wing and fuselage/weight. **10**

c) Explain ideal jet engine cycle/Bryton cycle. **5**

### **PART-B**

**Q.5** a) Explain bending, shear and torsional effect of forces with the help of diagrams. **5**

b) What is Hooke's law? Draw stress vs strain curve for steel highlighting different critical points. **5**

c) Explain functions of basic structural elements of aircraft structure. **10**

**Q.6** a) What are flight instruments? What are different types of flight instruments? Write down mathematical relation used to find equivalent air speed. **10**

b) What do you mean by global positioning system? Write down its different segments. How does it work? **10**

**Q.7** a) What are the advantages of pneumatic systems as power sources for operating various aircraft units? **10**

- b) What are control surfaces? Explain the function of different control surfaces. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

### **ELEMENTS OF AERONAUTICAL ENGINEERING (AE-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.** Each question carries equal marks.

Q.1 Answer (**any ten**) 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) Define aerodynamic centre and neutral point.
- d) Draw  $c_1$  and  $\alpha$  curves for a cambered airfoil and a symmetrical airfoil.
- e) Write the thrust equation of a jet engine. Explain the part played by each term in the development of thrust.
- f) What do you understand by 'compressor air bleed' and for what services is this bleed air used?
- g) What frequencies are allocated to different navigation and communication systems?
- h) Name any two aircraft configurations which can attain vertical take-off.
- i) What do you understand by staging of rockets? Why do we need it?
- j) Name various types of hydraulic pumps that can be employed to supply hydraulic fluid for operating various services of the aircraft.
- k) Explain the function of a pressure relief valve with the help of a suitable diagram.
- l) What is a check valve? Draw a schematic diagram of a check valve and explain its operation.

**2x10**

#### **PART-A**

Q.2 a) What is the difference between an aircraft and a rocket? Explain their features with examples of each type.

**5**

b) Explain with the help of suitable sketches, the operation of a double cantilever, spring leaf type main landing gear.

**5**

c) What do you understand by tilt-rotor concept? Draw a sketch to explain the operation of aircraft using this concept. What are the advantages of a tilt-rotor over other V/STOL aircraft?

**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  $\alpha$  plots in case of a statically stable and unstable airplane. **4**

Q.4 a) By suitable sketches highlights the differentiating features of:  
i) A pure turbo-jet engine.  
ii) A by-pass jet engine.  
iii) A fan-jet engine.  
iv) A jet engine with a re-heat system.

**5x4**

### **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) The operation of GPS involves three segments. Discuss each of these segments giving details of information supplied/ monitored by each of them. **10**

b) What information is provided by the VOR and DME to the pilot? Explain the operation of DME.

**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, Dec. 2017**

B. Tech. (Aeronautical) - 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.** Each question carries equal marks.

- Q.1 a) Explain why:  
i) Drag on a flat plate at zero angle of attack in an inviscid flow is zero.  
ii)  $C_L$  is always less than  $C_e$ .  
b) What are the assumptions made to simplify the momentum equations into Euler's equations?  
c) Explain the term 'missing momentum' that is considered while defining the momentum thickness.  
d) Suggest methods that can be used to reduce form drag and induced drag.  
e) Explain slat effect and vane effect with the help of suitable illustrations.

**4×5**

### **PART-A**

- Q.2 a) Explain how drag of a two-dimensional body can be measured using momentum equation. **10**  
b) Explain various Mach number regimes of flow with the help of suitable illustrations. **10**
- Q.3 Derive expressions for lift coefficient, lift curve slope, moment coefficients about the leading edge and quarter chord for a symmetrical airfoil at an angle of attack using classical thin airfoil theory. **20**
- Q.4 a) What is Biot-Savart law? Obtain an expression for velocity induced at a point by an infinite, straight vortex filament. **10**

- b) For a finite wing, show the distribution of downwash along the span and explain the superposition of an infinite number of horse shoe vortices along the lifting line. **10**

### **PART-B**

- Q.5 a) What do you understand by "non-linear lift curve'? Using numerical non-linear lifting-line method for a finite wing of given plan form and geometry, describe the steps followed for calculating lift and induced drag of a finite wing. **15**
- b) Explain the concept of vortex lattice method and illustrate the same with suitable sketches. **5**
- Q.6 a) Derive the boundary layer equations for a steady, compressible, viscous, two-dimensional flow over a flat plate. **15**
- b) Explain the reasons for boundary layer separation with the help of a suitable diagram. **5**
- Q.7 a) What are the major methods of boundary layer control? Briefly explain each. **4**
- b) Explain the purposes of:
- i) Voltage generator.
  - ii) Wing fence. **3x2**
- c) Which two factors broadly limit the maximum lift achievable for a single element airfoil? How does a supercritical airfoil help in increasing the lift? **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth Semester

### **AIRCRAFT STRUCTURES-I (AE-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 (**any ten**) of the following:
- a) What do you mean by determinate structure?
  - b) What do you mean by 'Factor of safety' of any structure?
  - c) What do you mean by equilibrium equation for a 3-D structure?
  - d) Explain the role of Former and Bulkhead in fuselage design.
  - e) Write down any four different loads experienced by an aircraft in flight.
  - f) What is a gust? Mention its analysis techniques?
  - g) Define the shear centre of a body. What is its general position for a symmetric body?
  - h) Explain the concept of neutral plane in the bending of a beam.
  - i) What is the importance of equilibrium equation for stress analysis?
  - j) What do you mean by Maxwell's reciprocal theorem?
  - k) What are the loading problems with wing at high angle of attack?
  - l) What do you mean by inertial load on an aircraft? **2x10**

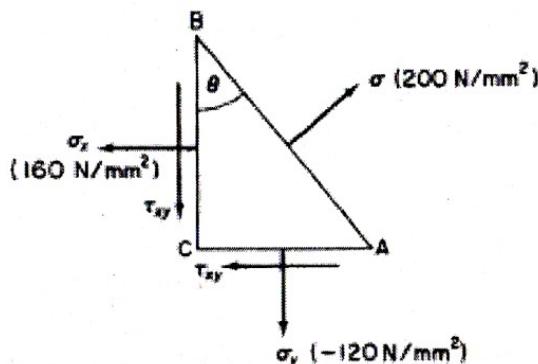
### **PART-A**

- Q.2 a) Draw the cross section of a wing, mark its essential parts and explain their role in wing structure. Also, explain V-n Diagram in case of straight and level flight. **10**

b) Derive the equation of equilibrium for a 3-D body

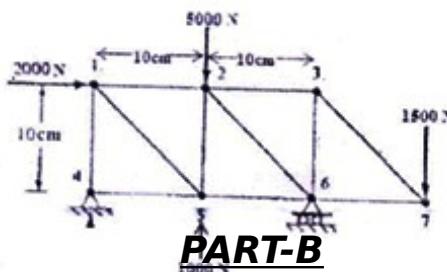
**10**

- Q.3 Direct stresses of  $160 \text{ N/mm}^2$  (tension) and  $120 \text{ N/mm}^2$  (compression) are applied at a particular point in an elastic material on two mutually perpendicular planes. The principal stress in the material is limited to  $200 \text{ N/mm}^2$  (tension). Calculate the allowable value of shear stress at the point on the given planes. Determine also the value of the other principal stress and the maximum value of shear stress at the point. Verify your answer using Mohr's circle.



**20**

- Q.4 Find the internal loads acting on each member of the structure shown in the figure below:

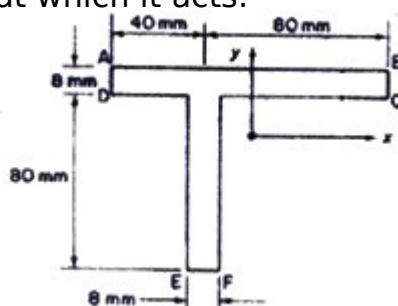


**20**

- Q.5 a) What do you mean by symmetrical bending of a beam? Show that for a symmetrical beam the neutral axis passes through the centroid of area of the cross section and further prove that:

$$\sigma_z = \frac{M_y}{I}$$

- b) A beam shown below is subjected to a bending moment of  $2000 \text{ Nm}$  in a vertical plane. Calculate the maximum direct stress due to bending stating the point at which it acts.

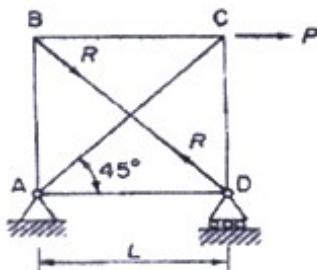


**20**

- Q.6 a) Determine the deflection of the free end of the tip-loaded cantilever beam shown below by using complementary energy method; the bending stiffness of the beam is  $EI$ .

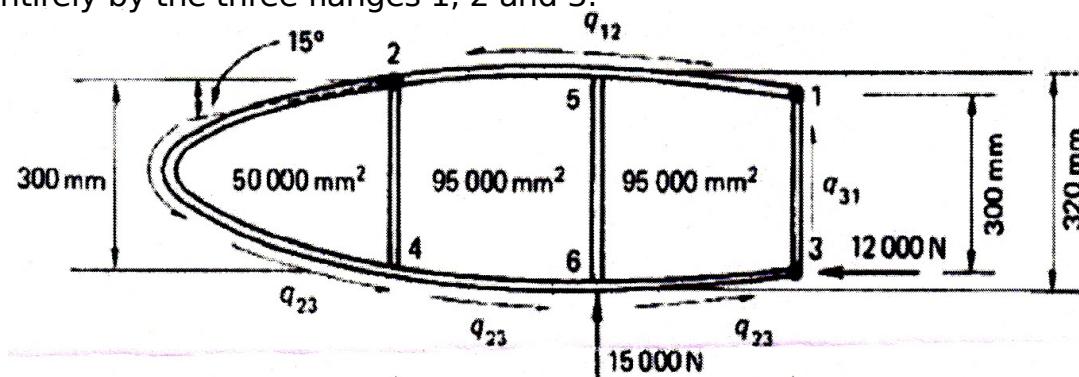


- b) Determine the force in the members of the pin-jointed framework shown below using virtual load method. Each member has the same cross section area and Young's modulus of elasticity.



20

- Q.7 Calculate shear flows in the web panels and the axial loads in the flanges of the wing rib shown in the figure below. Assume that the web of the rib is effective only in shear while the resistance of the wing to bending moment is provided entirely by the three flanges 1, 2 and 3:



20

## End Semester Examination, Dec. 2017

B. Tech. 300 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**. Each question carries equal marks.

- Q.1 a) Draw a sketch of mix- exhaust turbofan engine.  
 b) Show Bryton cycle on P Vs V curve.  
 c) What do you mean by propulsive efficiency?  
 d) Show isobar for inlet of a turbojet engine i.e.  $P_0, P_{t0}, P_2, P_{t2}$ .  
 e) What is compressible flow?  
 f) What does isentropic flow mean?  
 g) What are special features of normal shock compared to oblique shock?  
 h) Define stagnation state.  
 i) Explain blade element theory.  
 j) What are scramjet engines? 2×10

#### PART-A

- Q.2 a) Explain Otto cycle in detail with P-V diagram. 7  
 b) In a Diesel cycle, compression ratio is 16. At the beginning of isentropic compression temperature is 15°C and pressure is 0.1 MPa. Heat is added until the temperature at the end of constant pressure is 1480°C. Calculate T<sub>2</sub> (temperature before heat addition) and heat supplied (Q<sub>1</sub>). 8  
 c) Why are propeller engines most preferred in military cargo aircraft? 5

- Q.3 a) Write a note on turbojet engine with descriptive diagram highlighting its operating velocity, its application in aerospace industry. **10**
- b) Inlet flow conditions for an engine are  $T_1=25^\circ\text{C}$ ,  $u_1=150\text{m/sec}$ ,  $C_{p1}=1004\text{J/kg.k}$ ,  $\gamma_1=1.4$ . Find total temperature of the given condition. Again if 42 MW of heat is added to the system then find total temperature of exit flow. **10**
- Q.4 a) A liquid propellant rocket engine consumes 200 kg/s of oxidizer and 50 kg/s of fuel. After the combustion, the gas is accelerated in a convergent-divergent nozzle where it attains  $V_9= 4000 \text{ m/s}$  and  $p_9 = 200 \text{ kPa}$ . The rocket engine is at sea level where  $P_0 = 100 \text{ kPa}$ . If the exit diameter of the nozzle is 2 m, calculate pressure thrust and rocket gross thrust. **10**
- b) Explain supersonic diffuser and nozzle. **5**
- c) Write a note on inlet of a turbojet engine. **5**

### **PART-B**

- Q.5 a) Define specific thrust and propulsive efficiency. A turbojet engine is flying at 200 m/s. The product of combustion has an exhaust velocity of 900 m/s. Estimate its engine propulsive efficiency. **6**
- b) What is the function of compressor in a turbojet engine **4**
- c) Consider turbojet engine in take-off condition with following parameters:  $m_{\text{f}} = 100 \text{ kg / s}$ ,  $v_0 = 0 \text{ m / sec}$ ,  $m_{\text{g}} = 2 \text{ kg / s}$ ,  $Q_R = 42000 \text{ Kj / kg}$ ,  $v_9 = 900 \text{ m / s}$ . Find thermal efficiency and thrust at take-off. **10**
- Q.6 a) A gas turbine combustor has inlet condition  $T_{t3} = 800 \text{ K}$ ,  $P_{t3} = 2 \text{ MP}_a$ , air mass flow rate of 50 kg/s,  $\gamma^3 = 1.4$ ,  $C_{p3} = 1004 \text{ J/kg K}$ . A hydrocarbon fuel with ideal heating value  $Q_R = 42,000 \text{ kJ/kg}$  is injected in the combustor at a rate of 1 kg/s. The burner efficiency is  $\eta_b = 0.995$  and the total pressure at the combustor exit is 96% of the inlet total pressure, i.e., combustion causes a 4% loss in total pressure. The gas properties at the combustor exit are  $\gamma_4 = 1.33$  and  $C_{p4} = 1156 \text{ J/kg K}$ . Calculate
- i) Fuel-to-air ratio f. **7**
  - ii) Combustor exit temperature  $T_{t4}$  in K and  $P_{t4}$  in MPa **7**
- b) Write a note on ramjet engine. **5**
- c) A ramjet is flying at Mach 1.818 at an altitude 16.750 km altitude ( $\text{Pa} = 9.122 \text{ kPa}$ ,  $\text{Ta} = -56.50^\circ \text{C} = 216.5 \text{ K}$ , sonic speed,  $a = 295 \text{ m/s}$ ) Calculate  $T_{t0}P_{t0}T_{t2}P_{t2}$ . **8**
- Q.7 a) Explain ideal momentum theory for turboprop engine and airscrew coefficient. **10**
- b) Write assumptions and limitations of blade element theory. **6**
- c) Derive the expression for thrust coefficient ( $C_T$ ). **4**

## **End Semester Examination, Dec. 2017**

B. Tech. (Aeronautical) — 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) Define atomic packing factor.
- b) Explain briefly different crystal forms of iron.
- c) Define yield point in context to stress strain curves.
- d) What is plain carbon steel?
- e) Define quenching and its importance.
- f) Define alloys and their formation.
- g) What are cermets? Give their properties.
- h) Explain briefly refractories.
- i) What is the percentage of carbon in hypo-eutectoid?
- j) What are reinforced composites?

**2×10**

#### **PART-A**

Q.2 a) Explain the importance of temperature variations on metals. **10**  
b) What are critical temperatures? Explain their importance. **10**

Q.3 a) What are different heat treatment processes? Explain them in context to iron and steel. **15**  
b) What do you understand by "Case hardening"? Explain briefly. **5**

**9/5**

- Q.4 a) Explain the process of corrosion. What are the different types of corrosion? **12**  
 b) How corrosion can be prevented? Give examples. **8**

### **PART-B**

- Q.5 a) Explain various aluminium alloys in context to their use in aircrafts. **10**  
 b) Explain briefly various magnesium alloys and their use in aircrafts. **10**
- Q.6 a) What are the various heat resistant materials and the properties exhibited by them? **12**  
 b) Explain briefly ceramics and refractories. **4**  
 c) Explain briefly Monnel K 500. **4**
- Q.7 What are composites? Explain various types of composites and their uses. **20**

## **End Semester Examination, Dec. 2017**

B. Tech. (Aeronautical Engineering) — 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:
- What properties of the mesh and structure remain unaltered even after the conformal transformation?
  - What are the assumptions and basic principle of Polhamus theory for the calculation of the drag?
  - How the pressure, density, temperature, Mach number, velocity, total pressure, total temperature, enthalpy and entropy changes behind the normal shock wave?
  - Explain the concept for Mach reflection for an oblique shock.
  - Explain the application of Linearized velocity potential equation.
  - Explain the variation in the properties before and after the expansion wave. **4×5**

### **PART-A**

- Q.2 Transform a circle into cambered airfoil using the Kutta Zhukovsky transformation using the principle of conformal transformation. Calculate the velocity and pressure distribution on the Zhukovsky airfoil. **20**
- Q.3 a) Explain the subsonic characteristic of delta wing in details. **10**  
 b) Explain the assumptions and derive the relationship between coefficient of lift and drag for low aspect ratio aircraft. **10**

- Q.4 a) Using the energy equation, find out the relations between the actual properties and characteristic properties, i.e. Temperature, pressure, density and Mach number? **10**  
 b) Consider a point in an airflow where the local Mach number, static pressure and static temperature are 3.5, 0.4 atm and 195 K, respectively. Calculate the local values of  $p_0$ ,  $T_0$ ,  $T^*$ ,  $a^*$  and  $M^*$  at this point. **10**

### PART-B

- Q.5 a) Consider an oblique Shock wave generated by a compressible corner with a  $15^\circ$  deflection angle. The free stream Mach number ahead of the corner is 4, the flow pressure and temperature are standard sea level conditions. The oblique shock wave subsequently impinges on the straight wall opposite the compression corner. Draw the right flow geometry. Calculate the angle of reflected shock wave  $\phi$  relative to the straight wall. Also, obtain the pressure, temperature and Mach number behind the reflected wave.

Note: Use the  $\theta - \beta - M$  graph given at the end of question paper.

**20**

- Q.6 a) What is the critical Mach number? Derive an expression for  $C_p$  at critical Mach number? **5**  
 b) Explain the concept of sound barrier with the help of the explanation of drag divergence Mach number. **5**  
 c) Write a short note on area rule. **5**  
 d) Explain the use and aerodynamics of supercritical airfoil. **5**

- Q.7 Describe with all relevant equations, how the method of characteristics can be used to design a supersonic nozzle. State and explain the compatibility relations for characteristics lines. **20**

### **End Semester Examination, Dec. 2017**

B. Tech. (Aeronautical) — 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**. Each question carries equal marks.

(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 a) For isentropic flow in a duct of varying area, show that the non-dimensional mass flow rate  $\frac{m\sqrt{T_0}}{Ap_0}$  is given by:

$$\frac{m\sqrt{T_0}}{Ap_0} = \left[ \frac{2\gamma}{\gamma-1} \frac{1}{R} \left( \frac{p_1}{p_0} \right)^{\frac{2}{\gamma}} \left\{ 1 + \left( \frac{p_1}{p_0} \right)^{\frac{\gamma-1}{\gamma}} \right\}^{\frac{1}{2}} \right]$$

- b) Define:

i) The propulsion efficiency of a propulsive duct

Deflection angle  $\theta$ , degrees

(a)

- ii) The efficiency of energy conversion of a power plant.
- c) Define Power input factor and slip factor. Explain the relevance along with typical range of values for each.
- d) Briefly explain Diffusion factor as applicable to axial flow compressors and plot its variation with the friction losses in the rotor and stator.
- e) Briefly explain various types of combustion chambers used in turbojet engines. **4x5**

### **PART-A**

- Q.2 a) For frictionless flow in a constant area duct with heat transfer, write the flow equations for such a flow, called Rayleigh flow, and derive the relations for  $\frac{p}{P}$  and  $\frac{T}{T_0}$  in terms of the Mach number.

**10**

- b) Discuss the features of Rayleigh flow using a T-s plot highlighting the direction of heating and cooling with Mach number approaching unity.

**10**

- Q.3 a) Explain the cycle of turbojet with afterburning by showing the representative temperature values at the end of each process.

**5**

- b) What are the advantages of a turbofan over a pure turbojet engine? Draw line diagrams of some the configurations of high by-pass ratio turbofan engines. **5**

- c) How do you distinguish between a turbojet engine, a turboprop engine and a turbo shaft engine? Discuss their applications.

**5**

- d) Discuss, with the help of a plot of SFC and specific thrust ( $F_s$ ) against fan pressure ratio at different values of turbine inlet temperatures, how fan pressure ratio of a fanjet engine is optimized.

**5**

- Q.4 a) Explain the phenomenon of Surging, Choking and rotating stall in reference to centrifugal compressors.

**6**

- b) Determine the pressure ratio developed and the specific work input to drive a centrifugal air compressor having an impeller diameter of 0.5 m and running at 7000 rpm. Assume zero whirl at the entry and  $T_{1f} = 288$  K. **7**

- c) A single sided centrifugal compressor is to deliver 14 kg/s of air when operating at a pressure ratio of 4:1 and a speed of 200 rev/s. The inlet stagnation conditions are 288 K and 1.0 bar. The slip factor and power input factor may be taken as 0.9 and 1.04 respectively. The overall isentropic efficiency is 0.80. Determine the overall diameter of the impeller.

**7**

### **PART-B**

- Q.5 a) Define work done factor. Explain its variation with the number of stages in the case of an axial flow compressor. **8**

- b) Draw and explain radial variation of degree of reaction and describe various types of blading based on it along with the applicable formulae.

**12**

- Q.6 a) List out the main factors required to be considered for assessing a combustion chamber performance. Briefly explain any two.

**8**

b) Write short notes on **(any two)**:

- i) Flame tube cooling
- ii) Duplex and Spill burners
- iii) Surface Discharge Igniter

**6x2**

Q.7 a) Briefly explain various methods of blade cooling that have received serious attention and research effort in the case of an axial flow turbine.

**7**

b) List out and explain various sources of friction loss that should be accounted to arrive at overall blade loss coefficient in the case of an axial flow turbine.

**7**

c) Draw and explain pressure and velocity distributions on a conventional turbine blade.

**6**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

**AIRCRAFT STRUCTURES-II (AE-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) Differentiate between strut and column.
- b) Euler's formula for calculating critical load.
- c) Plane stress
- d) Plane strain
- e) Flutter instability
- f) Aileron reversal
- g) Properties of stiffness matrix.
- h) Structural idealization
- i) Margin of safety
- j) Difference between butt and fillet welds.

**2x10**

### **PART-A**

- Q.2 An aluminium column of length L and rectangular cross-section has a fixed end at B and supports a centric load at A. Two smooth and rounded fixed plates restrain end A from moving in one of the vertical planes of symmetry but allow it to move in the other plane.

**Fig.**

- a) Determine the ratio a/b of the two sides of the cross-section corresponding to the most efficient design against buckling.
- b) Design the most efficient cross-section for the column.

$$A = 20 \text{ in. } E = 10.1 \times 10^6 \text{ psi } P = 5 \text{ kips } FS = 2.5$$

**20**

- Q.3 Consider buckling of a thin flat plate, consider case of the thin plate of loaded as shown, and simply supported along all four edges. What is the expression for the critical buckling stress as a function of width b and thickness t? Draw the buckling Modes for Long Plates and k-values for a Simply Supported Plate.

**20**

- Q.4 What is aeroelasticity? Explain Collar's triangle. What is difference between static aeroelastic phenomena and dynamic aero elastic phenomena?

**Fig.**

**20**

### **PART-B**

- Q.5 Figure shows a axial pin-jointed structure 123. The axial rigidity  $E_1 A_1$  and length is  $l_1$  for member 12 and axial rigidity  $A_2 E_2$  and length  $l_2$  for member 23. Use the Matrix method to find the Stiffness matrix [K].

**Fig.**

**20**

- Q.6 The thin-walled single cell beam shown in Figure has been idealized into a combination of direct stress carrying booms and shear stress only carrying walls. If the section supports a vertical shear load of 10 kN acting in a vertical plane through booms 3 and 6, calculate the distribution of shear flow around the section.

Boom areas:  $B1 = B8 = 200 \text{ mm}^2$ ,  $B2 = B7 = 250 \text{ mm}^2$ ,  $B3 = B6 = 400 \text{ mm}^2$ ,  $B4 = B5 = 100 \text{ mm}^2$

**Fig.**

**20**

- Q.7 An eccentrically loaded riveted joint to be designed for steel bracket as shown in figure. The bracket is 25mm thick. All rivets are to be of same size. Load on bracket  $P = 50 \text{ kN}$ , Rivet spacing  $C = 100 \text{ mm}$ . Permissible shear stress is 65 MPa and crushing stress is 120 MPa. Determine the size of rivets to be used for joint.

**Fig.**

**20**

**End Semester Examination, Dec. 2017**  
B. Tech. - Fifth / Sixth Semester  
**AIRCRAFT STRUCTURES-II (AE-503A)**

Time: 3 hrs.

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

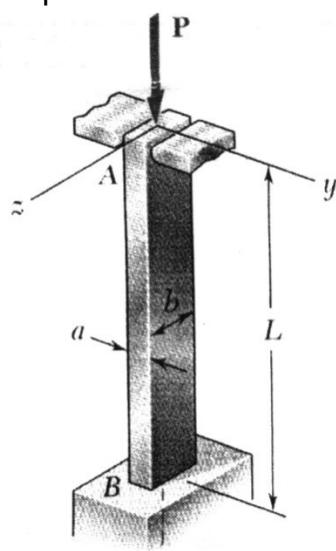
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1 Explain briefly the following:
- Difference between strut and column.
  - Euler's formula for calculating critical load.
  - Plane stress
  - Plane strain
  - Flutter instability
  - Aileron reversal
  - Properties of stiffness matrix.
  - Structural idealization
  - Margin of safety
  - Difference between butt and fillet welds.

**2x10**

### **PART-A**

- Q.2 An aluminium column of length L and rectangular cross-section has a fixed end at B and supports a centric load at A. Two smooth and rounded fixed plates restrain end A from moving in one of the vertical planes of symmetry but allow it to move in the other plane.



- Determine the ratio  $a/b$  of the two sides of the cross-section corresponding to the most efficient design against buckling.
- Design the most efficient cross-section for the column.

$$A = 20 \text{ in.} \quad E = 10.1 \times 10^6 \text{ psi}, \quad P = 5000 \text{ lbs}, \quad FS = 2.5$$

**20**

- Q.3 Consider buckling of a thin flat plate, consider case of the thin plate of loaded as shown, and simply supported along all four edges. What is the expression for the critical buckling stress as a function of width b and thickness t? Draw the buckling Modes for Long Plates and k-values for a Simply Supported Plate.

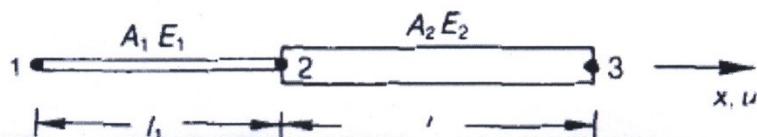
**20**

- Q.4 What is aeroelasticity? Explain Collar's triangle. What is difference between static aeroelastic phenomena and dynamic aero elastic phenomena?



**PART-B**

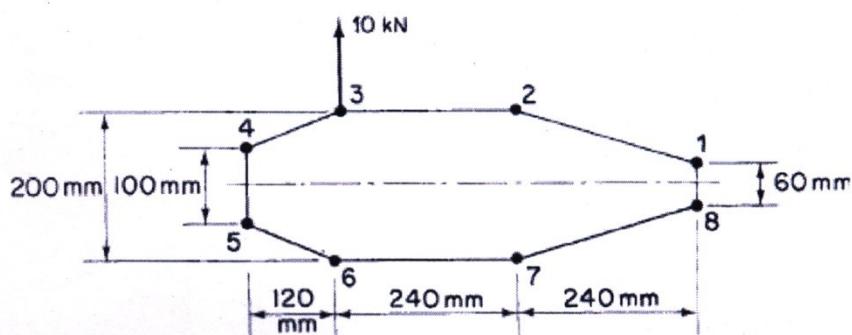
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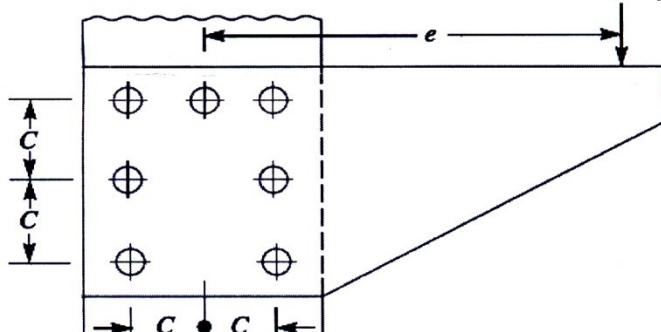
- Q.6 The thin-walled single cell beam shown in Figure has been idealized into a combination of direct stress carrying booms and shear stress only carrying walls. If the section supports a vertical shear load of 10 kN acting in a vertical plane through booms 3 and 6, calculate the distribution of shear flow around the section.

Boom areas:  $B_1 = B_8 = 200\text{mm}^2$ ,  $B_2 = B_7 = 250\text{mm}^2$ ,  $B_3 = B_6 = 400\text{mm}^2$ ,  $B_4 = B_5 = 100\text{mm}^2$



20

- Q.7 An eccentrically loaded riveted joint to be designed for steel bracket as shown in figure. The bracket is 25mm thick. All rivets are to be of same size. Load on bracket  $P = 50\text{kN}$ , Rivet spacing  $C = 100\text{m}$ . Permissible shear stress is 65 MPa and crushing stress is 120 MPa. Determine the size of rivets to be used for joint.



20

**End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

(The common data for the numerical problems is given in the starting. Make use of given data values only, any other assumed values will not be credited.)

**Common Data for the Numerical Problems:**

- Value of acceleration due to gravity:  $9.81 \text{ m/s}^2$ .
- Ambient density at sea-level:  $1.225 \text{ Kg/m}^3$ .
- Ambient density at 5 Km altitude:  $0.7364 \text{ Kg/m}^3$ .
- Ambient density at 10 Km altitude:  $0.4135 \text{ Kg/m}^3$ .
- Speed of Sound at 15 degrees C:  $340 \text{ m/s}$ .

**Q.1 Answer the following questions (**ANY TEN**):**

- What is profile drag?
- State and derive the hydrostatic equation.
- How the airspeed of an airplane is measured? Explain the mechanism.
- Define calibrated airspeed.
- What is dynamic pressure?
- What is drag polar?
- State a condition in which load factor has maximum value.
- What are effects of wing dihedral?
- What are the conditions for maximum range for a jet engine aircraft?
- What are the assumptions taken in finite wing theory?
- What are the conditions for maximum endurance of a piston-engine powered airplane?

**2x10**

**PART-A**

**Q.2** a) On a certain day the pressure at sea level is 758 mm of mercury ( $101059 \text{ N/m}^2$ ) and the temperature is  $23^\circ\text{C}$ . The temperature is found to fall linearly with height to  $-59^\circ\text{C}$  at 13 Km and after that it remains constant up to 20 Km. Calculate the pressure, density and kinematic viscosity at 8 Km and 16 Km altitude. **10**  
b) Explain various type of flaps used in aircraft with their uses.

**10**

**Q.3** A jet airplane with a weight of 450,000 N and wing area of  $110 \text{ m}^2$  has  $C_{Lmax}$  (with flaps) as 2.4. Obtain the take-off distance to 15 m screen height and the time taken for it.

Given that:  $V_1 = 1.12V_s$ ,  $V_2 = 1.22V_1$ ,  $C_L$  during ground run is 1.15,  
Drag polar with landing gear and flaps deployed is  $C_D = 0.044 + 0.05C_L^2$ ,  
Thrust variation during take-off can be approximated as:  $T = 128,500 - 0.085V^2$ ;  
where  $V$  is in Kmph and  $T$  is in Newtons and take-off takes place from a level, dry concrete runway ( $\mu = 0.02$  at sea level).

**20**

**Q.4** a) A piston engine aircraft is climbing at a constant Mach number of 0.6. Obtain the rate of climb when it is climbing at an altitude of 5 km. The following data has been given about the airplane:  
 $W = 54,000 \text{ N}$ ,  
 $S = 17 \text{ m}^2$ ,  
 $C_D = 0.017 + 0.055 C_L^2$ ,

And thrust available at 5 km altitude = 13,000 N.

**10**

- b) Consider a jet airplane with 20% of its weight as fuel fraction. It starts the cruise climb at an altitude of 11 Km. What will be the altitude at the end of cruise climb ( $h_f$ )?

Assuming  $V = 220$  m/s,  $TSFC = 0.6$  and  $(C_L/C_D) = 19$ , estimate the range in cruise climb ( $R_{cc}$ ). What is the angle of climb ( $\gamma_{cc}$ ) in cruise climb?

**10**

**PART-B**

- Q.5 An airplane stalls at  $M=0.25$  at sea level. What will be the Mach number and equivalent airspeed when it stalls at 5 km altitude? Compare the thrust required to maintain level flight near stall at the two altitudes. Assume the weight of the airplane to be same at the two altitudes.

**20**

- Q.6 Obtain the maximum speed and minimum speed in steady level flight at sea-level for the following airplane:

$$W = 36,250 \text{ N};$$

$$S = 28.0 \text{ m}^2;$$

$$C_D = 0.032 + 0.043C_L^2$$

$$BHP = 503 \text{ kW};$$

$$\text{Propeller efficiency} = 82\%;$$

$$C_{Lmax} = 1.5$$

**20**

- Q.7 An airplane with a weight of 156,960 N and a wing area of  $49 \text{ m}^2$  has a drag polar given by  $C_D = 0.017 + 0.06C_L^2$ . It accelerates under standard sea level conditions from a velocity of 100 m/s to 220 m/s. Obtain the distance covered and the time taken during the acceleration, assuming the thrust output to remain roughly constant at 53,950 N

**20**

# **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

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

- a) What are the primary and secondary controls? Give examples.
- b) What is the special feature of a Frise aileron and a Fowler flap?
- c) What is the difference between a hydraulic reservoir and a hydraulic accumulator? Write with respect to their usage.
- d) How is the pressure control carried out in hydraulic systems? Discuss with the help of a suitable diagram.
- e) When is the nose wheel steering carried out and when is the tail wheel steering required?
- f) Why is auxiliary fuel pump needed in aircraft fuel system? What type of pump is normally used for this purpose?
- g) How is oxygen leak check carried out and what precautions are taken during the leak check?
- h) Why are the emergency exits required on an aircraft and how they are operated?
- i) Name two halogens that are permitted for use in fire extinguishers in an aircraft. What is the alternative extinguishing agent in place of halogen?
- j) Name the typical zones on aircraft that require a fixed fire detection and fire extinguisher system.

**4x5**

### **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) Explain, with the help of a suitable system diagram, the function of vapour cycle air-conditioning system used in aircraft.

**10**

- b) With the help of suitable sketch explain the operation of an air cycle machine used in air-conditioning system.

**10**

- Q.6 a) Describe various forms of oxygen that are used normally in aircraft.

**10**

- b) Describe a continuous flow type oxygen system found on small to medium size aircraft.

**10**

- Q.7 a) Describe various types of fire detectors and extinguishers used in 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, Dec. 2017**

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.** Each question carries equal marks.

#### **Instructions:**

- Do not overstate your answers.
- Enumerate the equations wherever used in the derivations for quick reference.
- Use of calculator is permitted; however, sharing of calculator is not permitted.
- Do write the assumptions you are making while deriving an expression.

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

- a) Explain the term pedal-free directional stability.
- b) Explain how wing-sweep contributes to dihedral effect.
- c) Explain how sideslip is different from yaw.
- d) Which wing configuration has more longitudinal static stability, high wing or low wing? State with reason.
- e) Explain the term stick-fixed neutral point.
- f) Explain long period modes for an aircraft

**4×5**

#### **PART-A**

Q.2 a) Derive the expression for stick-fixed static stability for a tail-less aircraft.

**10**

- b) Explain the forward limit of center gravity for the static longitudinal stability. **10**

Q.3 a) Differentiate between pedal fixed and pedal free static directional stability. Derive and explain the contribution of power (tractor propeller) in the directional static stability of the aircraft.

**10**

- b) Explain how adverse yaw is brought about in an airplane. The wind tunnel tests on an airplane model indicate that full aileron deflection to right introduces an adverse yaw causing  $C_n = -0.008$ . How many degrees of rudder deflection must be applied to keep the sideslip zero during the roll? Given that:  $S = 16.4m^2, S_v = 2.1m^2, l_v = 5.5m, b = 9.8m, \eta_v = 0.95, C_{Lav} = 0.045$  per degree,  $\tau_{rudder} = 0.5$ .

**10**

- Q.4 Write short notes on:

- a) Elevons as substitute for elevators.
- b) Wing-body interference on tail.

**10x2**

### **PART-B**

- Q.5 Answer the following:

- a) Explain the concept of rudder lock.
- b) Explain the effect of acceleration on aircraft balancing.

**10x2**

- Q.6 a) Analyze and hence derive the expression for the spring-mass-damper system and discuss the conditions for overdamped, underdamped and critically damped system. **12**
- b) Write analytical expressions for the following, referring to above question:
- i) Period of oscillation.
  - ii) Damping frequency.
  - iii) Number of cycles to damp to  $1/n$  times the initial amplitude.
  - iv) Time to damp to  $1/n$  times the initial amplitude.

**8**

- 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. **10**
- b) Write a short note on 'cross coupling of lateral and directional effects in an aircraft'. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – 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.** Each question carries equal marks.

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

- a) During what performance segment in flight an aircraft is at slowest speed?
- b) What is the difference between an instantaneous and sustained turn?
- c) What are pusher and puller engines?
- d) How is the  $C_{D0}$  computed?
- e) What decides the a/c weight share to be taken by the main and the nose wheels?
- f) What is the difference between  $C_L$  and  $C_I$ ?
- g) What is the purpose of providing taper in a wing?
- h) What is critical Mach number?
- i) How does a wing-let reduce the induced drag?
- j) What is a Fowler flap?

**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) What are the requirements for the Taildragger and the tricycle landing Gears? **10**

b) Discuss various types of shock absorbers.

**5**

c) Sketch and discuss various gear retraction locations.

**5**

Q.6 a) Outline the methods of determining the subsonic  $C_{D_0}$  for design purposes .

**10**

b) Describe the method of designing the tail surfaces.

**10**

Q.7 a) What is load path, what principle for load path minimizes the structural weight? **5**

b) What is the established area rule for minimum 'wave drag'? What is 'Coke Bottling'? What are longitudinal contour guidelines for fuselage?

**7**

c) What are VTOL, STOL and Stealth aircraft, briefly describe the layout of a Stealth aircraft.

**8**

## **End Semester Examination, Dec. 2017**

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

**4×5**

### **PART-A**

Q.2 a) Derive the rotation matrix  $R$  for the given sequence of Euler angles successive principle rotations:  
 - A rotation  $\psi$  about the original  $z$ -axis.  
 - A rotation  $\theta$  about the intermediate  $y$ -axis.  
 - A rotation  $\phi$  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  $\psi$ ,  $\theta$ , and  $\phi$  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  $15^\circ$ . 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  $\Delta v$  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  $\Delta v$ . **10**
- Q.7 Write a short note on the Mars Science Laboratory. **20**

# **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester

## **VIBRATIONS AND AEROELASTICITY (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**. Each question carries equal marks.

**Q.1 Answer the following:**

- a) Define 'forced vibration'.
- b) Explain the beat phenomenon of a vibrating body.
- c) Show graphically, vector addition of forces in forced damped vibration.
- d) Write differential equation of free vibration with viscous damping.
- e) What is the application of Rayleigh energy method?
- f) Find longitudinal stiffness of a bar or a rod.
- g) Give one real life example of critical damping and under-damping.
- h) What are principal coordinates?
- i) What is divergence?
- j) What is control reversal?

**2x10**

### **PART-A**

**Q.2** a) An unknown mass  $m$  kg attached to the end of an unknown spring  $k$  has a natural frequency of 94 cpm (cycle per minute). When a 0.453 kg mass is added to  $m$ , the natural frequency is lowered to 76.7 cpm. Determine the unknown mass  $m$  and the spring constant  $k$  in N/m.

**8**

b) Give one example each of 1-DoF, 2-DoF, 3-DoF, clearly showing coordinates. **6**

c) Find equivalent spring constant of springs in parallel.

**6**

**Q.3** a) A heavy machine, weighing 3000 N, is supported on a resilient foundation. The static deflection of the foundation due to the weight of the machine is found to be 7.5 cm. Find stiffness of the foundation

**5**

b) Derive the response equation for critically damped system with spring-mass-damper. Show vector addition of all these forces. Draw the response curve. **15**

**Q.4** a) Write differential equation for 2-DoF system for forced vibrations, in detail starting with a free body diagram.

**10**

b) Find the natural frequencies and mode shapes of a spring-mass system for 2-DoF system which is constrained to move in the vertical direction only. Take  $m_1 = m_2 = m$  and  $k_1 = k_2 = k_3 = k$ .

**10**

### **PART-B**

**Q.5** What is divergence speed? Derive expression for divergence speed,  $V_d$  for a finite wing. **20**

- Q.6 a) What is flutter? What are the different types of flutter phenomena?  
**10**  
 b) Write response of a damped system under harmonic force. Explain the response graph and application of this system.  
**10**
- Q.7 a) How is buffeting different from flutter? What are the different types of flutter phenomena?  
**10**  
 b) What is quality factor? Draw the curve  $X/\delta_{st}$  Vs  $\omega/\omega_n$  showing quality factor, band width and half-power-point.  
**10**

### **End Semester Examination, Dec. 2017**

B. Tech. (Aeronautical) — Seventh / Eighth Semester  
**BOUNDARY LAYER THEORY (AE-802)**

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 Attempt **(any ten)** of the following question:
- Define momentum thickness.
  - Explain shape factor with relevant significance.
  - What is the difference between exact solution and approximate method?
  - Give an expression for Pohlhausen dimensionless quantity ( $\hat{\gamma}$ ) and define it with its physical interpretation for two dimensional flows.
  - Explain the physical significance with formulae of:
    - Prandtl number.
    - Eckert number.
  - Define forced and free flow.
  - Explain briefly the effect of transition over shape factor.
  - What is intermittency factor? How does it define the physical nature of the flow?
  - Write a short note on laminar airfoil.
  - Explain the method of injection of a different gas to control boundary layer control.
  - Define friction velocity.
  - What is Prandtl mixing length and explain its importance?
- 2×10**

#### **PART-A**

- Q.2 a) Derive an expression for displacement thickness with the help of appropriate diagram.  
 b) State all the assumptions and mention the physical interpretation briefly.  
 c) Define energy thickness? Explain the point of separation.  
 d) Explain general properties of boundary layer equation. **5×4**
- Q.3 a) Explain the two dimensional flow, using the approximate solution method due to Th. Von Karman and K. Pohlhausen. Also drive an expression for the displacement thickness, momentum thickness and viscous stress at the wall using this method. **10**

- b) Derive an exact solution for the axially symmetrical boundary layers for the rotation near the ground with the help of a diagram and give the theoretical explanation of the nature of flow. **10**

- Q.4 a) Discuss the outcome of the Navier-Stokes equation, using thermal boundary layer simplification.  
b) Derive the basic energy equation, using the first law of thermodynamics.  
c) Explain how and under what condition, Eckert number behaves like Mach number?  
d) Explain theoretically the effect of Prandtl number over the two boundary layers i.e. velocity boundary layer and thermal boundary layer. Explain the general properties of thermal boundary layer over the adiabatic wall.

**5x4**

### **PART-B**

- Q.5 Derive the Orr-Sommerfeld equation with the help of the method of small distribution as per the principle of the theory of stability of laminar flow. Further briefly explain the general properties of Orr-Sommerfeld equation. **20**

- Q.6 a) Explain the following methods of boundary layer control:  
i) Motion of the solid wall.  
ii) Suction.  
iii) Cooling of the wall. **10**  
b) Derive the fundamental equations of boundary layer suction with the help of a diagram and obtain a theoretical result using the approximation solution method. **10**
- Q.7 a) Explain the mean motion and fluctuations for turbulent flow. **5**  
b) Explain apparent or Reynolds stress in detail with all the assumptions. **5**  
c) Derive an expression for the stress tensor of Reynolds stress of turbulent friction from the Navier-Stokes equations. Explain the boundary conditions in detail. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester  
**ROCKETS AND MISSILES (AE-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 (**any five**) of the following questions:

- a) Obtain the rotation matrix for converting a vector in non-rotating geocentric equatorial frame to rotating geocentric frame. Assume that the geocentric frame which is fixed to Earth rotates with angular velocity  $\omega$  about the Z-axis of the non-rotating geocentric equatorial reference frame.
- b) Obtain the rotation matrix for converting a vector in rotating geocentric frame to vehicle centered horizontal frame. Assume that  $\psi$  is the geographic longitude and  $\phi$  is the geocentric latitude of the vehicle.
- c) State the equation for the velocity increment of a rocket in the free space. Use it to obtain the expression for velocity increment at burnout.
- d) Define the three rocket parameters. Express propellant ratio in terms of payload ratio and structural efficiency.
- e) State the condition for static longitudinal stability of a rocket vehicle.
- f) Differentiate between the two launch vehicle ascent trajectories, viz., Direct ascent and Hohmann Transfer Ascent based on location of summit point. In which case a parking orbit is used?

**4x5**

### **PART-A**

Q.2 a) Derive the equations of motion for rocket motion in a homogenous gravitational field assuming that the pitch program is known. Find the expression for the velocity as a function of time and calculate the culmination time if the mass ratio of the rocket is given as 12.10 and

assume it to have a thermal rocket engine of specific impulse 380s.

**10**

- b) Derive the expression for the ideal velocity of the multi-stage rocket.  
**10**

- Q.3 Obtain the expression for the normal force and the pitching moment coefficient for a rocket vehicle having four fins in cruciform configuration using the slender body theory. Explain the various types of drag forces that acts on a rocket and state which of these drag forces originates due to the presence of shock waves.  
**20**

- Q.4 Write the complete expression for converting the position and velocity vector of a satellite in terms of classical orbital elements.  
**20**

### **PART-B**

- Q.5 Explain the concept of staging and sub-rockets in launch vehicles by giving proper examples.  
**20**

- Q.6 Obtain the various expressions for differential changes in the orbit parameters due to injection point errors using Taylor series expansion ignoring the higher order terms. **20**

- Q.7 A rocket vehicle has 4 sub-rockets and the initial masses of the sub-rockets are given below:

$$M_{01} = 3,000 \text{ kg}$$

$$M_{02} = 1,750 \text{ kg}$$

$$M_{03} = 750 \text{ kg}$$

$$M_{04} = 250 \text{ kg}$$

All sub-rockets have same growth factor, 3.75, same propellant ratio, 0.6, and same structural efficiency, 0.35.

Find,

- i) Total structural efficiency of the rocket vehicle.
- ii) Velocity increment of sub-rocket 2 during motor operation in free space.
- iii) Burn-out velocities of all sub-rockets assuming the initial velocity of the rocket vehicle zero.

**20**

## **End Semester Examination, Dec. 2017**

B. Tech. — Seventh Semester  
**FLIGHT DYNAMICS (AE-824A)**

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.

### Instructions:

- Use ambient density at sea-level as  $1.225 \text{ Kg/m}^3$  and the acceleration due to gravity at the Earth surface as  $9.81 \text{ m/s}^2$ .
- Ensure that your calculations are having 4 decimal points precision.
- You may assume data wherever required however, you are not allowed to substitute the data values which are needed to be obtained by certain expected calculations.
- Use of calculator is permitted.

### Q.1 Answer the following questions (**any ten**):

- a) Define static and dynamic stability.
- b) Distinguish between stick-fixed and stick-free longitudinal stability.
- c) What are the conditions for longitudinal static stability and longitudinal control?
- d) How is wing dihedral used for lateral stability?
- e) What is a phugoid oscillation?
- f) What is the function of trim tab?
- g) Define the body axes system.
- h) Describe spiral divergence.
- i) What is meant by Dutch Roll?

- j) Define observability of a linear time-invariant system.  
k) Define controllability of a linear system.

**2x10**

### **PART-A**

- Q.2 An airplane has the following characteristics:  
 $C_{L_{aw}} = 0.082 \text{ deg}^{-1}$ ,  $C_{L_{at}} = 0.055 \text{ deg}^{-1}$ ,  $(dC_L/d\delta_e) = 0.032$ ,  $C_{hat} = -0.003 \text{ deg}^{-1}$ ,  $C_{h_{at}} = -0.0045$ ,  $i_w = 0$ ,  $\alpha_{OL} = -20$ ,  $i_t = -10$ ,  $\epsilon = 0.5$ ,  $S_t = 0.25 \text{ S}$ ,  $I_t = 3c$ ,  $(W/S) = 1500 \text{ N/m}^2$ , location of aerodynamic center =  $0.25c$ ,  $\eta = 1.0$ ,  $(C_{mac})_{f,n,p} = 0.37 \text{ rad}^{-1}$ . Obtain stick-fixed neutral point, stick-free neutral point, stick-free neutral point when  $C_{hat}$  is changed to 0.003.

**20**

- Q.3 A model of an airplane is tested in a wind tunnel without the vertical tail. Contributions of various components give  $C_{n\beta} = -0.0012 \text{ deg}^{-1}$ . If the vertical tail is to be positioned at a point on the aft end of the fuselage giving a tail length of 4.8 m, how much vertical tail area is required to give an overall  $C_{n\beta} = 0.0012 \text{ deg}^{-1}$ ? Assume that the vertical tail would have an effective aspect ratio of 2, the wing area is  $18 \text{ m}^2$ , wing span is 10.6 m and the wing is set at the middle of the fuselage.

**20**

- Q.4 a) Define the term maneuver point stick-fixed and maneuver point stick-free. Explain why for a given value of  $C_L$  the elevator deflection required in pull-up is more than that in a steady level flight.

**10**

- b) An airplane is equipped with a wing of aspect ratio 6 ( $C_{L_{aw}} = 0.05$ ) and span efficiency factor e of 0.90, with an airfoil section giving  $C_{mac} = 0.02$ . Calculate, for  $C_L$  between 0 and 1.5, the pitching moment coefficient of the wing about the center of gravity which is located 0.05c ahead of the aerodynamic center and 0.06c under aerodynamic center. Repeat the calculations when chord wise force component is neglected. Assume  $C_{D_{ow}} = 0.008$ ,  $\alpha_{OLw} = 1 \text{ degree}$ ,  $i_w = 5 \text{ degrees}$ .

**10**

### **PART-B**

- Q.5 The approximate form of Dutch roll mode can be described in the state-space form as:

$$\begin{bmatrix} \Delta\beta \\ \Delta\gamma \end{bmatrix} = \begin{bmatrix} Y_\beta/u_o & \frac{Y_\gamma}{u_o} + 1 \\ 0 & u_o \end{bmatrix} \begin{bmatrix} \Delta\bar{\beta} \\ \Delta\gamma \end{bmatrix} + \begin{bmatrix} \frac{Y_{\delta\gamma}}{u_o} \\ N_{\delta\gamma} \end{bmatrix} \Delta\delta_\gamma$$

It is given that,  $Y_\beta = -2.6 \text{ ms}^{-2}$ ,  $\gamma = -0.34 \text{ s}^{-1}$ ,  $\gamma = -1.572 \text{ ms}^{-2}$ ,  $Y\gamma = 0.741 \text{ ms}^{-1}$ ,  $u_0 = 51.33 \text{ ms}^{-1}$ ,  $N_\delta = 0.616 \text{ s}^{-2}$ , and  $N_\beta = 0.64 \text{ s}^{-2}$ .

- a) Examine the stability of the motion.

**10**

- b) Obtain the period of oscillatory mode and the time to damp to half amplitude.

**10**

- Q.6 Consider the control system given by the following state-space equation:

$$\dot{x} = Ax + Bu \text{ and } y = Cx + D$$

Where,

$$A = \begin{bmatrix} 1.05 & 3.10 & 1.00 \\ 4.00 & -3.20 & 0.75 \\ -2.50 & 0.00 & 1.00 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}, \quad C = [1 \ 1 \ 1], \quad D = 0$$

$x$  is the state-vector and  $u$  is the control input.

- a) Check if the system is controllable and observable.
- b) Comment on the stability of the system by giving proper justification
- c) Design a full-state feedback controller for the above system so that, the final closed loop system has poles at  $s = -1$ ,  $s = -0.5$  and  $s = -5$ .

**20**

- Q.7 Derive the approximate equations of aircraft longitudinal dynamics using small perturbation theory.

**20**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh 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.** Each question carries equal marks.

- Q.1 Answer the following questions with help of diagrams:

- a) Discuss any two basic configurations of wind turbines?
- b) Explain the term rated wind speed  $V_r$ .
- c) Different types of generators used in wind turbine.
- d) What are wind farms? Give an example of a wind farm used in India.
- e) Explain relative velocity in wind turbine.
- f) What are drag-type turbines? Explain briefly.
- g) Explain the significance of angle of attack and chord in a wind turbine aerofoil.
- h) What is turbine's swept area? Explain with the help of a diagram.
- i) Explain a Savonius rotor.

- j) What will be the dimensions of 100kW wind turbine? Assume standard data. **2x10**

### **PART-A**

- Q.2 What is the Betz limit? Why is Betz limit important? Derive Betz limit using axial momentum theory. **20**
- Q.3 What are the different configurations of Wind Turbines? Explain each configuration with the help of diagrams. Discuss their characteristics curves. **20**
- Q.4 a) What is meant by cut-in speed, Rated wind, cut out speed? What are major components and specifications of EDRA NASA 100-kilowatt experimental wind turbine? **6**  
b) Consider a wind turbine with 5m diameter rotor. Speed of the rotor at 10 m/s wind velocity is 130rpm and its power coefficient at this point is 0.35. Calculate the tip speed ratio and torque coefficient of the turbine. What will be the torque available at the rotor shaft? Assume the density of air to be  $1.24 \text{ kg/m}^3$ . **14**

### **PART-B**

- Q.5 The active power in a circuit is 5000 W and the power factor is 0.7. How much is the current in the circuit, if the applied voltage is 220 V? What are harmonics? Are they good or bad? In a wind farm, the outputs from all turbines are connected to a collector. Why is each wind turbine not connected to the grid separately? **20**
- Q.6 a) What are the environmental impacts and benefits of wind power? **10**  
b) Why do wind turbines interfere with communications? What are the points to be considered for employing wind turbines in residential areas? **10**
- Q.7 Investigate the WECS viability in respect to wind speed variation with time, height, terrain and geographic zone .Find the power in the wind for an area of a circle whose diameter is 100 m, if the air density is  $1.23 \text{ kg/m}^3$  and wind speed is 8m/sec. **20**

## **End Semester Examination, Dec. 2017**

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:

- What is a substantial derivative? What are its components? Explain their physical meaning.
- What do you understand by primitive and flux variables?
- Define Jacobian. Where do we use it in the study of CFD?
- Write the continuity equation for a finite control volume fixed in space. Discuss the significance of its terms.
- Differentiate between direct transformation and inverse transformation. Discuss both.

f) What is a turbulence model? Classify the most common turbulence models. **4x5**

### **PART-A**

- Q.2 a) Discuss the classification of quasi-linear partial differential equations using Cramer's rule for finding the velocity derivatives. Briefly discuss the general behavior of hyperbolic, parabolic and elliptic equations. Name the types of flows which are governed by each of the above types of equations. **16**
- b) Explain the meaning of a well-posed problem. **4**

$$\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2}$$

- Q.3 a) Consider one-dimensional heat conduction equation  $\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2}$ . Using this equation, explain explicit and implicit approaches for time marching. **15**
- b) What are the relative advantages and disadvantages of explicit and implicit approaches used for CFD solutions? **5**

- Q.4 Explain the Lax-Wendroff technique for time marching solution of flow parameter. Specify the flow conditions assumed. Write if you feel there is any specific difficulty in using this technique which makes MacCormack's technique more suitable. **20**

### **PART-B**

- Q.5 Explain the concept of staggered grid with proper grid illustrations for u-cell and v-cell. Why do we need staggered grid arrangement? Using the governing x- and y-momentum equations for incompressible viscous flow in conservation form, derive the pressure correction formula. Discuss the philosophy of pressure-correction method. **20**

- Q.6 Consider a plate of thickness  $L = 2$  cm, thermal conductivity  $k = 0.5$  W/mK, and volumetric heat generation  $q = 1000$  kW/m<sup>3</sup>. The faces of the plate are maintained at 100°C and 200°C respectively. Assuming one-dimensional heat transfer across the thickness  $L$ , explain how we can obtain temperature distribution numerically across the thickness of plate. **20**

- Q.7 Explain how the following methods are used for studying turbulence:

- a) Large Eddy Simulation method.  
b) Direct Numerical Simulation.

10x2

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh / Eighth 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 a) Give the relations between surface integral, volume integral and line integral for a control surface around a control volume.  
b) For flow over a flat plate, write on the behaviour of governing equations used for solving the flow under following cases:  
i) Subsonic flow ( $M < 0.4$ )

- ii) Supersonic flow ( $M > 1.5$ )
- c) What are time marching and space marching? Can a governing equation involve both space and time marching? Give an example for the same.
- d) What are conservation and non-conservation forms of equations?
- e) Define 'explicit and implicit schemes'.
- f) Define: i) Computational plane. ii) Physical plane.
- g) What is PISO model? To which type of flows can it be applied and why?
- h) What is the difference between RANS, LES and DNS?
- i) List out different RANS techniques for flow computation.
- j) Give the relations for:
  - i) Length scale ratio.
  - ii) Time scale ratio.
  - iii) Velocity scale ratio.

**2x10**

### **PART-A**

- |     |   |           |
|-----|---|-----------|
| Q.2 | a) Derive the 3D Momentum equation for viscous flow.  | <b>8</b>  |
|     | b) Derive the 3D Energy equation for viscous flow.  | <b>7</b>  |
|     | c) Write a note on the governing equations of CFD for a 3D flow.  | <b>5</b>  |
| Q.3 | a) Define FDM. Briefly explain the governing equation for discretization used in FDM.   | <b>4</b>  |
|     | b) Differentiate explicit and implicit approaches with a proper example for each.   | <b>6</b>  |
|     | c) Give the error analysis and calculate the CFL for 1D heat conduction equation.   | <b>10</b> |
| Q.4 | a) Write notes on following: <ul style="list-style-type: none"> <li>i) Hyperbolic equations.</li> <li>ii) Elliptic equations.</li> <li>iii) Parabolic Equations.</li> </ul> | <b>10</b> |
|     | b) Describe metrics and Jacobians? Give the governing equation of CFD in vector form and explain each term.   | <b>7</b>  |
|     | c) Give the transformed 2D continuity equation for the stretched grid of following transformation:<br>$\gamma = \frac{y}{x}$  | <b>3</b>  |

### **PART-B**

- |     |   |           |
|-----|---|-----------|
| Q.5 | a) Write a note on pressure correction method and list out the steps for SIMPLE algorithm.  | <b>10</b> |
|     | b) Write a note on 'lax-wendroff scheme'.   | <b>6</b>  |
|     | c) Write a note on 'over relaxation technique'.   | <b>4</b>  |
| Q.6 | a) Describe the methodology for 1D and 2D diffusion.  | <b>7</b>  |
|     | b) Write a note on convection-diffusion problem using Central differencing scheme.  | <b>6</b>  |
|     | c) Draw the flow charts for: <ul style="list-style-type: none"> <li>i) SIMPLE Algorithm.</li> <li>ii) SIMPLEC Algorithm.</li> </ul> | <b>7</b>  |
| Q.7 | a) Write a note on 'McCormack scheme'.  | <b>7</b>  |
|     | b) Explain: <ul style="list-style-type: none"> <li>i) Mixing length Model.</li> <li>ii) Spalart-Allamaras Model.</li> </ul>         | <b>5</b>  |
|     | c) Explain and derive the Filtered Unsteady NSE.  | <b>8</b>  |

## **End Semester Examination, Dec. 2017**

B. Tech. - Seventh 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:

- a) What is the physical meaning of divergence of the velocity? Explain the meaning of  $\nabla \cdot (\rho u V), \nabla \cdot (\rho v V) \wedge \nabla \cdot (\rho w V)$ .

- b) Explain briefly the difference between under-relaxation and over-relaxation. Where do we use them and which one is generally preferred or used?
- c) Draw the domain and boundaries for the solution of elliptic equations in two dimensions and discuss the flow type.
- d) Write the total differential of velocity  $u$  for a 3-D flow. What are the first order and second order metric terms in a generic transformation equation?
- e) Define stress tensor  $\tau_{ij}$  and strain tensor  $\varepsilon_{ij}$ . Write Boussinesq approximation.
- f) For a turbulent flow, define:
  - i) Time average of fluctuations,  $\bar{\phi}'$
  - ii) rms value of flow property,  $\bar{\phi}$
  - iii) Kinetic energy per unit mass,  $k$
  - iv) Turbulence intensity,  $T_i$

**4x5**

### **PART-A**

- Q.2 a) For the governing equation of flow most suited for CFD, in conservation form, namely,

$$\frac{\partial U}{\partial t} + \frac{\partial F}{\partial x} + \frac{\partial G}{\partial y} + \frac{\partial H}{\partial z} = J \quad \text{15}$$

- b) Discuss briefly the general behavior of hyperbolic and parabolic equations. **5**

- 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?

**5**

- Q.4 Explain the transformations used for the generation of (i) Stretched grids in case of boundary layer flow over a flat surface and (ii) Elliptic grid for flow around airfoil. **20**

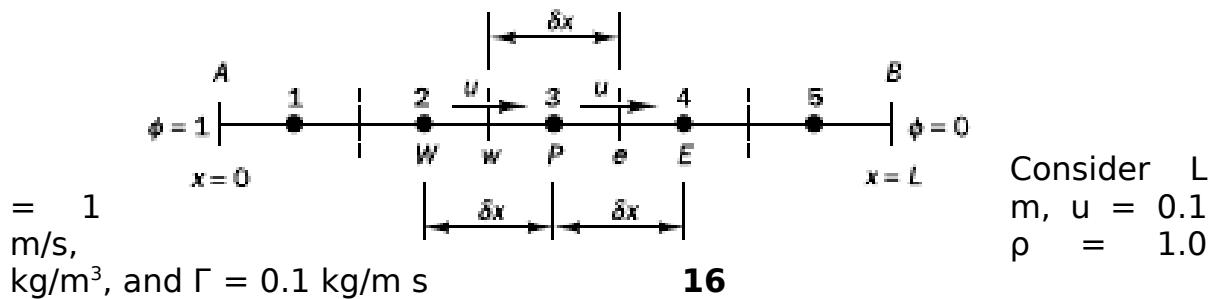
### **PART-B**

- Q.5 Explain the concept of staggered grid with proper grid illustrations for u-cell and v-cell. Why do we need such arrangement? Using the governing x- and y-momentum equations for incompressible viscous flow in conservation form, derive the pressure correction formula. Discuss the philosophy of pressure-correction method. **20**

- Q.6 a) What is upwind differencing vis-à-vis central differencing?

**4**

- b) Explain how a typical problem of convection and diffusion through a one-dimensional domain can be solved by using the upwind differencing scheme. The problem domain is shown in the figure below:



- Q.7 a) Write the governing equations for turbulent kinetic energy  $k$ , and rate of viscous dissipation  $\varepsilon$  as per  $k-\varepsilon$  model of turbulence and explain the effect of each term contained therein.

**15**

- b) How does the Reynolds Stress Model differ from  $k-\varepsilon$  model of turbulence?

**5**

## End Semester Examination, Dec. 2017

B. Tech. — Third / Fourth Semester

### **BASICS 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) What is the function of differential?
- b) What are the salient features of saloon car?
- c) What is the function of a carburetor?
- d) What is the function of a spark plug?
- e) What is the function of a torsional spring in friction plate?
- f) State four requirements of a wheel.
- g) What is aspect ratio of a tyre?
- h) How a tandem master cylinder different from a normal master cylinder?
- i) Name four types of steering gears.
- j) Why skidding take place in a vehicle? How it can be prevented?

**2×10**

#### **PART-A**

- Q.2** a) Name the different parameters used for specifying a vehicle and explain the importance of each. **10**
- b) Give the specification of any car running on Indian road. **5**
- c) On a hilly track performance of rear wheel drive vehicle is superior as compared to the front wheel type vehicles. Explain the reason for same. **5**
- Q.3** a) Explain the following with the neat sketch:  
i) CRDI system.  
ii) DTSSI system. **5×2**
- b) Explain the working of splash lubricating system with the help of a neat sketch. **10**
- Q.4** a) With the help of suitable diagrams, describe the constructional features of a diaphragm spring type of clutch. Discuss its advantages in relation to the clutch employing helical spring. **10**
- b) Explain the construction and working of synchromesh gear box in detail. **10**

#### **PART-B**

- Q.5** Explain with sketches the following terms and their effects:  
a) Castor.  
b) Camber.  
c) King pin inclination.  
d) Scrub radius. **5×4**
- Q.6** a) Classify brakes & explain the requirements of automobile brakes. **10**
- b) Draw a simple diagram to show the layout of hydraulic operated four wheel brakes system and explain its working in detail. **10**
- Q.7** a) Name different type wheel rims. Explain anyone with the help of a neat sketch. **10**
- b) Write short notes on the following:  
i) Wheel balancing.  
ii) Tubeless tyres.  
iii) Spoke wheel.

## End Semester Examination, Dec. 2017

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**. Each question carries equal marks.

**Q.1 Answer the following:**

- a) What are the advantages of catalytic cracking over thermal cracking?
- b) What do you understand by isomerisation?
- c) What are the prime functions of lubricant in an engine?
- d) What are the requirements of a good fuel?
- e) What are two delays occur in ignition delay period?
- f) Write the advantage and disadvantage of alcohol as a fuel.
- g) What are the disadvantages of using hydrogen as a fuel?
- h) Define the term ‘lubricant and lubrication’.
- i) What is a lubricating emulsion?
- j) What is hydrodynamic lubrication?

**2×10**

### **PART-A**

- Q.2** a) With the help of a neat sketch, explain the crude oil refining process. In the sketch show at what temperature different products are obtained? **10**
- b) What are different kinds of fuels used in I.C. engines? Discuss merits and demerits of liquid fuel in detail. **10**

**Q.3** Write short notes on:

- a) Aniline point.
- b) Decomposition stability.
- c) Precipitation number.
- d) Steam emulsion number.

**5x4**

- Q.4** a) Bring out clearly the process of combustion in CI engines and also explain the various stages of combustion in detail. **10**
- b) What are the various factors affecting the flame speed in SI engines? **10**

### **PART-B**

- Q.5** a) Explain the reasons for looking for alternate fuels for IC engines. List some alternative fuels. **10**
- b) What is natural gas? What are its major constituents? List the advantages and disadvantages of using natural gas as alternate fuels for SI engines? **10**
- Q.6** a) What are the various desired properties of a lubricant and explain how do additives help to achieve the desired properties. **10**
- b) What are the requirements for automotive lubricants? **10**
- Q.7** a) Explain the mechanism of lubrication in detail. **10**
- b) Define and differentiate between:
- i) Hydrodynamic lubrication.
  - ii) Elasto hydrodynamic lubrication.

**5x2**

## End Semester Examination, Dec. 2017

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**. Each question carries equal marks.

**Q.1** Answer the following questions:

- a) Explain positive and negative earthing.
- b) Write troubleshooting of lead-acid battery.
- c) Describe various torque terms associated with starting motor.
- d) Explain latest trends in automotive electronic engine management system.
- e) Write the function and construction of spark plug.

**4×5**

#### **PART-A**

- Q.2** a) Explain the classification of automotive electrical system. **15**  
b) Differentiate between earth and insulated return system. **5**
- Q.3** a) Explain in detail the battery testing methods. **10**  
b) Explain long life batteries such as alkaline battery and its advantage over lead acid battery. **10**
- Q.4** a) Explain in detail the characteristics principle and construction of starter motor. **10**  
b) Write short notes on the following:  
i) Role of bridge rectifier in alternator.  
ii) Compensated voltage regulator. **5×2**

#### **PART-B**

- Q.5** a) Explain onboard diagnostic system and warning system. **10**  
b) Explain programmable logic controls. **10**
- Q.6** a) Discuss the composition of ignition system and its types. **10**  
b) What is inlet manifold vacuum advance system? Explain with a neat sketch. **10**
- Q.7** Explain the following terms:  
a) Energy demand.  
b) Head light dazzle.  
c) Circuit breakers.  
d) Role of FUSES. **5×4**

# **End Semester Examination, Dec. 2017**

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:**

- a) What is meant by endurance strength of a material?
- b) Write Soderberg's equation and state its application to different type of loadings.
- c) How are the shafts formed?
- d) A hollow shaft has greater strength and stiffness than solid shaft of equal weight. Explain.
- e) What is nipping in a leaf spring?
- f) List the important physical characteristics of a good bearing material.
- g) What are the merits and demerits of gear drives?
- h) Explain the different causes of gear tooth failures.
- i) Explain the various stresses induced in the connecting rod.
- j) What are the different design considerations for piston of an I. C. engine?

**2×10**

### **PART-A**

**Q.2** A bar of circular cross-section is subjected to alternating tensile forces varying from a minimum of 200 kN to a maximum of 500 kN. It is to be manufactured of a material with an ultimate tensile strength of 900 MPa and an endurance limit of 700 MPa. Determine the diameter of bar using safety factors of 3.5 related to ultimate tensile strength and 4 related to endurance limit and a stress concentration factor of 1.65 for fatigue load. Use Goodman straight line as basis for design. **20**

**Q.3** A solid circular shaft is subjected to a bending moment of 4000 N-m and a torque of 12000 N-m. The shaft is made of 45 C 8 steel having ultimate tensile stress of 680 MPa and a ultimate shear stress of 455 MPa. Assuming a factor of safety as 6, determine the diameter of the shaft. **20**

**Q.4** A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 N/mm<sup>2</sup>. The speed of the journal is 900 r.p.m. 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:

- a) The amount of artificial cooling required.
- b) 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 pair of straight teeth spur gears, having  $20^\circ$  involute full depth teeth is to transmit 12 kW at 300 r.p.m. of the pinion. The speed ratio is 3 : 1. The allowable static stresses for gear of cast iron and pinion of steel are 60 MPa and 105 MPa respectively. Number of teeth of pinion=16; Face width=14 times module; Determine the module, face width and pitch diameter of gears. Assume data, if required. **20**
- Q.6 Design crown of piston, radial ribs and piston rings of a cast iron piston for a single acting four stroke engine for the following data: cylinder bore=100 mm; stroke=125 mm; Max.gas pressure=5N/mm<sup>2</sup>; Mechanical efficiency=80%; Fuel consumption. 0.15 kg per brake power per hour, HCV of fuel= $42 \times 10^3$  kJ/kg; Speed=2000 rpm. Any other data required for the design may be assumed. **20**
- Q.7 Design I-section connecting rod an I.C. engine running at 1700 rpm and developing a maximum pressure of 5.0 N/mm<sup>2</sup>. The diameter of the piston is 100m; mass of the reciprocating parts per cylinder 3.5 kg; length to connecting rod 400mm; stroke of piston 200mm and compression ratio 6:1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressures as 10N mm<sup>2</sup> and 15N mm<sup>2</sup>. The density of material of the rod may be taken as 6500kg/m<sup>3</sup> and the allowable stress in the bolts as 55N/mm<sup>2</sup> and in cap as 75N/mm<sup>2</sup>. The rod is to be of I-section for which you can choose your own proportions. Use Rankine formula for which the numerator constant may be taken as 320N/mm<sup>2</sup> and the denominator constant 1/7500. **20**

## **End Semester Examination, Dec. 2017**

B. Tech. (Automobile) – 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.** Marks are indicated against each question.

Q.1 Answer the following questions:

- a) Enumerate important criteria for a service station layout planning.
- b) What is tyre rotation and why it is necessary?
- c) What is job card? Explain its importance.
- d) Describe operation of bearing puller.
- e) Define brake grabbing, brake noise and brake pulsation.
- f) What is extended warranty? When it is provided?
- g) Define the term oversteer and understeer.
- h) What is predictive maintenance?
- i) Explain valve seat lapping.
- j) What are the different observations can be drawn by exhaust smoke?

**2×10**

### **PART-A**

Q.2 a) What are the different important criteria for the site selection of service station? **5**

b) Name the different types of service stations. Explain each of them in detail. **15**

Q.3 a) Explain the engine removal process in detail. **10**  
b) Explain the working of five important tools of an automobile workshop with the help of neat sketch. **10**

Q.4 a) Explain the following engine block service processes:

- i) Cylinder honing.
- ii) Cylinder liner fitting.

**5×2**

b) Explain possible faults for the following symptoms:

- i) Engine starts but stops immediately.
- ii) Engine runs at irregular idle speed.

**5×2**

### **PART-B**

Q.5 a) Explain the working of following components of injection system:

- i) Fuel pump.
- ii) Electronic control unit.
- iii) Fuel filter.
- iv) Lamda sensor.
- v) Fuel injector.

**3×5**

- b) Explain the testing and cleaning of petrol injectors. 5
- Q.6 a) Explain the procedure to be followed for diagnosis the fault in the manual transmission. 10  
 b) What are the common clutch problems? Explain the corrective measures in detail. 10
- Q.7 a) Why bleeding of brake fluid is required? Explain any two method of carrying it. 10  
 b) Explain with the help of neat sketches the effect of tyre pressure on tyre wear behavior. 10

### **End Semester Examination, Dec. 2017**

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 Short answer type questions:  
 a) What is global warming?  
 b) Enlist pollution effects on human health.  
 c) Name of harmful gases present in exhaust gases.  
 d) What is NOx?  
 e) What do you mean by the poly nuclear hydrocarbons?  
 f) What do you mean by EURO thousands of pollution?  
 g) What are the green house effects?  
 h) What is the purpose of chassis dynamometer?  
 i) What are the methods to reduce noise pollution?  
 j) What is engine knocking? **2×10**

#### **PART-A**

- Q.2 a) Explain with proper diagram crankcase emission and its effects.  
 b) What is evaporative emission? Explain in detail. **10×2**
- Q.3 a) Explain under what condition NOx formation takes place in case of SI engine.  
 b) Explain how the effect of design and operating variables takes place on emission formation? **10×2**
- Q.4 Explain the disadvantages of emission of poly nuclear HC and how their compound reacts with nitric acid and sulfuric acid to form NOx or Sox which further produce gases responsible for photochemical smoke formation and finally acid rain that damage ozone layer. **20**

#### **PART-B**

- Q.5 What modifications are made in design to reduce the total emission, specially NOx emissions? Explain in detail. **20**
- Q.6 a) Describe the exhaust gas recirculation.  
 b) Explain construction, working and application of catalytic converters. **10×2**
- Q.7 Explain the following in brief with neat sketch:  
 a) Emission standard.  
 b) Smoke meter. **10×2**

## **End Semester Examination, Dec. 2017**

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** Short answer type questions:

- a) What are the main components of air pollution?
- b) When was motor vehicle act implemented in India?
- c) What are the roles of driving schools?
- d) What do you understand by revocation of driving licence?
- e) What is the need of vehicle registration?
- f) What is the procedure for vehicle insurance claim settlement?
- g) What is Special Economic Zone?
- h) What are the emissions standards as per Bharat stage 4?
- i) What is the role of speed governors in automobiles?
- j) How noise from automobiles can be reduced?

**2×10**

#### **PART-A**

**Q.2** What are the procedures for the enactment and implementation of motor vehicles air pollution by?

- a) Central government.
- b) State government.

**10×2**

**Q.3** Explain the following associated with Licensing as per CMV Act.

- a) Renewal of licenses.
- b) Suspension of licenses.

**10×2**

**Q.4** a) How do the address and transfer of ownership in vehicle registration copy is changed?  
b) What is hire and purchase? Explain with suitable example.

**10×2**

#### **PART-B**

**Q.5** What is a permit? What is the procedure for permit grant? Explain different types of permits in detail. **20**

**Q.6** Explain in detail, prevention, control and abatement of environmental pollution. **20**

**Q.7** What are the guidelines given in MV Act and Central Motor Vehicle Rules regarding:  
a) Auto exhaust pollution.  
b) Rent a car scheme.

**10×2**

## **End Semester Examination, Dec. 2017**

B. Tech.- Sixth / Seventh 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 Explain following terms in brief:
- Linearity and sensitivity of an instrument.
  - Transfer characteristics of a transducer.
  - Methods of measurement of force.
  - Working of bellows.
  - Working of 'hex tip' screwdriver.

**4x5**

### **PART-A**

- Q.2 A voltmeter with internal resistance of  $200\text{ k}\Omega$  is connected across an unknown resistance. It reads 250 volts and the milliammeter (with very small internal resistance) connected in series with the same resistance reads 10 mA.

Determine:

- The apparent resistance, actual resistance and the loading error due to the loading effect of the voltmeter.

**10**

- If the same voltmeter and milliammeter when connected to another unknown resistance 100 v and 2A respectively, determine the loading error in this case. **10**

- Q.3 Describe with the help of neat and labeled diagrams, four mechanical devices used as primary detectors. Relate their output in terms of their physical dimensions. **20**

- Q.4 Explain how to measure the power by using rope brake dynamometer? Explain with a neat diagram.

**20**

### **PART-B**

- Q.5 Describe with the help of neat diagram, the construction and working of 'McLeod gauge' for low pressure (vacuum) measurement.

**20**

- Q.6 How to measure temperature of very hot bodies (above 650°C)? Explain the construction and working of 'total radiation pyrometer' with help of a neat diagram. **20**
- Q.7 Explain the working of following tools:  
 a) Combination wrench.  
 b) Ratchet socket wrench.  
 c) Measuring wheel (distance measurement)  
 d) Micrometer.
- 5x4**

**End Semester Examination, Dec. 2017**  
 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**. Marks are indicated against each question.

- Q.1 Answer the following questions:  
 a) Write design variables affecting performance of CI engines.  
 b) Write operating variables affecting emission of CI engines.  
 c) Differentiate between sedan and hard top.  
 d) What is the importance of downward visibility?  
 e) Define the term tractive effort.  
 f) What is the significance of mean effective pressure?  
 g) List and define various resistances against vehicle motion.  
 h) Describe four advantages of GRP.  
 i) List various body trim items.  
 j) What is a F.R.P.? Indicate its merits and demerits as body material. **2x10**

**PART-A**

- Q.2 a) 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? **15**  
 b) Explain how varying number of cylinders of an IC engine affect its performance. **5**
- Q.3 a) Describe the vehicle according to its body shapes. **10**  
 b) Discuss the different methods of improving visibility. **10**
- Q.4 a) Explain various flow visualization techniques. **10**  
 b) Explain how wind tunnel testing helps in improving its vehicle aerodynamics? **10**

**PART-B**

- Q.5    a) Explain tractive effort and obtain an expression for tractive effort as function of engine torque. 10  
       b) Explain resultant forces at various crank angles. How is it used to calculate the power of an engine? 10
- Q.6    a) What is mean effective pressure? Write the steps to find mean effective pressure for IC engine. 10  
       b) Explain PV diagrams used for SI and CI engines. 10
- Q.7    a) Explain the painting procedure adopted for a car. 10  
       b) Explain the usage of various plastics in vehicle body construction. 10

### **End Semester Examination, Dec. 2017**

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    a) What is fuel cell?  
       b) List features to be considered for car designed for aging population.  
       c) How fuel cell is better than battery?  
       d) Define turbo lag.  
       e) What are capacitors?  
       f) What are the advantages of regenerative braking system?  
       g) List various types of sensors used in an automobile.  
       h) How EGR affects the emission of a diesel engine?  
       i) What are the various methods for changing valve timing of an engine?  
       j) Brief the cylinder deactivation in vehicles engine. **2×10**

#### **PART-A**

- Q.2    a) Discuss challenges of automobile industry for 21<sup>st</sup> century vehicles in terms of energy and environment. **10**  
       b) Explain the terms:  
           i) Brand management.  
           ii) Customer relationship management. **5×2**
- Q.3    a) Explain the working of the following:  
           i) Alkaline fuel cell.  
           ii) Molten carbonate fuel cell.  
           iii) Solid oxide fuel cell.  
           iv) Proton exchange membrane fuel cell. **5×4**
- Q.4    a) Explain the 42 volt system. What are the challenges of 42 volt system? **10**

- b) Explain the working of:  
 i) Electromagnetic valves.  
 ii) Camless engine actuation. 5×2

### **PART-B**

- Q.5 a) What is the difference between hybrid electric vehicles and battery electric vehicles? Explain with constructional and functional details. 10
- b) Explain the following:  
 i) Series hybrid electric vehicles.  
 ii) Parallel hybrid electric vehicles. 5×2
- Q.6 a) Discuss ‘Start Stop Operation’. How it is environment friendly technology?  
 b) Explain integrated starter generator with constructional details and benefits. 10×2
- Q.7 a) What is X by wire technology?  
 b) Explain steer by wire and brake by wire. What are their limitations and advantages? 5  
15

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) List features to be considered for new cars in mega cities.  
 b) How EGR affects the emission of a diesel engine?  
 c) Why hydrogen fuel cell is an important alternate propulsion technology?  
 d) How does a fuel cell differ from traditional methods of energy generation (like batteries)?  
 e) Define Turbolag?  
 f) How EGR affects the emission of a diesel engine?  
 g) What is the advantage of a PHEV to the environment?  
 h) How are ultra-capacitors beneficial for electric automobiles?  
 i) What is regenerative braking system?  
 j) What is integrated starter generator?
- 2x10**

### **PART-A**

- Q.2 a) Discuss the alternative mobility sources developed to use for future cars. 10
- b) Explain the terms:  
 i) Products development management.  
 ii) Quality management. 5x2
- Q.3 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.4 a) How today's diesel engine is different from that used a decade before?  
 Discuss it in terms of:  
 i) Performance.  
 ii) Emission.  
**10**
- b) What are the various devices used to enhance the performance of a diesel engine.  
**10**

### **PART-B**

- Q.5 a) How a series HEV is different from a parallel HEV?  
**8**
- b) What is the difference between hybrid electric vehicles and battery electric vehicles? Explain with constructional and functional details.  
**12**
- Q.6 a) What is start stop operation? How it can be achieved in a vehicle? List its benefits.  
**10**
- b) Discuss the need of new energy storage media.  
**10**

- Q.7 a) Explain various power assist technologies in vehicles? How it is different from X-by wire technology?  
**10**
- b) Explain semi-active and fully active suspension system in detail.  
**10**

### **End Semester Examination, Dec. 2017**

B. Tech. (Biotechnology) — First / Second Semester  
**ELEMENTS OF BIOTECHNOLOGY (BT-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:
- Enlist five differences between living and non-living things.
  - What are the different ways by which a population can be separated?
  - State the function of endoplasmic reticulum.
  - Why are chromosomes called hereditary vehicles?
  - What is a codon? Give an example
  - What is Turner's syndrome?
  - Oil does not dissolve in water. Explain.
  - Mention the role of DNA helicase in replication.
  - What are the applications of cryopreservation?
  - Enumerate the uses of embryonic stem cell.

**2x10**

### **PART-A**

- Q.2 a) State the theory of "Abiogenesis". Explain Darwin's theory of natural selection. **10**  
b) Discuss evolution of life. What are the different theories and evidences? **10**
- Q.3 a) How are eukaryotes more advanced than prokaryotes? **5**  
b) How is mitosis different from meiosis? **15**
- Q.4 a) Describe various types of chromosomal mutations. **10**  
b) Give the salient features of genetic code. **10**

### **PART-B**

- Q.5 a) Discuss DNA replication with a suitable diagram. **12**  
b) Explain the difference between saturated and unsaturated fat. **8**
- Q.6 a) Describe the procedure for DNA fingerprinting. How are DNA fingerprints analyzed? **14**  
b) Mention the types of gene banks and discuss their utility. **6**
- Q.7 a) Enlist the importance of biotechnology in human health and its commercial and entrepreneurship potentials. **12**  
b) Elaborate the biosafety risk classification and its significance. **8**

## **End Semester Examination, Dec. 2017**

B. Tech. — Second Semester  
**BIOMOLECULES (BT-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 briefly the following questions:
- Name and draw the structure of a tripeptide molecule.
  - Describe electrophoresis with figure.
  - Give the ring structures of sucrose and lactose, highlighting the glycosidic linkages.
  - Write a note on essential fatty acids.
  - Define heteropolysaccharides.
  - Define mutarotation.
  - What do you mean by co-enzymes and co-factors?
  - Write a note on denaturation of DNA strands.
  - Write different forms of DNA with their characteristic features.

j) Write different types of buffers.

**2×10**

### **PART-A**

- Q.2 a) Write the importance of non-covalent interactions in biological systems. **12**
- b) Define different units of measuring concentration of solutions:
- i) Molarity.
  - ii) Normality.
  - iii) Molality.
  - iv) PPM.
- 2×4**
- Q.3 a) What is pl (isoelectric pH)? How it is measured? **4**
- b) Give properties of amino groups of amino-acids. **8**
- c) Explain denaturation of proteins, agents of denaturation and characteristics of denaturation. **8**
- Q.4 Write short notes on:
- a) Enzymes specificity. **6**
  - b) Competitive inhibition. **7**
  - c) Lactate dehydrogenase. **7**

### **PART-B**

- Q.5 a) Give different examples of hetero and homo-polysaccharides **8**
- b) Write a note on inversion of sucrose. **12**
- Q.6 a) What is Chargaff's rule of DNA composition? **8**
- b) Write the role of different types of RNA. **12**
- Q.7 a) Give classification of lipids and give examples of each type of lipids. **8**
- b) What are the essential fatty acids? **4**
- c) How can one check the purity of fats and oils? **8**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer briefly the following questions:

- a) Differentiate between homozygous and heterozygous.
- b) Define phenocopy with an example.
- c) What do you mean by expressivity of a gene?
- d) How does a nucleoside differ from a nucleotide?
- e) What are chromosomal aberrations?
- f) Describe genotype and phenotype.
- g) How can we calculate recombinant frequency?
- h) Explain pleiotropy.
- i) Define reciprocal cross.

j) What is genetic drift? **2×10**

### **PART-A**

- Q.2 Explain the following with suitable examples:  
a) Mendal's law of segregation.  
b) Supplementary genes. **10×2**
- Q.3 a) Describe 'origin' and different types of aneuploidy in detail.  
b) Explain chromosomal basis of inheritance in detail. **10×2**
- Q.4 Explain the following:  
a) Lampbrush chromosomes with a diagrams.  
b) Euchromatin and heterochromatin. **12**  
**8**

### **PART-B**

- Q.5 a) Explain coupling and repulsion theory of linkage.  
b) Give a detailed account of gene mapping by taking suitable examples. **8**  
**12**
- Q.6 a) Describe maternal effects and maternal inheritance with examples.  
b) How cytoplasmic inheritance by endosymbiont takes place? **15**  
**5**
- Q.7 a) Discuss Hardy Weinberg equilibrium in detail.  
b) Illustrate different factors affecting gene frequency. **12**  
**8**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer briefly:  
a) Write a short note on 'convergence and divergence in cell signaling'.  
b) Cell survival depends on balancing water uptake and loss. Comment.  
c) What do you mean by Excitotoxicity?  
d) What is the role of cholesterol in maintaining fluidity of membrane?  
e) Define the terms: Tumor, Neoplasia, Malignant and Benign.

**4x5**

### **PART-A**

- Q.2 a) Describe the structure of Plasma membrane with reference to fluid mosaic model. **13**

b) How does an increase in temperature affect membrane fluidity?

**7**

Q.3 a) How dynein “walking” moves flagella and cilia? Discuss the structure and functions of the structural component of cytoskeleton in flagella and cilia.

**10**

b) Discuss the discovery, structure and function of endoplasmic reticulum in detail. **10**

Q.4 Give the structure and functions of:

- a) Ribosome's.
- b) Mitochondria.

**10x2**

### **PART-B**

Q.5 What is cell signaling? Describe the different pathways (any two) with the help of flow charts and diagram.

**20**

Q.6 a) Discuss the role of ECM in animal cells.

**10**

b) Is cancer a heritable disease? Explain.

**4**

c) What types of genes get mutated in cancer?

**6**

Q.7 Describe the structure, properties, types and functions of a muscle cell.

**20**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer the following questions in brief:

- a) What are the contributions of Louis Pasteur in microbiology?
- b) Explain Whittakar's five kingdom classification.

- c) Write a brief note on gas vacuole in bacteria.
- d) Compare and contrast gram positive bacterial cell wall and gram negative bacterial cell wall.
- e) Distinguish between ascomycetes and deuteromycetes.
- f) Why would cells that are vigorously growing when inoculated into fresh culture medium have a long lag phase?
- g) Define photolithoautotrophs and chemolithoheterotrophs.
- h) Mention the names of at least four microorganisms that use ED pathway for generation of energy.
- i) How does the F' (F prime) plasmid differ from a regular F plasmid?
- j) Briefly explain ionization and non-ionization radiation.

**2×10**

### **PART-A**

- Q.2 Write short notes on the following:
- a) Polymerase chain reaction.
  - b) Winogradsky column.
  - c) Microbial characteristics used for the classification in the Bergey's manual of systematic bacteriology.
  - d) Major characteristics used in microbial taxonomy.

**5×4**

**5×4**

**14**

### **PART-B**

- Q.5 Write short notes on the following:
- a) Embden-Meyerhof pathway.
  - b) TCA cycle.
  - c) Anaerobic respiration.
  - d) Cyclic and Noncyclic photophosphorylation.

**5×4**

**5×3**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

**BIOCHEMISTRY (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**. Each question carries equal marks.

Q.1 Answer briefly:

- a) Explain the structure of ATP.
- b) What causes phenylketoneuria?

- c) Distinguish between oxidative phosphorylation and substrate level phosphorylation, with examples.
  - d) What is gluconeogenesis? Mention the names of different pathways that are involved in gluconeogenesis.
  - e) What are essential and non-essential amino acids?
- 4×5**

### **PART-A**

- |     |   |           |
|-----|---|-----------|
| Q.2 | a) Explain in detail the chemiosmotic theory.   | <b>10</b> |
|     | b) Describe the steps involved in electron transport chain.   | <b>10</b> |
| Q.3 | a) What is glucose-alanine cycle? Give the significance of this cycle.                              | <b>10</b> |
|     | b) Write the different metabolic fates of glycine.  | <b>5</b>  |
|     | c) How is serine synthesized by cells?  | <b>5</b>  |
| Q.4 | a) What are the steps involved in glycolysis? What do the two different phases of glycolysis imply? | <b>10</b> |
|     | b) Describe glycogenolysis.   |           |
|     | c) Where does glyoxylate cycle occur in cell? Explain the steps involved in this pathway.           | <b>10</b> |

### **PART-B**

- |     |  |           |
|-----|--|-----------|
| Q.5 | a) Describe in detail the biosynthesis of triacyl glycerols.   | <b>10</b> |
|     | b) Explain 'the steps' involved in the complete ω oxidation fatty acids.   | <b>5</b>  |
|     | c) Where are phospholipids synthesized? What are the strategies for the attachment of polar head to the phospholipids? | <b>5</b>  |
| Q.6 | a) Explain the first law and second law of thermodynamics in detail.   | <b>10</b> |
|     | b) Define anabolism and catabolism with examples.  | <b>5</b>  |
|     | c) What are high energy compounds? Give examples.  | <b>5</b>  |
| Q.7 | a) Explain the steps involved in catabolism of purine nucleotides.   | <b>10</b> |
|     | b) Discuss the catabolism of pyrimidine bases.   | <b>10</b> |

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester  
**BIOCHEMISTRY (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**. Each question carries equal marks.

- Q.1 Briefly answer:
- a) What do you mean by anabolism? Explain with the help of an example.
  - b) What is the role of pyridoxal phosphate in amino-transferase reactions?

- c) Name the organ and organelle where detoxification of ammonia occurs in humans.
- d) Differentiate between essential and non-essential amino acids.
- e) Where does Glycolysis, Glyoxylate cycle, TCA cycle and ETC occur in cell?
- f) On what basis the glycolysis pathway have been divided into two phases.
- c) What is the role of Pyruvate dehydrogenase complex?
- d) How do uncouplers inhibit oxidative phosphorylation?
- e) How sterols are different from steroids?
- j) Where Pentose Phosphate Pathway does occurs in a cell, state whether it is Aerobic or Anaerobic?

**2×10**

### **PART-A**

- Q.2 Write notes on the following:
- a) State and explain the laws of thermodynamics.
  - b) Cori cycle.
  - c) Depending on the availability of oxygen what are the various fates of pyruvate.
  - d) Write down the irreversible glycolysis reactions that are bypassed during gluconeogenesis. Name the enzymes involved in the by-pass.

**5×4**

- Q.3 a) Describe the reactions of Urea cycle.

**10**

- b) What are the fates of Urea?

**5**

- c) Name the disease caused by elevated ammonia level in blood. What are the consequences of the enzyme deficiencies in the Urea cycle?

**5**

- Q.4 a) Write down the various steps involved in catabolism of human carbohydrate reserve.

**10**

- b) Write in detail about the two phases occurring in Pentose Phosphate Pathway.

**10**

### **PART-B**

- Q.5 a) Describe the various steps involved in Electron transport through ETC.

**10**

- b) What is the role of mitochondria in ETC?

**5**

- c) How ATP is produced in ETC?

**5**

- Q.6 a) With the help of an example write the synthesis of pyrimidine nucleotide.

**10**

- b) Write in details the various steps involved in electron transport chain.

**10**

- Q.7 a) Explain the De Novo synthesis of Purine nucleotides.

**10**

- b) Briefly describe catabolism of Purine nucleotides.

**10**

B. Tech. – Third Semester  
**BIOANALYTICAL 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**. Each question carries equal marks.

- Q.1** Answer briefly:
- a) How are systematic errors eliminated in measurement? **3**
  - b) What is the difference between resolution and contrast? **2**
  - c) What is the advantage of phase contrast microscopy? **2**
  - d) Define relative centrifugal force (RCF). Explain all the terms in the equation. **3**
  - e) How will you calculate the Rf factor in thin layer chromatography? **2**
  - f) Why is SDS used in SDS-PAGE? **2**
  - g) What is the function of blank in spectrophotometry? **2**
  - h) How are X-rays formed? **2**
  - i) Define the following units of radioactivity:
    - i) Becquerel
    - ii) Gray**2**

**PART-A**

- Q.2**
- a) Describe the functional parts of an instrument giving a simple model of the instrument. **8**
  - b) What is the importance of calibration? **4**
  - c) Compare:
    - i) Accuracy and Precision
    - ii) Random and Systematic errors**8**
- Q.3**
- a) Describe in detail the construction and working of fluorescence microscope. Give advantages and applications of fluorescence microscopy. **10**
  - b) How is sub-cellular fractionation carried out using density gradient centrifugation? **10**
- Q.4**
- a) Discuss various types of chromatographic separations. **10**
  - b) Describe different types of detectors commonly used in Gas chromatography. **10**

**PART-B**

- Q.5**
- a) How can we determine the molecular weight of proteins using SDS-PAGE? **10**
  - a) Briefly explain the technique of 2-D Gel electrophoresis. Enlist its applications. **10**
- Q.6.** Discuss the principle and applications of following types of spectroscopic techniques:
- a) UV-Vis spectroscopy
  - b) Spectrofluorimetry
  - c) Infra-Red spectroscopy
  - d) X-ray spectroscopy **5×4**
- Q.7**
- a) Explain the nature of different types of radiations. **8**

- b) Describe in detail the principle of working and instrumentation of scintillation counters. **12**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

### **BIOCHEMICAL CALCULATIONS (BT-306A / BT-306B)**

Time: 3 hrs

Max Marks: **100**

No. of pages: 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:

- What is Avogadro's law for gases? What are the different values of Poisson's constant for different gases?
- Convert  $57^{\circ}\text{C}$  to F. How is  $^{\circ}\text{C}$  related to Kelvin?
- What is an indicator and where is it used? Name four indicators.
- What is heat capacity? How is it different from specific heat?
- Explain two methods to determine amino acids in a sample.

**4x5**

#### **PART-A**

Q.2 a) How is pH related to pKa? Derive the equation for the same. **10**

- What is ppm, mole% and mass%?

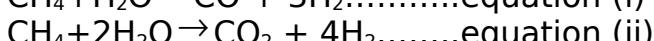
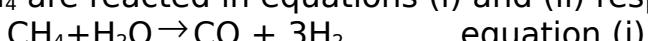
**6**

- Explain the functioning of acetate buffer.

**4**

Q.3 a) Explain "yield" of a reaction. What do you understand by conversion? **12**

- For the below reactions, calculate% conversion of  $\text{CH}_4$  if 'a' moles of  $\text{CH}_4$  are fed in a reaction chamber of which 'b' moles of  $\text{CH}_4$  and c moles of  $\text{CH}_4$  are reacted in equations (i) and (ii) respectively.



**8**

Q.4 a)  $\text{C}^{14}$  has a half-life of 5700 years. Calculate the fraction of atoms that will decay **12**

- per year
- per second.

- Derive the equations for heat capacity at constant volume and heat capacity at constant pressure.

**8**

#### **PART-B**

Q.5 a) On which laws spectrophotometric observations are based? Explain. **8**

- Name five amino acids and draw their structures. **10**

- c) What do you understand by optical rotation or chirality of a compound? **2**
- Q.6 a) Write in brief about enzyme assays. **8**  
 b) Derive the equation  $V_o = 1/2 (V_{max})$  when  $[s] = K_m$ . **6**  
 c) What do DNA and RNA stand for? What types of sugars are present in them? **6**
- Q.7 a) If a sample solution of concentration 4 g/L has a transmission of 90% in a cuvette of path length 1 cm, calculate transmission if:  
 i) concentration is 8 g/L  
 ii) path length is 4 cm. **10**  
 b) Describe three methods by which proteins can be denatured? **6**  
 c) What does A, T, C, U and G stand for as nitrogenous bases? What are the different types of bonding between different bases? **4**

### **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

### **BIOCHEMICAL CALCULATIONS (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 in brief:
- What is the mole and mass percentage? A sample contains 600 kg of NaCl and 200 Kg of KCl. Find the composition in mole% and mass%. Given atomic mass of Na = 23, K = 39 and Cl = 35.5.
  - List four essential properties of Goods buffer.
  - Draw and explain different components of a spectrophotometer.
  - What is the DNA template that will code for the mRNA segment of sequence 5' G-C-U-A-G-U 3'? In E.coli DNA, the AT/GC ratio is 0.93. If the number of moles of adenine in DNA sample is 558000, calculate the number of moles of guanine present.
  - What is the difference between end point and equivalence point? What does indicator recognize: end point or equivalence point?
- 4x5**

### **PART-A**

- Q.2 a) What are the different laws on which stoichiometry is based? Explain each of them. **10**  
 b) What is the electron-donor-acceptor system for acids and bases? Explain with example. **8**

c) What mass of lithium nitrate would have to be dissolved in 30.0g of water in order to make 18% solution?

**2**

Q.3 a) Define:

- i) Molality.
- ii) ppm
- iii) Specific gravity
- iv) Molar volume at STP
- v) Equivalent mass

**5x2**

b) How is pH related to pKa? Derive the equation.

**6**

c) What is a limiting reagent? Explain with an example.

**4**

Q.4 a) Explain what are basic and derived units? Give five examples of each.

**10**

b) The density of a solution prepared by dissolving 120g of urea ( $M_w = 60$ ) in 1000g of water is 1.15 g/mL. What is the molarity of the solution?

**6**

c) Calculate the specific heat capacity of copper given that 204.75 J of energy raises the temperature of 15g of copper from  $25^{\circ}$  to  $60^{\circ}$  C.

**4**

### **PART-B**

Q.5 a) What is the chemical nature of enzymes? Derive the equation for steady state. **10**

b) Explain diagrammatically the functioning of a polarimeter.

**4**

c) What is the ratio of A and T in a normal DNA strand? What are the different types of bonding between A&T and C&G?

**4**

Q.6 a) Explain natural and artificial radioactivity.

**4**

b) What is average life of a radioactive substance? How is it related to half-life of the substance?

**10**

c) Derive mathematically the relation between  $K_m$  and  $S$ , if velocity is half of  $K_m$ . **6**

Q.7 a) Explain different types of enzyme assays.

**8**

b) A solution containing the complex formed between Bi (III) and thiourea has a molar absorptivity of  $9.32 \times 10^3 \text{ L mol}^{-1} \text{ cm}^{-1}$  at 470 nm.

i) What is the absorbance of a  $6.24 \times 10^{-5} \text{ M}$  solution of the complex at 470 nm in a 1.00 cm cell?

ii) What is the percent transmittance of the solution described in (i) above? **10**

**End Semester Examination, Dec. 2017**  
B. Tech. - Third Semester  
**BIOCHEMICAL CALCULATIONS (BT-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.** Each question carries equal marks.

Q.1 Answer in brief:

- a) What mass of  $MgBr_2$  would be required to prepare 720 ml of a 0.939M aqueous solution? Given molecular weight of Mg= 24.305, Br= 79.9.
- b) What is half-life period of a radioactive substance? Derive the equation.
- c) What is Gas constant? Write its equation and give its value for gases.
- d) What is the difference between end point and equivalence point?

e) What is the group displacement law?

**5x4**

### **PART-A**

Q.2 a) A saturated solution of salicylic acid ( $\text{HO-C}_6\text{H}_4\text{COOH}$ ) in methanol contains 64kg salicylic acid per 100kg of methanol at 298.15 K. Find (i) mass% (ii) mol% composition of the solution.

**8**

b) In a microbiology experiment, the students performed a three step 1:100 serial dilution of a bacterial culture. What is the final dilution of the broth? Also, what is the new concentration of bacteria in the new solution?

**6**

c) What is the difference between a basic and derived unit? Explain with examples. **6**

Q.3 a) Discuss briefly acid base concepts given by Arrhenius, Bronsted-lowry and Lewis. **8**

b) Derive Henderson Hasselbach equation.

**6**

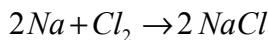
c) What is buffer capacity? Give its equation. What is its acceptable range? **6**

Q.4 a) What are the different laws on which stoichiometry is based? Discuss in detail. **10**

b) Write short notes on: (i) Excess reactants (ii) Limiting reactants

**6**

c) A student places a 0.8g piece of sodium inside a  $500 \text{ cm}^3$  flask containing chlorine gas. How much sodium chloride would be formed by the reaction at STP? **4**



### **PART-B**

Q.5 a) Discuss briefly four different chemical tests carried out for the analysis of amino acids.

**12**

b) Write the properties of  $\alpha$ ,  $\beta$  and  $\gamma$  radiations.

**8**

Q.6 a) What is feedback inhibition of enzyme? Discuss briefly.

**4**

b) Derive Michaelis menten equation.

**10**

c) For a reaction  $E + S \rightleftharpoons ES \rightleftharpoons E + P$   $k_1 = 1 \times 10^7 \text{ M}^{-1}\text{sec}^{-1}$ ,  $K_{-1} = 1 \times 10^2 \text{ sec}^{-1}$  and  $k_p = 3 \times 10^2 \text{ sec}^{-1}$ , calculate (i)  $K_s$  (ii)  $K_m$  **6**

Q.7 a) Discuss the principle of fluorometry. How is it different from spectrophotometer? **6**

b) Explain diagrammatically the functioning of a polarimeter.

**6**

c) How is transmission affected by change in either concentration of path length of the sample solution? If a sample of Formula Weight=250g of concentration 2 g/L transmits 60% of incident light when placed in a

cuvette of path length 1 cm. Calculate % transmission if concentrations are: (i) 1 g/L (ii) 6 g/L.

**8**

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 briefly the following questions:

- a) Differentiate between primary and secondary lymphoid organ.
- b) Define immunogenicity?
- c) What is the difference between epitope and paratope?
- d) What is the significance of IgA?
- e) What is Freund's adjuvant?
- f) How does Fab fragment different from Fc fragment?
- g) How can immune system distinguish between tumor cell and normal cell?
- h) What are toxoid vaccine and state its disadvantages?
- i) What is degranulation?
- j) Differentiate between immediate and delayed type hypersensitivity. **2x10**

**PART-A**

- Q.2** a) Explain in brief the morphology and function of lymph nodes. **10**  
b) Write in detail the different barriers of the innate defense. **10**
- Q.3** a) What are cytokines? Explain its types and functions. **10**  
b) Describe the structure and function of antibodies. **10**
- Q4** a) Discuss about the mechanism of DNA rearrangement. **10**  
b) Explain the structure of MHC I. How are antigens processed through cytosolic pathway? **10**

**PART-B**

- Q.5** a) Give an account on HAT medium and its applications in immunology. How it is important in the selection of mAB? **10**  
b) Give a brief account of immune response to bacterial infection. **10**
- Q.6** a) Give full form of FACS. Write the principle and application of FACS. **10**  
b) Name the technique used to detect specific proteins in a tissue sample or extract. Describe its principle. **10**
- Q.7** a) What are the modern methods used in the treatment of autoimmune diseases? **10**  
b) Give an account of the different types of vaccines available today. Highlight their advantages and disadvantages. **10**

B. Tech. – Fourth Semester  
**MOLECULAR BIOLOGY (BT-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 Do as directed:**

- a) **Histones have abundance of \_\_\_\_\_ amino acid.**
- b) \_\_\_\_\_ can remove or insert supercoil twists into circular DNA.
- c) \_\_\_\_\_ subunit of RNA polymerase holoenzyme is responsible for promoter recognition.
- d) The structure of tRNA resembles a \_\_\_\_\_.
- e) The sequence of the -10 region of prokaryotic promoters is \_\_\_\_\_.
- f) \_\_\_\_\_ is added at the 5' end of pre mRNA.
- g) The largest proportion of the human genome is contained in which of the following transposable element \_\_\_\_\_.
- h) Copia elements are found in \_\_\_\_\_.

**1×8**

**Answer the following:**

- i) Thymine dimer mutations are corrected by what DNA repair system?
- j) What will happen if a mutation is done in DNA polymerase that eliminate the 3'-to-5' exonuclease activity?
- k) In the mismatch repair system, how does the exonuclease distinguish which base is the correct one?
- l) What is the significance of ubiquitination of proteins?
- m) What do you understand by C value paradox?
- n) If the following RNA polymerases were missing from a eukaryotic cell, what types of genes would not be transcribed?
  - i) RNA polymerase I
  - ii) RNA polymerase II

**2×6**

**PART-A**

- Q.2** a) **Describe the two main mechanisms by which the bacteria DNA becomes compacted.** **10**
- b) **Describe the characteristics of highly repeated DNA sequences.** **5**
- c) **What are the roles of core histone proteins compared to the role of H1 histone in the compaction of eukaryotic DNA?** **5**
- Q.3** a) **How the ends of the eukaryotic chromosomes are replicated?** **10**
- b) What is the role of the following in replication of DNA?
  - i) Dna A protein.
  - ii) DNA helicase.
  - iii) Topoisomerase.
  - iv) Primase.
  - v) DNA polymerase-I.
- 2×5**

- Q.4** a) What is the subunit composition of bacterial RNA polymerase holoenzyme? What are the functional roles of the different subunits? How this enzyme carries out the transcription? **14**
- b) Discuss the difference between rho dependent and rho independent termination. **6**

## **PART-B**

- Q.5 Discuss the following: **10**
- a) Role of cAMP in the regulation of lac operon.
  - b) Role of attenuation in tryptophan biosynthesis. **10**
- Q.6 Briefly explain the following: **7**
- a) Vitamin K dependent modification of proteins.
  - b) Prenylation. **7**
  - c) Selenoproteins. **6**
- Q.7 What are transposons? Give an account of different types transposons in humans along with the evolutionary significance of transposable elements. **20**

# **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**. Each question carries equal marks.

**Q.1 a) Answer the following questions as directed:**

- i) Is it true that the microbes only produce hydrogen as a product of fermentation? If not, then justify your answer.
- ii) Who discovered penicillin and streptomycin?
- iii) While it is possible to insert new genes into organism, it is not possible to increase product. If false, give the correct answer with justification.
- iv) Name two microbial strains used for the production of butanol and acetic acid.
- v) The proteases are used in leather industry to removes stains. If false, then give the right answer.
- vi) Differentiate between alpha amylase and beta amylase.
- vii) Name the microbial strains used for the production of tetracycline.

**2×7**

**b) Fill in the blanks:**

- i) Lyophilization is a process in which \_\_\_\_\_ is removed from a product after it is frozen and placed under a \_\_\_\_\_, allowing the ice to change directly from \_\_\_\_\_ to \_\_\_\_\_ without passing through a \_\_\_\_\_ phase.
- ii) Lysine occurs in \_\_\_\_\_ protein only \_\_\_\_\_ is now used worldwide for the production of Lysine by production strains \_\_\_\_\_, \_\_\_\_\_.
- iii) The immediate concern of industrial microbiologist for fermentation process is \_\_\_\_\_ and generation of \_\_\_\_\_. Industrial product decision will be based on \_\_\_\_\_ and \_\_\_\_\_.

**2×3**

## **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) Describe the methods used for the improvement of industrially important microbial strains. **10****  
**b) What are the different methods used for the preservation of microbial strains? **10****
- Q.4 a) What are the microbial strains used for the production of ethanol? Explain the biosynthesis of ethanol. **10****  
**b) Discuss different types of proteases and their industrial applications. **10****

## **PART-B**

- Q.5 a) Give a detailed account of mode of action of tetracycline and its industrial production. **10****  
**b) Briefly explain the occurrence and economic significance of vitamin B<sub>12</sub>. **10****
- Q.6 a) Write short notes on:**  
i) Biopolymers.  
ii) Biofertilizer. **5×2**  
**b) Discuss single cell protein alongwith its advantages and disadvantages. **10****
- Q.7 a) What are the basic objectives used in the development of a fermentation process economically viable. **10****  
**b) Explain in detail about the market potential for a fermentation process. **10****

**End Semester Examination, Dec. 2017**

**B. Tech. (Biotechnology) - 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.** Each question carries equal marks.

**Q.1** Answer briefly the following questions:

- a) Explain the relation between temperature and reaction rate constant. **2**
- b) What is the relationship between temperature and viscosity of liquids and gases? **3**
- c) Briefly state and explain Fourier's law. **3**
- d) Differentiate between uniform and steady flow. **3**
- e) What is the basis of separation in distillation? **3**
- f) What is the function of reference junction in pH electrode? **3**
- g) Give an expression for Reynold's number. Explain its significance. **3**

**PART-A**

- Q.2** a) If 6.0 g of substance [S] decomposes for 36 minutes, the mass of unreacted [S] remaining is found to be 0.750g. What is the half life of this reaction if it follows first-order kinetics? **6**
- b) Describe the factors that affect the rate of homogeneous reactions. **6**
- c) Explain the working of an ideal batch stirred tank reactor. **8**
- Q.3** a) Explain in detail different types of non-Newtonian fluids. **10**
- b) Derive and explain Bernoulli's equation. **10**
- Q.4** a) Explain in detail the mechanisms of heat transfer. **10**
- b) Compare the co-current and counter-current flow in heat exchangers. **5**
- c) Give Stefan Boltzmann equation and explain its terms. **5**

**PART-B**

- Q.5** a) Briefly explain the significance of study of mass transfer in bioprocess industry. **4**
- b) Describe in detail mass transfer in solid-liquid systems. **8**
- c) What are the factors that affect 'convective mass transfer coefficient, K? **8**
- Q.6** Write in detail about the following unit operations:  
a) Solid-Solid mixing.  
b) Liquid-Liquid extraction. **10×2**
- Q.7** a) Explain the principle of ratio controller. Draw a well-illustrated diagram showing its components. **8**
- b) What are random errors? How are they eliminated? **4**
- c) Explain the working of orifice meter. **8**

# **End Semester Examination, Dec. 2017**

B. Tech. (Biotechnology) - 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**. Each question carries equal marks.

Q.1 Answer briefly:

- a) Diffusion.
- b) Chemical coupling.
- c) Boltzmann distribution.
- d) Standard free energy.
- e) Phase transition.

**4×5**

### **PART-A**

Q.2 a) Give a detailed account on heat engine. Explain equilibrium conversion in brief. **15**

- b) Differentiate between enthalpy and entropy. **5**

Q.3 a) What is Raoult's law? Explain the relationship between Raoult's and Henry's law.

- b) Explain chemical potential and chemical coupling with suitable examples. **10×2**

Q.4 a) What is open system? Discuss the importance of Gibbs energy in an open system.

- b) Explain giving examples biological concepts in thermodynamics. **10×2**

### **PART-B**

Q.5 Briefly explain:

- a) Entropy production.
- b) Prigogine's principle. **8**

**12**

Q.6 Explain the following:

- a) Diffusion and Boltzmann constant.
- b) Thermodynamics of passive transport. **10×2**

Q.7 a) Describe stability of different non equilibrium stationary states in detail.

- b) Briefly explain with examples:

- i) Biological clock.
- ii) Routes to chaos. **10×2**

# **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer the following questions in brief: **2½×8**
- a) Enumerate the applications of bioinformatics.
  - b) What do you mean by LAN?
  - c) How primary database helps in homology modeling?
  - d) Enlist two softwares for homology studies.
  - e) What do you mean by secondary structure of protein?
  - f) How PDB helps in structure prediction?
  - g) Write Fasta format.
  - h) What do you mean by secondary structure of protein?

### **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 informations? **6**  
b) Discuss any DNA sequencing method. **14**
- Q.4 a) Briefly explain secondary database. **10**  
b) What do you mean by ER diagram? Explain with example. Discuss different symbols used in ER diagram. **10**

### **PART-B**

- Q.5 Align the given sequence using Smith-Waterman algorithm for the given sequences CCCGTT and CGCGGT up to trace back using +1, -1 and 0 for match, mismatch and gap penalty respectively. **20**
- Q.6 a) How MSA helps in establishing evolutionary relationship? **8**  
b) Discuss different methods used in phylogenetic studies. **12**
- Q.7 Write short notes on:  
a) Protein structure prediction methods.  
b) Challenges faced in integration of biological data. **10×2**

# **End Semester Examination, Dec. 2017**

B. Tech. (Biotechnology) – Fifth Semester

## **RECOMBINANT DNA TECHNOLOGY (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 briefly the following questions:

- a) Why the technique "rDNA technology" is termed so?
- b) Name the scientists who constructed the first recombinant DNA using bacterial DNA and plasmids.
- c) What is the role of Cro protein in bacteriophage life cycle?
- d) Why is agrobacterium known as nature's genetic engineer? Name the chemical compound that helps in agrobacterium to infect plants.
- e) Why is autoradiography done in colony hybridization?
- f) What advancements were done for the automation in Sanger sequencing method?
- g) What do you understand by the term transgenic? Give an example of a transgene being used in plant system.
- h) What is the principle of magnetofection in DNA/gene transfer?
- i) What is the role of promoter in expression system? Differentiate between a strong promoter and weak promoter.
- j) Name the blotting technique used to detect RNA. Write down its principle.

**2×10**

### **PART-A**

- Q.2** a) Write about the various tools used in rDNA technology. **12**  
b) DNA polymerase I is known to fill recessed 3' end of DNA fragment and digest away the protruding overhangs. With the help of diagram show how is this done? **8**
- Q.3** a) Write in detail about the molecular mechanism of lytic and lysogenic cycle of  $\lambda$  bacteriophage. **15**  
b) What are hybrid vectors? With the help of an example write its characteristic feature. **5**
- Q.4** a) Write about the detailed methodology that you will employ to study whole DNA content of an organism. **10**  
b) With the help of schematic diagram explain Maxam and Gilbert DNA sequencing method. **10**

### **PART-B**

- Q.5** a) Write a note on PCR based molecular marker. **15**  
b) How can Adeno associated viruses are used as vectors in DNA/gene delivery. **5**
- Q.6** a) Write a note on promoters used in yeast expression system. **12**

- b) *E. coli* is a prokaryotic organism and suffers a setback when it is used to produce eukaryotic proteins. Discuss about the setbacks and how can these be overcome? 8
- Q.7 Write detailed notes on the following:  
 a) Gene silencing.  
 b) Transgenic plants. **10×2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **BIOREACTOR AND BIOPROCESS ENGINEERING (BT-502 / BT-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) Write a short note on “microbial and biochemical interaction with chemical engineering”. 3  
 b) Distinguish between primary and secondary bioproducts with examples. 3  
 c) Enlist the different components parts of a bioreactor. 3  
 d) What are the reasons for non-ideal flow? 3  
 e) What is an ideal reactor? 3  
 f) What is a batch sterilization? 3  
 g) What is GMP? 2

#### **PART-A**

- Q.2 a) *Explain the procedure involved in the determination of cell number and cell mass concentration.* 10  
 b) *Briefly describe the monod model for microbial growth.* 10
- Q.3 a) Explain the factors to be considered for developing medium for a microbial cell. 10  
 b) What are the effects of contamination on large scale fermentation processes? 10
- Q.4 *Write short notes on:*  
 a) *Fluidized bed bioreactor.*  
 b) *Bubble column bioreactor.*  
 c) *Packed bed reactor.*  
 d) *Air derived bioreactor.* 5x4

#### **PART-B**

- Q.5 a) Write a note on continuous sterilization process. 10  
 b) What is meant by Del factor? Describe the calculation of the Del factor for a fermentation process. 10
- Q.6 a) *State Fick's law of diffusion and write its applications.* 10  
 b) *Write a note on liquid-liquid mass transfer.* 10
- Q.7 a) Explain in detail about the filter sterilization. 10  
 b) How GMP could be necessary if there is a quality control laboratory? 5  
 c) Write a note on ‘scale up of bioprocess’. 5

## **End Semester Examination, Dec. 2017**

### **B. Tech. – Fifth Semester DOWNSTREAM PROCESSING (BT-505A)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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) How does downstream processing affect upstream processing?
  - b. Give an example of technique used in:
    - i) Particle-Liquid separation
    - ii) Liquid-liquid separation
  - c) Expand RIPP and explain it briefly.
  - d) Give a mathematical expression that describes the product release in a ball mill.
  - e) What is the basis of separation in centrifugation?
  - f) Enlist any four adsorbents.
  - g) What is the difference between ultrafiltration and microfiltration?
  - h) What how is the effect of protein charge on electrophoretic mobility in SDS-PAGE?
  - i) Define:
    - i) Resolution in chromatography
    - ii) Capacity of column
  - j) Differentiate between precipitation and crystallization. **2×10**

#### **PART-A**

- Q.2 a) Describe the different unit operations that form a part of a typical bioprocess. **10**
- b) What are the problems in downstream processing of bio-products? **10**
- Q.3 a) Classify bio-products based on their chemical nature and their applications. **10**
- b) Explain in detail the basis of bioseparation. **10**
- Q.4 a) Explain the working of rotary vacuum filters. **10**
- b) Discuss the principle, application and limitations of chemical methods of cell disruption. **10**

#### **PART-B**

- Q.5 a) Write in detail about the aqueous two phase extractions with respect to following:
  - i) Principle

ii) Typical separation media.	<b>10</b>
iii) Applications.	<b>10</b>
b) State and explain Langmuir adsorption isotherm.	<b>10</b>
Q.6 a) Describe in detail the technique of affinity chromatography giving suitable examples of the affinity media.	<b>10</b>
b) How do we analyze the size of nucleic acids using agarose gel electrophoresis?	<b>10</b>
Q.7 Write in detail about:	
a) Need of drying in Pharmaceutical industry.	
b) Factors affecting crystal size during crystallization.	
c) Freeze drying.	
d) Protein crystallization.	<b>5x4</b>

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer the following questions in brief:

- a) Why is CO<sub>2</sub> incubator used in animal cell culture? **2**
- b) What type of culture vessels are used to grow animal cells? **2**
- c) What are various types of sterilization techniques used in animal cell culture? **2**
- d) Define stem cells. Name the applications of stem cells. **2**
- e) How laminar airflow help in maintaining sterility in animal cell cultures? Explain its principle of working. **4**
- f) What is a cell line? How is primary cell line obtained from source tissue? How is secondary cell line obtained from primary cell line? **4**
- g) What is the unit of distance in molecular mapping of genomes? Why is molecular mapping done? **4**

#### **PART-A**

- Q.2 Describe various types of contaminates in animal cell culture. How can these contaminants be monitored? Also describe in detail the aseptic techniques used to prevent contamination in animal cell culture. **20**
- Q.3 a) Describe various components of media used in animal cell culture. Also explain the role of these components. **10**  
 b) What are transgenic animals? What is the need of genetic engineering in animal cell technology? Describe different host systems used in genetic engineering. **10**
- Q.4 a) What is the importance of cancer research to biotechnology? What changes in genome occur in cancer? Describe the molecular basis of cancer and cell transformation. **10**  
 b) What is gene therapy? Describe treatment methodologies used for cancer. **10**

## **PART-B**

- Q.5 a) What kind of variants and instabilities occur in animal cell lines? How are animal cells preserved? Describe the techniques in detail. **10**
- b) How are cell lines characterized? Describe various methods of characterization in detail. **10**
- Q.6 a) What do you understand by 'confluence'? What is the need of passaging or sub culturing of animal cell cultures? Describe the methods for quantitation of cell viability. **10**
- b) Given a chemical 'X' which is used in a drug to treat certain disease. How will you assess the toxicity of 'X' on cultured animal cells? Explain step by step procedure. **10**
- Q.7 a) What are the sources of stem cells? Where in human body, are these cells present? Differentiate between adult and embryonic stem cells. **10**
- b) What is the current role of stem cells in Indian market? Also describe various applications of stem cells. **10b**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer briefly:

- a) What is the scientific name of Baker's Yeast?
- b) Give two examples of microbes involved in spoilage of food.
- c) What is meant by most probable number?
- d) Name two food items that are fermented by microbes.
- e) What is water activity?
- f) How spirulina is important in food industry?
- g) Which enzymes are used in brewery industry?
- h) What is malt?
- i) Who coined the term pasteurization? What does it refer to?
- j) What is the significance of colors in food industry?

**2x10**

### **PART-A**

Q.2 a) Explain the sources and types of various microorganisms related to food in detail. **10**

b) How food biotechnology holds a promise in industrial scenario?

**10**

Q.3 a) Give a synopsis of different genera of yeast associated with food.  
**10**

b) Discuss about the spoilage of fruits. Give examples for the types of disease and microbes involved in the process.

**10**

Q.4 How is the microbiological examination for food surfaces carried out? Explain the tests with appropriate examples.

**20**

### **PART-B**

- Q.5 a) Discuss in detail the role of radiation in food preservation. **10**  
 b) Discuss about the role of different organisms in the process of pickling. **10**
- Q.6 a) Describe the protocol for the production of wine on industrial scale. **10**  
 b) What are SCPs? Discuss their advantages and disadvantages and the process of their production in detail. **10**
- Q.7 What is process waste? How it can be utilized for the production of valuables? **20**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer briefly:
- What is residence time distribution?
  - Differentiate between primary and secondary metabolites with examples.
  - Describe different foaming patterns in a bioreactor and ways of handling foam.
  - What are the advantages of continuous sterilization over batch sterilization?
  - List the criteria for choice of recovery process for a fermentation product.
- 5x4**

### **PART-A**

- Q.2 a) What are the salient features, advantages and disadvantages of bioprocesses compared to conventional chemical processes? **6**  
 b) Schematically represent a typical bioprocess including upstream and downstream processing. **8**  
 c) Elaborate the role of a biochemical engineer in development of biotechnology. **6**
- Q.3 a) How is dynamic gassing out technique used for determination of volumetric mass transfer coefficient? **10**  
 b) Explain the aeration and agitation system of a bioreactor, in detail. **10**

- Q.4 a) Describe Monod's growth kinetics for cell growth in batch culture. **12**  
 b) Why is fed-batch cultivation used for production of penicillin? **8**

### **PART-B**

- Q.5 a) Compare carbohydrates and hydrocarbons as carbon sources in fermentation media. **5**  
 b) Explain the role of chelators, buffers, precursors, inhibitors and inducers in fermentation media with examples. **10**  
 c) List properties of an ideal antifoam agent. **5**
- Q.6 a) Mathematically describe destruction of microorganisms during sterilization in terms of number of viable organisms after sterilization time 't' and death rate constant. **8**  
 b) What are the different mechanisms based on which, suspended solids are separated from sterilization media? **8**  
 c) What are different ways to avoid contamination of media? **4**
- Q.7 a) Discuss different methods of cell disruption. **5**  
 b) Outline the steps involved in production of penicillin. **7**  
 c) Explain, in detail, about the principle, operation and applications of affinity chromatography. **8**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **HUMAN GENOMICS AND PROTEOMICS DISCIPLINE (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.** Each question carries equal marks.

Q.1 Answer briefly:

a) What do you mean by functional genomics?

**3**

b) Differentiate between Pre genomic and Post genomic era.

**2½**

c) What do you mean by protein chip?

**2½**

d) Explain working of four tools used in proteomic studies.

**4**

e) Discuss mechanism by which gene targets are identified.

**2**

f) What do you mean by pseudogene?

**3**

g) Explain haplotype and SNP with suitable example.

**3**

### **PART-A**

- Q.2 Explain different components need to be considered while assembling genome. **20**
- Q.3 What are the different factors need to be compared while comparing two genome? Explain different factors, using diagram.  
**20**
- Q.4 What are the cancer checkpoints? Discuss p53 tumor suppressor gene.  
**20**

**PART-B**

- Q.5 What are the methods by which one can identify protein? How MALDI-TOF is used in analysis of peptide mass?  
**20**
- Q.6 How gene expression profile helps to analyze genome of a species? Discuss tools used in proteomic study.  
**20**
- Q.7 What do you mean by high throughput screening? Discuss high throughput experiment design and data analysis.  
**20**

**End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester  
**BASIC VIROLOGY-DISCIPLINE (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.** Each question carries equal marks.

- Q.1 Answer briefly the following:
- Who is known as the father of virology?
  - What is a retrovirus?
  - What is the term for a virus that infects bacteria?
  - What are prion proteins?

- e) What is a cloning vector?
- f) SARS refers to \_\_\_\_\_.
- g) What is meant by Epidemiology?
- h) What is a vaccine?
- i) Differentiate between capsid and envelope.
- j) Name two tumor causing viruses.

**2x10**

### **PART-A**

Q.2 a) Give a detailed overview of most accepted virus classification system.

**10**

b) Explain two methods of virus multiplication under in vitro conditions.

**10**

Q.3 a) Give an account of replication strategy adopted by +ve strand RNA viruses. **10**

b) What are vaccines? Explain in detail the types of vaccines and how they evolved with time?

**10**

Q.4 What is meant by antiviral? Explain the various methods for production and delivery of antivirals.

**20**

### **PART-B**

Q.5 a) Explain with illustration the biology of lambda phage vectors.

**10**

b) What are cosmids? Explain their role in gene therapy.

**10**

Q.6 Discuss in detail the principles of biosafety. What is its relation to virology? **20**

Q.7 Explain in detail the epidemiology and pathogenesis of Influenza Virus. Give illustrations.

**20**

## **End Semester Examination, Dec. 2017**

B. Tech – Fifth Semester

**FOOD MICROBIOLOGY DISCIPLINE (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**. Each question carries equal marks.

- Q.1 Answer the following questions in brief:
- a) What is the significance of food microbiology?
  - b) Name some anaerobic bacteria and airborne fungi associated with food.
  - c) Discuss in brief about the different sources for food contamination.
  - d) How food is contaminated with pathogenic organisms?
  - e) How food can be prevented from contamination?
  - f) Name the microorganisms that cause poultry spoilage.
  - g) How water activities affect the microbial growth in food?
  - h) Mention the types of food decay that could occur due to microbial spoilage of food.
  - i) How *Campylobacter jejuni* infections occur?
  - j) Why are antioxidants added to food? Mention any two antioxidants. **2×10**

### **PART-A**

- Q.2 a) Describe the morphology and significance of fungi associated with food. **10**
- b) Write a note on the microbiology of bacteria. **10**
- Q.3 Describe the various techniques used for the rapid identification of food pathogens. **20**
- Q.4 a) Explain in detail about the various parameters that affect the growth of microorganism in food. **10**
- b) Discuss the spoilage of bakery and dairy products. **10**

### **PART-B**

- Q.5 a) Write a note on fermented milk. **10**
- b) Discuss about the microbiology of egg and fish products. **10**
- Q.6 Write short notes on the following:  
a) Food borne illness.  
b) Food intoxication.  
c) Mycotoxins.  
d) Bacterial toxins. **5×4**
- Q.7 a) What are food additives? Mention the names of most dangerous food additives and their harmful effects. **15**
- b) Why are the emulsifying agents added to the food? Discuss some emulsifier agents and their application in food. **5**

Time: 3 hrs

Max Marks: **100**

No. of pages: 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) Define food processing technology.
- b) What is the concept of TDT?
- c) Write down any two scopes of food processing.
- d) Define sanitation.
- e) What do you mean by wheat milling?
- f) Define raw milk.
- g) What is HTST method for milk preservation?
- h) What is defertilization?
- i) Define thermostabilization.
- j) What is the significance of GMP for fruit and vegetable production.

**2x10**

### **PART-A**

Q.2 a) What is the present status and importance of food processing?

**12**

b) What do you mean F, Z and D values?

**8**

Q.3 a) Describe 'infestation'. What are the sources and basic steps for control of infestation? **12**

b) Discuss processing and storage of cereals in detail.

**8**

Q.4 Describe the processing of fruits and vegetables by giving suitable examples. **20**

### **PART-B**

Q.5 a) Discuss different facts and methods related to milk and milk products preservation. **16**

b) Write a short note on 'tyndalization'.

**4**

Q.6 a) Discuss processing and preservation of eggs and its products in detail. **12**

b) What are the different precautions one should take during chicken handling? **8**

Q.7 a) Explain GAP and GMP for fruit and vegetable production. **14**

b) Discuss quality control of packed foods in detail.

**6**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Answer briefly:

- a) “Cellular totipotency” is the basis of plant tissue culture, justify the statement.
- b) How are somatic hybrids different from hybrids?
- c) Mention the role of hydrogenase in nitrogen fixation.
- d) What are chimeric gene vectors? Give their advantages.
- e) Give examples of genetic modification for delayed fruit ripening. **4×5**

### **PART-A**

- Q.2 a) Describe the process of pollen culture and mention the plant growth hormone requirements for androgenesis. **15**  
b) Discuss the significance of haploids. **5**
- Q.3 a) Explain the principle of somatic hybridization, giving its uses. **10**  
b) Why do somaclonal variations appear in plant tissue cultures? How are beneficial variants selected? **10**

Q.4 Write short notes on:

- a) Nitrogenase enzyme. **10**
- b) Siderophores. **10**

### **PART-B**

- Q.5 a) Describe various processes of gene silencing in plants. **10**  
b) How is whole genome of plants sequenced? **10**
- Q.6 a) Explain the role of virulence genes in transfer of T-DNA from *Agrobacterium* to host. **15**  
b) Differentiate between transient and stable gene expression. **5**
- Q.7 a) Discuss the role of genetic modification in conferring disease resistance to plants. **12**  
b) What are the threats imposed by GM crops? **8**

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester

### **ENVIRONMENT BIOTECHNOLOGY (BT-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 briefly:**

- a) What is the greenhouse effect and how does it affect the climate?
- b) Give significance of activated sludge treatment in wastewater treatment.
- c) What are the factors affecting vermicomposting?
- d) What are the different ways in which municipal waste gets treated?
- e) What do you understand by phytoremediation?

**4×5**

#### **PART-A**

- Q.2** a) What is the difference between primary and secondary air pollutants? What are the implications of air pollution for public health? **10**  
b) Is climate change the same thing as global warming? Why is it a problem if the Earth's average temperature gets a little warmer? **10**

**Q.3** Explain the tertiary waste water treatment. How is nitrogen removed from waste water by advanced treatment? **20**

- Q.4** a) Explain the characteristics and treatment technologies for hospital waste management. **10**  
b) What is compost? Discuss the principle, types and advantages of composting in detail. **10**

#### **PART-B**

- Q.5** a) What are xenobiotics? Explain the mechanism and purpose of biotransformation in detail. **10**  
b) Discuss in detail, the role of cytochrome P450 and monoamine oxidase in xenobiotic metabolism. **10**

- Q.6** a) What are the requirements of bioremediation? Differentiate between intrinsic and accelerated bioremediation. **10**  
b) Discuss the advantages of bioventing and biosparging in detail. **10**

- Q.7** a) What are bioplastics? How do they contribute in sustainable development?  
b) Write a short note on 'biofuels and biomethanation.' **10×2**

## **End Semester Examination, Dec. 2017**

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 briefly:

- a) **What is a pharmacopoeia? Name some of the prominent pharmacopoeias. Explain the need of pharmacopoeia.** **3**
- b) **Differentiate between quality control and quality assurance?** **3**
- c) **What are spurious drugs?** **3**
- d) **Enlist the advantages of sustained release drugs delivery system.** **3**
- e) **What do you understand by first pass metabolism?** **4**
- f) **Explain the following terms: i) Potency ii) Specificity** **4**

#### **PART-A**

Q.2 a) What are the significant provisions of Drugs and Cosmetics Act 1940? **10**  
b) **Explain the procedure for approval of a new drug in India.** **10**

Q.3 a) **Describe the characteristics of different routes of drug administration.** **10**  
b) **Discuss strategies for targeted drug delivery.** **10**

Q.4 a) **How do physicochemical properties of drug affect drug absorption by oral route?** **10**  
b) **Describe the different types of additives used in dosage forms.** **10**

#### **PART-B**

Q.5 a) Describe in detail the process of manufacture of tablets. **15**  
b) Describe different routes of parenteral drug administration. **5**

Q.6 a) Write in detail about manufacture, packaging and storage of liquid dosage forms. **10**  
b) Discuss the properties of bases and other adjuvants used for the manufacture of suppositories. **10**

Q.7 How do the properties of drug influence pharmacokinetics with respect to?  
a) Absorption.  
b) Distribution.  
c) Metabolism.  
d) Excretion. **5x4**

## **End Semester Examination, Dec. 2017**

B. Tech – 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.** Each question carries equal marks.

- Q.1 Answer the following questions, in brief:
- a) Mention the four minimum properties of a biomaterial.
  - b) What is a composite?
  - c) Give an example for both conventional and advanced biomaterials.
  - d) Expand LVAD.
  - e) How biomaterials prove to be an interdisciplinary field?
  - f) What is an endosseous implant?
  - g) Differentiate between in-vivo and in-vitro assessment of biomaterials.
  - h) Mention one most important property of hydrogels.
  - i) What is pulsincap technology in controlled drug delivery system?
  - j) Explain the term tissue engineering. **2×10**

### **PART-A**

- Q.2 a) Give a detailed overview of the medical devices being used in cardiovascular diseases. **10**
- b) What is pyrolytic carbon and how does it implicit its effect as a biomaterial? **10**
- Q.3 Elaborate on the process of blood coagulation as a host response to biomaterials and explain all possible blood-biomaterial interactions. **20**
- Q.4 a) What are the various models for drug diffusion in Biodegradable Polymers? **10**
- b) How one can tailor the degradability of biomaterials? What are the various factors that control the degradation of polymers? **10**

### **PART-B**

- Q.5 a) What are hydrogels? Mention their major properties. Explain the theory for hydrogel swelling? **10**
- b) Discuss the use of hydrogels as molecular gates in controlled drug delivery systems. **10**
- Q.6 What is the process of bio-mineralization? Explain the use of marine shells in antibiotic delivery to the host. **20**

- Q.7 Explain, how nanoparticles are being used as novel drug delivery systems? Discuss the various advancements with examples of application areas. **20**

## **End Semester Examination, Dec. 2017**

B. Tech – 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**. Each question carries equal marks.

- Q.1 Answer the following questions in brief:

- a) What is stem cell niche?
- b) Briefly explain spindle checkpoint in cell cycle.
- c) Differentiate between embryonic stem cells & adult stem cells.
- d) What are the symptoms of 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.  
b) What are stem cells? Describe the therapeutic use of stem cells in regenerative medicine. **10×2**

- Q.3 a) What do you understand by cell cycle checkpoint? Explain DNA dependent checkpoint in yeast.  
b) Describe drosophila embryo with a well labeled diagram. **10×2**

- Q.4 a) Explain the characteristics of mammalian primordial germ cells that maintain their pluripotent state.  
b) Describe the development of trophoblast lineage. **10×2**

#### **PART-B**

- Q.5 a) Discuss in detail the four properties of hematopoietic stem cells.  
b) Describe the molecular pathways involved in hemangioblast development. **10×2**

- Q.6 a) What are the strategies to repair the nervous system?  
b) Discuss the stem cell therapy of the human central nervous system. **10×2**

- Q.7 What is diabetes? Give the causes, symptoms & its types. Discuss the use of stem cells in pancreatic regeneration in diabetes. **20**

**End Semester Examination, Dec. 2017**  
B. Tech. – Sixth Semester  
**DIAGNOSTIC TECHNIQUES (BT-623B / BT-623B1)**

Time: 3 hrs

Max Marks: **100**

No. of pages: **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, Dec. 2017**

B. Tech. – Seventh Semester

### **BIOSAFETY 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**. Each question carries equal marks.

Q.1 Answer the following briefly:

- a) Define biosafety and bioethics.
- b) What are the ethical issues in biotechnology?
- c) Discuss social concerns of bioethics.
- d) What do you mean by Intellectual Property Rights?
- e) How biosafety concerns for human health?
- f) What are the assessments of risk during lab research?
- g) Name any two things that are non patentable.
- h) What is biological containment?
- i) Define bio-safety regulations.
- j) What is ethical value?

**2x10**

### **PART-A**

Q.2 a) Explain the role of public education in the processes of biotechnology.

**10**

b) Explain the term monopoly and the benefit of sharing in reference to bioethics. **10**

- Q.3 a) What are the ethical conflicts in biotechnology?  
**10**  
b) Explain the conflicts and interference of biotechnology with nature.  
**10**
- Q.4 a) What are the biosafety measures necessary for working in laboratory?  
**10**  
b) Explain benefits and controversies related to GM products.  
**10**

### **PART-B**

- Q.5 a) Illustrate Cartagena Protocol on biosafety.  
**10**  
b) Explain assessment of biological hazards and levels of bio-safety.  
**10**
- Q.6 Write down notes on the following:  
a) Test of novelty of patents.  
b) Competitive research.  
**10x2**
- Q.7 a) Illustrate plant breeder's rights.  
**10**  
b) Write down a note on recent developments in patent system.  
**10**

## **End Semester Examination, Dec. 2017**

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:
- What are the various databases used for DNA microarray analysis?
  - Enlist applications of clustering gene expression data.
  - What do you mean by background correction?
  - What is the main purpose of using principal component analysis?
  - What do you mean by discretization of gene expression data?
  - Enlist two limitations of steady state approach.
  - How is physical map different from genetic map?

- h) Enumerate the advantage of feature selection.
- i) What do you mean by genotyping?
- j) What do you mean by Euclidean distance?

**2×10**

### **PART-A**

- Q.2 How is clustering of gene performed? Explain it with suitable example. **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 What do you mean by principal component analysis? Explain one method used to visualize the data. **20**

### **PART-B**

- Q.5 a) How do hypothesis driven experiments help in design of experiments? **14**  
b) Enumerate the advantages of independent verification. **6**
- Q.6 a) What do you mean by molecular classifiers? **12**  
b) Give an account of feature selection of microarray data. **8**
- Q.7 Explain different types of gene network in the context to reverse engineering of regulatory network? **20**

## **End Semester Examination, Dec. 2017**

B. Tech. (Biotechnology) — Seventh 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, Dec. 2017**

M. Tech. (Biotechnology) - First Semester  
**GENETIC ENGINEERING (BT-M-101A)**

Time: 3 hrs

Max Marks: **75**

No. of pages: 2

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 Briefly explain the following:
- What factors are required to constitute polyadenylation in *vitro*?
  - Differentiate between codes and anticodes.
  - How can a copy number of a plasmid be increased?
  - What is the difference between RAPD and RFLP markers?
  - How is screening of replacement phage vectors is done?
  - How is pBR327 better than pBR322?
  - How culture conditions determine the fate of a lambda phage?
  - How has Taq polymerase helped in the automation of PCR?
  - Which probe is used in Western blotting?

j) What is the difference between dNTP and ddNTP?

**1.5x10**

### **UNIT-I**

Q.2 a) State the role for each of the following enzymes in DNA replication:

- i) DNA polymerase III
- ii) Helicase
- iii) RNA primase
- iv) DNA polymerase I
- v) DNA ligase

**1x5**

b) In eukaryotic chromosomal replication, polymerase switching occurs. What is it and why does it take place? How are the ends of the chromosome replicated? **10**

Q.3 Gene expression can be regulated at the levels of transcription and translation. Discuss each, with suitable examples.

**15**

### **UNIT-II**

Q.4 a) What problems are offered by wild type lambda bacteriophage to be used as a vector for cloning of foreign gene and it is tailored to overcome these problems?

**10**

b) What is the role of  $P_{RM}$  and  $P_{RE}$  in the establishment of lysogenic life cycle?  
**5**

Q.5 Design a regulatory circuit for production of the green fluorescent protein in the yeast cell in the presence of galactose and copper in the growth media.

**15**

### **UNIT-III**

Q.6 You have isolated total RNA from several parts of plant-root, leaves, stem and flower. If the sequences of a particular gene and the corresponding protein are known, describe a method where you use the isolated total RNA  
a) to find out where the gene encoding the protein is expressed?

**6**

b) whether the mRNA expression varies between the different tissue types?  
**6**

c) to express this protein in a bacterium:

**3**

Q.7 a) What is the function of the following in DNA isolation?

- i) Proteinase K
- ii) Phenol
- iii) Isopropanol
- iv) Ethidium bromide
- v) Tracking dye

**1x5**

b) How *E.coli* can be engineered to produce human growth hormone and insulin? **10**

## **End Semester Examination, Dec. 2017**

M. Tech. (Biotechnology) — First Semester

**APPLIED BIOINFORMATICS (BT-M-102A)**

Time: 3 hrs.

Max Marks: **75**

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 explain:

- a) Algorithm of Blast.
- b) Difference between PAM and BLOSSUM.
- c) Distinguish between linked list and hash table.

- d) Gene Annotations.  
e) Secondary structure of protein.

**3×5**

### **UNIT-I**

- Q.2 a) Discuss Algorithm of Array. How it is different from queue? **10**  
b) What are the applications of information technology in the field of Bioinformatics? **5**
- Q.3 What do you mean by recursive function? Discuss algorithm of recursive function. **15**

### **UNIT-II**

- Q.4 a) Align the given sequence using Smith Waterman algorithm for the given sequences ACCGTT and AGCGAT upto trace back using +2, -1 and 0 for match, mismatch and gap penalty respectively. **15**
- Q.5 a) Discuss Fasta algorithm using protein sequence. **10**  
b) How Blast is different from Fasta? **5**

### **UNIT-III**

- Q.6 a) Discuss sequence repeats and inversion. **8**  
b) What are the different types of trees used in phylogenetic prediction? **7**
- Q.7 a) How is multiple sequence alignment related with phylogenetic prediction? **5**  
b) Explain UPGMA method with suitable example. **10**

## **End Semester Examination, Dec. 2017**

M. Tech. (Biotechnology) – First Semester  
**NANOBIOTECHNOLOGY (BT-M-103A)**

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 Answer briefly:

- a) Derive the schrodinger equation for electron in an atom.

- b) What is the principle of NMR?
- c) Explain different types of ceramics.
- d) Differentiate between SWCNT and MWCNT.
- e) What is a magnetosome?

**3x5**

### **PART-A**

Q.2 a) Draw MOT diagram for  $H_2^+$  ion and  $N_2$  molecule.

**10**

b) Explain  $sp^3$  hybridization with an example.

**5**

Q.3 a) Differentiate between metals, semiconductors and composite materials.

**7**

b) Explain the functioning of AFM.

**8**

Q.4 a) What are the different types of polymers used in the synthesis of nanoparticles for drug delivery? Explain in detail

**10**

b) What are quantum dots? Discuss its applications in brief.

**5**

### **PART-B**

Q.5 a) What are the toxicity issues associate with carbon nanotubes? Explain in detail. **10**

b) What is protein S layers?

**5**

Q.6 a) What do you understand by bacteriorhodopsin? Explain its functions in detail. **8**

b) Explain fabrication of DNA based metallic nanowires.

**7**

Q.7 a) How do microbes synthesise nanoparticles? Explain with examples.

**10**

b) What is non-viral transfection?

**5**

# **End Semester Examination, Dec. 2017**

M. Tech. (Biotechnology) – First Semester

## **BIOSENSORS AND BIOCHIPS (BT-M-104/ BT-M-104A)**

Time: 3 hrs.

Max Marks: **75**

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:
- Define selectivity, sensitivity and detection limit.
  - Explain enzyme-cell immobilisation with an example.
  - What are ion-sensitive electrodes?
  - Describe holographic biosensors.
  - What is microphysiometer? **3×5**

### **UNIT-I**

- Q.2 a) Explain the working principle and applications of amperometric transducers. **10**  
b) Comment on the applications of optical and acoustic wave transducers. **5**
- Q.3 Discuss short notes on **(any three):**  
a) Thermal transducers.  
b) Piezoelectric transducers.  
c) ISFET.  
d) SPR. **5×3**

### **UNIT-II**

- Q.4 a) What are Langmuir-Blodgett bilayers and how are they synthesized? **8**  
b) Plant tissues can be used as biorecognition systems in biosensors. Comment. **7**
- Q.5 a) Describe in detail the different methods of antibody immobilization. **8**  
b) How are aptamers synthesized through SELEX? **7**

### **UNIT-III**

- Q.6 a) Distinguish between biosensor and chip.  
b) Explain the role of photolithography in the construction of biosensors.  
c) What is the role of PDMS in biosensor fabrication? **5×3**
- Q.7 Explain briefly:  
a) Inhibition biosensor.  
b) Mono-enzyme and bi-enzyme electrode.  
c) Test strips for glucose monitoring. **5×3**

# **End Semester Examination, Dec. 2017**

## **M. Tech. (Biotechnology) – First Semester BIOSEPARATION TECHNOLOGY (BT-M-105A)**

Time: 3 hrs.

Max Marks: **75**

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 Answer briefly:
- a) Explain the relation between primary and secondary metabolic pathways.
  - b) What are the desirable qualities of tracers?
  - c) Compare between dry heat and moist heat sterilization.
  - d) Define Del or Nabla factor.
  - e) What is lyophilization? **3×5**

### **UNIT-I**

- Q.2 a) Discuss the role of a Bioprocess Engineer in biotechnology industry. **5**  
b) Explain the design and working of a stirred tank bioreactor in detail. **10**
- Q.3 a) Derive an equation for cell growth in continuous culture. **7**  
b) Explain the kinetics of product formation in different types of bioprocesses. **8**

### **UNIT-II**

- Q.4 a) What is the importance of filter sterilization? **5**  
b) Develop a mathematical expression applicable to the mechanism of depth filter sterilization. **10**
- Q.5 a) State Fick's law of diffusion. Explain the role of diffusion in bioprocessing. **7½**  
b) What are the factors affecting cellular oxygen demand? **7½**

### **UNIT-III**

- Q.6 a) Explain the different methods of cell disruption in detail **10**  
b) Describe the construction and working of any one type of industrial centrifuge. **5**
- Q.7 Write notes on:  
a) Affinity chromatography.  
b) Gas chromatography. **7½×2**

# **End Semester Examination, Dec. 2017**

M. Tech. (Biotechnology) — Third Semester

## **ANIMAL BIOTECHNOLOGY (BT-M-302)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE** question from each **UNIT**.  
**Q.1 is compulsory.** Each question carries equal marks.

Q.1 Answer briefly the following:

- a) Differentiate between embryonic stem cells and somatic stem cell.
- b) Discuss segregation of synchronized cultured cells.
- c) Where does a bioreactor find its application in animal cell culture?
- d) Specify the distinction between subculture and preservation.
- e) What is gene expression?

**3×5**

### **UNIT-I**

Q.2 a) What is balanced salt solution? Define the role of each component constituting balanced salt solution. **10**  
b) State the problems associated with serum in the culture media. **5**

Q.3 Justify the role of the following in culturing of animal tissue:

- a) Preservation.
- b) Carbon dioxide.
- c) Subculture.

**5×3**

### **UNIT-II**

Q.4 a) Explain in detail the procedure of cloning in gram negative bacteria. **10**  
b) Enumerate the limitations of cloning in gram positive bacteria. **5**

Q.5 a) Discuss the different methods of karyotyping and mention their respective significance. **10**  
b) What is the format of a karyogram according to international conventions? **5**

### **UNIT-III**

Q.6 a) Define anti-sense therapy. How are antisense oligonucleotide designed? **10**  
b) How are different types of monoclonal antibodies generated? **5**

Q.7 a) Briefly explain the key steps involved in the production of viral vaccines. **10**  
b) Describe the methods of generating stable transgenic animals. **5**

# **End Semester Examination, Dec. 2017**

M. Tech. (Biotechnology) — Third Semester  
**STEM CELL THERAPY (BT-M-322D)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all; taking at least **ONE** question from each **unit**.  
**Q.1 is compulsory.** Each question carries equal marks.

Q.1 Answer briefly the following:

- a) How peripheral blood stem cells are isolated?
- b) What type of cells are stored in stem cell banks?
- c) Explain the molecular defect in cystic fibrosis.
- d) How IPS cells are produced?
- e) Can we create human embryo for research?

**3×5**

## **UNIT-I**

Q.2 a) Classify different types of stem cell transplantation with their properties.**5**  
b) Explain the principles of gene therapy. Name the commonly used viral vectors and their limitations in gene therapy. **10**

Q.3 What types of stem cells are present in umbilical cord blood? Describe the procedure of its collection, applications and demerits. **15**

## **UNIT-II**

Q.4 What is multiple sclerosis? Elaborate different types of MS, symptoms and the therapeutic potential of stem cells for MS. **15**

Q.5 Describe the principle and method of SCNT. Discuss the limitations and prospects of SCNT in stem cells therapy. **15**

## **UNIT-III**

Q.6 Write a detailed account on the ethical issues pertaining to embryo destruction for the benefit of humanity. **15**

Q.7 a) Explain the different types of legislations in the field of stem cell research. **8**

- b) What types of cell lines are available for stem cell research?

**7**

# **End Semester Examination, Dec. 2017**

M.Sc. (Biotechnology)-First Semester

## **CELL AND MOLECULAR BIOLOGY (BT-S-101A)**

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 Answer briefly:

a) What is the role of Topoisomerase and single stranded binding protein in DNA replication?

**4**

b) Enlist functions of different types of RNA.

**2**

c) What is the role of Initiation Factors in translation?

**2**

d) State general principle of cell signaling.

**2**

e) What do you mean by RNA splicing?

**2**

### **UNIT-I**

Q.2 a) Enlist role of plasma membrane in the integrity of the cell.

**4**

b) What are secretary pathways? Discuss the cell organelles that help in secretion of protein.

**8**

Q.3 a) What do you mean by G Protein linked receptors? How it is different from Enzyme lined cell surface receptor?

**6**

b) What do you mean by convergence, divergence and crosstalk among different signaling pathway?

**6**

### **UNIT-II**

Q.4 a) Discuss different types of RNA polymerase found in prokaryotes and eukaryotes.**8**

b) What do you mean by mRNA stability?

**4**

Q.5 a) Enumerate the factors that influence replication in detail.

**8**

b) What do you mean by open complex and closed complex?

**4**

### **UNIT-III**

Q.6 a) What are the components of the translation machinery?

**6**

b) Discuss different steps of translation in prokaryotes.

**6**

Q.7 Write short notes on:

a) Genomic libraries.

b) Genome sequencing strategies.

**6x2**

## **End Semester Examination, Dec. 2017**

M. Sc. (Biotechnology) — First Semester

### **MICROBIAL PHYSIOLOGY AND GENETICS (BT-S-102A)**

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) How chemotrophs are different from phototrophs?

b) How Petroff Hausser counting chamber is used to enumerate the number of bacteria in a given sample?

c) What is a chemostat?

d) Differentiate between spore and vegetative cell.

e) What is the state of F factor in Hfr and F'?

f) How air can be sterilized?

**2x6**

#### **UNIT-I**

Q.2 Give a brief account of various characteristics that are being considered for bacterial classification. **12**

Q.3 a) What is a pure culture? How it can be obtained? **6**

b) Briefly explain the following with suitable examples:

i) Differential medium.

ii) Selective medium.

iii) Enrichment medium.

**2x3**

#### **UNIT-II**

Q.4 a) What is a synchronous culture? How it can be obtained? **6**

b) *Bacillus cereus* divides every 30 minutes if a broth is inoculated with exactly 100 bacterial cells, how many bacteria are present after 3 hrs. **6**

Q.5 Give a brief account of various inclusion bodies present in a bacterial cell. **12**

#### **UNIT-III**

Q.6 Generalized transduction transfer any gene, but specialized transduction is restricted to only a small set. Explain. **12**

- Q.7 How the different proteins and molecules act to decide the fate of a bacteriophage? Also discuss how nutritional conditions in which a bacterial host is growing governs the life cycle of a bacteriophage. **12**

**End Semester Examination, Dec. 2017**  
M. Sc. (Biotechnology) — First Semester  
**BIOMOLECULES (BT-S-103A)**

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 Answer the following questions:
- Why buffers are considered important in biochemical reactions?
  - Name and write the structure of carbohydrate present in cotton.
  - Name and write the structure of any two amino acids having sulphur.
  - On what basis the PPP have been divided into two phases.
  - What is the significance of Ramachandran maps?
  - Write down the structure of urea and the source of nitrogen and carbon in urea formation. **2x6**

**UNIT-I**

- Q.2 a) How is thermodynamics important in biochemical reactions? Write about the different principles of thermodynamics. **6**  
b) Write in detail about the heterocyclic compounds. **6**

- Q.3 Write in detail about the classification of amino acids. **12**

**UNIT-II**

- Q.4 a) Write a note on protein sequencing. **8**  
b) Of the various chromatographic techniques, which one gives protein with purest form? Write about that process in detail. **4**
- Q.5 a) Write a note on various interactions and bonds involved in formation of tertiary structure of proteins. **4**  
b) How can spectroscopy and electrophoresis be used to analyze biomolecules? **8**

**UNIT-III**

- Q.6 a) Derive the M.M equation. What is the significance of  $K_m$ ? **10**  
b) What do you understand by the term in-born error? Give an example. **2**
- Q.7 a) Write in detail about pentose phosphate pathway. Write down the significance of the two phases of the pathway. **8**  
b) How the pH of blood is maintained in the human body? **4**

## **End Semester Examination, Dec. 2017**

M. Sc. (Biotechnology) — First Semester

### **BIOANALYTICAL TECHNIQUES (BT-S-104A)**

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) Which types of interactions (between object and electrons) contribute to image formation in scanning electron microscope?
- b) Enlist the factors that affect the resolution of peaks in a chromatogram.
- c) Mention the significance of isoelectric point in Ion Exchange Chromatography.
- d) What is IR fingerprint? Why is it so called?

**3×4**

#### **UNIT-I**

Q.2 Differentiate between Epi-illumination and Trans-illumination in Microscopy. Explain the functioning of a compound microscope giving ray diagram. Mention the advantage and disadvantage of staining of biological samples.

**12**

Q.3 What is meant by relative centrifugal force? Explain describe the technique of differential centrifugation.

**12**

#### **UNIT-II**

Q.4 a) Briefly describe the process of separation of biomolecules through adsorption chromatography.

**6**

- b) Explain the working of HPLC system, giving brief description of all its components.

**6**

Q.5 Explain the technique of isoelectric focusing of proteins. Mention its advantages over SDS PAGE.

**12**

#### **UNIT-III**

Q.6 What is a calibration curve? Describe the principle and operation of a double beam UV-VIS Spectrophotometer.

**12**

Q.7 a) Mention the properties of  $\alpha$ ,  $\beta$  and  $\gamma$  rays.

**6**

- b) Discuss the issues of safety hazards and give suggestion on radioactive waste management.

**6**

## **End Semester Examination, Dec. 2017**

M. Sc. (Biotechnology) - First Semester

### **BIOSTATISTICS (BT-S-105A)**

Time: 3 hrs.

Max Marks: **60**

No. of pages: **2**

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 briefly:
- Define mean, median and mode. What is the relationship between them?
  - What is hypothesis testing?
  - Explain Wilcoxon pair test.
  - Define skewness and its various types.
- 3×4**

#### **UNIT-I**

- Q.2 a) Calculate mean, median, mode and standard deviation for the following data:  
23, 22, 20, 24, 16, 17, 21, 18, 19  
**4**
- b) State and explain different measures of dispersion.  
**4**
- c) There are 12 females and 4 males participating in a quiz competition. What is the probability that the 1st and 2nd positions are won by the females?  
**4**

- Q.3 a) Of a total of ten rabbits, eight are to be used in a laboratory experiment. How many different combinations of eight rabbits may be formed from ten?  
**4**
- b) Calculate the mean, median, mode and variance for the following data set:

x	6	7	8	9	10
f	5	4	4	3	2

**8**

#### **UNIT-II**

- Q.4 a) What are non-parametric tests? Name any two nonparametric tests and list their advantages over parametric tests.  
**6**
- b) Body temperature of 25 crabs was measured and found to have a mean of  $25.03^{\circ}\text{C}$  and a  $s^2$  of  $1.80^{\circ}\text{C}$ . Does the sample have sufficient evidence at 90% confidence level to indicate that the crabs came from a population with mean body temperature of  $24.3^{\circ}\text{C}$ ?  
( $t_{0.05}$  for  $d.f=24=2.064$ ).  
**6**

- Q.5 A study was conducted to compare three fuels  $A$ ,  $B$ ,  $C$  with respect to emission of organic pollutants associated with PM 2.5 that are known to be mutagenic and carcinogenic. Four stoves were employed for the test. Each of the three fuels were tested in the four stoves to eliminate stove to stove variability. The emissions from each of the four stoves for the three fuels are given below:

FUELS	Emissions from stove ( $\mu\text{g/kg}$ )			
	Stove 1	Stove 2	Stove 3	Stove 4
Fuel A	15.7	17.0	17.3	16.1
Fuel B	17.2	18.1	17.9	17.7
Fuel C	16.1	17.5	16.8	17.8

- a) Does the data provide sufficient evidence at  $\alpha = 0.05$  to indicate difference in mean organic pollutant emission for the 3 fuels? Explain by constructing the ANOVA table and calculating the value of  $F$  statistics. (For  $d.f. 1=2$ ,  $d.f. 2 = 6$ ,  $F_{0.05} = 5.14$ ) **10**
- b) Find 90% confidence interval for the difference in emissions from fuel  $A$  and  $B$  ( $t_{0.05}$  for  $d.f.6 = 1.943$ ). **2**

### **UNIT-III**

- Q.6 On entry to a college, an intelligence test was given to a small group of students. The results obtained in that test and in a subsequent examination are given below:

Student Number	Intelligence test score( $x$ )	Marks in subsequent examination ( $y$ )
1	6	4
2	4	4
3	6	7
4	8	10
5	8	4
6	10	7
7	8	7
8	6	1

- a) Draw a scatter diagram to display the relationship between these two sets of results and explain. **4**
- b) Calculate Karl Pearson's coefficient of correlation and test the significance of the obtained value at 5% level of significance. ( $t_{0.025}$  for  $df-6 = 2.447$ ) **8**
- Q.7 a) Differentiate between correlation and regression. **2**
- b) A researcher recorded the time taken (min) by a material to form gel ( $y$ ) depending on the temperature ( $^{\circ}\text{C}$ ) used for gelation ( $x$ ). The data is given below:

$x$	0	10	20	30	40	50	60
$y$	16	27	28	39	39	48	51

Calculate the equation of least square regression line of  $y$  on  $x$ , writing your answer in the form  $y = \alpha + \beta x$ . Also, calculate the time taken to form gel, if the temperature used is  $45^{\circ}\text{C}$ . **10**

**End Semester Examination, Dec. 2017**  
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, Dec. 2017**

M. Sc. (Biotechnology) — Second Semester  
**MICROBIAL PHYSIOLOGY AND GENETICS (BT-S-201A)**

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.** Each question carries 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, Dec. 2017**

M. Sc. (Biotechnology) — Second Semester

### **BIOPROCESS TECHNOLOGY (BT-S-202A)**

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.** Each question carries equal marks.

Q.1 Answer the following in briefly:

- a) Explain the role of a “bioprocess engineer”.
- b) Enlist the disadvantages of cell counting by “electronic cell counter”?
- c) What do you understand by the term “limiting nutrient”?
- d) Give the properties of an ideal culture medium.
- e) How does contamination affect your process?
- f) How does cellular metabolism affect oxygen demand?

**2×6**

#### **UNIT-I**

Q.2 a) Give a comparison of chemical and biochemical process. **4**  
b) Derive a rate equation that describes “exponential growth phase” in batch culture. **4**  
c) Explain Luedeking and Piret equation describing kinetics of product formation. **4**

Q.3 Describe in detail the working of an ideal continuous stirred tank reactor. Explain the kinetics of cell growth and substrate utilization in ideal CSTR. Explain the following terms:  
a) Steady state.  
b) Dcritical.  
c) Dmaxoutput.  
d) Washout. **3×4**

#### **UNIT-II**

Q.4 Explain the construction and working of following types of bioreactors:  
a) Bubble column reactor.  
b) Packed bed reactor. **6×2**

- Q.5 a) Describe in detail the basic design of a stirred tank bioreactor. **6**  
 b) Elaborate the reasons for non-ideality in reactors in detail. **6**

### **UNIT-III**

- Q.6 Explain the formulation of microbial media in detail. **12**
- Q.7 Write detail notes on the following:  
 a) Film theory.  
 b) Factors affecting diffusivity.  
 c) Liquid-Liquid mass transfer. **4×3**

## **End Semester Examination, Dec. 2017**

M. Sc. (Biotechnology) — Third Semester

### **ANIMAL BIOTECHNOLOGY (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.** Each question carries equal marks.

- Q.1 Briefly answer the following:  
 a) Differentiate between embryonic stem cells and somatic stem cells.  
 b) Discuss segregation of synchronized cultured cells  
 c) Where does a bioreactor find its application in animal cell culture?  
 d) Specify the distinction between subculture and preservation  
 e) Why is sterilization a significant factor in culturing of animal cells?  
 f) What is organ culture? **2×6**

### **UNIT-I**

- Q.2 a) What is a primary culture? Discuss various steps in establishing a primary culture. **8**  
 b) State the problems associated with undefined cell culture media. **4**
- Q.3 Justify the role of the following in culturing of animal tissue:  
 a) Serum.  
 b) Cryopreservation.  
 c) Passaging. **4×3**

### **UNIT-II**

- Q.4 a) What is cell synchronization? Describe the various methods involved in identifying, synchronizing and segregating the synchronized cells in a culture media. **10**  
 b) Briefly discuss the various parameters of cell cytotoxicity. **2**
- Q.5 Write short notes on the following:  
 a) Cell cloning.

- b) Organ culture.  
c) Apoptosis.

**4×3**

### **UNIT-III**

- Q.6 a) What are stem cells? Elaborate steps of formation of stem cells during embryogenesis. **8**  
b) Discuss the unique properties of stem cells highlighting the self-renewal pathway. **4**
- Q.7 Briefly describe the following:  
a) Cell based vaccines.  
b) Somatic cell genetics.  
c) Applications of animal culture technology in current times. **4×3**

## **End Semester Examination, Dec. 2017**

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) Describe the phenomena of micropropagation. **7**  
b) Discuss different methods for protoplast isolation. **5**
- Q.3 Write short notes on the following:  
a) Symmetrical and non-symmetrical hybrid. **6**  
b) Germplasm conservation. **6**

### **UNIT-II**

Q.4 Describe the *Agro bacterium* mediated gene transfer method.

**12**

Q.5 Discuss any three methods for direct DNA transfer.

**12**

### **UNIT-III**

Q.6 a) Write down methods for herbicide and insect resistance in plants.

**8**

b) How can we increase the shelf life of fruits and flowers?

**4**

Q.7 a) Differentiate between RFLP and RAPD.

**8**

b) What are microsatellites?

**4**

## **End Semester Examination, Dec. 2017**

M. Sc. (Biotechnology) – Third Semester

## **ENVIRONMENT BIOTECHNOLOGY (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.** All questions carry equal marks.

Q.1 Answer briefly:

- a) Coagulation and flocculation.
- b) Hotspots.
- c) Global environmental issues.
- d) Anaerobic digestion.

**3×4**

### **UNIT-I**

Q.2 How is polluted water responsible to disturb ecological balance? Discuss about it's sources, effect and management in detail. **12**

Q.3 a) Differentiate activated sludge process with rotating biological contactors.

**6**

b) What are the nitrification and denitrification processes? **6**

## **UNIT-II**

- |     |   |   |
|-----|---|---|
| Q.4 | a) Why bioremediation is preferred over physical and chemical methods of environmental cleanup? | 6 |
|     | b) Discuss about phytoextraction and phytostabilization in detail.                              | 6 |
| Q.5 | a) Elucidate the role of GEMs in improving bioremediation in detail.                            | 6 |
|     | b) Write in detail about biocomposting.   | 6 |

## **UNIT-III**

- |     |   |   |
|-----|---|---|
| Q.6 | a) What is biological diversity?                        | 2 |
|     | b) Write the major threats towards biodiversity.        | 3 |
|     | c) Explain the biogeographical classification of India. | 7 |
| Q.7 | a) What are the 3Rs in sustainability?                  | 3 |
|     | b) Describe the different sustainability models.        | 9 |

## **End Semester Examination, Dec. 2017**

M.Sc. (Biotechnology) – Third Semester

## **FOOD AND ENZYME BIOTECHNOLOGY (BT-S-304A)**

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 Answer briefly:

- a) Name two mdds associated with food.
- b) Give two examples of microbes used in production of beer.
- c) Give two examples of Biphasic system.
- d) What are the characteristics of ES complex?
- e) What is Salting Out?
- f) Name the first organism to be used as SCP.

**2x6**

## **UNIT-I**

- |     |  |   |
|-----|--|---|
| Q.2 | a) What are the different types of yeasts associated with food?                | 6 |
|     | b) Enlist the different methods of detection of microbes associated with food. | 6 |

- Q.3 a) How is process waste utilized for the production of valuables? Explain with examples. **6**  
b) Discuss about the various methods for preservation of food. **6**

### **UNIT-II**

- Q.4 How are enzymes stabilized in biphasic aqueous systems? How is this methodology utilized on industrial scale? **12**

- Q.5 Explain with appropriate examples, the concept of biding site and the models for formation of ES complex. **12**

### **UNIT-III**

- Q.6 Discuss in detail the use of glucose oxidase in food industry. **12**

- Q.7 Comment on:  
a) Process of baking and role of enzymes in the process.  
b) Role of enzymes in brewery industry.

**6x2**

## **End Semester Examination, Dec. 2017**

M. Sc. (Biotechnology) — Third Semester

### **STEM CELL AND 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.** Each question carries equal marks.

- Q.1 Briefly answer the following:  
a) Differentiate symmetrical and asymmetrical ES cell renewal.  
b) How totipotent stem cell is different from pluripotent stem cell?  
c) How SCNT is useful in medical biotechnology?  
d) What is gp130?  
e) Specify the role of Oct4 in ES cell self-renewal.  
f) What is type 1 diabetes?

**2x6**

### **UNIT-I**

- Q.2 a) Enlist the various factors mediating ES cell self-renewal. **6**  
b) Elucidate the role of stem cell niche in ES cell function? Classify different types of stem cells with sources. **6**
- Q.3 a) Explain the term "fate mapping of stem cells" and name the commonly used fate mapping techniques. **4**  
b) How Cre-LoxP technology is used in mapping cell lineage? **8**

### **UNIT-II**

- Q.4 Discuss the repopulating patterns of primitive hematopoietic stem cells with suitable cell lineage diagrams. **6**
- Q.5 Describe in detail the biomarker patterns of both HSC and MSC during undifferentiated and differentiated states. **6**

### **UNIT-III**

- Q.6 a) How induced pluripotent stem cells are generated? **6**  
b) What are the potential medical applications of iPSC? **6**
- Q.7 a) Describe the strategies that can be used to repair neurodegenerative diseases. **4**  
b) Explain the etiology and symptoms of Parkinson's disease (PD). **4**  
c) How PD can be cured by stem cells? Explain. **4**

## **End Semester Examination, Dec. 2017**

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:
- Porosity.
  - Sources of stones.
  - Properties of good sand.
  - Ingredients of glass.
  - Coal tar.
  - Properties of aluminium.
  - Gypsum plaster.

- h) Rice husk ash.
- i) Igneous rocks.
- j) Characteristics of paint.

**2×10**

### **PART-A**

- Q.2 a) What are the different methods of quarrying of stones? Explain quarrying with channeling machine. **10**
- b) What are the constituents of good brick earth? **10**
- Q.3 a) List down all the physical tests performed on cement and write the procedure for testing initial setting time. **10**
- b) Explain the manufacturing process of terracotta. **10**
- Q.4 a) Explain the method of kiln seasoning of timber in detail. **10**
- b) What are the effects of flyash on cement concrete? **10**

### **PART-B**

- Q.5 a) Write about the classification of mortars on the basis of building materials. **10**
- b) What are paints? List down the ingredients of paints and explain their functions. **10**
- Q.6 a) What are vibrators? What are their functions and purpose? **10**
- b) Write about the properties and uses of cast iron. **10**
- Q.7 a) Explain various forms of bitumen. **10**
- b) Write about classification of plastics according to their behavior with respect to heating. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third Semester

### **STRUCTURAL ANALYSIS-I (C-301A/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.** Each question carries equal marks.

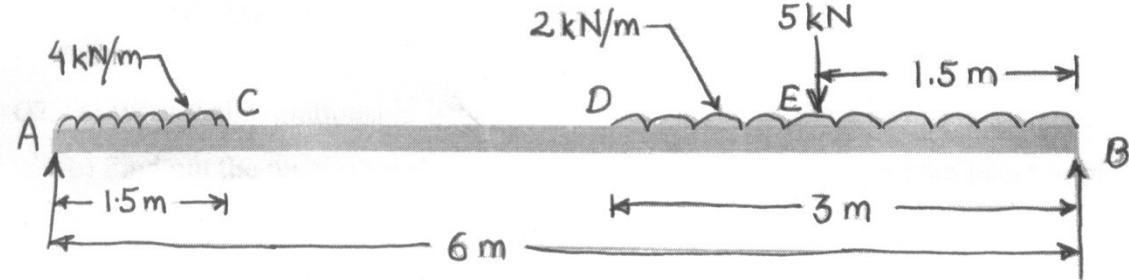
- Q.1 Answer the following question:
- a) What do you understand by bending moment and shear force?
  - b) How is bending Moment, shear force and loading related?
  - c) What are shorter than span UDL positions for maximum shear (+ve and -ve) at a particular section?
  - d) Write two uses of influence line diagram?
  - e) In a parabolic symmetrical three hinged arch, the bending moment at any section due to dead load is zero. Why?

- f) Check determinacy of a three hinged arch and two hinged arch.
- g) Draw any two types of roof trusses?
- h) How do you differentiate perfect, deficient and redundant trusses?
- i) What are the limitations of Euler's formula?
- j) State moment area first and second theorem.

**2x10**

### **PART-A**

- Q.2 Draw shear force and bending moment for the following beam.

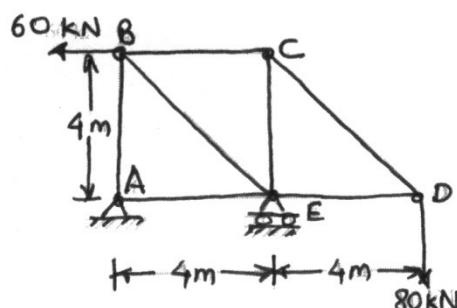


**20**

- Q.3 A simply supported beam has a span of 15 m. uniformly distributed load of 40 kN/m. and 5 m. long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment at a section 6 m. from left end. Use these diagrams to calculate the maximum shear force and bending moment at this section. **20**
- Q.4 A three hinged parabolic arch hinged at the supports and at the crown have a span of 24 m. and a central rise of 4 m. It carries a concentrated load of 50 kN at 18 m. from left support and an UDL of 30 kN/m. over the left half portion. Determine:
- The vertical and horizontal reactions at the supports.
  - The moment at a section 6 m. from the left support.
  - Normal thrust at 6 m. from left support.
  - Radial shear at 6 m. from left support. **5x4**

### **PART-B**

- Q.5 Compute the forces in the members BC, CD, BE and CE of the truss shown using any method.



**20**

- Q.6 a) Obtain an expression for Euler's crippling load in case of column with both ends fixed. Draw a neat diagram of the deformed shape of the column. **10**  
 b) A hollow alloy tube 4 m. long with external and internal diameters of 40 mm. and 25 mm. respectively was found to extend 4.8 mm. under a tensile load of 60 kN. Find the buckling load for the tube with ends pinned. Also find the safe load on the tube, taking a factor of safety as 5. **10**
- Q.7. a) What is the relationship between real beam and conjugate beam? **6**  
 b) Find out the maximum slope and deflection of a simply supported beam with UDL on entire length using double integration method? **14**

## **End Semester Examination, Dec. 2017**

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) Distinguish between Pier and Column.
- b) What do you mean by Dutch bond?
- c) What do you mean by "Strip footing"?
- d) Define slenderness ratio.
- e) Define parapet level.
- f) Write about couple roof.
- g) What is internal damp proofing?
- h) Draw figure of chain dog.

- i) How walls are classified on the basis of their function?  
j) What is the minimum width of cavity wall?

**2×10**

### **PART-A**

- Q.2 a) What do you understand by concrete masonry? State the advantages of hollow block concrete masonry. State various types of surface finishes in such a masonry. **10**  
b) Compare stone masonry with brick masonry. **10**
- Q.3 a) What are the various advantages of cavity walls? **10**  
b) Explain in brief the various forms of concrete partition walls. **10**
- Q.4 a) What is meant by a combined footing? When do you adopt it? What modification will you make if one of the columns lies just at the edge of the adjacent property? **10**  
b) Explain the situations in which the pile foundation is preferred. **10**

### **PART-B**

- Q.5 a) Describe various methods of damp proofing. **10**  
b) What are the requirements of an ideal material for damp proofing? **10**
- Q.6 Write short notes on the following:  
a) Granolithic flooring.  
b) Tiled flooring.  
c) King post roof truss.  
d) Advantages and disadvantages of a flat roof. **5×4**
- Q.7 a) Write a short note on “Sustainability in construction materials”. **10**  
b) What do you mean by special concretes? Explain any two. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third Semester

## **BUILDING CONSTRUCTION AND MATERIALS (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**. Each question carries equal marks.

- Q.1 a) Explain perpend.  
b) Size of a standard brick is \_\_\_\_\_.  
c) What is a valley in a pitched roof?  
d) Explain hollow brick.  
e) Why do we use wall ties and what material are they made of?  
f) What is guniting?  
g) What is the need for sustainability in construction and material?  
h) What is the size and weight of a standard brick?  
i) List any four materials which can be used for damp proofing.

j) What is strap footing?

**2×10**

### **PART-A**

Q.2 a) Give detail classification of rubble masonry with neat sketches.

**10**

b) i) Explain various defects in brick masonry.

**5**

ii) Write a short on composite stone masonry.

**5**

Q.3 Explain with neat sketches the construction of a cavity wall starting from the trench level to the eave level. Mention the necessary precautions at various stages of construction. **20**

Q.4 a) What are various purposes of foundations?

**4**

b) Give a brief classification of foundation. Also explain pile foundation in detail. **6**

c) Write a short note on raft foundation.

**4**

d) What are geophysical methods? Explain any one in detail.

**6**

### **PART-B**

Q.5 a) What is damp proofing and enlist the causes and sources of dampness.  
b) Explain treatment for foundation on damp soil with a neat sketch. **10×2**

Q.6 a) What are the different types of flooring? Explain any two in detail. **12**  
b) Explain Mansard truss with a neat sketch depicting all the components. **8**

Q.7 a) Write short notes on:

i) Hot weather concrete      ii) Fibre reinforced concrete      iii) Flyash  
**5x3**

b) What are smart materials? Explain any two in detail.

**5**

## **End Semester Examination, Dec. 2017**

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 Write short notes on:

- a) Density and mass Density.
- b) Newtonian and non-Newtonian fluids.

- c) Steady and unsteady flow.
- d) One, two and three dimensional flows.
- e) Centre of pressure.
- f) Utility of pitot tube.
- g) Laminar sub-layer.
- h) Similitube.
- i) Buckingham's  $\pi$  theorem.
- j) Absolute pressure and gauge pressure.

**2×10**

### **PART-A**

- Q.2 a) Define surface tension and capillarity. Prove that the relation between surface tension and pressure inside a droplet of liquid in excess of outside

$$\text{pressure is given by } p = \frac{4\sigma}{d} \quad \text{10}$$

- b) A vertical gap 2.2cm wide of infinite extent contains a fluid of viscosity 2 Ns/m<sup>2</sup> and specific gravity 0.9. A metallic plate 1.2 m×1.2 m× 0.2 cm is lifted up with a constant velocity of 0.15m/sec through the gap. If the plate is in the middle of the gap, find the force required. The weight of the plate is 40N. **10**

- Q.3 a) What do you understand by the terms?

- i) Total acceleration.
- ii) Convective acceleration.
- iii) Local acceleration.

**2×3**

- b) Define the terms:

- i) Velocity potential function.
- ii) Stream function.
- iii) Irrotational flow.

**2×3**

- c) A 30cm diameter pipe, conveying water branches into two pipes of diameters 20 cm and 15cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15cm pipe if average velocity in 20 cm diameter pipe is 2 m/s. **8**

- Q.4 a) Define vacuum pressure. Give the relationship between absolute, gauge, atmospheric and vacuum pressures. **6**

- b) What are the gauge and absolute pressure at a point 3 m below the free surface of a liquid having a density of  $1.53 \times 10^3 \text{ kg/m}^3$  if the atmospheric pressure is equivalent to 750 mm of mercury?

Take specific gravity of mercury = 13.6

and density of water =  $1000 \text{ kg/m}^3$ . **8**

- c) What are the conditions of equilibrium of a floating body and a submerged body? **6**

### **PART-B**

- Q.5 a) What is Euler's equation of motion? Derive the expression and explain how will you obtain Bernoulli's equation from it? **10**

- b) Water flow through a triangular right angled weir and then over a rectangular weir of 1m width. Take  $C_d$  for triangular and rectangular weir as 0.6 and 0.7 respectively. If the depth of water over the triangular weir is 360 mm, find the depth of water over the rectangular weir. **10**

- Q.6 a) Define laminar boundary layer, turbulent boundary layer, laminar sub-layer and boundary layer thickness with a neat sketch depicting boundary layer concept over a flat plate. **10**
- b) What do you mean by separation of boundary layer? What are the different methods of preventing the separation of boundary layer? **10**
- Q.7 a) What do you mean by dimensionless numbers? Explain any four along with their significance. **10**
- b) What are the methods of dimensional analysis? Describe the Buckingham's TC method in detail. **10**

**End Semester Examination, Dec. 2017**  
B. Tech. (Integrated) - Third Semester  
**FLUID MECHANICS-I (C-303)**

Time: 3 hrs

Max Marks: **100**

No. of pages: 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 cohesion and adhesion.

- b) What is a Newtonian fluid?
- c) Define steady and non-steady flows.
- d) What is a flow net?
- e) What is gauge pressure?
- f) What is the purpose of an orificemeter?
- g) Enumerate the assumptions made in derivation of Bernoulli's equation.
- h) Give two uses of dimensional analysis.
- i) Write two advantages of modal studies.
- j) Write characteristics of turbulent boundary layers.

**2x10**

### **PART-A**

- Q.2 a) Calculate the specific weight, specific mass, specific volume and specific gravity of liquid having a volume of  $6 \text{ m}^3$  and weight of 44 kN.  
**10**
- b) Derive the expression for pressure inside a water droplet and soap bubble. **10**
- Q.3 a) What is the difference between:  
 i) Uniform and Non-uniform flow  
 ii) Laminar and turbulent flow  
**5x2**
- b) Derive the continuity equation in three-dimensions.  
**10**

- Q.4 a) State and prove Pascal's law.  
**10**

- b) Derive the expression for total pressure on vertically immersed body.  
**10**

### **PART-B**

- Q.5 a) Write short notes on:  
 i) Pitot tubes  
 ii) Venturimeter  
**5x2**
- b) What is Euler's equation of motion? How will you obtain Bernoulli's equation from it?  
**10**
- Q.6 a) What is the difference between laminar flow and turbulent flow?  
**5**
- b) What is local friction and average friction coefficient?  
**5**
- c) What are the different types of boundary layer thickness? Explain.  
**10**

- Q.7 a) State and explain Buckingham's theorem.  
**10**

- b) What are the advantages of dimensional and model analysis?  
**5**
- c) What is dimensional analysis? Explain its uses in fluid mechanics.  
**5**

# **End Semester Examination, Dec. 2017**

## **B. Tech. (Integrated) – Third Semester**

### **SURVEYING-I (C-304)**

Time: 3 hrs

**100**

Max Marks:

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 the following:**

- a) Surveying.
- b) Plane surveying and geodetic surveying.
- c) Base line and tie line.
- d) Fore bearing and back bearing.
- e) Benchmark.
- f) Offset.
- g) Magnetic meridian.
- h) What is reduced level?
- i) Name of accessories used in plane table surveying.
- j) What is the least count of a leveling staff?

**2x10**

#### **PART-A**

**Q.2 a) Explain the basic principles of surveying.**

**7**

**b) What are the errors that occur in chaining?**

**3**

**c) A 20 m chain was found to be 6 cm too long after chaining a distance of 3800 m. It was tested again at the end of day's work and found to be 9 cm too long after chaining a total distance of 7,000 m. If the chain was correct before the commencement of the work, find the true distance.**

**10**

**Q.3 a) Difference between prismatic and surveyor's compass.**

**5**

**b) What is local attraction? How it is detected and what remedial measures are adopted for its rectification?**

**5**

**c) The following bearing were observed in an open traverse. Correct them where necessary for local attraction:**

Line	Fore-bearing	Back-bearing
AB	154°00'	334°00'
BC	205°00'	23°38'
CD	140°00'	321°22'
DE	69°38'	249°38'

**10**

Q.4 a) Define contour. What are the characteristics of contour?

**5**

b) Name the different kinds of level used for surveying. Explain any two types of level in detail with neat sketches.

**5**

c) The following consecutive readings were taken with a dumpy level: 6.21, 4.92, 6.12, 8.42, 9.81, 6.63, 7.90, 8.26, 9.71 and 10.21. The level was shifted after 4<sup>th</sup>, 6<sup>th</sup> and 9<sup>th</sup> readings. The reduced level at first point was 130 m. Rule out a page of your answer book as a level-field-book and fill all the columns. Use collimation system and apply the usual arithmetical check.

**10**

### **PART-B**

Q.5 a) Explain the various methods for measurement of horizontal angles.

**10**

b) The following are the lengths and bearings of the sides of a closed traverse ABCD:

Line	Length in meters	Bearing
AB	78.2	140°12'
BC	198.0	36°24'
CD	37.8	338°48'
DA	?	?

Calculate the length and bearing of line DA.

**10**

Q.6 a) What is plane table surveying? What are the methods of surveying by plane table? **8**

b) Explain with a neat sketch, three point problem in plane table surveying.  
**8**

c) What are the operations required for adjustment of plane table?

**4**

Q.7 a) Explain the stadia system of techeometry.

**5**

b) What are curves? How curves are classified?

**5**

c) In order to determine the constants of a tacheometer, two distance 201 m and 400 m were accurately measured from the instrument and readings on a stadia rod on the upper and lower wires were taken as follows:

Distance in meters	Readings at	
	Lower stadia	Upper stadia
201	2.00	4.00
400	0.50	4.50

Determine the values of the constants and find the distance when the readings of the wires were 1.5 and 4.5 m. The line of sight being horizontal in all cases. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third Semester  
**SURVEYING-I (C-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 the following question:

- a) What is a map? Define.
- b) Define plane surveying.
- c) What do you understand by cadastral surveys?
- d) What is whole circle bearing?
- e) Define a mistake.
- f) Where do we use an odometer?
- g) What is a secular variation?-
- h) What are the dimensions of telescopic alidade?
- i) Define datum.
- j) What is a tachometry?

**2×10**

### **PART-A**

Q.2 a) Measured radius of a circle is 86.6 m. and is in error by 0.025 m. What is the error in the computed area? **10**

- b) How many types of chains are there? Explain in detail? **10**

Q.3 a) The following bearings were observed with a compass. Calculate the interior angles:

Line	Fore Bearing
AB	64°30'
BC	130°0'

CD	47°0'
DE	210°30'
EA	310°30'

**10**

b) Explain Bowditch's method in detail.

**10**

**Q.4** a) How many methods of leveling are there? Explain.

**10**

b) The following readings were observed successively with a leveling instrument. The instrument was shifted after 5<sup>th</sup> and 11<sup>th</sup> readings:

- i) 0.585      ii) 1.010      iii) 1.735      iv) 3.295      v) 3.775
- vi) 0.350      vii) 1.300      viii) 1.795      ix) 2.575      x) 3.375
- xi) 3.895      xii) 1.735      xiii) 0.635      xiv) 1.605 m

Draw up a page of level book and determine the RL of various points, if RL of first point is 136.440.

**10**

### **PART-B**

**Q.5** a) Define vertical axis, trunnion axis, line of collimation, altitude level axis, axis of plate level.

**10**

b) The co-ordinates of two points A and B are as follows:

Point	Northing	Easting
A	500.25 m.	640.75 m.
B	840.75 m.	315.60 m.

Compute the length and bearing of AB.

**10**

**Q.6** a) Explain and differentiate between radiation and intersection method of plane table survey.

**10**

b) Derive the formula for distance and elevation for inclined sight with staff vertical.

**10**

**Q.7** a) A circular curve has 300 m. radius and 60' deflection angle. What is its degree by arc definition and by chord definition of standard length 30 m? Calculate:

- i) Length of curve.
- ii) Tangent length.
- iii) Length of long chord.

**10**

b) How do we set vertical curves by tangent correction method?

**10**

**End Semester Examination, Dec. 2017**  
B. Tech. — Third Semester  
**CONCRETE TECHNOLOGY (C-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 question:

- a) Define “OPC 43” grade.
- b) Define freeze and thaw effect.
- c) What is Platten effect?
- d) What is dimensional stability?
- e) What is the size of specimen for split tensile test?
- f) What is curing?
- g) What is plasticizer?
- h) Define flash set.
- i) What are well-graded aggregates?
- j) Define fineness modulus.

**2×10**

**PART-A**

Q.2 What is hydration of cement? Explain duff Abram's law with graph showing variation of strength with gel/space ratio. **20**

Q.3 a) What are the factors governing use of maximum size of aggregate in reinforced concrete? **10**  
b) Explain the features of gap-graded aggregate. **10**

- Q.4 a) What are the accelerators? Give some examples. In what types of constructions, accelerators are used? Do accelerators affect the strength of concrete? Justify. **15**  
 b) Discuss the environment sustainability of mineral admixture. **5**

### **PART-B**

- Q.5 a) What are the fundamental factors influencing compressive strength of concrete? **10**  
 b) What are the different methods for measuring workability? Explain any one in detail. **10**
- Q.6 a) How we can prevent alkali aggregate reaction? **10**  
 b) Explain the procedure for split tensile test in detail. **10**
- Q.7 a) Give suitable solutions for the problems encountered in hot conditions. **10**  
 b) Briefly explain mechanism and application of fiber reinforced concrete. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third Semester  
**STRENGTH OF MATERIALS (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.** Each question carries equal marks.

- Q.1 Answer the following questions:  
 a) Define volumetric strain.  
 b) State Hooke's law.  
 c) Explain plane stress condition.  
 d) Differentiate between 'major principal stress' and 'minor principal stress'.  
 e) Explain Mohr's circle.  
 f) Define 'section modulus'.  
 g) What do you mean by composite beams?  
 h) Define 'shear centre'.  
 i) Show the variation of shear stress in an I section and in T section.  
 j) Define core of a section. **2×10**

### **PART-A**

- Q.2 A rectangular block 400 mm x 150 mm x 200 mm is subjected to an axial load as follows: 500 kN compressive in the direction of its length, 1000 kN compressive on the 400 mm x 200mm face, 1500 kN tensile on the 400mm x 150mm faces. Assuming Poisson's ratio as 0.3 and  $E = 2.1 \times 10^5$  N/mm<sup>2</sup>, find the values of modulus of rigidity and bulk modulus for the material of the block. Also calculate the change in the volume of the block due to application of the load specified. **20**

Q.3 The stresses at a point are:  $\sigma_x = -80$  MPa and  $\sigma_y = 40$  MPa with  $\tau_{xy} = 80$  MPa. Find the magnitudes of normal, tangential and the resultant stress on a plane at  $50^\circ$ . Also find the principal stresses. **20**

Q.4 A rectangular section 300 mm wide and 400 mm deep is used on a span of 5 m. Find out the uniformly distributed load that this section can carry if the permissible stress is limited to  $150$  N/mm $^2$ . **20**

### **PART-B**

Q.5 A 400 mm x 500 mm I-girder has 15 mm. thick flanges and 15 mm thick web. It is subjected to a shear force of 300 kN at a particular section. Find the ratio of maximum shear stress to minimum shear stress in the web. What is the maximum shear stress in the flange? **20**

Q.6 A short column of rectangular section 300 mm x 400 mm carries a compressive load of 1000 kN. The load is applied at a point (50, 50) considering the centroid of the section as the origin. Find the stresses at the four corners of the section. **20**

Q.7 a) Write the assumptions made in deriving the equation of torsion. **5**  
b) A solid shaft is required to transmit 120 kW power at 200 rpm. Find the suitable diameter of the shaft if the allowable shear stress is 70 N/mm $^2$ .

**15**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth Semester

### **STRUCTURAL ANALYSIS II (C-401A / 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**. Each question carries equal marks.

Q.1 Answer the following:

- Define 'analogous column'.
- State clapeyron's theorem.
- What are sign convention involved in slope deflection method?
- Define 'distribution factor and stiffness'.
- Calculate static indeterminacy:



- Write the expression for horizontal thrust in two hinged arch.
- Define 'strain energy'.
- Write castigliano's second theorem.
- Define ' elastic curve'.

j) What is radial shear and write the expression involved in it?

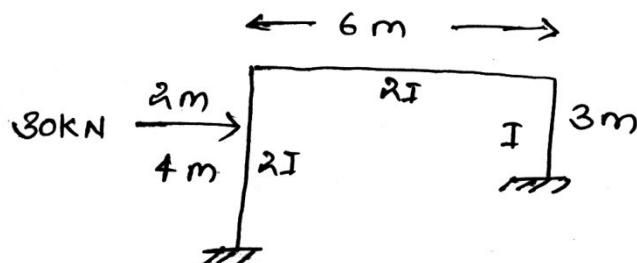
2x10

## **PART-A**

- Q.2 Analyse the continuous beam shown in figure by slope deflection method. If joint B sinks by 10 mm. Given  $EI=4000 \text{ kN/m}^2$ . Draw bending moment and shear force diagram.



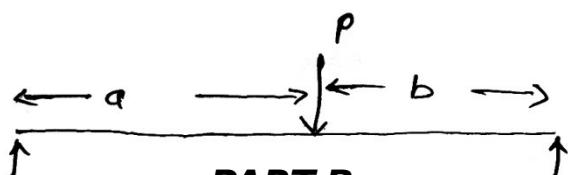
- Q.3 Analyse the frame shown in figure by moment distribution method and sketch the bending moment diagram.



20

- Q.4 a) Find the vertical and horizontal deflection of the end A and also the angle of rotation of A of member ABCD shown in the figure. Take  $E=210 \text{ kN/mm}^2$ . **12**

- b) A simply supported beam carries a point load  $P$  eccentrically on the span. Find the deflection under the load. Assume uniform flexural rigidity.



8

## **PART-B**

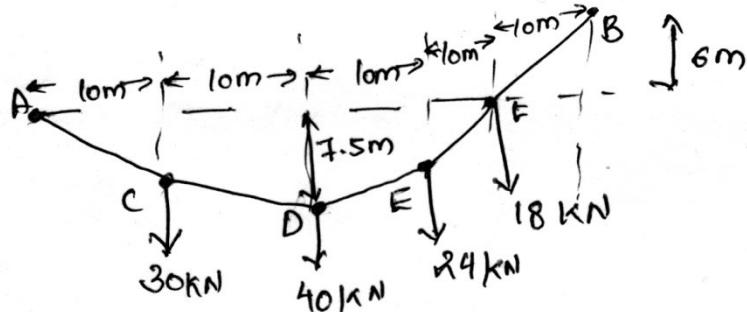
- Q.5 a) Determine the horizontal thrust in a two hinged parabolic arch subjected to uniformly distributed load of  $w$  per unit length over a length of  $L/2$  from left end support.

-  
16

- b) Derive the expression for horizontal thrust in two hinged arch by using castiglanos theorem.

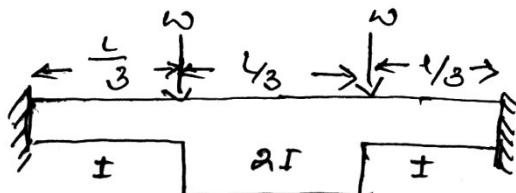
4

- Q.6 Figure shows a loaded cord ACDEFB of span 50 m. The dip of the cord at D is 7.5 m below the left support A. The right support B is 6 m higher than support A. Find the reactions at the supports, the tension in the various parts of the cable, the inclination of various parts of cable and total length of cable.



20

Q.7 Analyse the fixed beam by using column analogy.



20

## End Semester Examination, Dec. 2017

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**. Each question carries equal marks.

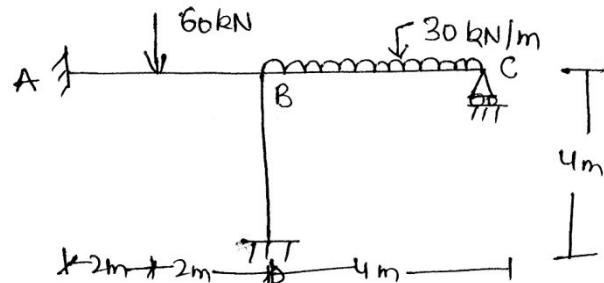
- Q.1** Answer in brief:
- Define Clapeyron's theorem.
  - What is distribution factor?
  - State Maxwell's Reciprocal theorem.
  - Define Castigliano's 2<sup>nd</sup> theorem.
  - Explain whether two hinged arch is a determinate structure or indeterminate.
  - How does temperature affects horizontal thrust in two hinged arch?
  - Define 'Betti's law'.
  - State Maxwell's reciprocal theorem.
  - Define 'carryover factor'.
  - What is normal thrust and write the expression involved in it.

**2×10**

138/5

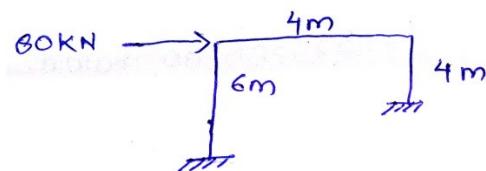
## PART-A

- Q.2 Analyze the frame using slope deflection method and draw the bending moment diagram. Flexural rigidity ( $EI$ ) is same for all members.



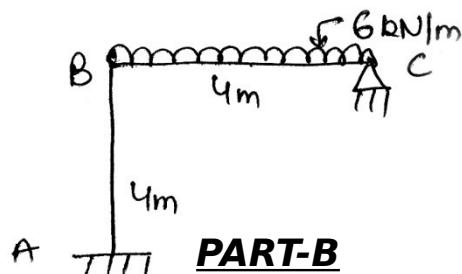
20

- Q.3 Analyse the rigid frame by Moment Distribution Method. Sketch the Bending Moment Diagram.



20

- Q.4 Analyze the given frame using strain energy method. Calculate reaction at supports if  $EI$  is uniform. Draw bending moment diagram.



20

## PART-B

- Q.5 a) Derive the expression for horizontal thrust in two hinged arch.

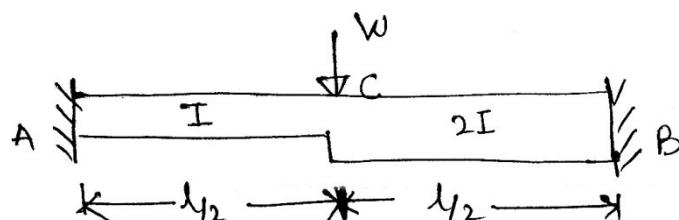
**6**

- b) Show that the horizontal thrust developed in a parabolic arch of span  $L$  and rise  $h$  subjected to a concentrated load  $W$  at a distance ' $a$ ' from a springing is given by:

$$H = \left[ \frac{5}{8} \right] \frac{W}{hL^3} a(L-a)(l^2 + la - a^2)$$

14

- Q.6 A fixed beam of span  $l$  carries a point load  $W$  at mid-span. The moment of inertia of section is  $I$  for left half of the span and  $2I$  for right half of the span. Find fixed end moments using column analogy method.



20

- Q.7 A fixed beam AB of Span 6 m carries point loads 120 kN and 90 kN at distances 2 m and 4 m from the left end A. Determine the fixing moments at the ends. **20**

**End Semester Examination, Dec. 2017**  
**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.** Each question carries equal marks.

- Q.1 a) Why do we apply coefficient of refraction?  
b) How do we define well-conditioned triangle?  
c) What does principle of least squares suggest?  
d) What do you understand by weight?  
e) How station adjustment is applied?  
f) What is passive remote sensing?  
g) How principle point is found out?  
h) What is prime vertical?  
i) How do we define solastices?  
j) What is a nodal point?

**2×10**

## **PART-A**

- Q.2 a) Determine the height of an object elevated above the ground when its base and top are visible but not accessible and baseline is horizontal and in line with the object.
- b) Determine the height of a pole above the ground on the basis of following angles of elevation from two instrument stations A and B in line with the pole. Angle of elevation from A to the top and bottom of pole =  $28^\circ$  and  $24^\circ$ . Angles of elevation from B to top and bottom of pole =  $35^\circ$  and  $28^\circ$ , horizontal distance AB = 30m. The reading obtained on staff at B.M. with two instrument settings are 1.48 m and 1.32 m respectively. What is the horizontal distance of pole from A? **10×2**
- Q.3 a) The probable error of direction measurement is 1.25 seconds. Compute the maximum value of R if the maximum probable error desired is:  
i) 1 in 25,000.  
ii) 1 in 10,000. **5×2**
- b) The altitude of two proposed stations A and B 130 km apart are respectively 220 m and 1160 m. The altitudes of two points C and D on the profiles between them are respectively 308 m and 636 m. The distance being AC = 50 km and AD = 90 kms. Determine whether A and B are intervisible and if necessary, find the minimum height of a scaffolding at B, assuming A as the ground station. **10**
- Q.4 a) Prove that the sum of the squares of residuals found by the use of arithmetic means is a minimum.
- b) Form the normal equations for  $x$ ,  $y$  and  $z$  in following equations of given weights:  
 $3x + 3y + z - 4 = 0$ , weight = 2  
 $x + 2y + 2z - 6 = 0$ , weight = 3  
 $5x + y + 4z - 21 = 0$ , weight = 1 **10×2**

## **PART-B**

- Q.5 a) Define following terms:  
i) Declination.  
ii) Co-altitude.  
iii) The observer's meridian.  
iv) The visible horizon.  
v) Celestial poles and equator. **5×2**
- b) Calculate the distance in kilometers between two points A and B along the parallel of altitude given that:  
i) Lat. of A,  $28^\circ 42'N$ , Longitude of A,  $31^\circ 12'W$ .  
Lat. of B,  $28^\circ 42'N$ , Longitude of B,  $47^\circ 24'W$ .  
ii) Lat. of A,  $12^\circ 36'S$ , Longitude of A,  $115^\circ 6'W$   
Lat. of B,  $12^\circ 36'S$ , Longitude of B,  $150^\circ 24'W$ . **5×2**
- Q.6 a) A section appears in line AB to be 10.16 cm on a photograph for which the focal length is 16 cm. The corresponding line measurement is 2.54 cm on a map which is to a scale  $1/50,000$ . The terrain has an average elevation of 200 m. above MSL. Calculate the flying altitude of the aircraft above MSL, when photograph was taken.
- b) Write a short note on aerial camera and its components in 300 words with suitable figure. **10×2**
- Q.7 a) What an idealized remote sensing system should consist of?  
b) Write in detail about different types of remote sensing platforms. **10×2**

**End Semester Examination, Dec. 2017**  
B. Tech – Fourth Semester  
**DESIGN OF CONCRETE STRUCTURE-I (C-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.** Each question carries equal marks.  
Use of IS-456 is permitted.

- Q.1 Explain the following:
- Characteristic strength of concrete.
  - Permissible stress of steel in compression.
  - Modular ratio and its significance.
  - Partial safety factor for loads.
  - Minimum eccentricity in design of column.
  - One way shear and two way shear.

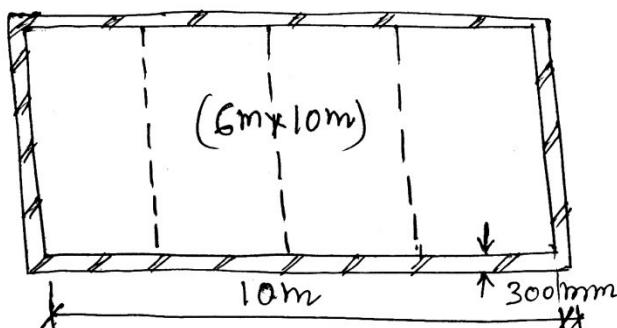
- g) Combined footing.
- h) Development length.
- i) Torsion in beam.
- j) T-beam action.

**2×10**

### **PART-A**

- Q.2 a) Differentiate between working stress method of design and limit state method of design. **6**
- b) A single reinforced beam of a size (300 mm × 450 mm) is reinforced with 4 of 16 mm diameter bar on tension side only with adequate shear reinforcement. Considering M20 grade concrete and Fe415 grade steel find moment of resistance of the beam section. If the section is used for a simply supported span of 6m then find safe load carrying capacity of the beam. **14**

- Q.3 Design a typical beam for a hall of size 6 m × 10 m as shown in the figure:



Floor is subjected to an imposed load of 2.5 KN/M<sup>2</sup> and floor finish of 1 KN/M<sup>2</sup>. Use M20 grade concrete and Fe415 grade steel. **20**

- Q.4 a) Explain different type of shear reinforcement provided in beam element. **8**
- b) A reinforced concrete beam of rectangular section of overall size 300 mm × 500 mm is reinforced with 4 bars of 22 mm diameter on tension side at an effective depth of 450 mm. The section is subjected to a factored bending moment of 65 KN-m. If  $F_{ck} = 25$  N/mm<sup>2</sup>, and  $F_y = 500$  N/mm<sup>2</sup>, calculate the ultimate torsional resistance that can be permitted on the section. **12**

### **PART-B**

- Q.5 a) Classify Slabs. **4**
- b) A R.C.C. slab of size 4 m × 6 m is resting on 200 mm thick masonry walls on all four edges and is discontinuous at all the supports. Considering no provision of torsional steel at corners, design the slab. Assume M20 grade concrete and Fe415 grade steel. **16**
- Q.6 a) Classify Columns. **5**
- b) Design a short column to carry an axial load of 2000 KN (service) as:
- i) Rectangular column.
  - ii) Circular column.
- Use M25 grade concrete and Fe415 grade steel. **15**
- Q.7 a) Sketch different types of R.C.C. footing. **5**
- b) Design a R.C.C. footing to carry an axial load of 800 KN from a column of size 400 mm × 400 mm with following data:
- i) SBC of soil = 140 KN/M<sup>2</sup>.
  - ii) M30 grade concrete.
  - iii) Fe500 grade steel. **15**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth / Sixth Semester

### **DESIGN OF STEEL STRUCTURE-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.** Each question carries equal marks.

IS-800 and steel table is permitted.

**Q.1** Answer the following:

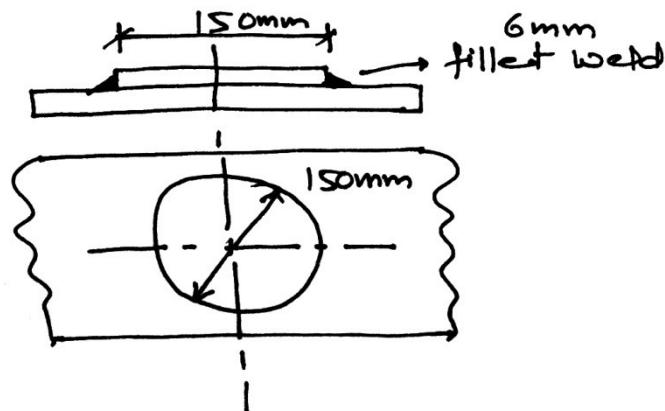
- a) What are the impact loads in case of gantry girder?
- b) What are the drag load as applied to gantry girder?
- c) What is the tension field action in plate girder?
- d) How does a plate girder derive post buckling strength?
- e) State the purpose of providing anchor bolts.
- f) Differentiate between web buckling and web crippling.

- g) What is the joists?
- h) Draw the sketch of a batten.
- i) How are the distortion in wedded joint minimize?
- j) What are the rolled steel section?

**2×10**

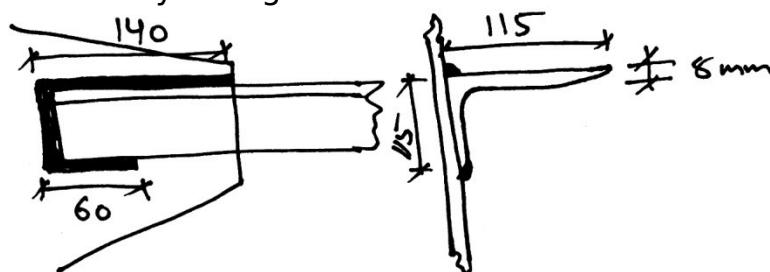
### **PART-A**

- Q.2 a) Draw the different shapes of rolled steel sections. **5**  
 b) A circular plate, 150 mm diameter is welded to another plate by means of 6 mm fillet weld as shown below. Calculate the ultimate twisting moment that can be resisted by the weld. Use steel of grade Fe 410 and shop welding.



**15**

- Q.3 a) Compute the tensile strength of an angle section ISA 150 mm x 115 mm x 8 mm of Fe 415 grade of steel connected with the gusset plate as shown below, in following cases:  
 i) Gross section yielding.  
 ii) Net section yielding.



**15**  
**5**

- b) Write a short note on 'lacing and battens' with diagram.

- 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 rest on M15 grade concrete pedestal. Use 24 mm diameter bolts for grade 4.6 for making connections. **20**

### **PART-B**

- Q.5 a) What is castellated beam? Draw its shape also. **5**  
 b) Design a bearing plate at the support for [ISMB600@1202.71](#) N/m resting on a concrete pedestaled masonry wall 250 mm thick for the following data:  
 Reaction = 200 kN  
 Grade of concrete = M20 **15**

- Q.6 a) Draw the different shapes of a Gantry Girder. **5**  
 b) Differentiate between surge loads and drag loads as applied to Gantry Girder. **5**  
 c) Write a short note on 'fatigue effect in Gantry Girder'. **10**

- Q.7 a) Why stiffeners are provided in plate girder. Name the different types of stiffeners. **5**  
b) Derive the formula for optimum depth and optimum thickness for web plate. **15**

## **End Semester Examination, Dec. 2017**

B. Tech - Fourth / 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.** Each question carries equal marks.

Q.1 Answer the following questions:

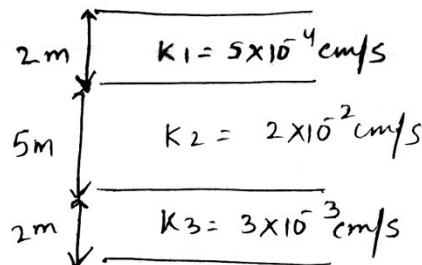
- If liquid limit of soil is 40% and plastic limit is 20% then what will be its plasticity index?
- What do you mean by SM, GC as per IS classification system?
- What is coefficient of curvature?

- d) What are the equipments used for laboratory compaction of soil?
- e) What is the size of sample used in unconfined compressive strength of soil?
- f) Define permeability.
- g) Explain optimum moisture content.
- h) Mention limitations of Darcy's law.
- i) What is the relation between coefficient of volume change and coefficient of compressibility?
- j) List methods of determining coefficient of permeability in laboratory. **2x10**

### **PART-A**

- Q.2 a) A wet sample weighting 23 N had a volume of 1150 cm<sup>3</sup>. After oven drying its weight is reduced to 19.6 N. If G = 2.65, determine:
- i) Water content.
  - ii) Bulk unit weight.
  - iii) Dry unit weight.
  - iv) Void ratio.
  - v) Porosity.
- b) Explain Indian standard soil classification system. **2x5  
10**

- Q.3 a) A stratified soil deposits are shown in figure below along with coefficient of permeability of the individual strata. Determine the ratio of K<sub>H</sub> to K<sub>V</sub>.



- b) Derive Laplace's equation of flow. **10**
- Q.4 a) Explain the concept of isobar or pressure bulb. **5**
- b) A line load of magnitude 500 kN acts on the surface of the ground. Assuming the soil mass to be uniform, compute the intensity of vertical stress due to the load at a depth 1 m, 2 m, 100 m:
- i) Along the vertical line of action of the point load.
  - ii) Along the vertical line having a horizontal distance of 5 m from the line of action of load. **15**

### **PART-B**

- Q.5 a) What kind of improvement of the engineering properties of a soil mass can be brought about through compaction? **10**
- b) The laboratory test result of a light compaction test performed on a soil is:  
 Volume of mould = 1000 cm<sup>3</sup>.  
 Empty mass of mould = 2475 gm.

Trial no.	1	2	3	4	5	6
Mass of mould +wet 50 g	4219	4330	4407	4387	4339	4268
Moisture content (%)	10.1	12.3	13.9	15.8	18.3	20.4

Draw the compaction curve and determine maximum dry density and the corresponding optimum moisture content. **10**

- Q.6 a) Explain graphical methods to find out pre-consolidation pressure. **10**  
 b) Define the terms: coefficient of compressibility, normally consolidated soil, compression index, primary settlement, pore water pressure. **10**
- Q.7 a) Explain direct shear test of determining the shear strength of soils. **10**  
 b) How do we define failure in soil? According to Mohr – Coulomb criterion, how is the failure plane recognized and how is shear strength defined? **10**

## **End Semester Examination, Dec. 2017**

B. Tech (Civil Engineering) – Fourth Semester  
**ENGINEERING GEOLOGY (C-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.** Each question carries equal marks.

- Q.1 Answer the following questions:
- Why earthquake occurs?
  - Define meandering.
  - List geological features formed due to action of winds.
  - What do you mean by strike?

- e) List any four minerals from mica group.
- f) Write parts of a fold.
- g) What is importance of dams?
- h) What do you mean by refractive index?
- i) Give four suitable examples of sedimentary rocks.
- j) What is remote sensing?

**2×10**

### **PART-A**

- Q.2 a) What is geology? Name its various branches. Also, explain in detail any three of them. **10**
- b) Write short note on importance of geology in civil engineering projects. **10**
- Q.3 a) What is meant by weathering of rocks and discuss its significance in civil engineering structures. **10**
- b) Explain briefly the geological work of rivers giving examples of topographical features of river erosion. **10**
- Q.4 a) Give salient features and mention important properties of following group of minerals:
  - i) Mica group.
  - ii) Pyroxene group.**5×2**
- b) Describe various types of textures and structures developed in rocks due to metamorphic process. Also, give examples of metamorphic rocks. **10**

### **PART-B**

- Q.5 Write short notes on:
  - a) Fold and its types. **7**
  - b) Causes of faults. **7**
  - c) Importance of geological structures in civil engineering projects. **6**
- Q.6 a) Write an essay on “Ground water and engineering practice”. **10**
- b) Define the following:
  - i) Water-table.
  - ii) Artificial recharge.
  - iii) Geological maps.
  - iv) Aquifers. **2½×4**
- Q.7 a) Discuss critically the role of geological conditions that influence design, cost and stability of traffic tunnel. **10**
- b) Give a general account of geological characters that have to be known for location of a dam. **5**
- c) Write short note on geological problems after dam construction. **5**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth Semester

### **FLUID MECHANICS (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.** Each question carries equal marks.

- Q.1 a) Define hydraulic gradient line.
- b) Define specific volume and specific gravity.
- c) What do you mean by sub-critical and super-critical flow?
- d) Define stream function.
- e) Define Mach's number.

- f) Define meta-centric height.
- g) What do you mean by laminar and turbulent flow?
- h) Define viscosity.
- i) What is the use of Pitot-Tube?
- j) What is dimensional homogeneity? **2x10**

### **PART-A**

- Q.2 a) Define 'Capillarity'. Derive an expression for capillary rise. **5**
- b) Enunciate Newton's law of viscosity. What is the effect of temperature on viscosity of water and that of air? **5**
- c) Two large plane surfaces are 3.0 m. apart. The space between the surfaces is filled with glycerine. What force is required to drag a very thin plate of surface area 0.5 square meter between the two large plane surfaces at a speed of 0.6 m/s, if:
- i) The thin plate is in the middle of the two plane surfaces.
  - ii) The thin plate is at a distance of 1.2 m. from one of the plane surfaces? Take dynamic viscosity of glycerine as  $8.10 \times 10^{-1}$  Ns/m<sup>2</sup>. **10**
- Q.3 a) State the equilibrium conditions of a floating body and submerged body. **3**
- b) Derive an expression for the meta-centric height of a floating body. **10**
- c) 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 the free surface of water. Determine the total pressure and the position of centre of pressure when the upper edge is 1.5 m. below the free water surface. **7**
- Q.4 a) Define the equation of continuity. Obtain an expression for the continuity equation for a three - dimensional flow. **10**
- b) If for a two-dimensional potential flow, the velocity potential is given by:  

$$\varphi = x(2y - 1)$$
- Determine the velocity at the point (4, 5). Also determine the value of stream function at the point P. **10**

### **PART-B**

- Q.5 a) State and derive Bernoulli's equation for a steady flow and also state the assumptions. **10**
- b) A horizontal venturimeter with inlet diameter 30 cm and throat diameter 15 cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through the venturimeter is 50 litre/s, find the reading of the oil-mercury differential manometer. Take co-efficient of discharge as 0.98. **10**
- Q.6 a) State Buckingham's  $\pi$ -theorem. **10**
- b) Define 'Similitude'. Explain the various types of similarities in detail. **10**
- Q.7 a) What is a turbine? How will you classify a turbine? Explain any one type of turbine in detail. **10**
- b) Derive an expression to measure the rate of flow through an open channel by Chezy's formula. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fifth Semester

## **TRANSPORTATION ENGINEERING-I (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.** Each question carries equal marks.

- Q.1 a) Write down the recommendations of Jayakar Committee.  
b) What are the basic requirements of an ideal alignment?  
c) Explain the concept behind ESWL.  
d) Mention the main features of Roman roads.

- e) Write down the classification of roads as per Nagpur Road Plan.
- f) Define Kerb and Camber.
- g) Explain PIEV theory.
- h) What do you understand by super-elevation?
- i) What is the effect of temperature on CC pavement?
- j) What is the purpose of dowel bars in CC pavement?

**2x10**

### **PART-A**

- Q.2 a) Differentiate between Telford and Macadam construction.

**5**

- b) From the following data for a district, calculate the road length required based on Nagpur road plan. Total area =  $6300 \text{ km}^2$ , Agricultural area =  $2800 \text{ km}^2$ , No. of villages with population ranges <500, 501-1000, 1001-2000, 2001-5000 and above 5001 are 450, 320, 110, 50 and 10 respectively. Length of railway track = 75 km.

Population of towns and villages	Number of towns and villages
2,001-5,000	120
5,001-10,000	35
10,001-20,000	20
20,001-50,000	10
50,001-100,001	6
>100,001	2

**10**

- c) What is the importance of transportation? Write in social, economic and political aspects.

**5**

- Q.3 a) What are the various factors that influence an alignment?

**10**

- b) Explain the various surveys performed before the preparation of a detailed project report.

**10**

- Q.4 a) An ascending gradient of 1 in 50 meets a descending gradient of 1 in 80. Determine the length of summit curve to provide i) ISD ii) OSD for design speed of 80 kmph. Assume all other data.

**6**

- b) The radius of a horizontal curve is 400m; the total pavement width at curve is 7.6m. Design the transition curve length for a speed of 100 kmph. Assume pavement to be rotated about the inner edge.

**8**

- c) Derive an expression for finding the extra widening required on horizontal curve. **6**

### **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) List out the various test performed on bitumen. Explain any two tests in detail. **10**

- Q.6 a) Calculate the stresses at interior, edge and corner of a CC pavement by Westergaard's stress equations.

Modulus of elasticity of concrete =  $3.0 \times 10^5$  kg/cm<sup>2</sup>

Poisson's ratio of concrete = 0.15

Modulus of subgrade reaction = 8.5 kg/cm<sup>2</sup>

Wheel load = 5100 kg

Radius of loaded area = 15 cm

Assume other data if required.

**10**

- b) Explain the CBR method of pavement design. How is the method useful to determine thickness of component layers?

**10**

- Q.7 a) What is the significance of road user characteristics in traffic engineering?

Discuss the various factors which affect the road user characteristics and their effects in traffic performance.

**10**

- b) Enumerate the different methods of carrying out traffic volume studies.

Indicate the principle of each.

**10**

# **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**. Each question carries equal marks.

**Q.1** Answer the following question briefly:

- a) What do you understand by population forecasting?
- b) Define hardness of water.
- c) Define super chlorination.
- d) What is canal intake?
- e) Define fluoridation.
- f) What are the various methods of aeration adopted in the field?
- g) What is the objective of treatment of water?
- h) What do you understand by leakage and wastage of water?
- i) What is the necessity of pumping?
- j) Name few common valves used in the pipe line distribution system. **2x10**

## **PART-A**

**Q.2** a) Explain briefly five major types of water demand considered for design of capacity of a water treatment plant. **10**

b) Determine the future population of a town for the year 1970 from the data given below by using:  
i) Geometric increase method.  
ii) Incremental increase method.

<b>Year</b>	<b>1880</b>	<b>1890</b>	<b>1900</b>	<b>1910</b>	<b>1920</b>	<b>1930</b>	<b>1940</b>
<b>Population</b>	<b>25,000</b>	<b>27,500</b>	<b>33,000</b>	<b>39,000</b>	<b>45,000</b>	<b>54,500</b>	<b>61,000</b>

**5x2**

**Q.3** a) Explain the common impurities mostly found in natural water and their significance. **10**  
b) Determine the pH of a mixture: Solution A: Volume 500ml, pH 7.2 & Solution B: Volume 300 ml, pH 6.4. **5**  
c) A treated wastewater having the chloride concentration 300 mg/l with a discharge of 1.5 m<sup>3</sup>/sec. enters into a stream which has also the chloride concentration of 15 mg/l with the discharge of 50 m<sup>3</sup>/sec. Determine the concentration of chloride of the stream after the point of injection of the waste water. **5**

**Q.4** a) What is filtration? Explain briefly the various types of filters with design parameters. **10**  
b) Describe the unit of flush mixer with a neat sketch. **5**  
c) In a continuous flow settling tank 3 m. deep and 60 m long, what flow velocity of water would you recommend for effective removal of 0.025 mm particles at 25°C. The sp. gravity of particles is 2.65, and kinematic viscosity  $\nu$  for water may be taken as 0.01 cm<sup>2</sup>/sec. **5**

## **PART-B**

**Q.5** a) Explain briefly the various removal processes of temporary hardness and permanent hardness. **10**  
b) Define aeration. Explain the removal process of iron and manganese in brief. **5**  
c) Determine the quantity of alum required in order to treat 13 MLD of water per day at a treatment plant, where 12 mg/l of alum dose is required. Also determine the amount of CO<sub>2</sub> gas. **5**

Q.6 a) Describe the purpose of using valves in the pipe line. Explain different valves used in the pipe line distribution system. **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 @ 50,000 GPH.

Total length of pipeline = 200 m.

Suction head of pump = 5 m.

Static head of tank = 2.5 m. Ground level difference = 0.5 m.

**10**

Q.7 a) Calculate the storage required to supply the demand shown in the following table if the inflow of water to the reservoir is maintained at a uniform rate throughout 24 hours.

Time (hrs.)	00-04	04-08	08-12	12-16	16-20	20-24
Demand in million litres	0.48	0.87	1.33	1.00	0.82	0.54

**10**

b) Describe the factors affecting losses and wastage of water. How are the leaks and wastage of water in the distribution systems detected? **10**

B. Tech. — Fifth Semester  
**IRRIGATION ENGINEERING-I (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**. Each question carries equal marks.

- Q.1** Write short notes on the following: **2×10**
- a) Consumptive use of water.
  - b) Kor watering and paleo irrigation.
  - c) Advantages of lining.
  - d) Most economical section and its condition.
  - e) Layout plan of diversion head works.
  - f) Cross head regulator and distributary head regulator.
  - g) Hydraulic gradient line.
  - h) Classification of dams according to material used.
  - i) Phreatic line.
  - j) Cavitation.

**PART-A**

- Q.2** a) Define the duty, delta and base period. Derive their relation. Also list the factors affecting duty of a crop. **7**  
 b) Explain irrigation efficiency and its types in detail. **10**  
 c) Describe the sprinkler method of irrigation with diagram. **3**
- Q.3** a) Calculate the width of a trapezoidal channel for a discharge of  $110 \text{ m}^3/\text{s}$  having a side slope of 1.5 horizontal, 1 vertical, bed slope 1 in 4900 and roughness coefficient ( $h$ ) = 0.015 for a normal depth of 3 m. **10**  
 b) Describe the three regime conditions as given by lacey. **5**  
 c) What are the different types of outlets? Describe any one, in detail. **5**
- Q.4** a) What are canal falls? Explain their necessity. Describe five major types of falls with diagram. **10**  
 b) What are silt excluders and silt ejectors? Describe and differentiate, in detail, with the help of diagrams. **10**

**PART-B**

- Q.5** a) Describe Bligh's creep theory in detail with the corrections given against failure of hydraulic structures made on permeable foundations. **10**  
 b) What are cross drainage works? Describe aqueducts with diagram. **5**  
 c) Explain the utility of canal escapes along with its types. **5**
- Q.6** a) Determine the phreatic line through an earth dam with the following data:  
 Level of top of dam = 300 m.  
 Level of deepest river bed = 280 m.  
 HFL of reservoir = 297.5 m.  
 Width of top of dam = 4 m.  
 Upstream slope = 3:1  
 Downstream slope = 2:1  
 Coefficient of permeability =  $5 \times 10^{-4} \text{ cm/sec}$ .  
 Also, find the discharge passing if a horizontal filter of length 25 m is provided from the inward side of downstream toe. **12**

c) List the merits and demerits of:

- i) Gravity dams.
- ii) Earthen dams.
- iii) Timber dams.
- iv) Rock fill dams.

**8**

Q.7 a) Design the profile of an Ogee spillway with the following data:

$$Q = 9000 \text{ m}^3/\text{s}.$$

Number of spans = 8; Clear width between spans = 8 m.

Thickness of pier = 2.5 m.

Downstream slope = 0.7H : 1V.

Height of spillway crest = 204 m.

Average river bed at site = 100 m.

$$K_p = 0.01, K_a = 0.1$$

**12**

c) Define spillway. Describe five major types of spillways along with diagrams. **8**

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. Assume any data suitably if not given.

### **Q.1 Answer the following questions:**

- a) Write the items to be mentioned in site plan.
  - b) Give reason why straight reach of river is desirable at any bridge site.
  - c) What are the reasons for generation of secondary stresses?
  - d) Explain scouring.
  - e) Draw a neat plan of abutment showing-breast wall, wing wall and return wall.
  - f) Why no bearing are needed at the support of rigid frame bridge? Explain.
  - g) Mention any three advantages of steel bridge over concrete bridge.
  - h) List out functions of a pin cap.
  - i) Describe main difference between fixed and expansion bearing.
  - j) What do you understand by grip length?

2x10

## **PART-A**

Q.2 a) In planning and design of a bridge, selection of a suitable bridge site is very important. Describe characteristics of an ideal bridge site. **12**  
b) Write a short note on 'economical span'. **8**

Q.3 a) Mention types of standard live loads as per IRC on a bridge and describe any one in detail. **10**

b) Write short notes on **(any two)**:

- i) Impact-effect.
- ii) Centrifugal force.
- iii) Buoyancy effect.

5x2

Q.4 a) Find out maximum bending moment for which a RCC slab type culvert is to be designed for data given below:

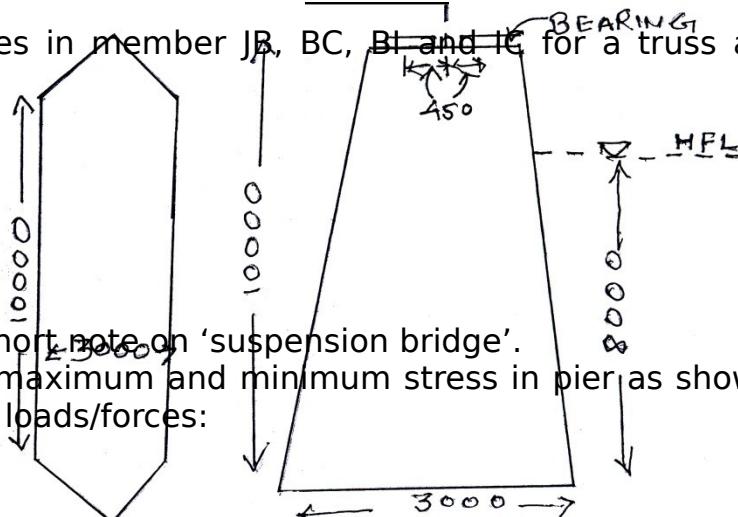
- i) Width of bridge = 12 m
  - ii) Clear span = 5 m
  - iii) Wearing course = 56 mm thick asphaltic concrete.
  - iv) Load class to be considered-class AA tracked vehicle.
  - v) Impact factor = 23.5%.

12

b) Write a short note on T-beam Type Bridge.

~~PART-B~~ 2000-

Q.5 a) Find forces in member JB, BC, BI and IC for a truss and loading shown below:



12

b) Write a short note on 'suspension bridge'.

8

Q.6 a) Find the maximum and minimum stress in pier as shown in the figure for following loads/forces:

**PLAN AT BOTTOM            SECTION**  
**(ALL DIMENSIONS ARE IN MM)**

- i) Dead load of span and self-weight
- ii) Buoyancy effects.
- iii) Stress due to eccentricity of live load.
- iv) Stresses due to longitudinal forces.

It is given that dead load from each span equal to 2250 kN is coming over the pier and live load from each span equal 900 kN is coming over the pier at 45 cm from centre line of pier.

- b) Write a short note on 'non-mettalic bearing'. 8

- Q.7 a) Well foundation is widely used in river bridge. Discuss it in detail with a neat sketch. 12
- b) Pile foundation is increasingly used in urban flyover and metro rail. Describe how load carrying capacity of a single pile is found out. 8

**End Semester Examination, Dec. 2017**

B. Tech. — Fifth Semester

**DESIGN OF CONCRETE STRUCTURES-II (C-601 / C-601A)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

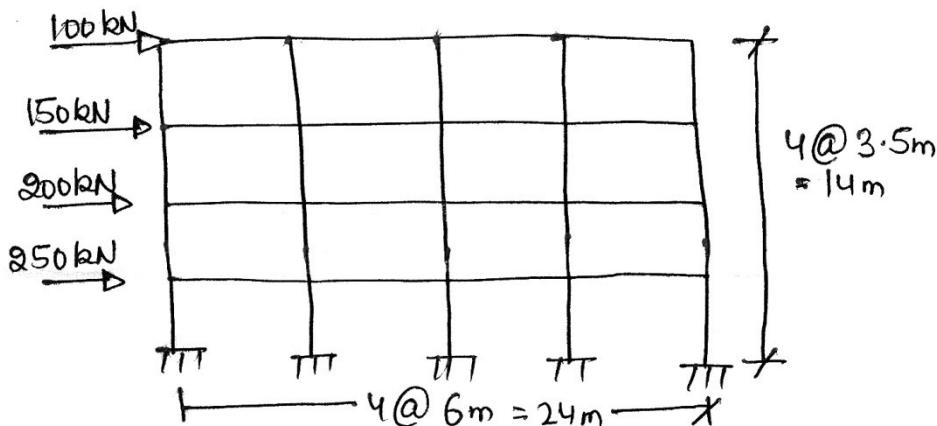
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Marks are indicated against each question.

**Q.1** Answer the following questions:

- What is the grade of concrete required for post tensioning work?
- Assumptions of cantilever method.
- Give advantages of a flat slab.
- Define bundled tube structure.
- What is redistribution of moments?
- Mention the code used for design of a water tank.
- What is the purpose of constructing retaining wall?
- Draw the labeled cross-section of a flat slab.
- Briefly describe substitution method of analysis.
- Which failure is predominant in raft footing, one way shear or two way shear? **2x10**

### **PART-A**

**Q.2** Analyze the frame using portal method:

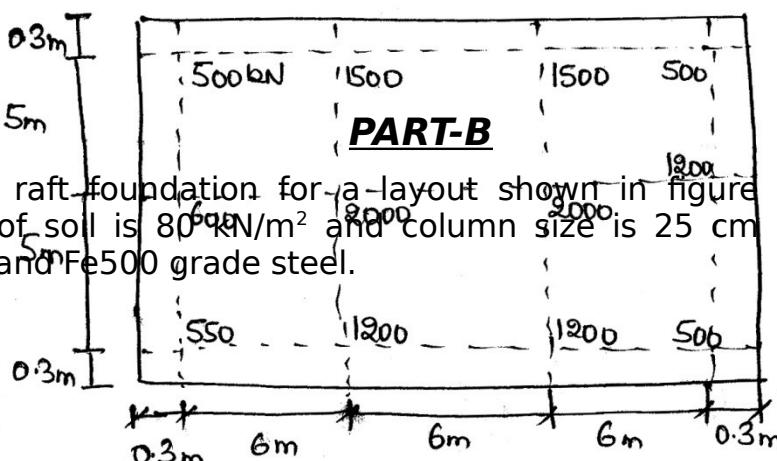


**20**

**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**

**Q.5** Design a raft foundation for a layout shown in figure below. Net bearing capacity of soil is 80 KN/m<sup>2</sup> and column size is 25 cm x 25 cm. Use M30 concrete and Fe500 grade steel.



**160/5**

**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/m<sup>2</sup>. **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**

## **DESIGN OF STEEL STRUCTURE-II (C-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**. Each question carries equal marks.

Q.1 Write short notes on:

- a) Kinematic or upper bound theorem.
- b) Define 'plastic section modulus'.
- c) Neatly sketch purlins and show loading on purlin.
- d) Different type of pressed steel tank.
- e) Joints in pressed steel tank.
- f) Proportioning of stack.
- g) Define 'self-supporting steel stack with sketch'.
- h) K-bracing lattice tower.
- i) Local buckling of plate elements.
- j) Effective design width.

**2x10**

### **PART-A**

Q.2 A two span continuous beam of uniform section loaded with ultimate loads as shown in figure. Determine the required plastic moment of resistance.

**Fig.**

**20**

Q.3 An industrial building is to be built in Guwahati near a small hill 160 m high with a slope of 1 vertical to 3 horizontal. The building is planned to be provided at a height of 120 m above the base of the hill. The terrain may be considered as open terrain with scattered obstruction, the height of obstructions being in the range of 1.5 m to 10 m above the ground level. The height of the building is 18 m. Find the design wind pressure. Assume that the building size is in the range 20 m to 50 m and its life period is 50 years.

**Fig.**

**20**

Use:

Basic wind speed = 50 m/s at Guwahati risk coefficient  $k_1 = 1$  for 50 year life.

Q.4 An elevated rectangular steel water tank open at top is required to have a capacity of 95000 liters with a free board of not less than 150 mm. The bottom of tank is at 10 m above ground level. Using 1.25 m x 1.25 m standard pressed steel plates and suitable allowable stress, design the following:  
i) Design the size of the tank and arrangement of the pressed steel plates.  
Show the sketch of the tank.  
ii) Design upper and lower stays.  
iii) Design longitudinal and cross sectional beam.

**20**

### **PART-B**

- Q.5 Design chimney shell at 10 meter from top of a welding self-supporting steel stack located in the outskirts of New Delhi for the following data:
- |                           |             |
|---------------------------|-------------|
| Terrain category          | 2           |
| Topography                | Almost flat |
| Height of steel stacks    | 95 m        |
| Diameter of steel stacks  | 3 m         |
| Thickness of brick lining | 100 mm      |
| Corrosion allowance       | 3 m         |
- 20**
- Q.6 a) Briefly elaborate loads acting on lattice towers. Write down empirical relationship between the wind force, net wind force coefficient and solidity ratio. **10**  
 b) Explain neatly the different component of masts. Briefly explain the different load acting over the masts. **10**
- Q.7 Find the column section properties and allowable load for the column section as shown. The effective length of column is 3.0 m. Take  $f_y = 235 \text{ N/mm}^2$ .

**Fig.**

**20**

## DESIGN OF STEEL STRUCTURE-II (C-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**. Each question carries equal marks.

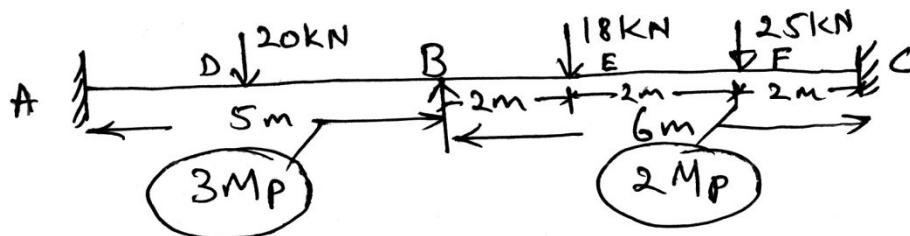
Q.1 Write short notes on:

- Define plastic modulus.
- Write down numerical values of circular section and rectangular section:  
Shape factor.
- Differentiate between class A, B, C type of building.
- What is force in stack per foundation bolt?
- What are different types of stack? Define stacks with limitation of height.
- Define and neatly sketch self-supporting tower.
- What is the concept of effective width-define?
- What is meaning of local bucking of this element?
- Differentiate between self-supported tower and most.
- Write down different component of industrial building.

**2×10**

### **PART-A**

Q.2 Find the value of plastic moment  $M_p$  for the continuous beam loaded with collapsed load as shown in figure.



**20**

Q.3 a) Briefly explain truss and their types. **5**

- b) Design an industrial building situated near a wide road close to New Delhi. It has length of 40.5m and breadth of 23.4m measured externally. The height from ground to eaves is 10m. Pitch of the truss is 1/5 and roof over hangs by 300mm on horizontal beyond the walls. Determine the design pressure on the various faces of the wall and roof of high permeability. Assume data, if required. **15**

Q.4 a) Define the following term and analyze the forces of pressed steel tank: **5**

- Upper stays.
  - Lower stays.
- b) Design a rectangular tank of capacity 120000 litres of water supported over a 13.5m high staging. Column arc supported over concrete pedestal of M-15 concrete. The bearing capacity of soil is 100 kN/m<sup>2</sup>. Design wind pressure may be assumed to be 1.05 kN/m<sup>2</sup>. Plates of 1.25 width and 8.75m length are available. **15**

### **PART-B**

- Q.5 a) Show with the neat sketches of anchor bolt lug. Take  $W_s$ ,  $W_l$ ,  $M_w$ ,  $F_{br}$ ,  $F_l$  and  $F_t$  are self wt of stack, wt of liner, moment at a base, foundation reaction maximum force per unit length, allowable bending stress respectively. 5  
 b) Design a guyed steel stage of 21m height with one set of guy wire attached at 7 m from the top. The diameter of the shaft is 1.2m. Assume the necessary relevant data. Design guyed steel wires. 15
- Q.6 a) Explain the various type of the load acting on the transmission line. 5  
 b) Analyze for a suitable configuration of a lattice tower for 55 m high microwave antenna lattice tower is to be built near Faridabad where the terrain at the site is nearly a level ground with terrain of category 3. The diameter of the hemispherical antenna disc fixed at the top is 4m. The width of the tower at the top has to be 3.5 m select the suitable configuration for the lower.  
 $wt$  of platform = 0.82 kN/m<sup>2</sup>,  $wt$  of antenna = 22 kN, weight of railing at top = 0.4 kN/m<sup>2</sup>,  $wt$  of ladder = 0.75 kN/m,  $wt$  of misc item = 3.5 kN, self  $wt$  of tower truss = 3.5 kN/m, line load = 950 kN/m<sup>2</sup>. 15
- Q.7 a) Explain concept of local buckling of thin element with help of  
 i) When edges are simply supported?  
 ii) When edges are fixed? 5  
 b) Two channel section with bent up 200mm × 80mm are connected with webs to acts as column. The thickness of channel in 3.2mm. The depth of lip is 25 mm. The effective length is 4.4m. Determine axial compress of element and safe load carrying capacity of the light gauge steel cold section. 15

**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 **TWO** questions from **PART-B.** Each question carries equal marks.

**Q.1** Write short notes on:

- a) Utility of a weir.
- b) Critical exit gradient.
- c) Marginal bunds.
- d) Super-passage and its relative bed levels.
- e) Roughening devices.
- f) Stilling basins and its utility.
- g) Meander ratio.
- h) Ogee spillway.
- i) Sloping glacis fall.
- j) Earthquake forces in a dam.

**2×10**

**PART-A**

**Q.2** a) An impervious floor of a weir on permeable soil is 15 m long and has sheet piles at both the ends. The upstream pile is 4 m deep and the downstream pile is 5 m deep. The weir creates a net head of 3m. Calculate the uplift pressures at the junction of the inner faces of the pile with the weir floor using Khosla's theory. Neglect the thickness of weir floor. **10**  
 b) Describe Bligh's creep theory in detail with the corrections given against failure of hydraulic structures made on permeable foundations. **10**

**Q.3** a) Describe various types of river training works and protection works. **10**  
 b) Sketch a suitable cross -section of a guide banks as used in river training works. Explain the process of launching of aprons in such works. **10**

**Q.4** a) What are cross drainage works? Describe the different types of cross drainage works with diagrams. **12**  
 b) Explain the method of fixation of water way of drain in an aqueduct. **8**

**PART-B**

**Q.5** a) What is meant by an "energy dissipator"? Discuss the various methods used for energy dissipation below spillways. **8**  
 b) Design the profile of an Ogee spillway with the following data:  
 $Q = 10000 \text{ cumecs}$   
 $L = 60 \text{ m}$   
 $K_p = 0.01$   
 $K_a = 0.1$   
 No. of spans = 6  
 Downstream slope = 0.7:1  
 Average bed level = 100 m  
 Height of spillway crest at RL = 204 m **12**

**Q.6** a) What do you understand by a fall in a canal? Why is it necessary? Enumerate the different types of canal falls. **8**  
 b) Design a 1.5 m Sarda type fall for a canal having a discharge of 10 cumecs with the following data:

Bed level upstream = 104 m  
Side slopes of channel = 1:1  
Bed level downstream = 102.5 m  
Full supply level upstream = 105.5 m  
Bed width upstream and downstream = 1m  
Assume Bligh's coefficient = 6

**12**

- Q.7 a) What do you understand by gravity dam? Explain various forces that act on a gravity dam. **10**
- b) Discuss in brief various modes of failure of a gravity dam. **10**

### **End Semester Examination, Dec.2017**

B. Tech. – Sixth Semester

**TRANSPORTATION ENGINEERING - II (C-604A)**

Time: 3 hrs

Max Marks: **100**

No. of pages: 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 names of various compacting equipments.  
b) Explain the difference between plant mix and road mix.  
c) Explain the functional evaluation of pavement by “unevenness’ index”.  
d) Explain the stages while deciding the alignment of hill roads.  
e) Explain with a sketch, the method of providing capillary cut-off to control capillary rise of water.  
f) What are the functions of rails? Name the various types of rails in use in India.  
g) Explain the function and types of ballast in permanent track.  
h) What are the types of imaginary surfaces?  
i) Explain the term runway patterns with diagram.  
j) Explain various methods of tunneling in soft soil.

**2x10**

### **PART-A**

- Q.2 a) Mention the specifications of materials, construction steps and quality control tests for the construction of cement concrete pavement slab.

**10**

- b) Write short notes on:  
i) Prime coat  
ii) Tack Coat  
iii) Seal Coat  
iv) Surface dressing

**10**

- Q.3 a) What are the various methods of pavement surface condition evaluation and their applications? Discuss in detail.

**10**

- b) Discuss any four types of failures of pavement, their causes and the required remedial methods.

**10**

- Q.4 a) Discuss the construction procedure of hill roads in detail.

**10**

- b) Explain how the surface water is collected and disposed off in:  
i) Rural Roads,  
ii) Urban roads.

**10**

### **PART-B**

- Q.5 a) What do you understand by gradient? Define momentum, pusher, ruling and minimum gradient.

**10**

- b) Find out the length of the curve for a B.G. curved track having  $4^0$  curvatures and a cant of 12 cm. The maximum permissible speed on curve is 85 kmph. Also find out the offsets at every 15m.

**10**

- Q.6 a) List various factors controlling taxiway layout in detail.

**10**

b) Determine the turning radius of the taxiway for a supersonic transport aircraft with a wheel base of 30m and tread of main loading gear as 6m for a design turning speed of 50 kmph. Assume coefficient of friction between tyre and pavement surface as 0.13 and width of taxiway pavement as 22.5 m. **10**

Q.7 a) Discuss the various methods of hard rock tunneling and mention the advantages and disadvantages of each of them.

**10**

b) Explain the various shapes of tunnels with diagrams.

**10**

## **End Semester Examination, Dec.2017**

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.** Each question carries equal marks.

- Q.1 a) What is mixing height of the atmosphere?  
b) What is stack?  
c) Write the function of bin.  
d) What are non-biodegradable wastes? Give examples.  
e) Define non-recyclable wastes.  
f) Write the relation between BOD and COD.  
g) Write the BOD and SS removal %age in PST.  
h) Explain diffused sources of water pollution.  
i) Define function of greet chamber in STP.  
j) What do you mean by the term 'Activated Sludge'?

**2x10**

#### **PART-A**

- Q.2 a) Discuss with diagram the different types of plume behaviour of stack happens in the atmosphere.

**10**

- b) Average pressure of the day at station level = 720 mm of Hg;  
i) Average temperature =  $320^{\circ}$  C  
ii) Actual sampling time = 24 Hrs.  
iii) Sampling rate: Clean after = 1.8 cum/min and filter after exposure = 1.6 cum/min.  
iv) Weight of filter before exposure = 3.23 gm  
v) Weight of filter after exposure = 3.75 gm  
v) Determine suspended particulates concentrates.

**10**

- Q.3 a) What are the objectives of solid wastes management system? Explain any two methods of composting with diagrams.

**10**

- b) In a solid waste management system per capita solid waste under house to house collection system is 400 gm/day. Given that the density of solid waste is  $550 \text{ kg/m}^3$ . Design the size and number of pedal tri-cycle. Consider population of each ward to be 10,000.

**10**

- Q.4 a) Explain different pattern of sewerage layout with the help of diagrams.

**10**

- b) A small town with a projected population of 20000 residing over an area of 10 hectares is provided with a water supply @ 200 lpcd. Find the design discharge for a combined sewage. Assume run-off coefficient = 0.4 and time of concentration = 15 minutes. Make suitable assumption where needed.

**10**

**PART-B**

- Q.5 a) Explain sewage disposal by land treatment process with its merits and demerits. **10**
- b) A city with population of 120,000 and a sewage flow 150 lpcd is located on a stream with a rate of flow of  $0.7\text{m}^3/\text{sec}$ . The BOD of sewage is 210 mg/l. The DO and BOD content of stream above the outfall of sewer are 7.8 and 1 mg/liter respectively.
- i) How many kg of oxygen per day are available above the outfall?
  - ii) What is the total kg of BOD per day in the stream just below the outfall, assuming no oxygen takes place?
  - iii) Express the total BOD in mg/liter.

**10**

- Q.6 a) Explain any one biological sewage treatment method of attached growth system with a diagram. **10**
- b) Design a primary setting tank of rectangular shape for a town having a population of 50000 with a water supply of 180 lpcd. **10**

- Q.7 a) Explain the self-purification process of river with a diagram. **10**

- b) Write short notes on:
- i) Point sources of water pollution.
  - ii) Aeration of polluted water.

**5x2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **PRACTICAL ASPECTS OF PROJECT MANAGEMENT (C-705)**

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:

- a) CPM.
- b) IRR.
- c) Bill of material.
- d) Updating of PERT.
- e) Name at least three drivers of Real Estate Sector.
- f) What is meant by “Front Loading” in an Item Rates Tender? Explain by giving an example.
- g) Is it a good policy to put Purchase and Stores under the same person? Give reasons.
- h) Prepare Project Organogram for a project site showing at least five positions.
- i) Daily site report.
- j) Monthly project report.

**2x7**

#### **PART-A**

Q.2 a) What is meant by Compounding and Discounting? Explain the difference.

**5**

- b) What is Quality of Materials / Quality of Works? Explain giving two examples of each.

**10**

- c) What is Gantt Chart and Network Diagram? Explain the difference.

**5**

Q.3 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**

- Q.4 a) Draw a bill of quantity for manufacturing 100 cum of M 20 concrete to be placed in position of a roof slab. Also, draw the table for quantity of materials required to manufacture concrete.

**10**

- b) A Project has 4 towers to be built. Each Tower has an area of 20,000 sft and the construction cost is estimated @ Rs. 2,500 / sft. Because of a recession in market, contract is awarded only for 2 towers. The Contract value is Rs. 11 Crore – higher than estimates because some prices were incorrectly assumed. It is expected that order for the 3rd and 4th towers will be released after one year at 8% higher rates (due to inflation).
- i) What is the initial Estimated Cost of Project?  
**3**
  - ii) What is the Committed Cost?  
**3**
  - iii) What is the expected Cost to Completion?  
**4**

### **PART-B**

- Q.5 Define and explain:

- a) Time value of money.
- b) Compound annual growth rate (CAGR).
- c) Payback period.
- d) Internal rate of return.
- e) Balance sheet.
- f) Cash flow statement.
- g) NPV.
- h) Discounting.
- i) P&L account.
- j) WBS.

**2×10**

- Q.6 a) For a Project, Team A prepared a plan based upon 5 days working in a week [Monday to Friday]. Team B prepared their plan on 6 days a week [Monday to Saturday, with Christmas Eve (24 December) and on New Year (2 January) as holidays]. What is their End Date?

**10**

- b) The Country's GDP projection for the next few years is given below. Calculate the GDP Growth in shaded cells and mark the trend on the Graph.  
**3**

- c) What is DPR and MPR? Explain the difference and illustrate a few contents of both. **3**
- d) What is meant by "Cost to Completion"? Why is it important?  
**4**
- Q.7 a) The Contractor has submitted the Measurement Sheet for his RA Bill. Compute the Qty and prepare the RA Bill.  
**10**
- b) What is a Pour Card? Where is it used? Why is it important? Explain.  
**5**
- c) Why is Project Close-out important? Illustrate at least 3 of its contents.  
**5**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **PRACTICAL ASPECTS OF PROJECT MANAGEMENT (C-705/C-705A)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **5**

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 full form for:
- i) FIFO
  - ii) BOQ
  - iii) MPR
  - iv) GDP
- b) Describe "Uncertainty" in a Civil Engineering Project and how is it handled?
- c) What is meant by "Big Picture"? Explain giving example.
- d) What is "Feedback" and why is it useful?

- e) What is Gantt Chart and Network Diagram? Explain the difference.
- f) What is meant by "Front Loading" in an item rates tender? Explain giving example.
- g) What is a pour card and what is its importance?
- h) What is site instruction book and what is its importance?
- i) Which of the graphs below signifies the scope for value addition against the timeline of a Project? A, B, C or D?



- j) What is version control in GFC and how is it managed?

**2x10**

### **PART-A**

- Q.2 a) What is Project Management? Write a note in not more than 150 words covering the following:
- i) Non-routine nature of work.
  - ii) Uncertainties in a project.
  - iii) Phases in project management.
  - iv) Players in a project and their roles.
  - v) Objectives of project management.
  - vi) How a project manager can bring value to a project?
- b) What is contribution analysis? What is fixed cost and variable cost? Derive the profit/ (loss) made by a tea stall owner on a particular day, using the following data:
- i) The tea vendor expects to sell 200 cups every day and purchases the raw materials every morning, for the full day. Milk being a perishable material, cannot be kept overnight and any milk left unused in the day goes waste. Other materials can be used on next day.
  - ii) Each cup of tea requires Water (₹0.50), Tea Leaves (₹1.00), Milk (₹1.50) and Sugar (₹0.75)
  - iii) Kerosene Stove and Cart are taken on Rent of ₹90/day and ₹225/day. A Helper is employed, who is paid ₹200/day.
  - iv) Tea is made in lots of 5 cups every time, using Kerosene of ₹2 per lot. Any unsold tea left at the end of day goes waste.
  - v) 168 Tea cups are actually sold on a particular day @ ₹8/cup. On that day, 4 students walked away without paying (this is a loss to tea vendor).

Suggest how he can improve his profit/reduce the loss?

**20**

- Q.3 a) Draw the Project Network comprising of minimum 15 Activities and Milestones. It should have 3 Parallel Paths. Clearly label all components and mention suitable time duration for all activities. Show / compute:
- i) Arrows and nodes.
  - ii) Activities and milestones.
  - iii) Precedence relationships.
  - iv) Burst and merge.
  - v) Serial and parallel activities.
  - vi) Early start/finish and late start/finish.
  - vii)

Critical path.

**10**

- b) For a project, team A prepared a plan based upon 6 days working in a week [Monday to Saturday]. Team B prepared their plan on 5 days working in a week [Monday to Friday]. Christmas (25 December) is a holiday. As the New Year falls on a Sunday, the next day (2 January) is also a holiday. Fill the Start and end dates of all activities for team A and team

B in the table provided in attachment. The start date of the project is 04 December 2017. **10**

- Q.4 a) Write a note on the real estate sector in India. What are the factors that drive growth of real estate sector? What is RERA and how is it likely to impact the practices in the Real Estate Sector? (write in not more than 150 words). **10**
- b) The Item of works in a civil contract are as given in attached sheet. The material rates and their consumption norms for each item of works are also given. Fill all shaded cells.
- Find out the quantity consumed for each material.
  - Find out the Value Consumed for each material and the total value of materials consumed for the project.
  - Fill the consumption quantity and value in table "material rates and qty."
  - Find the cost of each item of works and cost/unit. What is the total cost of all items of work?
- 10**

### **PART-B**

- Q.5 a) A commercial building with 4 equal office floors is to be constructed on a plot of size 100 m wide and 200 m long. The maximum ground coverage, FAR and building height allowed are as shown in attachment; the minimum set back required is also shown. What is the best building plan possible? Give FAR achieved, FAR area achieved and ground coverage achieved? Also, what would be the floor-wise break-up of areas and height of building above NGL? (Hint: maximum basement height allowed is 5 m and basement/stilt areas are not included in FAR) ignore slab thickness. **10**
- b) The layout of the plot mentioned earlier is shown in attachment. A high tension electric cable runs 30 m inside the plot and parallel to the rear boundary. The law required that no permanent building can be constructed below the HT cable, in a corridor 20 m wide (10 m on each side of cable). Draw the building foot print in the attachment, and show where you would locate the i) Site office (5m×3m), ii) Steel yard (20m×3m), iii) Stores (5m×5m) and iv) Gate office (2m×2m). Dimension the drawing. **10**
- Q.6 a) What is a mock-up flat and how is it different from a sample flat? Prepare a checklist for inspecting various features of the mock-up flat and the quality parameters desired/observed. Include civil works, Interior works, electrical and plumbing works. **10**
- b) A Tender was floated in which 4 parties submitted their bids. The tender is to be evaluated using a combination of quality and price as the criteria. The weightage given is 40% to quality and 60% to price as shown in attachment. The component on which quality is judged, and their weightage is also given? The scores of all 4 bidders are also shown in the table. Show the complete working of scores and select the winning bidder. **10**

- Q.7 a) Prepare the agenda for a meeting called to review quality problems in the civil structure and to find solutions/action plan.  
The meeting could not be held as scheduled, and was held on the next day, same time.  
Prepare the minutes of meeting.  
(Show the various components of both these documents) **10**
- b) In project A, all activities have a 'likely' time for their respective completion. Based upon these likely times, project A is expected to take 28 weeks to complete. However, due to the uncertainties associated with the various activities, they may take longer or shorter than their likely

times. Because of this, the actual project duration may vary, as shown in the Table below.

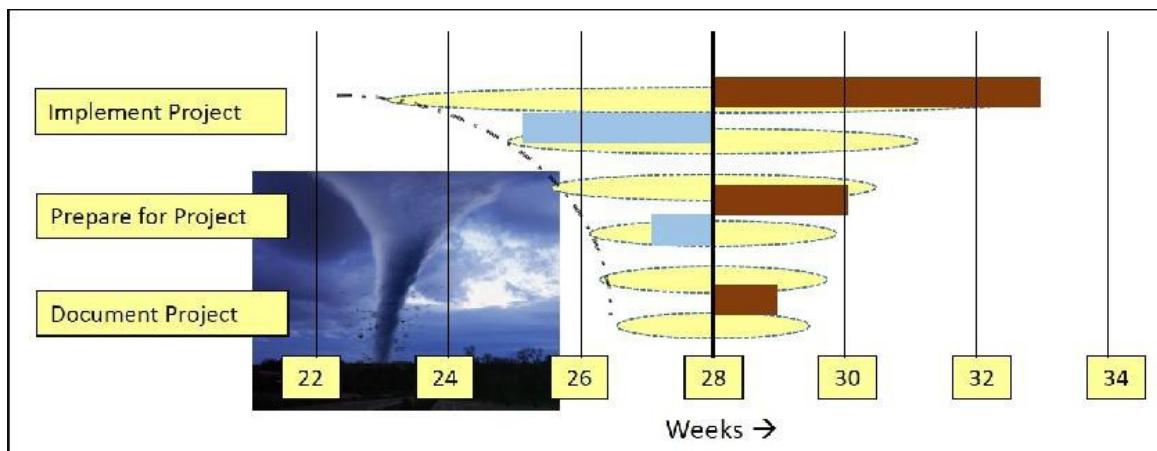
E.g., because of variation in the actual time taken by "Prepare for Project", project A may finish 1 week early (i.e., in 27 weeks) or 2 weeks late (i.e., in 30 weeks). The 'Range' of this activity, or the net variation in the project duration due to variation of the time taken by this activity is 3 weeks (=30-27).

Tornado<sup>1</sup> chart is the visual representation of this "Impact on project duration due to variation in activities' time taken" and is shown below. It is centered around the project's likely time duration.

Project A				
S.No.	Task Name	Project Duration		
		Min	Max	Range
1	Prepare for Project	27	30	3
2	Implement Project	25	33	8
3	Document Project	28	29	1

Activities Sorted on decreasing "Range"				
S.No.	Task Name	Project Duration		
		Min	Max	Range
2	Implement Project	25	33	8
1	Prepare for Project	27	30	3
3	Document Project	28	29	1

### Tornado Chart



The Likely Project Duration of Project B is 56 weeks. The activities in Project B are as shown in the attachment. Draw the Tornado Chart in the space provided in the attached sheet.

(Hint: Sort the activities in decreasing order of their Range first)

**10**

### ATTACHMENTS

(Answers to be filled in these sheets and attached to your Answer Sheets)

Q.3 b) — Project duration.

Team A - 6 day week

Task Name	Duration (days)	Start	Finish
Start	0		
Prepare for Project	6		
Implement Project	16		
Document Project	5		
End	0		

Team B - 5 day week

Task Name	Duration (days)	Start	Finish
Start	0		
Design	6		
Construct	16		
Interiors	5		
End	0		

1 The name is derived from TORNADO, which is a rapidly rotating and upward moving storm as shown in the picture.

Calendar: Dec 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31				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

Calendar: Jan 2018

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	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			

#### Q.4 b) — BOQ

III. Material Rates & Qty						
Mati. S.No.	1	2	3	Total		
Material	Cement	Steel	Bricks			
Unit	Bag	Kg.	No			
Rate	280	45	6			
Consumption (Units)	Quantity					
Value						

IV. Item of Works						
Item S.No.	Items of Works	U/M	Estimated Quantity (U/M)	Cost of Item of Works	Cost / Unit	Total Cost
1	IICC Work M20	Cu.M	400			-
2	Plastering	Sq.M	600			
3	115 mm Brick Masonry	Sq.M	300			
Total						-

I. Quantity Consumed						
Item S.No.	Items of Works	U/M	Quantity of Material Consumed by Item of Works			Value of Material Consumed
			1	2	3	
			Cement	Steel	Bricks	
			Bag	Kg.	No	
1	IICC Work M20					
2	Plastering					
3	115 mm Brick Masonry					
Consu	Quantity					
mption	Value					
Total						

Consumption Norms						
Items S.No.	Items of Works	U/M	Quantity of Material Consumed by Item of			
			1	2	3	
			Cement	Steel	Bricks	
			Bag	Kg.	No	
1	IICC Work M20	Cu.M	10 Bag/Cu.M	60 Kg./Cu.M		
2	Plastering	Sq.M	3 Bag/Sq.M			
3	115 mm Brick Masonry	Sq.M	4 Bag/Sq.M		60 No/Sq.	

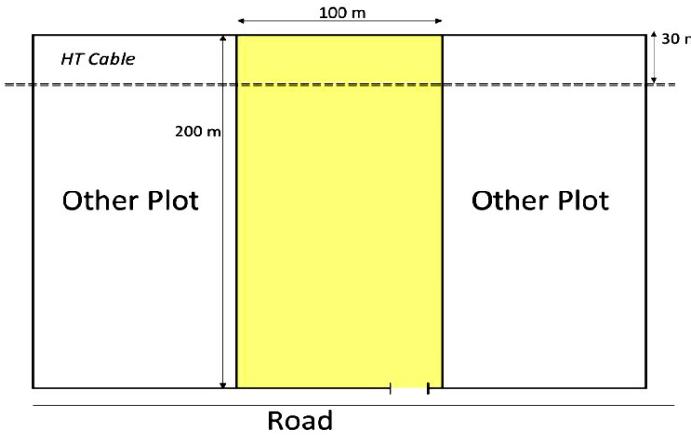
  

II. Value Consumed						
Items S.No.	Items of Works	U/M	Value of Material Consumed by Item of Works			
			Cement	Steel	Bricks	Total
1	IICC Work M20					
2	Plastering					
3	115 mm Brick Masonry					
	Value					

#### Q.5 a) — Regulatory compliance

Plot area (Sq.m.)	20,000		
Max. Ground Coverage:	60.00%		
Max. FAR:	2.50		
Min. Set Backs (m)	10.00		
Max. Height (m)	15.00		
Max. Height of Stilt (m)	2.20		
 Particulars	Permissible	Achieved	
Ground Coverage (Sq.m.)			
FAR	2.5		
FAR Area (Sq.m.)			
Building Width (m)			
Building Length (m)			
 Floor / Particulars	Height (m)	Constructed Area (Sq.m.)	FAR Area (Sq.m.)
Basement Floor (below NGL)			
Basement Roof (NGL)			
Stilt Roof (above NGL)			
Ground Floor Roof			
First Floor Roof			
Second Floor Roof			
Third Floor Roof			
Total:			
- Height of Building			
- Constructed Area			
- FAR Area			

#### b) — Site enabling Plan



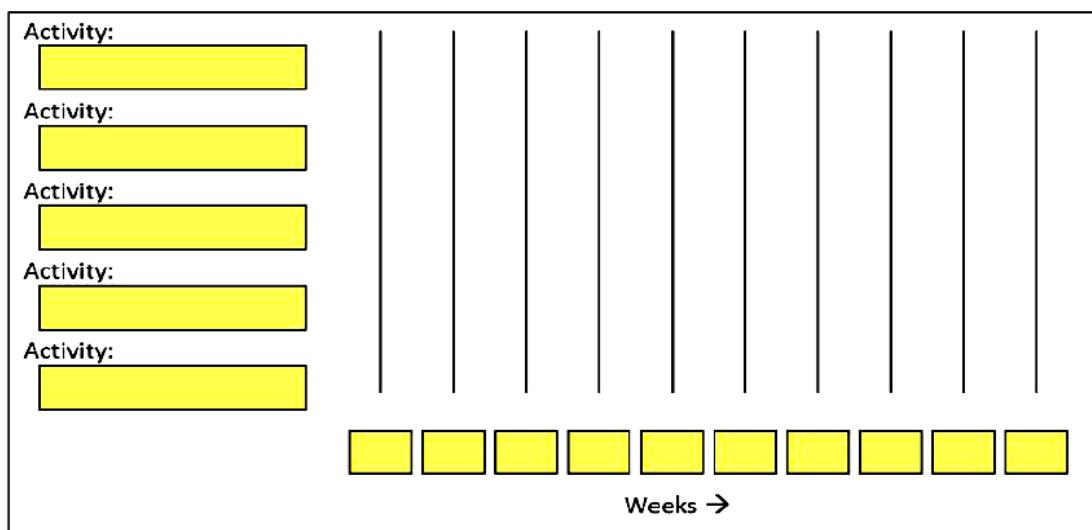
**Q.6 b) — Bid evaluation**

Parameter	Weightage	Bidder A			Bidder B			Bidder C			Bidder D		
		Qualified?	Score	Wgh. Score									
<b>Quality Weightage:</b>													
Management Team	20%	Y	60%		Y	80%		Y	80%		Y	60%	
Prior Experience	30%	Y	70%		Y	60%		Y	50%		Y	70%	
Client References	30%	Y	40%		Y	80%		Y	60%		Y	70%	
Equipment Available	20%	Y	60%		Y	70%		Y	70%		Y	50%	
Total	100%												
<b>Price Bid (Cr. Rs.)</b>													
Price Score (%)				55			68			65			60
<b>Selection Criteria</b>													
Quality	40%												
Price	60%												
Total	100%												

**Q.7 b) — Tornado Chart**

Project B			Sorted		
S.No.	Task Name	Project Duration			Project Duration
		Min	Max	Range	
1	Purchase Land	53	60		
2	Get Approvals	50	64		
3	Arrange Funds	54	58		
4	Construct Structure	52	61		
5	Do Interiors	55	57		

Tornado Chart



**End Semester Examination, Dec. 2017**

B.Sc. (ID) / B.Tech. – Sixth / Seventh Semester

**PRACTICAL ASPECTS OF PROJECT MANAGEMENT (C-705 / C-705A)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: 4

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 Full Form for:

- i) PERT
  - ii) IRR
  - iii) WBS
  - iv) BOQ
- b) What is meant by “Big Picture”? Explain giving example.  
c) What is meant by “Front Loading” in an item rates tender? Explain giving example.  
d) What is “Feedback” and why is it useful?  
e) What is Gantt Chart and Network Diagram? Explain the difference.  
f) What is payback period? Explain giving example.  
g) What is pour card and what is its significance?  
h) What is critical path? Explain with an example.  
i) What is a mock-up flat? Why is it important?  
j) What is quality of materials/quality of works and the difference? **2×10**

### **PART-A**

Q.2 a) Two friends – Ajay and Vijay start their own ventures at the same time. Ajay invests ₹60 lakh and Vijay invests ₹50 lakh. Their income over the next 4 years is as shown in the table.

- i) Compute all the shaded cells in the table.
  - ii) What is the NPV of Ajay (take discounting rate @ 10% pa)?
  - iii) What is the NPV of Vijay (take discounting rate @ 8% pa)?
  - iv) What is the NPV of Vijay (take discounting rate @ 10% pa)?
  - v) Which out of the following could be the IRR on Vijay’s investment: 7%, 8%, 9%, 10% or 11%? Support your answer with logic? **10**
- b) What is meant by compounding and discounting? Explain the difference using numeric example. **10**

Q.3 a) See the project network in the attached sheet, in which durations are mentioned:

- i) Fill in the early start, early finish, late start and late finish of all activities and milestones
  - ii) Which is the critical path?
  - iii) What is the project duration? **10**
- b) What is a logic note and what is its importance? Explain with an example. **10**

Q.4 a) The item of works in a civil contract are as given in attached sheet. The material rates and their consumption norms for each item of works are also given. Fill all shaded cells.

- i) Find out the quantity consumed for each material.
  - ii) Find out the value consumed for each material and the total value of materials consumed for the Project.
  - iii) Fill the consumption quantity and value in table “Material Rates and Qty.”
  - iv) Find the cost of each item of works and cost/unit. What is the total cost of all items of work? **10**
- b) Why is it important for the architect/ID to visit the project site? Explain, giving reasons. List down at least four stages when the architect/ID should visit the site, explaining the importance of each visit. **10**

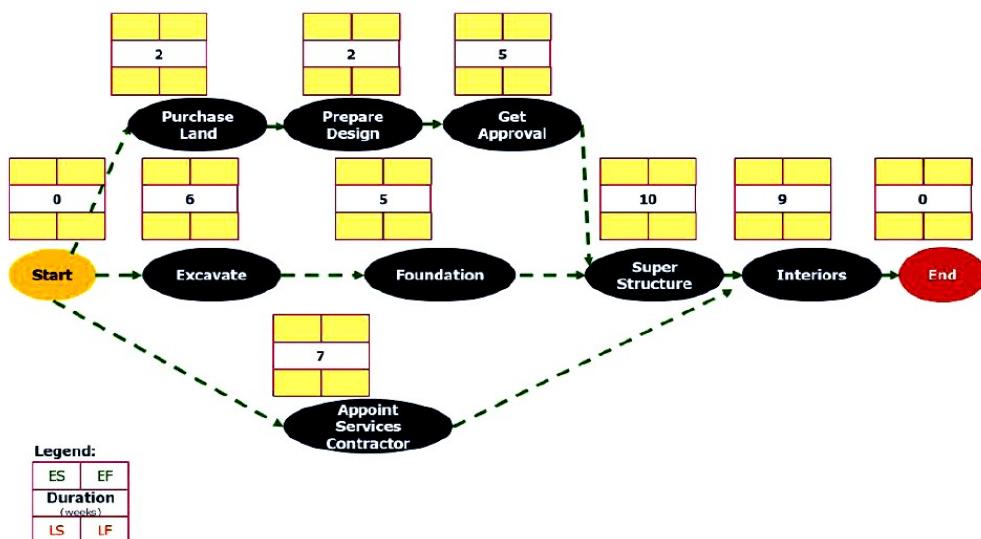
## **PART-B**

- Q.5 a) A Project has 3 towers to be built. Each tower has an area of 20,000 sft and the construction cost is estimated @ ₹2,000/sft. Because of a recession in market, contract is awarded only for 2 towers. The Contract value is ₹9.00 crore – higher than estimates because some prices were incorrectly assumed. It is expected that order for the 3<sup>rd</sup> tower will be released after one year at rates higher than the present contract by 20 % (due to inflation).
- i) What is the initial Estimated Cost of Project?  
ii) What is the Committed Cost?  
iii) What is the expected Cost to Completion? **10**
- b) What is Project Close-out? Why is it important to have a proper close-out of Project? Explain in detail, illustrating at least three important things that must be included in a Project Close-out document. **10**
- Q.6 a) What is Site Enabling Plan? Draw a hand sketch of a trapezoidal Site – 60 metres wide frontage with 2 gates on both sides, 50 metres at the rear and 80 metres long. 4 metres have to be kept clear all along the front and side boundaries for movement of material. Show at least 5 important components of Site Enabling Plan. **10**
- b) What are Checklists? What is their importance in Project Management? Select any one Construction process and develop a Checklist for the same. **10**
- Q.7 a) The project cost (budget) has been estimated as shown in the table.
- i) Part of the civil works were awarded for 180, out of which bills of 140 have already been paid. The balance part is yet to be awarded at an estimated cost of 260.  
ii) Plumbing works have been awarded for 70, out of which 30 is paid so far.  
iii) For electricals, the major equipment (DG sets/transformer/panels) have been de-scoped and would be bought directly by client, the expected cost of which is 45. Only the wiring and low-end Contract has been awarded for 40; no payments have been made.  
iv) No other contracts have been awarded yet.  
Compute the expenses committed, future commitments, estimated final cost and variance in the table. **10**
- b) What all information should the minutes of meeting contain? Prepare MOM for a project review meeting. **10**

Q.2 a) -Attachment (all shaded areas to be filled)

	Year						Total
		0	1	2	3	4	
<b>Ajay</b>							
Investment	-60.00						
Return		10.00	15.00	25.00	30.00		
<b>Net Inflow</b>							
Present Value, Discounted @	10%						
<b>Vijay</b>							
Investment	-50.00						
Return		5.00	10.00	20.00	30.00		
<b>Net Inflow</b>							
Present Value, Discounted @	8%						
Present Value, Discounted @	10%						
<b>IRR</b>	%						

Q.3 a) -Attachment (all shaded areas to be filled)



Q.4 a) -Attachment (all shaded areas to be filled)

#### **III. Material Status & Qty**

Mrkt.S.No.	1	2	3	Total
Material	Cement	Steel	Bricks	
Unit	kg	kg.	No	
	Rate	200	40	5
Consumption (Units)	Quantity			
	Value			

#### **N. Name of Works**

### I. Quantity Consumed

Item S.No.	Item of Works	Quantity of Material Consumed by Item of Works			Value of Material Consumed	
		Cement		Bricks		
		Bag	Kg.			
1	RCC Work 420					
2	Plastering					
3	115 mm Brick Masonry					
Contra Indice	Quantity					
	Value					

Consumption Patterns

Item S.No.	Item of Works	U/M	Quantity of Material Consumed by Item of		
			1		2
			Cement	Steel	Bricks
1	PCC Work M20	Cu.M	10 Bag/Cu.M	60 Kg./Cu.M	
2	Plastering	Sq.M	3 Bag/Sq.M		
3	155 mm Brick Masonry	Sq.M	4 Bag/Sq.M		60 Kgs/Sq.M

## II. Value Commodity

Q.7 a) -Attachment (all shaded areas to be filled)

Budget Head	Budget	Exp. Comm.	Future Comm.	Est Final Cost	Variance
Civil Works	425				
Plumbing Works	50				
Electrical Works	80				
Interiors & Finishing Works	350				
HVAC Works	100				
Elevators	50				
Misc. Works	45				
<b>PROJECT TOTAL</b>	<b>1,100</b>				

**End Semester Examination, Dec. 2017**  
B. Tech. (Civil Engineering) – 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) List the two predecessors of Swachh Bharat Abhiyaan.
- b) Give the name of ministry implementing Swachh Bharat Abhiyaan mission for urban areas.
- c) Define ‘Saprophytes’.
- d) List any four communicable diseases caused by bacteria.
- e) How is single pit system useful?
- f) List a few advantages of bio-digester toilets.
- g) What is the main objective of solid waste management?
- h) Define commercial waste.
- i) What is the norm for estimation of residential and commercial refuse?
- j) Expand IEC, OSS.

**2×10**

**PART-A**

- Q.2** a) Discuss the objectives and mission of Swachh Bharat Abhiyaan mission. **5**  
b) Discuss the targets and guidelines framed under SBM for provision of household toilets. **8**  
c) Discuss the precisions for solid waste management under SBM. **7**
- Q.3** a) List different micro-organisms and describe the role they play in spread of disease. **10**  
b) Describe the role of sanitation in prevention of communicable disease. **10**
- Q.4** a) Give an overview of existing status of sanitation in urban and rural India. **7**  
b) Describe the function of a bio-gas reactor. **7**  
c) Describe the functioning of septic tank. What are the limitations of it? **6**

**PART-B**

- Q.5** a) Describe any two waste treatment methods. **10**  
b) What is the significance of primary collection of waste? **10**
- Q.6** a) How do anaerobic treatment systems work? **10**  
b) Give an overview of activated sludge process. **10**
- Q.7** a) What efforts have been made by Maharashtra to make its cities open defacation free? **10**  
b) Describe the role of public participation in maintaining cleanliness. **10**

# **End Semester Examination, Dec. 2017**

B. Tech. – Seventh 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.** Each question carries equal marks.

Q.1 Write short notes on:

- a) Security money.
- b) Detailed estimate.
- c) Tender.
- d) Financial Bid.
- e) Capital Value.
- f) Cash Book.
- g) Advance payment.
- h) Lump sum contract.
- i) What are items of work? Name any four of them.
- j) Write general specifications of plastering.

**2x10**

### **PART-A**

Q.2 a) Prepare an estimate for the portion of a road from chainage 21 to 26 from data below:

Chainage	21	22	23	24	25	26
R.L. of ground	98.2	99.1	98.6	98.6	98.4	98.5
Formation Level	100m					

Length of chainage – 30 m

Rate of earthwork in cutting – Rs. 8 per cu meter.

Rate of earthwork in filling – Rs. 6 per cu meter.

Side slope is 2:1 (H:V)

Longitudinal slope is 1:100 throughout the length of road. Prepare an estimate for earthwork only.

**15**

b) Why an estimate should be prepared before start of a project? Describe any two types of estimates.

**5**

Q.3 a) Write detailed specifications of plastering on a brick wall.

**10**

b) Write general specification of (**any two**):

- i) PCC in foundation.
- ii) Cement Concrete 1:2:4
- iii) Damp proof course.
- iv) Pointing.

**5x2**

- Q.4 a) Calculate the rate of per cubic meter of 1:2:4 cement concrete (assuming suitable rates of various items required)  
**10**
- b) Calculate the no. of bricks required for 10m<sup>3</sup> Brickwork. Also, calculate the quantity of dry sand and cement required.  
**10**

### **PART-B**

- Q.5 a) Write a formal Tender Notice to be published in newspapers for construction of 10 storey residential building to be constructed at a cost of Rs. 120 crores in 36 months. (Assume required data).  
**10**
- b) Differentiate between "Technical sanction" and "Administrative Approval".  
**10**
- Q.6 a) Why contracting system is needed in civil engineering projects? Explain any two types of contracts with their advantages and disadvantages.  
**10**
- b) What are the various modes available for dispute resolution in contracts? Explain arbitration in detail.  
**10**
- Q.7 a) Calculate the net rent and gross rent of the property with following data:  
Cost of construction - Rs. 15,00,000/-  
Cost of land - Rs. 200/- per square meter.  
Measurement of land - 200 Sqm.  
Outgoing - Rs. 30,000 Pa.  
(Assume suitable rates return on land)  
**10**
- b) Explain the following terms:  
i) Valuation.  
ii) Labor Contract.  
iii) Termination of contract.  
iv) Refund of security money.
- 2½x4**

## **End Semester Examination, Dec. 2017**

### **B. Tech.-Eighth Semester TENDERING AND VALUATION(C-802)**

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:

- a) Corrigendum.
- b) Contract drawing.
- c) Notice inviting tender.
- d) Mitigation of penalty.
- e) Two bid system of tender submission.
- f) E-tender.
- g) Earnests money.
- h) Comparative statement.
- i) Arbitration
- j) Domestic arbitration.

**2x10**

### **PART-A**

Q.2 a) Differentiate between recommendations report and award of tender. Briefly explain the process of preparing recommendations report of a tender. **10**

- b) Write short notes on:
- i) Tender documents.
  - ii) Financial capacity.
  - iii) National tender.
  - iv) Global tender.

**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) Explain critical analysis of tender with an example.

**10**

Q.4 a) Write a notice inviting tender (NIT) for construction of a residential building of estimated project cost 70 crores covering all the required

points and assuming relevant data.

**10**

- b) What are the various types of tenders? Explain different methods through which a news paper publicity is given for each tender.

**10**

### **PART-B**

- Q.5 a) Explain the following:

- i) Project risk
- ii) Project time frame.
- iii) Liquidated damage.
- iv) Sorting and tallying number.

**10**

- b) Show critical analysis of tender; if the plinth area of a housing project is 15m X 15m and ceiling height is 3m. Justify with the help of project estimates, bill of quantity, rate analysis, construction schedule, schedule of tender etc.

**10**

- Q.6 a) Explain item rate contract, lump-sum contract and schedule contract in detail.

**10**

- b) Explain advantages and disadvantage of unit price contract and lump-sum contract. Also list out the general provisions of a contract.

**10**

- Q.7 a) Explain the basic goals of an arbitration in detail.

**10**

- b) Write short notes on:

- i) Agreement.
- ii) Administrative sanction.
- iii) Measurement book.
- iv) Detailed specifications.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh 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 Answer the following:

- a) Define 'hydrological cycle'.
- b) Name the various forms of precipitation.
- c) What is hyetograph?
- d) What do you mean by infiltration?
- e) Define unit hydrograph.
- f) Difference between confined and unconfined aquifer.
- g) Define direct runoff.
- h) Define specific yield.
- i) What do you mean by W-index?
- j) State Darcy's law.

**2×10**

### **PART-A**

- Q.2 a) Describe in detail the various methods of measuring rainfall. **10**
- b) Explain briefly the different methods of determining the average rainfall over a catchment area due to a storm. **10**
- Q.3 a) Define evaporation. What are the various factors on which evaporation depends? **10**
- b) What do you mean by evapotranspiration? How evapotranspiration is measured? **10**

- Q.4 a) A storm with 10 cm of precipitation produced a direct runoff 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 ( $\phi$ -index) of the storm. **10**
- b) Define infiltration and infiltration capacity. Explain in detail the various factors on which infiltration capacity of an area depends. **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	2	2	3	3	4	4
Ordinate of 4-h UH	0	2	8	13	15	13	9	5	2	1	5	0

- 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, Dec. 2017**

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:

- a) What are probable types of failure of a slope?
- b) Why retaining walls are usually designed for active earth pressure?
- c) Define safe bearing capacity.
- d) What are the assumptions made in Terzaghi's bearing capacity theory?
- e) What are cofferdams?
- f) Differentiate between isolated footing, strip footing and combined footing.
- g) What is meant by 'significant depth of exploration'?
- h) List field tests commonly used in subsurface investigation.
- i) Define degree of freedom.
- j) What do you mean by differential settlement?

**2×10**

### **PART-A**

- Q.2** a) What is meant by an infinite slope? What is the criterion for the stability of an infinite slope in sand? **10**  
b) Explain Swedish circle method in detail. **10**

- Q.3 a) A retaining wall with the smooth vertical back is 10 m high and retains two layer sand backfill with following properties:  
 0-5 m depth,  $c' = 0$ ,  $\phi = 30^\circ$ ,  $\gamma = 18 \text{ kN/m}^3$ .  
 Below 5 m:  $c' = 0$ ,  $\phi = 34^\circ$ ,  $\gamma = 20 \text{ kN/m}^3$ .  
 Show active earth pressure distribution, assuming W.T below the base of wall. **10**
- b) State Rankine's theory and calculate the passive earth pressure using this theory in case of cohesionless soil or a vertical smooth wall. **10**
- Q.4 a) Explain the phenomenon of arching in soil. **10**  
 b) Write short notes on the following:  
 i) Design of anchored bulk heads.  
 ii) Cantilever sheet piles in cohesive soil. **5×2**

### **PART-B**

- Q.5 a) Explain how the following factors affect depth of shallow foundation:  
 i) Ground water level. **3½**  
 ii) Volume change. **3**  
 iii) Underground defects. **3½**  
 b) Write steps for the selection of the types of foundation? **10**
- Q.6 a) Explain plate load test. How its results are interpreted? Mention its limitations also. **10**  
 b) A square footing  $1.5 \text{ m} \times 1.5 \text{ m}$  is located at a depth of 1 m. The soil has the following properties:  $\gamma = 17.5 \text{ kN/m}^3$ ,  $c = 20 \text{ kN/m}^2$ ,  $\phi = 20^\circ$ . Use IS method and compute the ultimate bearing capacity of soil. The footing base and ground are horizontal  $NC = 14.83$ ,  $Nq = 6.4$  and  $Nr = 2.9$ . **10**
- Q.7 a) Define the following terms:  
 i) Period.  
 ii) Resonance.  
 iii) Degree of freedom.  
 iv) Damping.  
 v) Free vibration. **2×5**  
 b) Write down the expression for maximum amplitude for the following cases:  
 i) Forced vibration without damping.  
 ii) Free vibration with damping. **5×2**

**End Semester Examination, Dec. 2017**  
B. Tech. – Seventh Semester  
**ELEMENTS 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**. Each question carries equal marks.

Use of IS-1893, IS-456 and IS-13920 is allowed.

**Q.1** Solve all:

- a) Define an earthquake.
- b) What are different types of seismic waves?
- c) Define seismograph.
- d) What is critical damping?
- e) Define response spectrum.
- f) Define ductility.
- g) What are seismic zones?
- h) Define logarithmic decrement.
- i) What is out of plane failure?
- j) Explain different types of dynamic load.

**2×10**

**PART-A**

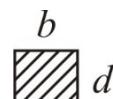
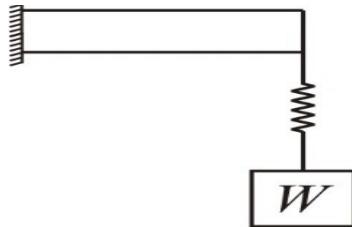
- Q.2**
- a) Write a short note on “plate tectonic theory”. **8**
  - b) Write a short note on ‘interior of earth’. **4**
  - c) Explain magnitude and intensity of an earthquake. **8**

Q.3 a) Define the following:

- i) Lumped mass.
- ii) Damping.
- iii) Stiffness.

3x3

b) Determine time period and natural frequency of the system.



$$b = 450 \text{ mm}$$

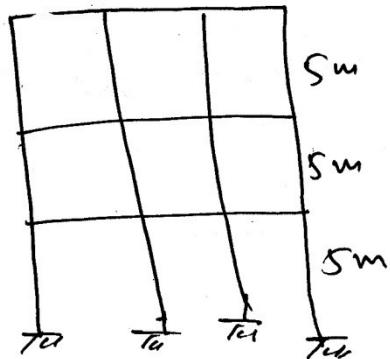
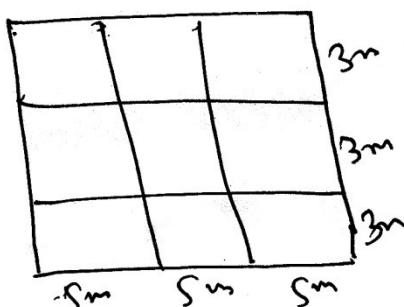
$$d = 450 \text{ mm}$$

$$L = 3 \text{ m}$$

$$W = 20 \text{ kN}$$

11

Q.4 The plane and elevation of three story RCC radio station is shown below. The building is located in Jaipur. The soil is medium stiff and is proposed to design as ordinary moment resisting frame. The intensity of DL is  $20 \text{ kN/m}^2$  and LL is  $5 \text{ kN/m}^2$ . 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 simply supported beam 5m long supports a mass of 200 kg at the mid span. Determine its natural frequency and natural period of vibration  $E = 2.8 \times 10^5 \text{ N/m}^2$ ,  $b = 450 \text{ mm}$ ;  $d = 500 \text{ mm}$ .

20

Q.6 a) What are different types of failure that occur in RCC building? 8  
b) Explain different techniques of retrofitting of RCC building. 12

Q.7 a) Write a short note of behaviour of unreinforced masonry walls. 8  
b) Explain box action and band action of masonry walls. 12

## **End Semester Examination, Dec. 2017**

### **B. Tech. — Seventh / 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.** Each question carries equal marks.

- Q.1 a) Differentiate between angle parking and parallel parking.  
b) What is the purpose of endoscope?  
c) What do you understand by desire lines?  
d) Write the merits and demerits of rotary.  
e) Define road pinching.  
f) Give examples of grade separated and at grade intersections.  
g) Explain PIEV theory.  
h) Define practical capacity. Write the expression to calculate basic capacity.  
i) Define spot speed and time mean speed.  
j) Write the expression for Webster's check for cycle time. **2×10**

#### **PART-A**

- Q.2 a) Explain the major six sections of traffic engineering with the scope of each. **10**  
b) Draw a flow chart showing the organizational setup of traffic management department in India. **10**
- Q.3 a) Enumerate the different method of carrying out traffic volume studies.  
How will you represent the data for analysis? **10**

- b) Derive an equation to determine the velocity of a vehicle that hits a parked vehicle at  $90^\circ$  angle. **10**
- Q.4 a) The free mean speed on a roadway is found to be 80 kmph. Under stopped condition the average spacing between the vehicles is 6.9 m. Determine the capacity flow. **5**  
 b) Differentiate between space and time headway. **5**  
 c) Explain the various factors affecting practical capacity. Also discuss how you will determine the LOS of any road. **10**

### **PART-B**

- Q.5 a) The average normal flow of traffic on cross roads A and B during design period is 400 and 250 PCU per hour; the saturation flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 sec. Design two phase traffic signal by Webster's method. **10**  
 b) Explain briefly the various design factors that are to be considered in rotary intersection design. **10**
- Q.6 a) Write down the regulations as per Govt. of India for vehicles and drivers. **10**  
 b) What are the various organizations handling the traffic management in India? Write down the scope of each. **10**
- Q.7 a) Enumerate the vehicular air pollution situation in India. **10**  
 b) Define arboriculture. Write down the detrimental effects of traffic on air pollution. **10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Define the following:  
 a) Total float.  
 b) Independent float.  
 c) Free float.  
 d) Interference float.  
 e) Cost slope.  
 f) EET and LET.  
 g) Updating of PERT.  
 h) Ripper.  
 i) Vibrator.  
 j) JCB and excavator. **2×10**

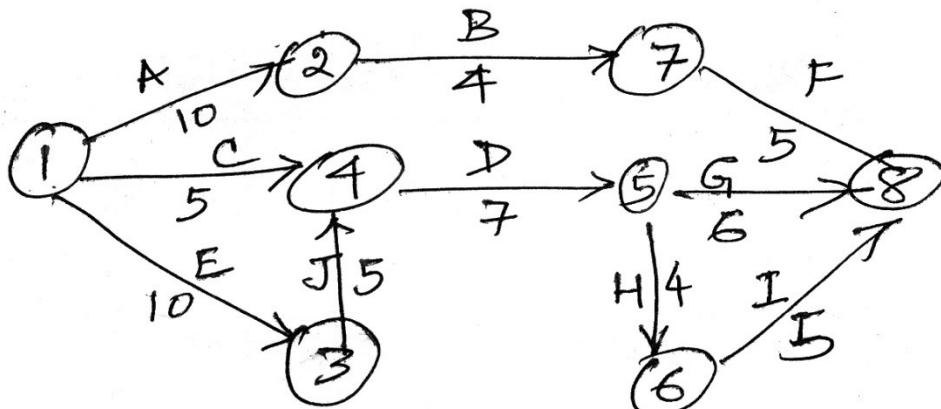
### **PART-A**

- Q.2 a) Why is a project organization chart essential for execution and planning of any project work? Draw a organization chart for execution of building work of 20 (twenty) floored building. **10**  
 b) How are these represented on PERT network?  
 i) Time

- ii) AOA and AON.
- iii) Dummy activity.

**10**

- Q.3 Determine the critical path of the following network and represent on network. Also, work out the total duration of project:



**20**

- Q.4 a) Explain the importance of project manager role and project management in a bridge project. **10**  
 b) List out equipments needed for excavation in hard soil. Discuss the advantages and disadvantages of the equipments suggested.

**10**

### **PART-B**

- Q.5 Calculate the optimum cost and duration for jobs of the network given below. Consider indirect cost as `12,000/- per week. Use time line diagrams at every stage of crashing:

Activity	Normal		Crashing	
	Duration	Cost	Duration	Cost
1-2	5	4,000	4	5,000
1-3	7	8,000	3	10,000
2-3	6	6,000	2	8,400

**20**

- Q.6 a) Explain the working process of "ready mix plant". What are its advantages and disadvantages over conventional method? **10**  
 b) A precast segment of 25 M.T. weights is to be placed in position at a height of 20 metres. Which equipment will be preferred to use when soil below is of sandy nature and why? **10**

- Q.7 Write short notes on **(any two)**:

- a) Bull-dozer.
- b) Ripper.
- c) Semi-portal crane.
- d) Excavator.

**10x2**

**End Semester Examination, Dec. 2017**  
B. Tech (Civil) – 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.** Each question carries equal marks.

Q.1 Briefly define the following:

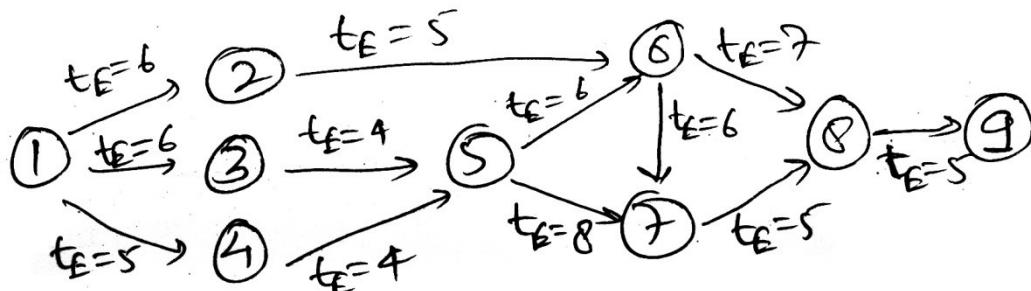
- a) Critical and super critical activity.
- b) Independent float.
- c) Milestone chart.
- d) Activity and event.
- e) Head and tail activities.
- f) Critical path.
- g) Scheduled completion time.
- h) Cost slope.
- i) Dragline is most used for \_\_\_\_\_.
- j) Functions of built-dozer.

**2×10**

**PART-A**

- Q.2 a) Define the limitations of bar chart. 6  
 b) Consider the project of purchasing a new heavy duty lathe and disposing the old lathe. It consists of following activities:  
 i) Await delivery of lathe.  
 ii) Remove existing lathe.  
 iii) Install power supply.  
 iv) Connect to power.  
 v) Test.  
 vi) Dispose of existing table.  
 Depict the project in form of activity oriented network and event oriented network. 8  
 c) Define tail event, parallel activity, dual role event. 6

- Q.3 a) Workout the  $T_E$ ,  $T_L$  as per pattern  $T_E^j = T_E^i + t_{E-j}$ ,  $T_L^i = T_L^j - t_{E-i}$ . Also calculate stack for following network and draw critical path.



Prepare the result in following table:

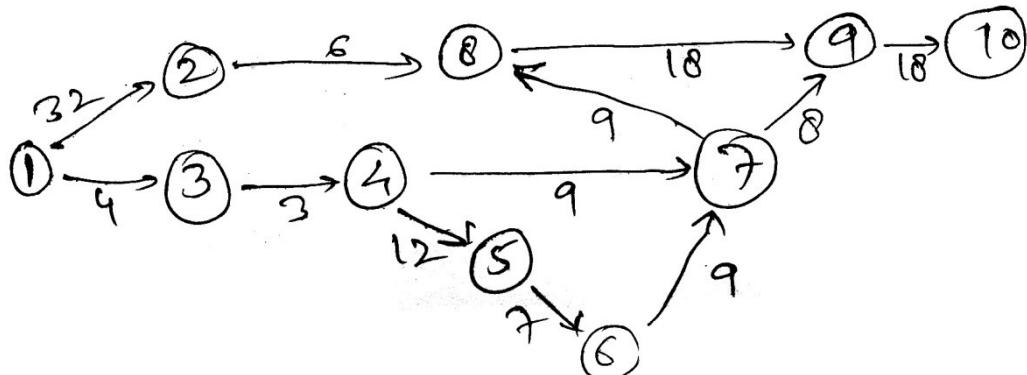
Event No.	$T_E$	$T_L$	Stack S = $T_L - T_E$

15

- b) Describe implications of positive slack, zero slack and negative slack. 5

- Q.4 Calculate  $T_E$ ,  $T_L$ , total float and free float for following network and tabulated the results in following table:

Activity i-j	Duration $t_{E-i}^{i-j}$	Earliest time		Latest time		Total float	Free float
		EST	EFT	LST	LFT		
1	2	3	4	5	6	7	8

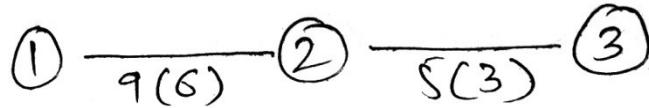


20

### **PART-B**

- Q.5 a) Describe to the points the terms:

- i) Outage and Overhead costs.
  - ii) Normal duration.
  - iii) Cost duration.
- 2x3**
- b) Table-1 below gives data about duration and costs of various activities for network shown below:



**Table-1**

Activity	Normal duration (days)	Normal cost (₹)	Crash duration (Days)	Crash cost (₹)
1-2	9	9,000	6	12,000
2-3	5	5,000	3	6,000

Overhead cost = ₹3,000/- per day.

Outage loss = ₹100/- per day for first 10 days and ₹200/- per day thereafter.

Find out optimum duration and exhibit the results graphically. **14**

- Q.6 a) Give a sketch of dragline and its functions. **6**  
 b) Make a sketch of tower crane and its functions. **6**  
 c) Write about functions and capacity parameters of a concrete pump. **8**
- Q.7 a) State the working of a hot mix plant for road construction. Draw a neat sketch. **12**  
 b) Describe the use of concrete pump and precautions for its use. **8**

## **End Semester Examination, Dec. 2017**

B. Tech. (Civil) — Seventh Semester  
**PRE-STRESSED CONCRETE (C-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 a) Define characteristic load.  
 b) What is eccentric tendon prestressing?  
 c) Explain loss of prestress due to shrinkage of concrete.  
 d) What is elastic shorting of concrete?  
 e) Define long line method of prestressing.  
 f) What is cracking moment?  
 g) What is the min grade of concrete required for pretensioned member?  
 h) Describe briefly the concept of load balancing.  
 i) Why end zone reinforcement is provided in post-tension concrete member?

j) Name two systems of anchorages used in post tensioning.

**2x10**

### **PART-A**

Q.2 a) Discuss the advantages and applications of prestressed concrete in detail.

**10**

b) What is the basic principle involved in analysis of prestressed concrete?

**10**

Q.3 a) Why larger value of characteristic strength is specified for pretensioned members than in post-tensioned members?

**5**

b) Define hydrogen embrittlement in brief.

**5**

c) Notify some needed properties of prestressed concrete and steel.

**10**

Q.4 A prestressed concrete beam of uniform rectangular C/S span 15m supports a total uniform distributed load of 272 kN excluding the weight of beam. Determine the suitable dimensions of the beam and calculate the area of the tendon and their position. The permissible stresses are 14 N/mm<sup>2</sup> for concrete and 1050 N/mm<sup>2</sup> for tendons.

**20**

### **PART-B**

Q.5 A prestressed concrete beam of C/S 250x300 mm of span 5m, an initial prestress is 400 kN with an eccentricity of 50mm, tendon area is of 400 mm<sup>2</sup>. Assume  $E_c = .33 \times 10^5$  N/mm<sup>2</sup>,  $E_s = 2 \times 10^5$  N/mm<sup>2</sup>, Slip in anchorage as 1.5 mm, creep coefficient as 1; shrinkage strain of concrete as 0.0002 and relaxation loss in steel as 3%. Find total% of loss in prestress.

**20**

Q.6 A prestressed concrete beam has a width of 200 mm and an overall depth of 400 mm. The permissible stresses in tension and compression due to prestressing alone are 4 N/mm<sup>2</sup> and 25 N/mm<sup>2</sup> respectively. Find the required prestressing force in tendon and eccentricity of tendon if straight tendon with a constant eccentricity is to be provided in the beam. No external load or self-weight effect is to be considered.

**20**

Q.7 a) Discuss about post tensioning systems.

**10**

b) Define Tendon splices.

**10**

## **End Semester Examination, Dec. 2017**

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-456, IS-1893, IS-13920, SP-16 is allowed.

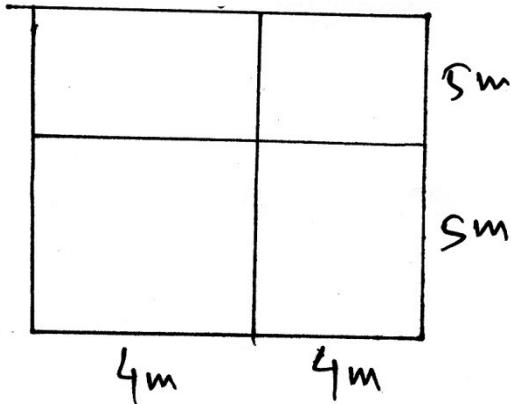
**Q.1** Solve all:

- Define an earthquake.
- What are the different types of seismic waves?
- Explain different types of dynamic loading.
- Define natural time period and frequency.
- Differentiate between free and forced vibration system.
- Define ductility.
- Define retrofitting.
- Define out of plane failure of masonry wall.
- What do you understand by "Importance factor" of a building?
- Define seismograph.

**2×10**

### **PART-A**

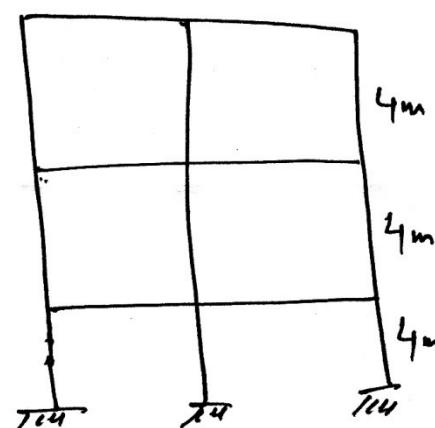
- Q.2** a) Write a short note on 'interior of earth'. **6**  
 b) Explain, in detail, difference between magnitude and intensity of an earthquake. **7**  
 c) Write a short note on 'plate tectonic theory'. **7**
- Q.3** a) Derive equation of motion for single degree of freedom free vibration system. **6**  
 b) Differentiate between "Under-damped", "Over-damped" and "critically-damped" system. **6**  
 c) A vibrating system consists of a mass of 100 kg and spring of stiffness  $6 \times 10^6 \text{ N/m}$  is viscously damped. The ratio of two consecutive amplitudes is 30:24. Determine the natural frequency, damped ratio and damped natural frequency. **8**
- Q.4** a) Define seismic base shear. **2**  
 b) Write a short note on 'plan irregularity of building'. **3**  
 c) The plan and elevation of a three story RCC 'TV station' building is shown in the figure. The building is located in Agartala. The type of soil encountered is Rock and is proposed to design the building as special moment resisting frame. The intensity of DL is  $10 \text{ kN/m}^2$  and imposed load is  $5 \text{ kN/m}^2$ . Determine the design seismic load on the structure by static analysis. Data for self-weight is given below:



Dimension of

all column = 450 mm×450 mm  
 wall thickness = 120 mm  
 slab thickness = 150 mm

all beams = 350 mm×400 mm



**15**

## **PART-B**

- Q.5 a) A simply supported RC beams of rectangular section has to carry a distributed load of 30 kN/m in addition to its own weight and a dead load of 25 kN/m. The maximum bending moment and shear force due to earthquake are 80 kN/m and 60 kN respectively. Centre to centre distance between supports is 5m. Design the beam using M30 and Fe415. **15**  
b) Explain weak beam-strong column concept. **5**
- Q.6 a) Write a short note on ‘building deficiencies’. **5**  
b) What are the different retrofitting techniques for RCC structures? **9**  
c) Write a short note on “objectives of retrofitting of a structure”. **6**
- Q.7 a) Write a short note on ‘behaviour of unreinforced masonry walls’. **5**  
b) What are the different features to improve the seismic behaviour of masonry buildings? **5**  
c) Determine the frequency and design seismic coefficient for an ordinary masonry shear wall in a school building in Jaipur for the following data:  
Roof load = 20 kN/m  
Height of wall = 3.0 m  
Width of wall = 0.2 m  
Unit weight of wall = 19.2 kN/m<sup>3</sup>  
Soil is Rock. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh 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 Briefly answer:

- a) Name bogue's compound.
- b) Why angular aggregates are best suitable for high strength concrete?
- c) What are natural pozzolana? Give example.
- d) Why volume batching is banned?
- e) What is the relation between compressive strength and modulus of elasticity of concrete?
- f) Which specimen has high compressive strength a cube or a cylinder?
- g) What is permeability of concrete?
- h) Give two advantages of light weight concrete.
- i) What is mass concrete?
- j) Define segregation and bleeding.

**2x10**

### **PART-A**

Q.2 a) What is bulking of sand? Draw the graph for effect of moisture content on bulking of sand.

**10**

b) Write short note on high alumina cement and sulphate resisting cement.

**10**

Q.3 a) Is mineral admixture economical, why? Discuss the environment sustainability of these admixtures.

**10**

b) Discuss the pozolanic activity of flyash.

**10**

Q.4 Design M40 grade of concrete without using flyash with OPC 43 grade cement, having maximum size of aggregate as 20 mm, minimum and maximum cement content as 320 Kg/m<sup>3</sup> and 450 Kg/m<sup>3</sup> respectively. Workability is 100 mm (slump). This is a pumpable sub concrete. Type of aggregate is sub angular. Super plastiaizer is used ( $G = 1.145$ ), specific gravity of cement is 3.15, specific gravity of coarse aggregate is 2.76, specific gravity of fine aggregate is 2.74 and it confirms to zone II. Assume missing data. **20**

### **PART-B**

Q.5 a) Briefly describe the stress-strain characteristic of stress-strain curve of concrete. **10**

b) Using same curve, explain the terms - Initial tangent modulus, Secant Modulus, Tangent Modulus.

**10**

Q.6 What is creep? Elaborate the process of measuring creep. What are the factors governing creep?

**20**

Q.7 a) Briefly explain the effect of hot weather on concrete.

**10**

b) Comment on performance of pozzolana concrete.

**10**

# **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

## **ENVIRONMENTAL AIR POLLUTION (C-831A)**

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) Expand MOEF, CPCB, EPA, CSIR.
- b) Define secondary pollutants.
- c) Define air quality index.
- d) What is threshold limit value?
- e) When was system of air quality forecasting and research (SQFAR) tested for the first time?
- f) What is greenhouse effect?
- g) Define lapse rate.
- h) What is green carbon?
- i) Define adiabatic lapse rate.
- j) How is emission inventory helpful?

**2×10**

### **PART-A**

- Q.2** a) Discuss great London smog of 1952. **5**  
b) Describe Bhopal Gas tragedy of 1987. **5**  
c) What are major sources of air pollution? **10**
- Q.3** a) Determine the suspended particulate concentration for the given data:  
Average pressure of the day at station level = 712.59 mm of Hg.  
Average temperature = 30.6°C.  
Actual sampling time = 24 hrs.  
Air flow through clean filter = 1.6 cum/min.  
Air flow through filter after exposure = 1.3 cum/min.  
Weight of clean filter = 5 gms.  
Weight of filter after exposure = 5.448 gms. **10**  
b) i) State the functions of Central Pollution Control Board. **5**  
ii) Explain the working of high volume sampler. **5**
- Q.4** a) A multi tray settling chamber having 6 trays, including the bottom surface handles  $4\text{m}^3/\text{sec}$  of air at 20°C. The trays are placed 0.25m apart and the chamber is 1m wide and 4m long. What is the minimum particle size of density  $2000 \text{ kg/m}^3$  that can be collected with 100% efficiency? What will be the efficiency of settling chamber if  $50\mu\text{m}$  particles are to be removed? Justify laminar flow condition and what is the collection efficiency for  $56$  and  $50\mu\text{m}$  particles? **10**  
b) List various stakeholder's of air quality in India and explain the role of Central Pollution Control Board as a stakeholder to environment. **10**

### **PART-B**

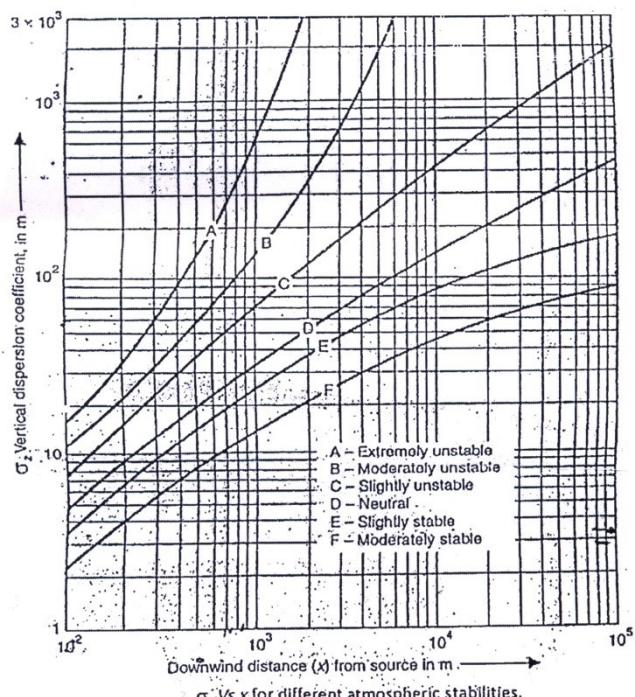
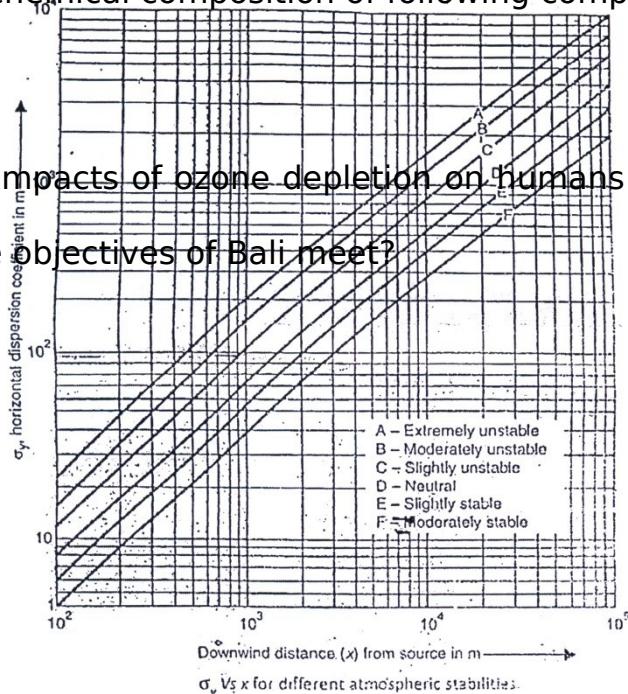
- Q.5 a) A thermal power plant burns coal at the rate of 6 tons/hour and discharge flue gases through the chimney having effective height of 90m. The coal has a sulphur content of 4.5%. The wind velocity at the top of the stack is 7.5 m/s. The atmospheric conditions are slightly unstable: Determine the maximum ground level concentration of  $\text{SO}_2$  and the distance from the stack at which this occurs. **10**
- b) What interferences are encountered in  $\text{NO}_2$  monitoring? **5**
- c) What is an air dispersion model? List few uses of air dispersion model. **5**
- Q.6 a) A photocopy machine is to be installed in a small room (volumes  $19.85\text{m}^3$ ). There is a concern that ozone level inside the room would be high during operation of the machine. To maintain the proper air quality inside the room ventilation (namely air changes@ 30/hr.) is recommended. Determine the capacity of exhaust fan. **5**
- b) Describe the purpose of ventilation. **5**
- c) What are the various causes of indoor air pollution? **10**

- Q.7 a) Compute the chemical composition of following compounds:

- i) CFC - 117
- ii) CFC - 36
- iii) CFC - 64
- iv) CFC - 85

b) What are the impacts of ozone depletion on humans and animals health? **6**

c) What were the objectives of Bali meet? **6**



## **End Semester Examination, Dec. 2017**

B. Tech. (Civil Engineering) — Seventh Semester  
**ENVIRONMENTAL AIR POLLUTION (C-831A)**

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) Expand EIA, MoEF, SPCB and RSPM.  
b) What are criteria pollutants?  
c) Define soiling index.  
d) List the parameters considered for calculating air pollution index.  
e) Which ministry constituted system for Air Quality Forecasting and Research (SAFAR)?  
f) What is air dispersion model?  
g) Define inversion.  
h) Define adiabatic lapse rate.  
i) What is green carbon?  
j) How does emission inventory help us?

**2x10**

### **PART-A**

- Q.2 a) Discuss the effects of air pollution on materials? **5**  
b) Explain the sources of various particulate pollutants. **5**  
c) Tabulate the effects of any five air pollutants, dosage and their effects. **10**

- Q.3 a) The following table shows the size distribution of a dust sample and the fraction efficiency of removal in a gas cleaning equipment. Calculate the overall collector efficiency.

Dust size efficiency (%)	Weight/100gm of dust	Fractional
<5	2	1
5-10	2	7
10-15	4	15
15-20	7	44
20-25	10	67
25-30	8	81
30-35	7	88
35-40	10	92
40-50	15	93
50-60	20	95

60-70	10	98	
>70	5	100	8

b) State the functions of State Pollution Control Board.

**6**

c) What are the objectives of National Ambient Air Quality Standards?

**6**

Q.4 a) A packed filter handling  $1 \text{ m}^3/\text{s}$  of standard air is packed with fitters of  $110\mu\text{m}$  in diameter. Dust laden air passes through the filter with a velocity of  $1.5 \text{ m/s}$  and the packing density is 0.1. The average diameter of the particles in the air is  $1.0 \mu\text{m}$  and the individual fibre efficiency ( $n_f$ ) = 0.6. Determine the dimensions of the packed filter if the overall efficiency is 99.5%. Assume  $W = H$  and what is the filter length if the  $n_f = 99.99\%$ ?

**10**

b) Explain the working of fabric filter system with the help of a neat sketch. Also list the advantages and disadvantages of fabric filters.

**10**

### **PART-B**

Q.5 a) A thermal power plant burns coal at the rate of 8 tons/hr and discharge flue gases through the chimney having effective height of 90m. Coal has a sulphur content of 4.5%. The wind velocity at the top of the stack is  $7.5 \text{ m/sec}$ . The atmospheric conditions are slightly unstable. Compute the concentration at  $x = 1000\text{m}$ ,  $y = 100\text{m}$ ,  $z = 20\text{m}$  and also calculate the value of  $y$  when the value of  $C_{2000,Y,O,H}$  is  $1 \times 10^{-4} \text{ g/m}^3$ .

**10**

b) What interferences are encountered in  $\text{SO}_2$  monitoring?

**5**

c) Explain the working principle of high volume sampler and interferences encountered in sampling.

**5**

Q.6 a) In a small hall (volume  $500\text{m}^3$ ), occupants (capacity 50 persons) are smoking @ 1.2 cigarettes per head /hr. To maintain proper ventilation fresh air is pumped @  $1250 \text{ m}^3/\text{hr}$  and the stale air is pumped out at the same rate. Estimate the concentration of formaldehyde per cigarette.

**5**

b) How does space occupancy contribute to deterioration of air quality?

**5**

c) What parameters are considered for monitoring and modeling of indoor air quality pollutants?

**10**

Q.7 a) Compute the chemical composition of following compounds:

- i) CFC-110
- ii) CFC-21
- iii) CFC-75
- iv) CFC-63

**8**

b) Discuss the impacts of global warming in detail.

**6**

c) What were the objectives of Kyoto Protocol?

**6**

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester

### **GROUND IMPROVEMENT TECHNIQUES (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.** Each question carries equal marks.

Q.1 Briefly explain the following:

- a) Principle of blasting and terraprobe.
- b) Most suitable soil condition electro osmosis.
- c) Typical compaction curve for different soil.
- d) Vertical drain.
- e) Time prediction for real problem without vertical drains.
- f) Geomembrane.
- g) Woven and non-woven.
- h) Hydrofracturing.
- i) Suspension grouts.
- j) Grouting materials.

**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) Vibro compaction.
- ii) Vibro displacement compaction.
- iii) Grouting and injection.

**5×3**

b) Briefly explain the following soil:

- i) Black cotton soil.
- ii) Laterites and lateritic soil.

**2½×2**

Q.3 a) Briefly explain comparison of compaction on dry of optimum with wet of optimum i.e. property and compaction.

**5**

- b) Explain with neat sketch of nuclear moisture density method for compaction quality control. 5
  - c) What is liquefaction? Explain remedies of liquefaction. 5
  - d) Explain different types of vibratory compaction equipment. 5
- Q.4 a) Explain the following different dewatering systems:  
 i) Open sumps and ditches.  
 ii) Well point system. 6  
 b) Explain with neat sketch vacuum dewatering system. 10  
 c) Briefly explain preloading and surcharge fills. What do you understand by preloading method? 4

### **PART-B**

- Q.5 a) Explain concept of Geosynthetics. 2  
 b) Elaborate the application of Geosynthetics for function of:  
 i) Separation-application-paved roads, unpaved roads, railways.  
 ii) Filtration and fluid transmission application in highway and rail roads, retaining wall. 2x5  
 c) What do you understand by reinforcement? Show the possible failure wedges and modes in respect of shear failure, reinforcement pull out failure and reinforcement tension failure. 8
- Q.6 a) Briefly explain rock bolting and cable anchoring. Write down the different components of fully grouted rock bolts.  
 i) Grouted solid expansion anchoring bolts.  
 ii) Hollow core grouted rock bolts. 15  
 b) Write brief explanation regarding use of rock bolts and cable anchors. What do you understand by ground anchoring? 5
- Q.7 a) Write brief notes on the following:  
 i) Pre-grouting site investigation.  
 ii) Grout characteristics.  
 iii) Grout plant and equipment. 15  
 b) What is chemical stabilization? Explain mix in place method of stabilization. 5

## **End Semester Examination, Dec. 2017**

### B. Tech. – Sixth Semester

### **HAZARDOUS WASTE MANAGEMENT (C-838)**

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 the following:

- a) Explain reactive waste and ignitable waste with suitable examples.
  - b) Expand HDPE, PETE and PS.
  - c) Components of hazardous waste management.
  - d) Environmental impacts of biomedical waste and toxic waste.
  - e) Principle of hazardous waste management.
  - f) List various hazardous waste processing methods.
  - g) Explain Waste transformation and waste minimization with suitable examples.
  - h) Explain different types of plastics that may be recycled.
  - i) What do you understand by E-waste and radioactive waste?
  - j) Explain biomedical waste and corrosive waste with suitable examples.
- 2×10**

#### **PART-A**

**Q.2** a) Explain the different routes of transportation of hazardous waste in the subsurface and atmospheric environment. **10**

- b) Calculate the seepage velocity of a particle of water and also calculate the time required for a particle of water to migrate from one end to the other end under these hydraulic head conditions. Using the dimensions  $h_1 = 0.67\text{ m}$ ,  $h_2 = 0.53\text{ m}$ ,  $L = 0.65\text{ m}$  and the hydraulic conductivity is  $1.2 \times 10^{-4}\text{ m/s}$  (a representative value of hydraulic conductivity for medium to fine sand). **10**

**Q.3** a) A town where 9.8 million households, each fill one 98 gallon container of solid waste per week. Estimate the total landfill volume required to dispose off this solid waste. If 12% of the landfill volume is occupied by the cover dirt. The density of the refuse when collected is  $202\text{ lb/yd}^3$  and is  $1214\text{ lb/yd}^3$  in the landfill. **10**

- b) Explain the different stages of hazardous waste management. **10**

**Q.4** a) Describing the following methods of analysing sample in detail with suitable examples.  
i) Chemical methods.  
ii) Instrumental methods. **10**

- b) Residential yard waste is to be composted and mixed with activated sludge from a waste water treatment plant. The compositions of yard waste and that of the sludge are as follows:

S.No	Component	Yard Waste	Sludge
1.	C/N Ratio	56	8.5
2.	Moisture Content	55%	72%
3.	Nitrogen Content	0.84%	6.3%

Determine the proportions of yard waste and sludge to achieve a blended C/N ratio of 25. Take 1kg yard waste and 1 kg sludge. **10**

### **PART-B**

- Q.5 a) Explain briefly the thermal treatment processes of hazardous waste materials with suitable examples. **10**
- b) What are the significant control parameters in composting? Give their optimum values and the methods of controlling the same. **10**
- Q.6 a) What are the categories of biomedical wastes? Discuss the method of treatment and disposal for each. **10**
- b) A worker weighing about 70kg is exposed to a carcinogen (average concentration in air =  $0.01 \text{ mg/m}^3$ ) for 8 hours per day for 300 days per year over a period of 30 years. Average breathing rate of worker is  $1.0 \text{ m}^3/\text{hr}$ . Estimate the risk of cancer if the carcinogen has a potency factor of  $0.1(\text{mg / kg / day})^{-1}$ . Assume average life of worker to be 65 years. **10**
- Q.7 a) Discuss suitable strategies for the remediation of a contaminated site. What technique would you suggest for site contaminated with radioactive wastes? Give reasons. **10**
- b) What are the sources of E-waste? Discuss characteristics of E-waste and radioactive waste. **10**

## **End Semester Examination, Dec. 2017**

M. Tech. (Construction Management) – First Semester  
**PROJECT PLANNING AND CONTROL (C-MC-101)**

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 Write short notes on:

- a) Feasibility studies of a project.
- b) Difference between CPM and PERT.
- c) Monte Carlo simulation.
- d) Advantages of use of AON over AOA technique.
- e) Identity factors which affect inventory control.

**3x5**

### **PART-A**

Q.2 A small construction project consists of following activities. Logical relations between them and duration are indicated against them.

Activity	Duration	Successor
A	7	C, D
B	4	C, D
C	6	E
D	2	E
E	8	-

Using AON/AOA method draw a network, find project duration, show critical path and find total float per each activity.

**15**

Q.3 Activities having most optimistic, most likely and most pesimistic time may be considered to find out the probability of its completion in 28 days. Use normal distribution curve.

Activity	$t_o$	$t_m$	$t_p$
1-2	4	6	8
2-3	5	7	15
2-4	4	8	12
3-6	15	20	25
4-6	8	9	10

15

Q.4 a) Write short notes on (**any three**):

- i) WBS
- ii) Activity time estimation
- iii) Nodes and their classification
- iv) Free Float
- v) Independent Float.

**3x3**

b) What are the factors, which can impact productivity of a construction project? **6**

### **PART-B**

Q.5 A project has only three activities A, B, and C. The time for each activity is a random variable relationship between these activities is finish to start. Probability distribution is given below:

Activity	Predecessor	Time	in	days
A	-	$\frac{3}{0.20}$ , $\frac{4}{0.60}$ , $\frac{5}{0.20}$		
B	A	$\frac{4}{0.20}$ , $\frac{6}{0.30}$ , $\frac{7}{0.50}$		
C	B	$\frac{6}{0.20}$ , $\frac{8}{0.40}$ , $\frac{9}{0.30}$ , $\frac{10}{0.10}$		

Make three runs only and find out project duration in each case. Use following sets for each run.

- a) 20, 59, 75
- b) 41, 20, 95
- c) 75, 18, 46

**15**

Q.6 Write short notes on (**any three**):

- a) Activity-Time Cost Trade.
- b) Limits of compression.
- c) Total Cost Curve.
- d) Project time cost trade off graph.

**5x3**

Q.7 For supply of cement at construction site, demand and lead time for distribution are given below.

Units demanded	4	6	8	10
Probability	0.2	0.3	0.4	0.1
Load time (days)		2	3	4
Probability		0.3	0.4	0.3

Ordering cost is Rs. 120/-

Holding cost per unit Rs. 40/-

Shortage cost Rs. 30/unit per day.

Re order quantity 30 units

Re order level 30 units

Beginning inventory balance 50 units.

Random numbers For demand 70, 35, 14, 20, 39, 79, 93

For load time 53, 27, 91, 28, 78

Find cost of inventory for four days only.

**15**

## **End Semester Examination, Dec. 2017**

M. Tech. (Construction Management) — First Semester

### **QUALITY CONTROL AND SAFETY IN CONSTRUCTION (C-MC-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.** Each question carries equal marks.

Q.1 Answer the following:

- a) What do you understand by Quality of a product?
- b) Role of PPEs.
- c) Define quantitative techniques in quality management.
- d) Explain total quality management.
- e) Explain DHSAS.

**3x5**

#### **PART-A**

Q.2 a) Explain the role of quality control and how does it differ from quality assurance? **8**  
b) What are the quality checks of machineries to be done for quality work achievement? **7**

Q.3 a) Explain in details TQM concept.

**8**

b) How quality assurance is achieved at project site?

**7**

- Q.4 a) Discuss various features of ISO-9000. Explain what is ISO-9001? **7**  
 b) Explain the methodology to inspect construction material. What is the importance of check list? **8**

### **PART-B**

- Q.5 a) How will you plan safety at a construction site? Discuss in detail. **7**  
 b) What are personal protective appliances required for work at a height of 5 meters? Explain your line of thoughts. **8**
- Q.6 a) Which one is more important: Safety or Quality? Discuss with examples. **8**  
 b) Describe safety acts and various legislatures in detail. **7**
- Q.7 a) What is the role of First-Aid Box? Why is it compulsory to be kept at site of work? **8**  
 b) What safety precautions will be suggested while planning for demolition of a building? **7**

## **End Semester Examination, Dec. 2017**

M. Tech. (Construction Management) - First Semester  
**CONSTRUCTION CONTRACT MANAGEMENT (C-MC-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.** Each question carries equal marks.

- Q.1 a) Define quasi contract.  
 b) Explain one bid system of tendering.  
 c) What is industrial dispute?  
 d) Define arbitration.  
 e) What is the need of trade union?  
 f) Describe technical criteria for awarding atender.  
 g) Define itemrate contract.

- h) Describe age criteria for employing children in industry.
- i) What is an agreement?
- j) Explain dispute redressal system.

**1½x10**

### **PART-A**

- Q.2 a) Explain in detail the general conditions of a contract.

**7.5**

- b) Explain the contracts types in detail.

**7.5**

- Q.3 a) Differentiate between security money retention and earnest money.

**9**

- b) Explain various specifications of a contract.

**6**

- Q.4 Explain two bid systems with advantages and disadvantages. Also write down the essential documents which form the part of technical envelope.

**15**

### **PART-B**

- Q.5 How many dispute mechanisms are there as per Indian Disputes Act?

**15**

- Q.6 Write various features of Child Labor Act. Explain why it was needed?

**15**

- Q.7 a) How trade unions are helpful in solving the disputes of industries?

**8**

- b) What are the effects of industrial disputes?

**7**

## **End Semester Examination, Dec. 2017**

M. Tech. (Construction Management) – Second Semester  
**CONSTRUCTION PERSONNEL MANAGEMENT (C-MC-203)**

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 Answer the following:
- a) Define hierarchy of formal organization.
  - b) Explain direct method of recruitment.
  - c) What is turnover of a company?
  - d) What is the purpose of performance appraisal?
  - e) Define compensation.
  - f) List out different types of motivation.
  - g) What is group motivation?
  - h) Define leadership.
  - i) What do you understand by accident prevention?
  - j) Define communication.
- 1½×10**

### **PART-A**

- Q.2 What is the philosophy of Personnel Management? Discuss the organization chart of line and staff organization. **15**
- Q.3 a) Why psychological tests are important for recruitment process? **7½**  
b) Discuss the selection process in detail. Explain with examples. **7½**
- Q.4 Write short notes on:  
a) Types of personnel policies.  
b) Managerial functions of an organization.  
c) Role of Personnel Manager. **5×3**

### **PART-B**

- Q.5 What is intergroup behaviour and conflict in an organization? Explain the problem and the solution to resolve them. **15**
- Q.6 Write short notes on:  
a) Recruitment and selection process.  
b) Demotion and causes of demotion.  
c) Need for training and its method and techniques. **5×3**
- Q.7 a) What is the purpose of rewards and incentives schemes? Discuss with at least two examples. **5**  
b) Define key elements of communication. What are the advantages and disadvantages of oral and written communication? **5**  
c) Explain causes of accidents and its remedial processes. **5**

## **End Semester Examination, Dec. 2017**

M. Tech. - Third Semester

**AIRPORT PLANNING AND DESIGN (C-MC-206A)**

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 **Write short notes on the following:**

- a) Head wind.
- b) Minimum turning radius.
- c) Vortices.
- d) Wind rose diagrams.
- e) Hangers.

**3x5**

### **PART-A**

Q.2 a) Explain the role and duties of ICAO and IGCA.

**5**

- b) Name and explain the factors which affect the change in direction of runway. **10**

Q.3 a) What is a taxiway? How it should be designed w.r.t runway and terminal building?

**10**

- b) Differentiate between apron and hangers w.r.t the function that need to be carried out.

**5**

Q.4 a) Explain the concept of drainage and grading of airport pavements.

**5**

- b) What are the amenities required at terminal building on airside and passenger side? Discuss any two.

**10**

### **PART-B**

Q.5 a) List down the factors affecting the site selection of Airport.

**5**

- b) What are the Aircraft characteristics that affect the design of Airport? Discuss any three of them.

**10**

Q.6 a) Explain the factors required to be considered while designing the parking facility for aircraft.

**10**

- b) Draw a typical sketch of the pavement of runway.

**5**

Q.7 a) List down the environmental impact areas positive and negative for a new Airport which will come up on the outskirts of a city.

**5**

- b) Building an Airport is a costly affair. Give your views on the viability of financing the Airport w.r.t initial investment and operational costs.

**10**

# **End Semester Examination, Dec. 2017**

M. Tech. (Structural Engineering) – 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) Super plasticizer.  
d) Shoring.  
e) Push launching technique.

**3×5**

## **PART-A**

- Q.2 a) How do we compare the use of materials for being used in formwork? **7½**  
b) Explain the formwork system for foundations with a neat sketch. **7½**
- Q.3 a) Explain in detail mechanized excavation process. **7½**  
b) Write the steps which need to be checked before putting formwork in slabs. **7½**
- Q.4 a) Why do we use tunnel formwork and how is it different from conventional formwork? **7½**  
b) How do we use slipform in pavement construction? **7½**

## **PART-B**

- Q.5 a) What is the difference in construction of high rise buildings than other buildings? **7½**  
b) Explain reshoring, preshoring and back shoring in detail. **7½**
- Q.6 a) Compare and contrast top-down and bottom up technology. **7½**  
b) How do we apply top-down technique in high rise construction? **7½**
- Q.7 a) How prefab construction has played its role in bridge construction? **7½**  
b) Differentiate between segmental and incremental construction. **7½**

# **End Semester Examination, Dec. 2017**

M. Tech. — First Semester

## **PRE STRESSED CONCRETE (C-MS-101)**

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.

Scientific calculator IS 1343: 1980 is permitted.

**Q.1** Answer the following questions:

- Write advantages and disadvantages of post tensioning over pre tensioning.
- What are the different forms of pre-stressing steel?
- Enlist the essential devices for post tensioning.
- Enumerate causes of various losses in pre-stressed concrete.
- What is a limiting zone for type I, type II and type III members? **3×5**

### **PART-A**

**Q.2** a) Justify the need for high strength concrete and high strength steel for pre stressed concrete. **3**  
 b) Describe briefly full, limited and partial pre stressing. Give values of tensile allowable stresses. **3**  
 c) Draw the various schematic stages of both pre tensioning and post tensioning? **9**

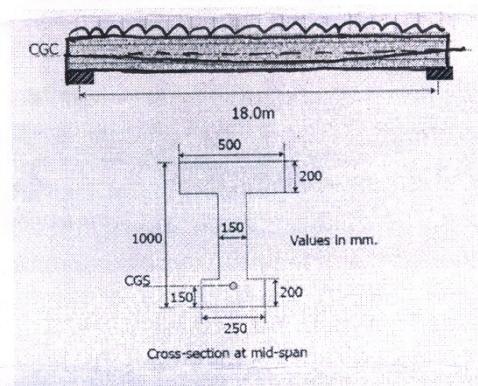
**Q.3** For the post tensioned beam with a flanged section as shown, the profile of the CGS is parabolic, with no eccentricity at the ends. The live load moment due to service loads at mid-span ( $M_{LL}$ ) is 648 kNm. The pre stress after transfer ( $P_0$ ) is 1600 kN. Assume 15% loss at service. Grade of concrete is M30. Evaluate the following quantities.

- Kern levels.
- Cracking moment.
- The stresses at the top and bottom fibres at transfer and at service.

Compare the stresses with the following allowable stresses at transfer and at service.

For compression,  $f_{cc,all} = -18.0 \text{ N/mm}^2$ .

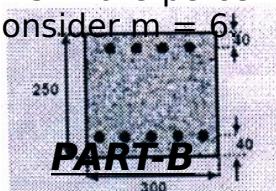
For tension,  $f_{ct,all} = 1.5 \text{ N/mm}^2$ .



**15**

**221/5**

- Q.4 a) Describe briefly the loss of pre stress due to creep and shrinkage. **8**  
 b) A pre stressed concrete sleeper produced by pre tensioning method has a rectangular cross-section of 300 mm.  $\times$  250 mm. ( $b \times h$ ). It is pre stressed with 9 numbers of straight 7 mm. diameter wires at 0.8 times the ultimate strength of 1570 N/mm $^2$ . Estimate percentage loss of stress due to elastic shortening of concrete. Consider  $m = 6$ .



**7**

- Q.5 Design a simply supported type 2 pre stressed beam with  $M_T = 435$  kNm. (including an estimated  $M_{sw} = 55$  kNm). The height of the beam is restricted to 920 mm. The pre stress at transfer  $P_{p0} = 1035$  N/mm $^2$  and the pre stress at service  $F_{pe} = 860$  N/mm $^2$ . Based on the grade of concrete, the allowable compressive stresses are 12.5 N/mm $^2$  at transfer and 11.0 N/mm $^2$  at service. The allowable tensile stresses are 2.1 N/mm $^2$  at transfer and 1.6 N/mm $^2$  at service. The properties of the pre stressing strands are given below:  
 Type of pre stressing tendon - 7-wire strand.  
 Nominal diameter = 12.8 mm.  
 Nominal area = 99.3 mm $^2$ .

**15**

- Q.7 a) Estimate the transmission length at the ends of a pre tensioned beam pre stressed by 7 mm. dia wires ( $\beta = 0.0174$ ). Assume the cube strength of concrete at transfer as 42N/mm $^2$ . (Adopt Krishna Murthy's empirical relation) **5**  
 b) A pre tensioned beam is pre stressed using 5 mm. dia wires with an initial stress of 80 percent of ultimate tensile strength of steel ( $f_{pu}=1600$ N/mm $^2$ ). The cube strength of concrete at transfer is 30N/mm $^2$ . Calculate  
 i) transmission length ( $\beta = 0.0235$ ).  
 ii) bond stress at  $\frac{1}{4}$  and  $\frac{1}{2}$  the transmission length from the end.  
 iii) Overall average bond stress **10**

- Q.7 Design a simply supported precast pre stressed (Type 1) composite slab for the following data.  
 Width of the slab = 0.3 m.  
 Clear span = 2.9 m.  
 Effective span ( $L$ ) = 3.1 m.  
 Thickness of the precast plank = 50 mm.  
 Thickness of the cast-in-situ topping slab = 50 mm.  
 Grade of concrete in precast plank: M60.  
 Grade of concrete in topping slab: M15.  
 The pre tensioned tendons are located at mid depth of the precast slab.  
 During the casting of the topping, planks are not propped.  
 Live load = 2.0 kN/m $^2$   
 Load due to floor finish = 1.5 kN/m

**15**

## **End Semester Examination, Dec. 2017**

M. Tech. (Structural Engineering)—First Semester

### **STRUCTURAL DYNAMICS (C-MS-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.** Each question carries equal marks.

**Q.1 Answer the following:**

- a) Differentiate between harmonic and non harmonic loading.
- b) Differentiate between free vibration and forced vibration.
- c) What is damping force? Explain different types of damping.
- d) Define “logarithmic decrement”.
- e) Define the term “Dynamic magnification factor”.
- f) Define Duhamel Integral.
- g) Define convolution integral or unit impulse response.
- h) Differentiate between dynamic and static coupling.
- i) What is beat phenomenon?
- j) Explain the component of a basic dynamic system.

**1½x10**

#### **PART-A**

**Q.2 a) Explain the different methods of discretization:**

- i) Lumped mass procedure.
- ii) Generalized displacement procedure.

**10**

**b) Discuss the formulation of equation of motion by direct equilibrium using D'Alembert's equation.**

**5**

**Q.3 Derive the solution of equation of motion for damped free SDOF vibration for all damping condition.**

**15**

**Q.4 Derive the response to harmonic loading in undamped system.**

**15**

#### **PART-B**

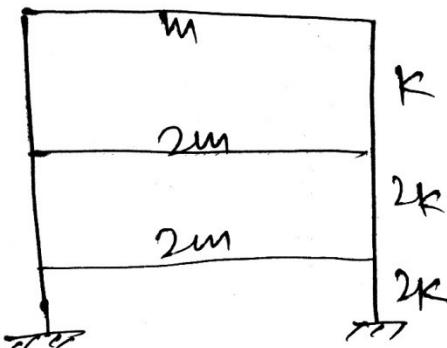
**Q.5 a) Discuss how to find the response to general dynamic loading?**

**7**

b) Discuss the numerical evaluation of response integral.

8

Q.6 Determine the natural frequencies and mode shapes for shear building given below:



15

Q.7 Derive the response to flexural vibration of beams.

15

## End Semester Examination, Dec. 2017

M. Tech. (Structural Engineering) – First Semester  
**ADVANCED STRUCTURAL ANALYSIS (C-MS-103)**

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 Explain in brief:

- What is static Indeterminacy?
- Explain unit load method.
- What do you understand by flexibility?
- Explain rigid joint.
- Write down stiffness of a pin-joint.

3x5

### PART-A

Q.2 Using unit-load method analyzes the portal frame and hence draw bending moment diagram. // 2KN

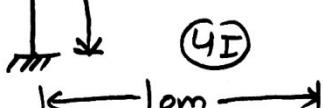


15

Q.3 Explain the moment calculation by slope deflection method in detail.

15

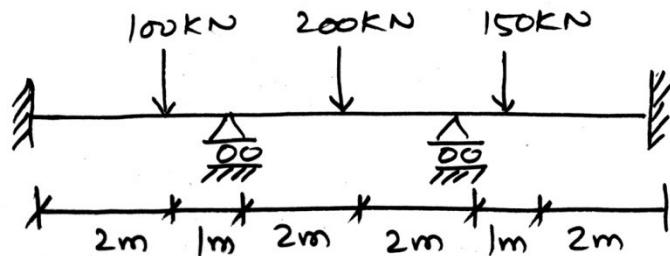
Q.4 Develop the flexibility and stiffness matrix for the portal frame ABCD with reference to the co-ordinates as shown below:



224/5

**PART-B**

Q.5 Analyze the continuous beam as shown below:



15

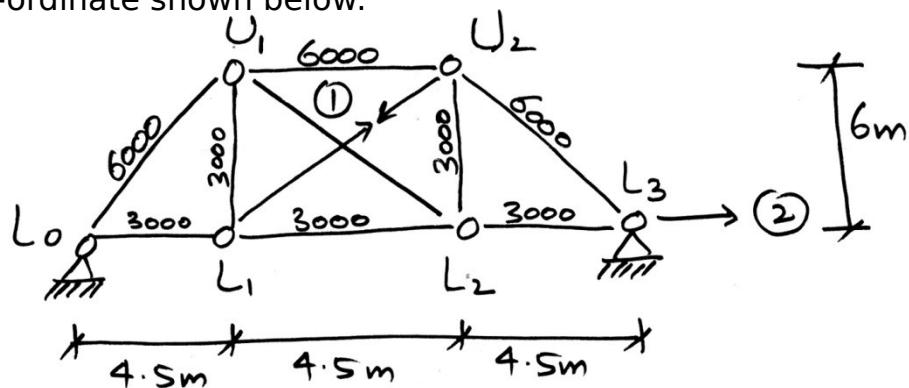
Q.6 a) Explain displacement method for grid structure.

5

b) Write down stiffness matrix elements for grid structure.

10

Q.7 Develop the flexibility matrix for the Pin-Jointed plane frame with reference to the co-ordinate shown below:



15

**End Semester Examination, Dec. 2017**  
M. Tech. (Structural Engineering) – First Semester  
**CONCRETE ENGINEERING AND TECHNOLOGY (CMS-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 Answer (**any five**) of the following short questions:

- a) Explain false set.
- b) Explain gap graded aggregate.
- c) Why volume batching is not preferred?
- d) Explain Poisson's ratio.
- e) What is sulphate attack?
- f) What is corrosion of steel rebar?
- g) What is shotcrete?

**3x5**

**PART-A**

Q.2 a) What are the compounds of cement? Explain their functions and write their hydration reactions.

**8**

- b) What is alkali aggregate reaction? Explain the factors that affect alkali aggregate reaction.

**7**

Q.3 Write short notes on the following:

- a) Air entraining admixture.
- b) Retarders.
- c) Flyash.

**5x3**

Q.4 Design a M40 grade concrete using flyash and opc-43 grade cement, having maximum size of aggregate as 10mm, minimum and maximum cement context is 320 kg/m<sup>3</sup> and 450 kg/m<sup>3</sup> respectively, w/c ratio 0.45 (max.).

Workability required is 50mm (slump). Type of aggregate used is crushed, angular, superplastilizer. Concrete is pumpable and exposure condition is sever. Specific gravity of flyash is 2.2. Specific gravity of cement is 3.15; specific gravity of coarse and fine aggregate of zone-I is 2.74; specific gravity of superplastilizer is 1.14. Assume other data suitably.

**15**

### **PART-B**

- Q.5 a) Draw stress-strain curve for concrete and explain the terms (i) initial tangent modulus, (ii) tangent modulus and (iii) secant modulus and mark them on the curve.

**8**

- b) What is the static modulus of elasticity? Explain the factors that affect modulus of elasticity.

**7**

- Q.6 a) What is creep? Explain the factors that govern the creep.

**8**

- b) Define durability. What is the significance of durability? What is the impact of water-cement ratio on durability?

**7**

- Q.7 Write short notes on the following:

- a) Fibre reinforced concrete.  
b) Self-compacting concrete.  
c) Light weight concrete.

**5x3**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester

### **ANALYSIS AND DESIGN OF TALL BUILDING STRUCTURES (C-MS-109)**

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.** Marks are indicated against each question.

IS-13920 is allowed.

- Q.1 Explain the following in brief:

- a) Define shear wall.  
b) Enlist forces acting on tall buildings.  
c) Composite floor system.  
d) Explain proportionate types of shear walls.  
e) Describe horizontal drift in tall buildings.

**3x5**

### **PART-A**

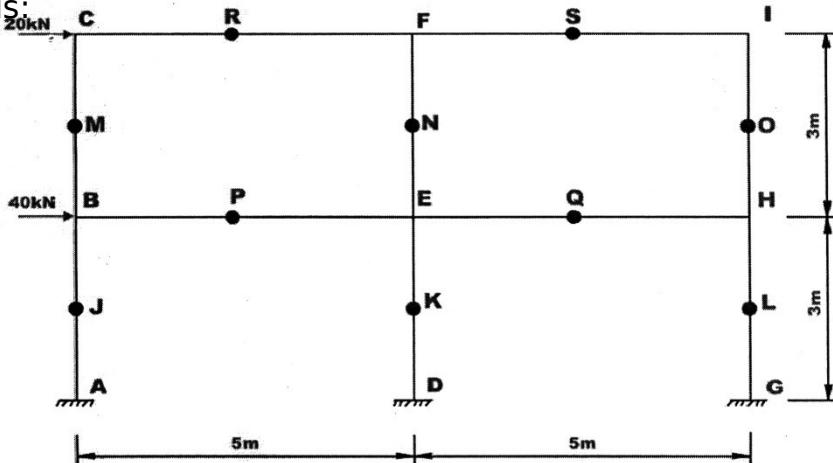
- Q.2 Reduction in weight of a structure plays a significant role safety of a building during earth quake. Write and explain factors which help to reduce the weight of tall building.

**15**

- Q.3 Enlist the factors affecting the growth of high rise building and discuss them in detail.

**15**

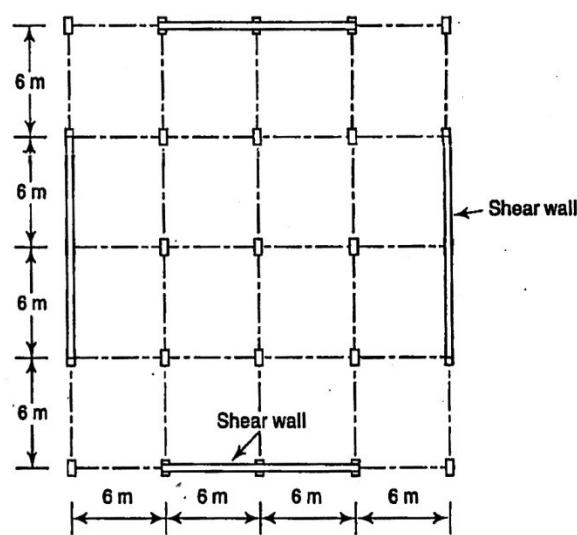
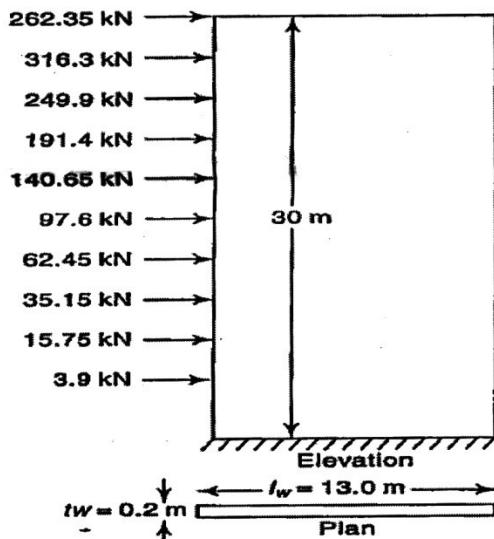
- Q.4 Analyse the following building frame by the portal method for horizontal loads:



15

### PART-B

- Q.5 Explain the suitability of different types of foundation systems for tall buildings. Explain foundation settlement and soil structure interaction in design aspect of foundations for tall buildings. **15**
- Q.6 Explain the behaviour of shear wall with appropriate sketches. Write general requirements of shear walls. **15**
- Q.7 A 10 storey building has plan dimensions as shown in figure. Two shear walls are to be provided in each direction to resist the seismic forces. The axial load on the each shear wall is 5700 kN due to dead and live loads. The height between floors is 3 m. The dead load per unit area of the floor, which consists of slab, finishes, etc., is 4 kN/m<sup>2</sup> and the weight of partitions on floor is 2 kN/m<sup>2</sup>. The intensity of live load on each floor is 3 kN/m<sup>2</sup> and on 1.5 kN/m<sup>2</sup>. The soil below the foundation is hard and the building is located in Delhi. Design the shear wall to resist the seismic forces using M-25 grade concrete and Fe-415 steel.



All dimensions are in meters

15

**End Semester Examination, Dec. 2017**  
M. Tech. — Second Semester  
**THEORY OF PLATES AND SHELLS (C-MS-204)**

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** Answer the following questions:

- a) Differentiate between thin and thick plates.
- b) Write the assumptions made for the analysis of thin plates with small deflection.
- c) Differentiate between “Synclastic” and “Anticlastic surface”.
- d) Write the formula for flexural rigidity of plates and explain the terms.
- e) Give the boundary conditions for a clamped edge.
- f) Write down the advantage of Levi's approach over Navier's approach.
- g) Write down the differential equation for bending of a circular plate under a lateral load.
- h) Define surface of revolution.
- i) Differentiate between “Singly-curved” and “Doubly curved” shells.
- j) Define “Discontinuity stresses” in a pressure vessel.

**1½×10**

### **PART-A**

- Q.2 Derive the equation for cylindrical bending of uniformly loaded rectangular plate with simply supported edges. **15**
- Q.3 Derive the differential equation for bending of an uniformly loaded circular plate. **15**
- Q.4 Derive the Levy's solution for the deflection of a simply supported square plate subjected to u.d.l. **15**

### **PART-B**

- Q.5 Derive the differential equation for bending of anisotropic plates. **15**
- Q.6 a) Write down the stress resultants acting on a shell element. **10**  
b) Differentiate between membrane theory and bending theory of shells. **5**
- Q.7 Derive the equation for deflection of a circular cylindrical shell loaded symmetrically with respect to its axis. **15**

## **End Semester Examination, Dec. 2017**

M. Tech. (Construction Management) – Second Semester  
**NUMERICAL METHODS IN CIVIL ENGINEERING (C-MS-209)**

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) Solve the following system by Gauss-elimination method,

$$x_1 + 2x_2 + x_3 = 0$$

$$2x_1 + 2x_2 + 3x_3 = 3$$

$$-x_1 - 3x_3 = 2$$

**7**

- b) Solve by Gauss Seidel iteration-elimination method, the following equations:

$$3x_1 + 9x_2 - 2x_3 = 11$$

$$4x_1 + 2x_2 + 13x_3 = 24$$

$$4x_1 - 2x_2 + x_3 = -8$$

Correct up to four significant figures.

**8**

Q.2 a) Find a root of the equation  $\sin x + \cos x = 1$ , by Regula-Falsi method, correct up to four significant figures. **7**

b) Find a real root of the equation  $\sin x = 10(x-1)$ , using Bisection method, correct to three significant figures. **8**

Q.3 The values of  $f(x)$  given below are of a polynomial of degree four. Find  $f(6)$  and  $f'(6)$ :

$x :$	0	1	2	3	4	5
$f(x) :$	1	5	31	121	341	781

**15**

Q.4 Compute  $f'(1.1)$  and  $f''(1.1)$ , from the given table:

$x :$	1.1	1.2	1.3	1.4	1.5
$f(x) :$	2.0091	2.0333	2.0692	2.1143	2.1667

**15**

Q.5 Compute  $y(0.2)$  from the equation  $dy/dx = xy, y(0) = 2$  and  $h = 0.2$ , by Runge-Kutta method. **15**

Q.6 Given  $dy/dx$  equal to  $(y-x)/(y+x)$  with initial condition  $y=1$  at  $x=0$ , find  $y$  for  $x=0.1$  by Euler's methods, correct upto four decimal, taking step length  $h=0.02$ . **15**

Q.7 Use the graphical method to solve the following LPP:

Minimize:  $z = 20x_1 + 10x_2$

Subject to the constraints:

i)  $x_1 + 2x_2 \leq 40$

ii)  $3x_1 + x_2 \geq 30$

iii)  $4x_1 + 3x_2 \geq 60$  and  $x_1, x_2 \geq 0$

**15**

## End Semester Examination, Dec. 2017

M. Tech. — First / Third Semester

## ADVANCE BRIDGE ENGINEERING (C-MS-301)

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 Answer the following questions:

- a) Define bridge.
- b) What do you understand by impact load? Explain.
- c) What are the advantages of giving a cross beam in T beam Type Bridge?
- d) Write down the main difference between forces acting on a pier and forces acting on an abutment.
- e) What do you understand between wind and water?

- f) What are the various modes through which load is by piles?
- g) Mention the advantage of elastomeric bearing transferred.
- h) Explain Buoyant force in relation to pier of a bridge.
- i) What do you understand by scour depth?
- j) Explain economic span of a bridge.

**1½x10**

### **PART-A**

- Q.2 a) Describe various types under which a bridge can be classified.

**7**

- b) Write a short note on Suspension bridge.

**8**

- Q.3 a) Describe IRC class AA loading with the help of a neat sketch.

**8**

- b) Write a detailed note on Seismic forces acting on a bridge.

**7**

- Q.4 a) Find maximum live load (for class AA tracked vehicle) and dead load moment for a R.C. slab culvert with following details:

Width of bridge = 12 Mtr

No foot path provided clear span = 5 Mtr

Wearing course = 56 mm thick asphaltic concrete.

Assume value of K for calculation of effective width as 3.0 for all value of

$\frac{L}{L}$

**10**

- b) Describe in detail merit and demerit of continuous girder bridge.

**5**

### **PART-B**

- Q.5 a) Find the maximum and minimum stress during dry and flood season in a pier with following details:

i) Dead Load from each span = 2250 kN

ii) Reaction due to line load on one span = 900 kN

iii) Maximum mean velocity of current = 3.6 M/s. Pier is 9 Mtr in total height and in of length 8.2 Mtr. Top width of pier is 1.8 Mtr and bottom width of pier is 2.7 Mtr.

The centre of bearing is 45 Cm away from center of pier. HFL is 8.1 Mtr. Take effect of forces mentioned below only:

- i) Dead Load and self-weight.
- ii) Buoyancy.
- iii) Eccentricity of live load.
- iv) Stresses due to longitudinal forces.

**10**

- b) Write a short note on abutment in case of a bridge.

**5**

- Q.6 a) Write a detailed note on Well foundation.

**10**

- b) How do you arrive at load carrying capacity of a pile? Discuss.

**5**

- Q.7 a) Describe in detail Elastomeric bearing.  
**10**  
b) Write a short note on provision of bearing in a bridge.  
**5**

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** Answer the following questions:

- Classify masonry units with standard dimension.
- Explain prism test.
- Differentiate modular brick and conventional brick with figure
- Describe about pre-stressed masonry.
- What is the function of shear wall?

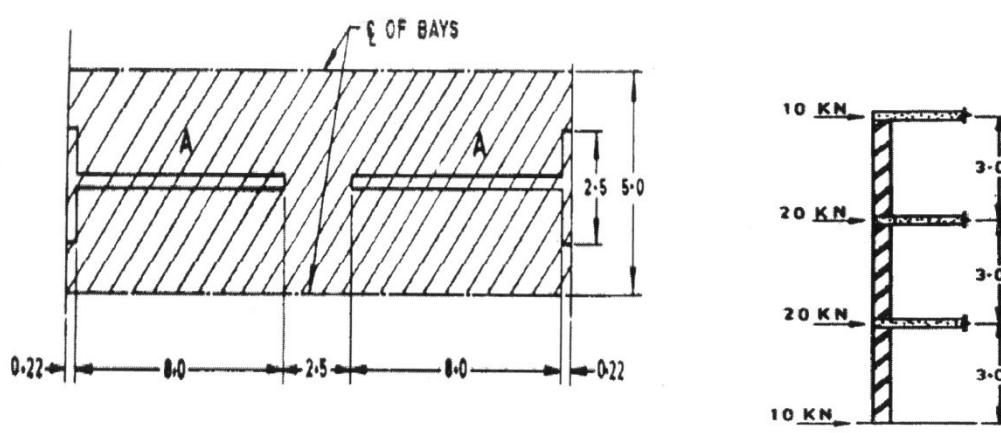
**3×5**

### **PART-A**

**Q.2** a) What is the structural advantage of using modular brick with respect to conventional bricks? **5**  
b) What are the different grades of mortar? Explain structural behaviour of mortar in masonry. **5**  
c) How do you retrofit a masonry building? **5**

**Q.3** How do you obtain permissible stress with basic stress of masonry? Explain the method of obtaining permissible stress. Explain limits of slenderness ratio on the design of masonry. **15**

**Q.4** A 3 storeyed building as shown in fig has load bearing cross walls of 230 mm. thickness. The building is subject to a wind pressure of  $1.32 \text{ kN/m}^2$ . External longitudinal walls are also 230 mm. thick while internal corridor walls are  $\frac{1}{2}$  brick thick. All walls are plastered both sides. Design the masonry for cross walls of first floor. Assume roof and floor loads (RCC slab) to be  $7 \text{ kN/m}^2$ . The building is without any parapet over the roof. Centre to centre height of floors is 3 m.  
(Fig.)



**15**

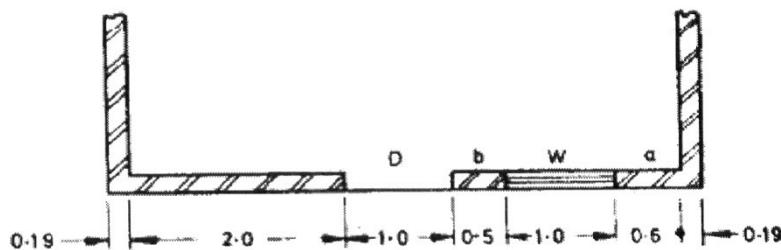
### **PART-B**

**Q.5** Derive the force-displacement relationship for a masonry wall subjected to static lateral loading. Describe the behavior of unreinforced masonry walls. **15**

**Q.6** In a single room building having the plan dimension 6 m.  $\times$  4 m. and 3.7 m. height. The lintel band is constructed at 2.2 m. above the ground level. The walls are built with 230 mm. conventional bricks in 1:6 cement sand mortar. The self-weight of the roof is 7 kN/m. Check the wall for vertical bending and

design the RC lintel band. The design seismic coefficient is 0.18. Assume the unit weight of masonry to be  $19.2 \text{ kN/m}^3$ . 15

- Q.7 External wall of a single storey house is 200 mm. thick and has door and window openings as shown in figure. Plinth level is 1.20 m. above the top of foundation footing and floor to ceiling height is 2.80 m. One way RCC slab of 3 m. clear span bears on the wall and is 100 mm. thick. Determine the maximum stress in the wall and calculate strength of bricks and grade of mortar required for the wall. There is a 200 mm. thick parapet wall of 0.8 m. height above the roof slab. Wall and parapet are plastered on both sides. (Fig.)



Lintel level is 2 m

Sill level of window is 0.6 m

All dimensions are in metres

**15**

M. Tech. (Transportation Engineering) - First Semester  
**URBAN AND REGIONAL TRANSPORTATION PLANNING (C-MT-102A)**

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**
- Write down the purpose of modeling.
  - What do you understand by short term and long term planning?
  - Differentiate between the processes problem solving and transportation planning.
  - Define trip production and trip attraction.
  - What are the various variables used to identify the status at the household level.
  - Write down the basic principle behind the gravity model.
  - What are the assumptions behind user equilibrium assignment for network modeling?
  - Write down the types of modal split models.
  - What do you understand by cordan count?
  - Show the relation between speed, density and flow using graphs.

**1½×10**

**PART-A**

- Q.2**
- What do you understand by urban transportation planning? Write down the various components of a transportation system.

**5**

- Explain the travel demand forecasting process.

**10**

- Q.3**
- What are the basic assumptions of regression analysis?

**5**

- Differentiate between home based and non home based trips. Write down the various characteristic that define a journey.

**10**

- Q.4** The number of trips produced in and attracted to the three zones 1, 2 and 3 are tabulated as:

Zone	1	2	3	Total
Trips produced	14	33	28	75
Trips attracted	33	28	14	75

The impedance values between the various zones have been found to be as follows:

O \ D	1	2	3
1	8	1	4
2	3	6	5
3	2	7	4

Distribute the trips between the various zones.

**15**

## **PART-B**

Q.5 a) Write down the factors influencing the choice of mode.

**5**

b) The total number of trips from zone I to zone J is 4200. Currently all trips are made by car. Government has two alternatives to introduce a bus or a metro. The travel characteristics and respective coefficients are given below. Decide the best alternative in terms of trips carried.

Coefficient	$t_{ij}^{(v)}$	$t_{ij}^{\text{walk}}$	$t_{ij}^t$	$F_{ij}$	$\Phi_{ij}$
Car	0.06	0.03	0.07	0.2	0.2
Bus	30	-	-	22	6
Metro	40	8	7	9	-
	16	15	4	7	-

$t_{ij}^{(v)}$  → in vehicle travel time

$t_{ij}^{\text{walk}}$  → walking time

$t_{ij}^t$  → waiting time

$F_{ij}$  → Fare charged

$\phi_{ij}$  → Parking cost

**10**

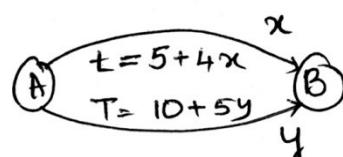
Q.6 a) Explain Link cost function in network assignment.

**5**

b) Write down the preferred models used for route assignment. Explain the basic principle behind each.

**5**

c) Using user equilibrium assignment, send the flows on both links.



**5**

Q.7 a) What are the different types of movements in a given study area. Explain each.

**5**

b) Explain the HHI in detail. Also write down the various factors influencing the trips based on HHI Survey.

**10**

## **End Semester Examination, Dec. 2017**

M. Tech. – First Semester

### **PAVEMENT MATERIALS AND CONSTRUCTION TECHNIQUES (C-MT-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) What is the necessity of providing a base course in CC pavement?  
b) Explain the function of joint sealer with the help of an example.  
c) What is the significance of Marshal mix design?  
d) What is mastic asphalt?  
e) Define the term soil stabilized road. **3×5**

#### **PART-A**

- Q.2 What are the different types of bituminous materials used in road construction? Explain in detail. **15**
- Q.3 Explain the stepwise procedure for construction of soil subgrade and sub-base course as per IRC guidelines. **15**
- Q.4 What are the various excavating and compacting equipments used in the highway construction? **15**

#### **PART-B**

- Q.5 Discuss in detail the desirable properties of paving bitumen. **15**
- Q.6 Mention the specification of materials and construction steps for laying premix carpet in detail. **15**
- Q.7 Write the procedure for designing a dowel and tie bar in detail. **15**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester  
**TRAFFIC ENGINEERING (C-MT-104)**

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 Answer the following questions:

- a) What is basic object of traffic engineering?
- b) Define traffic volume studies.
- c) List cross – sectional elements of roads.
- d) What is 98<sup>th</sup> percentile of speed?
- e) Draw any four basic forms of at grade intersections.

**3×5**

### **PART-A**

Q.2 a) Explain various vehicular characteristics that affect the design and traffic performance. **10**

- b) Define passenger car unit. Describe the various factors affecting PCU values. **5**

Q.3 Explain the procedure for conducting speed and delay studies. **15**

Q.4 a) Calculate the superelevation required for a road 7.5 m wide on a curve of 240 m radius for a permissible speed of 80 kmph. Assume coefficient of lateral friction as 0.15. Also, calculate the equilibrium superelevation for the condition when the pressure on inner and outer wheels will be equal. **10**

- b) Explain in general terms how sight distance effects the geometric designs of highways. **5**

### **PART-B**

Q.5 a) What is the importance of traffic signs? List out the general principles of traffic signing. **10**

- b) Write a short note on design of rotaries. **5**

Q.6 Design a traffic signal on an interaction formed by two streets A and B having critical lane volumes as  $V_a = 440 \text{ veh/hour}$ ,  $V_b = 200 \text{ veh/hour}$  during the heaviest traffic hours. Assume that the cycle for interaction is 50 sec and 5 sec. time is allotted between two change overs from go to stop and vice -

versa. Also assume that on the street A, the time spacing of vehicle is 3 sec and on a street B the time spacing of vehicle is 5 secs. **15**

- Q.7 a) Discuss the different methods of road lighting w.r.t:  
i) Silhouette effect.  
ii) Reverse silhouette effect. **7½**
- b) Write a short note on principles and practices of road safety audit. **7½**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester  
**TRAFFIC ENGINEERING (C-MT-104)**

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 Answer the following questions:  
a) What is basic object of traffic engineering?  
b) Define traffic volume studies.  
c) List cross – sectional elements of roads.  
d) What is 98<sup>th</sup> percentile of speed?  
e) Draw any four basic forms of at grade intersections. **3×5**

### **PART-A**

- Q.2 a) Explain various vehicular characteristics that affect the design and traffic performance. **10**  
b) Define passage car unit. Describe the various factors affecting PCU values. **5**

- Q.3 Explain the procedure for conducting speed and delay studies. **15**

- Q.4 a) Calculate the super elevation required for a road 7.5 m wide on a curve of 240 m radius for a permissible speed of 80 kmph. Assume coefficient of lateral friction as 0.15. Also calculate the equilibrium super elevation for the condition when the pressure on inner and outer wheels will be equal. **10**  
b) Explain in general terms how sight distance affects the geometric designs of highways. **5**

### **PART-B**

- Q.5 a) What is the importance of traffic signal? List out the general principles of traffic signing. **10**  
b) Write a short note on design of rotaries. **5**
- Q.6 Design a traffic signal on an interaction formed by two streets A and B having critical lane volumes as  $V_a = 440 \text{ veh / hour}$ ,  $V_b = 200 \text{ veh / hour}$  during **240/5**

the heaviest traffic hours. Assume that the cycle for interaction is 50 sec. and 5 sec. time is allotted between two change overs from go to stop and vice - versa. Also assume that on the street A, the time spacing of vehicle is 3 sec. and on a street B the time spacing of vehicle is 5 secs. **15**

- Q.7 a) Discuss the different methods of road lighting w.r.t:  
i) Silhouette effect.  
ii) Reverse silhouette effect. **7½**  
b) Write short note on principles and practices of road safety audit. **7½**

## **End Semester Examination, Dec. 2017**

M. Tech. (Transportation Engineering) – Third Semester

### **HIGHWAY SUBGRADE AND FOUNDATION ANALYSIS (C-MT-204)**

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 Answer the following:

- What are the properties of subgrade?
- Define plastic limit of soil.
- What do you mean by gravitational water?
- List engineering properties of soil.
- Write water content unit weight relationship.
- Why vertical drains are provided.
- What are fine grained soils?
- Differentiate between compaction and consolidation.
- Write expression to calculate rate of settlement for normally consolidated clays.
- Mention different methods of excavation.

**1½×10**

#### **PART-A**

Q.2 Discuss soil survey procedure for highways.

**15**

Q.3 What is the purpose of soil classification? Explain Indian Standard Classification System in detail.

**15**

Q.4 a) What are different soil water system? Explain.

**7½**

- Write short note on sub soil drainage.

**7½**

#### **PART-B**

- Q.5 a) Explain Modified Proctor test in detail.  
**7½**
- b) Discuss field compaction control methods.  
**7½**
- Q.6 Describe consolidation test. Show how the results of this test are used to predict the rate of settlement and magnitude of settlement.  
**15**
- Q.7 Write steps for construction of vertical sand drains. Mention its uses also.  
**15**

## **End Semester Examination, Dec. 2017**

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 What is meant by Intelligent Transportation Systems (ITS)? What objectives may be achieved through application of ITS? Describe in context of the problems faced in the urban transportation system. **15**

#### **PART-A**

- Q.2 Describe the utility of Geographic Information Systems (GIS) for ITS with examples. **15**
- Q.3 What all data can a GPS device collect? How can these data be analyzed and used for various ITS applications? Give some live examples. **15**
- Q.4 How can ATIS improve transportation system efficiency and effectiveness by providing timely information to travelers? Explain with examples. **15**

#### **PART-B**

- Q.5 What are the road safety issues commonly faced on rural roads/highways? Which ITS components can be used to improve road safety? How? **15**
- Q.6 How can ITS applications help in fairer pricing of transportation assets? How would it improve operational efficiency of transportation infrastructure? Give two examples of such technology and applications. **15**

Q.7 Based on the following data provided for a speed & flow study by a test car, in the table below please answer the questions given below:

Link No.	From	To	Distance (Km)	Journey Time (s)	Delay (s)	Vehicles in Opposite Direction	Vehicles Overtaking the Test Car	Vehicles Overtaken by Test Car
1	Neh PIC	Cm Plz	4.5	366	24	333	162	163
2	Crn Plz	MB Rd	3.5	372	18	289	113	136
2	MB Rd	Crn Plz	3.5	318	29	358	101	150
1	Crn Plz	Neh PIC	4.5	340	30	305	121	177

- a) What is the flow of traffic (Veh/Hr) on all links in both directions?
- b) What are the journey and running speeds respectively of the test car while travelling on Link 2 in MB Rd to Crn Plz direction?
- c) What are the journey and running speeds respectively of the test car while travelling on link 1 in Neh PIC to Crn Plz direction? **5x3**

## **End Semester Examination, Dec. 2017**

### **M. Tech. (Construction Management) - Second Semester ENVIRONMENTAL IMPACT ASSESSMENT (C-MT-302)**

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 Briefly answer the following:

- a) List a few benefits of conducting EIA.
- b) What is the main purpose of EIA?
- c) What is the validity period for environmental clearance of river valley project and mining projects?
- d) Describe primary pollutants.
- e) Expand SPCB, PDN and PII.
- f) How is atmospheric dispersion modeling useful?
- g) Define A-weighted sound level.
- h) What is impulse time weighing?
- i) How do informal discussions aid in public participation?
- j) Define sustainable road.

**1½x10**

### **PART-A**

Q.2 a) With the help of a neat sketch, explain the conceptual framework of EIA and explain various components, in detail? **8**  
 b) List various steps involved in EIA and briefly explain them. **7**

Q.3 a) Discuss the significance of impact indicators in EIA. **5**

- b) Discuss the significance of forecasting environmental changes with suitable examples. 5
  - c) Give the main objectives of EIA notification 2006. 5
- Q.4    a) Give an overview of environmental legislations of India. 8
- b) Explain the working principle of fabric filter with the help of a neat sketch. Also, explain its advantages and disadvantages. 7
- PART-B**
- Q.5    a) Discuss the effects of noise on human health. 8
- b) Describe the role of greenbelts as a tool in reducing noise. 7
- Q.6    a) Describe the principles of practical observation related to public participation. 7
- b) For an upcoming township having mixed landuse, it is intended to conduct public participation. What would your recommendations be for conducting the same? 8
- Q.7    a) National Highway Authority of India plans to develop a National Highway connecting Delhi with Lucknow with an aim to reduce travel time. Discuss a few positive and negative impacts of this project. 7
- b) What information is furnished in the EIA study of highway project? 8

### **End Semester Examination, Dec. 2017**

B. Tech. — Seventh 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 FOUR** questions from the remaining. Marks are indicated against each question.

- Q.1    Attempt **(any five)** of the following:
- a) Write one page on one of the successful first generation entrepreneurs.
  - b) Advantages of LLP form of business.
  - c) Relevance of market research for new business ventures.
  - d) Sources of generating new business ideas.
  - e) Importance of manpower planning in a business organization
  - f) Raising financial resources for new business venture. **4×5**
- Q.2    What makes an entrepreneur? What are the key characteristics of a successful entrepreneur? Mention some of the reasons why a new business venture may fail. **20**
- Q.3    What is meant by "Business Environment"? How does a new entrepreneur scan his business environment? **20**
- Q.4    What is the importance of drawing up a written business plan? How is a formal project report written? What are its key elements? **20**
- Q.5    Business entrepreneur is a leader in his own venture. Explain why? How does he/she develop required leadership qualities to manage the business venture successfully? **20**

- Q.6 What is the role of public sector banks and financial institutions towards supporting new entrepreneurs? **20**

## **End Semester Examination, Dec. 2017**

B. Tech. — First Semester

### **ELEMENTS OF COMPUTER AND PROGRAMMING (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:

- a) What are different types of RAM?
- b) Define flowchart with example.
- c) What is the use of header files?
- d) Define 2D array with example.
- e) What do you mean by EBCDIC code?
- f) Differentiate between array and structures.
- g) What is the use of pointers?
- h) Differentiate between character and strings.
- i) How can user-defined header files be created?
- j) What will be the output of following program?

```
#include <stdio.h>
void main ( )
{
    charch = "text"
    printf ("%c", Ch);
}
```

**2x10**

## **PART-A**

Q.2 a) Explain in detail different components of computer system.

**5**

b) Explain hierarchy of memory.

**5**

c) Convert:

i)  $(.0101)_2 = ( \ )_{10}$

ii)  $(720)_8 = ( \ )_{10}$

iii)  $(4BF.BC)_{16} = ( \ )_2$

iv)  $(1101 \times 101)_2 = ( \ )_2$

v) Find 2's complements of 230.

**2x5**

Q.3 a) Explain programming language. Differentiate between high level and low level language.

**6**

b) Write an algorithm and draw a flowchart for finding smallest of 3 numbers.

**8**

c) Differentiate between following:

i) Problem oriented and procedural oriented language.

ii) Compiler and interpreter.

**6**

Q.4 a) Discuss for loop, while loop, do-while loop with syntax.

**6**

b) Write a C program which reads a list in reverse order.

**8**

c) Discuss operators in C with example.

**6**

## **PART-B**

Q.5 a) Give the difference between actual and formal parameters with example.

**5**

b) What do you understand by function prototype?

**5**

c) Write a C program to print name, cost and pages of N books using structures.

**10**

Q.6 a) Explain string handling functions in C.

**5**

b) Write a C program to swap two numbers using call by value and call by reference.

**10**

c) Write a short note on pointer array.

**5**

Q.7 a) Explain the procedure of opening and closing of files.

**10**

b) Write short notes on:

i) Pre-processor directives.

ii) Error handling during file operations.

**10**

**End Semester Examination, Dec. 2017**  
B. Tech. — First Semester  
**INTRODUCTION TO COMPUTER SYSTEM (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) What is ALU?  
b) Explain optical disk.  
c) Differentiate between hardware and software.  
d) What is POST?  
e) What do you understand by ASCII?

- f) Explain real time operating system.
- g) Differentiate between HLL and LLL.
- h) Define LAN, WAN, MAN.
- i) Why antivirus is needed?
- j) Differentiate between Switch and Hub.

**2×10**

### **PART-A**

- Q.2 a) Define “computer system”. Explain its generations in detail. **10**
- b) Convert the following:
- i)  $(75)_{10} = (?)_2$
  - ii)  $(136)_{10} = (?)_8$
  - iii)  $(8945)_{10} = (?)_{16}$
  - iv)  $(101011)_2 = (?)_{10}$
  - v)  $(ABC)_{16} = (?)_2$
- 2×5**
- Q.3 a) Why secondary storage devices are required? Explain hard disk and optical disk in detail. **10**
- b) Explain computer organization in detail. **10**
- Q.4 a) What do you understand by machine and assembly language. Explain advantages and disadvantages of each. **10**
- b) Write short notes on the following:
- i) System software.
  - ii) Application software.
  - iii) Utility software.
  - iv) Programming language.
- 2½×4**

### **PART-B**

- Q.5 a) What is operating system? Explain windows operating system with architecture in detail. **10**
- b) Explain booting process in detail. **10**
- Q.6 a) What do you understand by network topologies. Explain star and ring topology in detail. **10**
- b) Why internet is needed. Explain its architecture. **10**
- Q.7 a) How system can be prevented from malicious software. Explain with example. **10**
- b) Write short notes on the following:
- i) Virus.
  - ii) Worm.
  - iii) Trojan horse.
  - iv) Intruder.
- 2½×4**

## **End Semester Examination, Dec. 2017**

B. Tech. — First / 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.** Each question carries equal marks.

- Q.1
- a) Define 'recursion'.
  - b) What is user defined function?
  - c) What are the advantages of using pointers in C?
  - d) Differentiate between array and string.
  - e) Define union in C.
  - f) Write two differences between 'while' and 'for' loop in C.
  - g) Differentiate between actual and formal parameters.

- h) Explain any two functions:  
 i) Strcpy ( ).  
 ii) Strcmp ( ).  
 iii) Strlen ( ).  
 i) Write any two basic operations on file in C.  
 j) Explain data types in C. **2x10**

### **PART-A**

- Q.2 a) Write a C program to find largest among three numbers using nested ifelse statement. **10**  
 b) Explain the following bitwise operators with syntax:  
 i) Bitwise AND  
 ii) Bitwise OR  
 iii) Bitwise XOR  
 iv) Bitwise left shift.  
 v) Bitwise right shift. **2x5**
- Q.3 a) What is an array? Explain the declaration and initialization of different types of arrays. **8**  
 b) Explain reading and writing in strings. Write a C program to check whether a string is palindrome or not using string handling functions. **12**
- Q.4 a) Define structure with the help of a program. Mention the advantage of union over a structure. **12**  
 b) Explain arrays within structure with the help of an example. **8**

### **PART-B**

- Q.5 a) Explain the array of pointers with examples. **8**  
 b) What is pointer? Write a C program for accessing variables using pointers. **12**
- Q.6 a) What is function? Explain different types of functions in C. Explain any five library functions in C. **14**  
 b) Write a C program to swap two integers using swap ( ) function. **6**
- Q.7 a) Explain about error handling in files. **5**  
 b) What is a file? Explain different types of files. Write a C program to count number of characters, spaces, tabs and newlines in a file. **15**

## **End Semester Examination, Dec. 2017**

B. Tech. — First Semester

### **INTRODUCTION TO OPEN SOURCE SOFTWARE AND OPEN STANDARDS (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.** Each question carries equal marks.

Q.1 Answer the following questions briefly:

- a) What are the attributes of open standard?
- b) Mention the three main areas of activity of ITU.
- c) Describe SLOSTA.
- d) Explain the term early adopters.
- e) What is OSI?
- f) Discuss Brook's law.

- g) Define application software.
- h) Write any two features of UNIX operating system.
- i) What do you understand by booting?
- j) Write any two available Linux distributions.

**2×10**

### **PART-A**

- |     |   |           |
|-----|---|-----------|
| Q.2 | a) Differentiate between open source and closed source software, giving examples.     | <b>10</b> |
|     | b) Explain four freedoms specified by Stallman.                                       | <b>5</b>  |
|     | c) Explain the meaning of copy left.  | <b>5</b>  |
| Q.3 | a) Discuss about different drives for wide spread adoption of open source, in detail. | <b>15</b> |
|     | b) Write short note on IT @ school.   | <b>5</b>  |
| Q.4 | a) How can one contribute to open source projects?                                    | <b>10</b> |
|     | b) Explain licence review process   | <b>5</b>  |
|     | c) What is forking?   | <b>5</b>  |

### **PART-B**

- |     |   |            |
|-----|---|------------|
| Q.5 | a) Differentiate between de-facto and de-jure standards, citing suitable examples.  | <b>10</b>  |
|     | b) Explain various attributes of open standard.   | <b>10</b>  |
| Q.6 | a) Discuss about the de-jure standard setters:<br>i) ASEAN.<br>ii) ITU.   | <b>5×2</b> |
|     | b) What are various degrees of association defined for national standards?  |            |
|     | <b>10</b>   |            |
| Q.7 | a) Write short notes on the following:<br>a) Booting in Linux.<br>b) Run levels.<br>c) Partitioning.<br>d) Problems associated with Linux installation. | <b>5×4</b> |

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- |     |  |
|-----|--|
| Q.1 | a) Prove that $(A - B) \cap B = \emptyset$ .   |
|     | b) Differentiate between a graph and a tree.   |
|     | c) Express the following statement using quantifiers: "subtraction of any two rational numbers is rational". |
|     | d) Define Hamiltonian paths.   |

- e) Let  $A = \{\phi, a\}$ , construct  $\{\phi\} - A$  set.  
f) Write truth table for 'NAND'.  
g) Define multigraph and weighted graph.  
h) How many different 8-bit strings are there that begin and end with 1?  
i) How mutually exclusive events are different from equally likely events?  
j) Let  $R$  be a relation on set  $A = \{k, l, m, n\}$  defined by  
 $R = \{(k, l), (m, l), (n, l), (l, l), (k, k), (m, k), (l, k), (n, k)\}$

Find domain and range of  $R$ .

**2x10**

### **PART-A**

- Q.2 a) Let  $P, Q$  and  $R$  are three infinite sets. Then prove:  
 $|P \cup Q \cup R| = |P| + |Q| + |R| - |P \cap Q| - |P \cap R| - |Q \cap R| + |P \cap Q \cap R|$ . **6**
- b) Let  $A = \{4, 6, 8, 10\}$   $R = \{(4, 4)(4, 10)(6, 6)(6, 8)(8, 10)\}$  is a relation on set  $A$ . Determine transitive closure of  $R$  using Warshall's algorithm. **6**
- c) Solve the following question:
- i) Let  $f, g, h: R \rightarrow R$  where  $f(x) = x^2 + 1$ ,  $g(x) = x + 5$ ,  $n(x) = \sqrt{x^2 + 5}$ . Show that  $(hog)of = ho(gof)$ . **8**
  - ii) Given  $A = \{1, 2, 3, 4\}$  and  $f: A \rightarrow A$  defined by  $f = \{(1, 2)(2, 2)(3, 1)(4, 3)\}$  find  $f^2$ . **4x3**
- Q.3 a) From the following formulae, find out tautology, contingency and contradiction:
- i)  $\neg(A \rightarrow B) \vee (\neg A \vee (A \wedge B))$
  - ii)  $(H \rightarrow (I \wedge J)) \rightarrow \neg(H \rightarrow I)$
  - iii)  $(p \leftrightarrow q) \rightarrow (p \wedge q) \vee (\neg p \wedge q)$
- b) What do you mean by quantifiers? Explain its types with examples. **8**

- Q.4 a) Show that  $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$  by mathematical induction. **10**
- b) How many permutations of the letter  $ABCDEFG$  contain:
- i) The string  $BCD$  ?
  - ii) The string  $CFG A$  ?
  - iii) The strings  $BA$  and  $GF$  ?
  - iv) The strings  $ABC$  and  $DE$  ?
  - v) The strings  $ABC$  and  $CDE$  ?
  - vi) The strings  $CBA$  and  $BED$  ? **6**
- c) There are ' $n$ ' objects out of which ' $r$ ' objects are to be arranged. Find the total number of permutations when:
- i) Four particular objects always occur.
  - ii) Four particular objects never occur. **4**

### **PART-B**

- Q.5 a) Solve the difference equation:

$$a_r + 4a_{r-1} + 4a_{r-2} = r^2 - 3r + 5$$

b) Solve by the method of generating function:

$$a_r + a_{r-1} - 56a_{r-2} = 7^r + r^2; r \geq 2$$

**10×2**

Q.6 a) Consider an algebraic system  $(G, *)$  where G is the set of all non-zero real

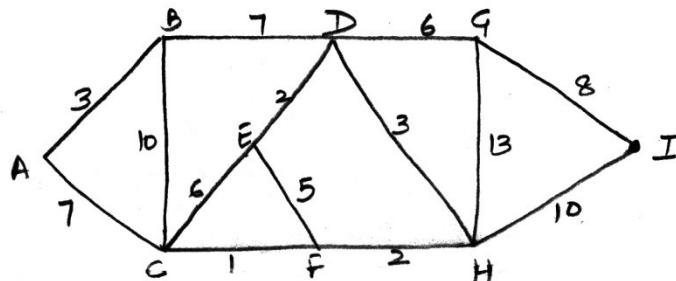
numbers and \* is a binary operation defined by  $a*b = \frac{ab}{4}$ . Show that  $(G, *)$  is an abelian group. **8**

b) Write short notes on:

- i) Homomorphism's.
- ii) Isomorphism.
- iii) Automorphism. **9**

c) Consider binary operation \* on  $\mathbb{Q}$ , the set of rational numbers, defined by  $c*d = c+d-cd, \forall c, d \in \mathbb{Q}$ . Determine whether \* is associative. **3**

Q.7 a) Write Prim's algorithm to find minimum spanning tree of the weighted graph and apply the same on following graph:



**12**

b) Draw a binary expression tree, when inorder and postorder traversal of the tree is given as follows:

Postorder	B	E	H	F	A	C	D	G	I
Inorder	H	F	E	A	B	I	G	D	C

**8**

## End Semester Examination, Dec. 2017

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 **TWO** questions from **PART-B**. Each question carries equal marks.

- Q.1 a) Write the syntax to declare a constant.  
 b) List any 5 string manipulation functions.  
 c) Explain foreach loop.  
 d) How include ( ) is different from require ( )?  
 e) List the functions to sort an array in descending order.  
 f) Define Exception.  
 g) Write the advantages of POST method over GET.  
 h) Write syntax to start and destroy a session.  
 i) How will you define a database?  
 j) What are cookies?

**2x10**

### **PART-A**

- Q.2 a) Which databases are supported by PHP? Explain how do you work with PHP.  
 b) Explain how client and server communicate. Give names of two programming languages each on client and server side. **10x2**
- Q.3 a) Take the salary as input from the user. Pass this value as a parameter to a function which calculates tax as follows:  
 If salary  $\leq$  50,000 Tax = 10%.  
 If salary  $>$  50,000 Tax = 15%. **10**  
 b) Explain the concept of call-by-value and call-by-reference with examples of each. **10**
- Q.4 a) Create an associative array. Sort it both in ascending and descending order according to both keys and values. **10**  
 b) Create a new file. Enter records of two students into it. Read the records one by one and display them on the web page. **10**

### **PART-B**

- Q.5 a) Explain the Exception handling mechanism. What do you mean by Exception Propagation? Give an example. **10**  
 b) What are the types of errors in PHP? Write JavaScript code to create dialog boxes. **10**
- Q.6 a) Differentiate between GET and POST method. Explain how a file is uploaded on server. **10**  
 b) What is a session? How a session is started and destroyed? What are cookies and hidden fields? **10**
- Q.7 a) Explain the steps required for PHP to communicate with MYSQL database. **10**  
 b) Give introduction of Eclipse. Explain the various views of Eclipse. **10**

## **End Semester Examination, Dec. 2017**

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 **TWO** questions from **Part-B**. Each question carries equal marks.

- Q.1 a) List any four features of PHP.  
b) How PHP is installed?  
c) Differentiate between echo and print.  
d) List down the types of operators in PHP.  
e) What is for each loop?  
f) What is the purpose of include and require?  
g) What are constructors? Define constructor in PHP.  
h) Write steps to create and run PHP project.  
i) Explain rsort( ) function in PHP.  
j) What are superglobals? List down any two superglobals with their need.

**2x10**

### **PART-A**

- Q.2 a) Demonstrate the use of isset(), unset() and empty() with example.  
**10**  
b) Calculate the area of a circle in PHP embedded in HTML. Also write appropriate comments.  
**10**
- Q.3 a) Write a program in PHP to check whether a given character is vowel or not using if-else.  
**10**  
b) Write a program in PHP to swap two numbers using call by value.  
**10**
- Q.4 a) What is an associative array? How to create, access and modify the elements of an associative array? Explain with suitable examples.  
**10**  
b) What are various file manipulation functions? Write PHP code to open a file, reading a record from a file, and writing a record into a file.  
**10**

### **PART-B**

- Q.5 a) What is an exception? How is it handled? Give an example of multiple catch blocks.  
**10**  
b) Discuss the various features of Java. What is the process of building and running Java application programs?  
**10**
- Q.6 a) What are events in JavaScript? Write a code for the dialog boxes in JavaScript.  
**10**  
b) What is DTD? Create an XML file to store the details of three students.  
**10**
- Q.7 a) Write down the features of SQL creates a table in SQL and apply aggregation functions on it.  
**10**  
b) Explain the various views of PHP.  
**10**

# **End Semester Examination, Dec. 2017**

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 **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1 a) List any four features of PHP.  
b) How PHP is installed?  
c) Differentiate between echo and print.  
d) List down the types of operators in PHP.  
e) What is for each loop?  
f) Which function is used to find the size of an array?  
g) List the functions to sort an array in ascending order.  
h) Differentiate between class and object.  
i) What is the use of a PHP framework?  
j) How a table is deleted in SQL?

**2x10**

### **PART-A**

- Q.2 a) Demonstrate the use of isset(), unset() and empty() with examples. **10**  
b) Calculate the area of a circle in PHP embedded in HTML. Also write appropriate comments. **10**
- Q.3 a) Explain any five string manipulation functions with examples. **10**  
b) Take a number from user as input and calculate its factorial using for loop, while loop and do while loop. **10**
- Q.4 a) Create an array and show outputs by applying count(), implode(), explode(), array-flip() functions. **10**  
b) Create a file and store the details of two employees into it. **10**

### **PART-B**

- Q.5 a) What is a constructor? Give an example of constructor with parameters. **5**  
b) What do you understand by exception propagation? Give an example to create custom exceptions. **10**  
c) Create an HTML form and apply validations using JavaScript. **5**

- Q.6 a) What are events in JavaScript? Write a code for the dialog boxes in JavaScript. **10**  
 b) What is DTD? Create an XML file to store the details of three students.  
**10**
- Q.7 a) Write a short note on Eclipse.  
**5**  
 b) What are the various tracking mechanisms?  
**5**  
 c) Create a table of student details in SQL. Enter three records into it. Update any two records and display all the data.  
**10**

## **End Semester Examination, Dec. 2017**

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 Answer the following questions:

- a) Define equivalence and partial order relations.
- b) What are universal quantifiers? Explain with examples.
- c) Determine the value of  $n$  if:  

$$6 \times np_3 = 3 \times {}^{n+1}p_3$$
- d) Solve the differential equation:  

$$9y_{k+2} - 6y_{k+1} + y_k = 0$$
- e) Define Bipartite graph with an example.

**4×5**

#### **PART-A**

- Q.2 a) A survey was conducted among 1000 people, of these 595 like Metro Channel, 595 like Star Movies and 500 like Zee TV, 395 of them like Metro channel and Star Movies, 350 of them like Metro channel and Zee TV and 400 of them like Star Movies and Zee TV, 250 of them like Metro channel, Star Movies and Zee TV.
- i) How many of them who do not like Metro channel, do not like Star Movies and Zee TV?
  - ii) How many of them who like Metro channel, Star Movies and do not like Zee TV?  
**5×2**
- b) Let  $f, g, h$  be functions from  $N$  to  $N$ , where  $N$  is the set of natural numbers so that:

$$f(n) = n+1, \quad g(n) = 2n, \quad h(n) = \begin{cases} 0 & \text{when } n \text{ is even} \\ 1 & \text{when } n \text{ is odd} \end{cases}$$

Determine  $f \circ f$ ,  $f \circ g$ ,  $g \circ f$ ,  $g \circ g$ ,  $h \circ g$ ,  $(f \circ g) \circ h$ .

**5**

c) Prove that:

$$A \times (B \cup C) = (A \times B) \cup (A \times C)$$

**5**

Q.3 a) Construct truth table for following statement:

$$\text{i)} \quad (P \rightarrow (q \rightarrow r)) \rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$$

$$\text{ii)} \quad p \leftrightarrow (\sim p \vee \sim q)$$

**5x2**

b) From the following formulae, find tautology, contingency and contradiction:

$$\text{i)} \quad \sim(A \rightarrow B) \vee (\sim A \vee (A \wedge B))$$

$$\text{ii)} \quad (p \leftrightarrow q) \rightarrow (p \wedge q) \vee (\sim p \wedge \sim q)$$

**5x2**

$$1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$$

Q.4 a) Prove by Mathematical induction.

**10**

b) Explain Pigeonhole principle.

**3**

c) A five person committee having members Ankit, Arjit, Sonu, Monu and Nonu is to select a president, vice-president and secretary then:

i) In how many ways can this occur if either Sonu or Monu must be president?

**2**

ii) How many selections are there in which either Nonu is a secretary or he is excluded?

**2**

iii) How many selections exclude Ankit or Arijit?

**3**

### **PART-B**

Q.5 a) Solve the differential equation:

$$a_r + 4a_{r-1} + 4a_{r-2} = r^2 - 3r + 5$$

**10**

b) Solve the recurrence relation  $a_{r+2} - 3a_{r-1} + 2a_r = 0$  by the method of generating functions with the initial conditions  $a_0 = 2$  and  $a_1 = 3$ .

**10**

Q.6 a) Explain various properties of binary operations.

**10**

b) 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.

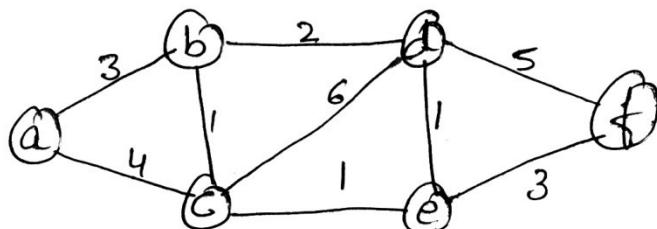
**10**

Q.7 a) Draw the unique binary tree for the given in-order and post-order traversals:

In-Order	4	6	10	12	8	2	1	5	7	11	13	9	3
	12	10	8	6	4	2	13	11	9	7	5	3	1

**10**

b) Write Dijkstra's algorithm to find shortest path in a graph and find shortest path from a to f in following graph:



**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester  
**DATA STRUCTURES AND ALGORITHMS (CS-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**. Each question carries equal marks.

- Q.1 Answer the following questions briefly:
- State the conditions that shows stack is full or empty.
  - Compare static and dynamic implementation of data structures.
  - How are recursive algorithms different from iterative algorithms?
  - What is priority queue? How many queues are needed to implement it?
  - Give the pseudo code to create a node structure.
  - What is ‘expression’ tree? Give one example.
  - Explain how do we store graphs in memory statically?
  - What is the difference between bubble sort and insertion sort?
  - Give best case, average case and worst-case complexity of selection sort.
  - What is hash-function? Explain with help of proper example. **2×10**

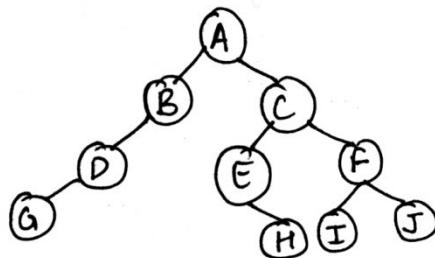
### **PART-A**

- Q.2 a) Define the term ‘data structures’. How will you categories various types of data structures? Explain all in detail with help of neat diagrams. **10**
- b) State the algorithm to convert infix expression to postfix expression. Also show how you will use this algorithm to convert the following infix expression to postfix:

$$A + (B - C) \times ((D - E) \uparrow F) - ((G \times H) / I)$$

**10**

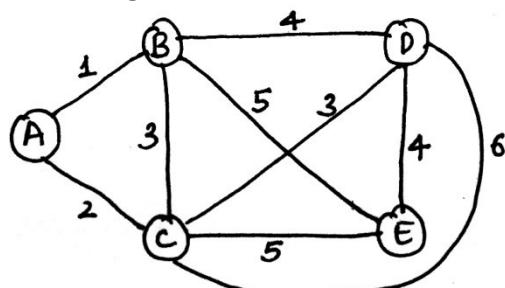
- Q.3 a) What is queue? Define deque. Explain how various operations are performed on different types of deques? Also list down at least three to four application areas where queue data structure can be used. **10**
- b) Create a structure to implement linear queue data structure dynamically. Write the pseudo code to perform creation, insertion, deletion and traversing operations. **10**
- Q.4 a) Define the term binary search tree. Write the Pseudo code to perform searching and deletion operations in it. **10**
- b) Consider the following binary tree:



- i) Find the per-order, in-order and post-order traversal. **3**
- ii) Write down the pseudo code to find post-order traversal and dry-run the same to find whether it matches with Q:4b i) result or not. **7**

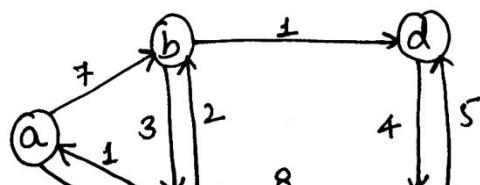
### **PART-B**

- Q.5 a) What is spanning tree? Find the minimal spanning tree for the following graph using Prim's algorithm:



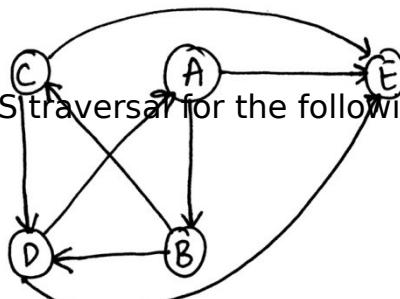
**7**

- b) Find out the shortest path for source node 'a' present in the following graph:



**7**

- c) Give the BFS and DFS traversal for the following graph:



- Q.6 a) State how insertion sort is different from bubble sort? Write the algorithm to sort numbers using insertion sort. Support your algorithm with help of suitable example. **10**
- b) Write an algorithm to sort the number in a list of integers using merge sort. Discuss the complexity of this sorting algorithm in all cases. Also sort the following elements using merge sort: 25, 12, 10, 11, 6, 5. **10**
- Q.7 a) Write the searching algorithm that uses divide and conquer strategy. What is the time complexity of this searching algorithm? Discuss with help of example. **10**
- b) Define hashing. The keys 15, 12, 19, 13, 17, 5, 27, 22 and 21 are inserted into empty hash table of size 10 using open addressing, linear probing and hash function  $h(k) = k \bmod 10$ . Illustrate how the hash table will have these elements stored? **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

### **DATA STRUCTURES AND ALGORITHMS (CS-302)**

Time: 3 hrs

Max Marks: **100**

No. of pages: **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 mean by balance factor of a height balance tree?  
 b) Give time complexity of insertion sort and selection sort.  
 c) What is the need of priority queue?  
 d) Explain adjacency matrix.  
 e) What is recursion?  
 f) Give the difference between array and link list.  
 g) What is meant by collision in hashing?  
 h) Give the applications of queue computers.  
 i) Define minimum spanning tree  
 j) Explain shell sort?

**2x10**

### **PART-A**

- Q.2 a) What is meant by term 'data structures'? What are various types of data structures? Explain all in detail. Also list various operations that can be performed on them. **10**  
b) Write down the algorithm for insertion and deletion operations in LIFO data structure.

**5**

- c) Convert the following infix expression into postfix notation:

**5**

$$A + (B - C) * D ^ F - ((G / H) + I) * J$$

- Q.3 a) Give the linked list representation of queue. Explain the algorithm for insertion and deletion of an element from the circular queue.

**10**

- b) Write down the algorithm for the following operations.  
i) Deletion of a node from link list.  
ii) Insertion of a node into the link list.  
iii) Calculate the number of nodes in doubly link list.

**10**

- Q.4 a) What is pre-order, post-order and in-order traversal? Explain.

**5**

- b) Write down the properties of Binary tree and explain their implementation. **5**  
c) What is AVL Tree? Explain the algorithm for LL, RR, LR, RL rotation with suitable example.

**10**

## **PART-B**

- Q.5 a) Write and explain the Kruskal's algorithm for minimum spanning tree with an example.

**5**

- b) Explain Krushkal algorithm to find shorted path.

**7**

- c) Differentiate between depth-first and breadth-first traversal with an example. **8**

- Q.6 a) Write a function to sort the numbers in a list of integers using quick sort. Discuss the time complexity of quick sort algorithm in best case and worst case. Also apply the sorting on following elements 12, 25, 10, 11, 5, 6.

**10**

- b) Write a function in 'C' to sort numbers using bubble sort

**5**

- c) Explain selection sort algorithm.

**5**

- Q.7 a) Write an algorithm for searching an element in a list of integers using binary search. Discuss the time complexity of algorithm in best case and worst case. **10**

- b) What do you understand by term hashing? The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function  $h(k) = k \bmod 10$  and linear probing. What is the resultant hash table?

**10**

**End Semester Examination, Dec. 2017**  
B. Tech. – Third Semester  
**COMPUTER ARCHITECTURE AND ORGANIZATION (CS-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.** Each question carries equal marks..

Q.1 Answer the following:

- a) What do you understand by computer architecture?
- b) Distinguish between combinational and sequential circuits.
- c) Write the control word for  $R_7 \neg R_1 + R_2$  for general register organization.
- d) What is micro-architecture?
- e) Explain MIPS.
- f) Give an example of one-address instruction.
- g) What do you understand by memory access time?
- h) What are the benefits of pipelining?
- i) What is the use of concurrency?
- j) Explain different types of ROM's.

**2x10**

### **PART-A**

Q.2 a) Draw and explain the block diagram of multiplexer.

**5**

b) Explain common bus system design (using multiplexers)

**10**

c) Explain structured organization of computer systems.

**5**

Q.3 a) Compare RISC with CISC.

**10**

b) Explain different types of instruction formats.

**10**

Q.4 a) Explain the detailed data path of typical register base CPU.

**10**

b) Explain instruction cycle in detail.

**10**

### **PART-B**

Q.5 a) Differentiate between hardwired and microprogrammed control memory.

**5**

b) Explain microinstruction sequencing of control memory in detail.

**15**

Q.6 a) What is the need of memory hierarchy? Also, explain locality of reference principle.

**10**

b) Explain different types of cache memory mapping techniques.

**10**

Q.7 a) Explain Flynn's classification of computers.

**10**

b) Explain instruction level parallelism in detail.

**10**

# **End Semester Examination, Dec. 2017**

B. Tech.—Third Semester

## **OBJECT ORIENTED PROGRAMMING SYSTEMS (CS-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 Briefly Answer:**

- a) What are the elements of object oriented Programming?
- b) Differentiate between static binding and late binding.
- c) Explain how constructors and destructors differ from normal functions.
- d) Explain the importance of operator overloading.
- e) Describe the syntax for defining objects with example.
- f) What is operator overriding?
- g) Enlist the operators that cannot be overloaded.
- h) How to initialize a pointer?
- i) What is a pure virtual function?
- j) Why do we need friend function?

**2x10**

### **PART-A**

**Q.2** a) Write an interactive programming in C++, for swapping integers.

**7**

b) Write a C++ program that has a class called POINT which stores coordinates in (x, y) form. Define constructor and overload ‘‘operator to calculate distance between two points.

**7**

c) Write a program to illustrate the concept of parameterized constructor.

**6**

**Q.3** a) Write a C++ program to create a class called STRING and implement the following operations.

Display the result after every operation by overloading the operator <<.

- i) STRING S1= 'MRIU'
- ii) STRING S2 = 'FARIDABAD'
- iii) STRING S3 = S1+S2 (Use copy constructor).

**15**

b) List the characteristics of a friend function.

**5**

**Q.4** a) Explain polymorphism and types of polymorphism. Cite one suitable example to illustrate the concept.

**10**

b) What is an abstract class? Explain with suitable example.

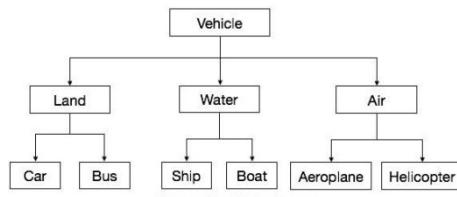
**10**

## **PART-B**

Q.5 a) What is Inheritance and what are the different types of Inheritance?  
Which type of inheritance is reflected in the following figure?

**8**

b) Write a program to implement the inheritance as shown in figure. Assume suitable member function to accept and display data.



**12**

Q.6 a) What are streams in C++? What are the advantages of C++ I/O STREAMS class library over C standard I/O library?

**10**

b) Write a C++ program to copy one file to another file after converting the lower case characters to upper case characters.

**10**

Q.7 Write short notes on following:

- a) Exception Handling.
- b) This pointer.
- c) Inline functions.
- d) Function and Class Templates.

**5x4**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third / Fourth Semester

### **DATABASE MANAGEMENT SYSTEMS (CS-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.** Marks are indicated against each question.

- Q.1 Write short notes on the following:
- a) Data redundancy and Consistency.
  - b) Referential integrity.
  - c) Domain constraints.
  - d) Data independency.
  - e) Properties of a relation.
  - f) Trivial functional dependency.
  - g) Concurrency control.
  - h) Serializability.
  - i) Timestamp.
  - j) Normalization.

**2×10**

#### **PART-A**

- Q.2 a) Define “Database and DBMS”. What are the advantages of using DBMS over traditional file system? **10**
- b) Explain three level architecture of DBMS. Why is data independence needed? **10**
- Q.3 a) Construct an ER diagram for a car insurance company whose customers own or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance company covers one or more cars and has one or more premium payments associated with it. Each payment is for a particular period of time and has an associated due date and the date when the payment was received. **10**
- b) Explain in detail about various key constraints used in database system. **6**
- c) What is the functionality of network model? **4**
- Q.4 a) Explain insertion, deletion and updation of anomalies with suitable examples. **8**

- b) Explain about weak entity, entity integrity, primary key and foreign keys. **4**  
c) What are the guidelines to design a database system? Explain it briefly. **8**

### **PART-B**

Q.5 The given database schema is:

Employee (FName, Initial, LName, ENO, DOB, Address, Sex, Salary, Supereno, Dno)  
Department (Dname, Dnumber, Mgrno, Mgrstartdate)

Dept\_locations (DNumber, Dlocation)

Project (Pname, Pnumber, Plocation, dnum)

Workson (EENO, PNO, Hours)

Dependent (EENO, Dependent\_Name, Sex, Bdata, Relationship)

Write the queries in relational algebra with above schema.

- Retrieve the name and address of all employees who work for "Research department".
- List the project numbers for projects that involve an employee whose last name is "Kumar".
- For each department, retrieve the department name and average salary of all employees working in that department.
- Retrieve the average salary of all female employees.
- List the name of employees who have a dependent with the same first name as themselves.

**4x5**

Q.6 a) When does a collision occur in hashing? Illustrate various collision resolution techniques. **10**

b) Explain various operations performed on sequential, index sequential and direct file organization techniques. **10**

Q.7 Write short notes on the following:

- Conflict serializability.
- Locking mechanism.
- Failure recovery.
- Deadlock detection methods.

**5x4**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) Define class and object with suitable examples.  
b) What do you understand by data structure?  
c) What is a destructor?  
d) What are the various operations that can be performed on a string?  
e) What is a queue?  
f) How an element is searched using depth first search method?  
g) What is a priority queue?  
h) Define big omega ( $\Omega$ ).  
i) What is linear search?  
j) Define binary search tree. **2×10**

#### **PART-A**

- Q.2 a) What is a 2-d array? Write a program in Java to show its implementation. **10**  
b) What is a function? Write a program in Java to swap two numbers using function. **10**
- Q.3 a) What do you understand by method overloading? Explain using suitable program. **10**  
b) What is a constructor? Write its properties. Explain default and parameterized constructors using a suitable program. **10**
- Q.4 a) Define stack. Write and explain algorithms to insert and delete an element from stack. **10**  
b) Write and explain the algorithm for Breadth First search technique. **10**

#### **PART-B**

- Q.5 a) What is hashing? Explain various hashing techniques in detail. **10**

- b) Explain the concepts: Abstraction and Polymorphism using suitable examples. **10**
- Q.6 a) Write and explain the insertion sort algorithm in detail. **10**  
 b) Write an algorithm to print n elements of Fibonacci series using recursion. **10**
- Q.7 a) What are the properties of a binary tree? Explain its implementation in detail. **10**  
 b) Write an algorithm to insert an element in a binary search tree. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third Semester  
**APPLIED STATISTICAL ANALYSIS (CS-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 short questions:
- Differentiate between experimental data and survey data.
  - What is CHI-square test?
  - How do you identify Type-II errors?
  - What is a neuron?
  - What are the different measures of dispersion of data sets?
  - Define scatter plots. Where is it used in statistics?
  - What is Karl-Pearson coefficient?
  - What is factor analysis?
  - Differentiate between correlation and regression.
  - When a fair coin is flipped 100 times, let X be the number of heads. What is the variance of X?
- 2x10**

### **PART-A**

- Q.2 a) Define and explain the following terms with examples:
- Quantitative and Qualitative variables.
  - Parameter and statistics.
  - Census and sampling.
  - Independent and dependent variables.
- 2½x4**
- b) Explain the different methods of statistical analysis with an example of each. **10**

Q.3 a) A coin is tossed four times. Find the mean, variance and standard deviation of the number of heads that will be obtained.

**6**

b) Explain the different types of data used in statistics with an example.

**10**

c) Differentiate between Binomial and Poisson distribution.

**4**

Q.4 a) A researcher reports that the average salary of software engineer is more than

Rs. 42,0000/- . A sample of 30 software engineers has a mean salary of Rs. 43,2600/- . At 95% confidence level, test the claim that software engineers earn more than Rs. 42,0000/- a year. the standard deviation of the population is 5230/- . (At  $\alpha = 0.05$ ,  $z = +1.65$ )

**10**

b) How Type-I errors are different from Type-II errors? Explain with the help of examples.

**7**

c) Explain the procedure of hypothesis testing in brief.

**3**

### **PART-B**

Q.5 Explain the following tests used in statistics with an example:

a) Analysis of Variance (ANOVA)

b) Chi-square goodness of fit test.

c) Kruskal-wallis test.

**20**

Q.6 Explain the following terms with an example:

a) Weighted least square and two stage least square.

**10**

b) Correlation and its types.

**10**

Q.7 Write short notes on the following:

a) Classification.      b) Decision Trees.      c) Neural Networks.

**20**

**End Semester Examination, Dec. 2017**  
B. Tech.—Third Semester  
**INTRODUCTION TO IT INFRASTRUCTURE LANDSCAPE (CS-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.** Each question carries equal marks.

**Q.1 Answer the following:**

- a) Differentiate amongst DDL, DML and DCL.
- b) How are data mining and data warehouse related?
- c) What is RAID?
- d) Define zoning and classify it.
- e) What is server network technology?
- f) What is a virtual machine?
- g) What is server deployment? Why it is necessary?
- h) Explain LDAP-client-server interaction.
- i) What is cryptography? What are its applications?

j) Explain channel and messaging.

**2x10**

### **PART-A**

Q.2 a) What is relational DBMS? Explain its terminology with the help of labeled diagram.

**5**

b) What are constraints in DBMS? Explain unique, primary key, referential and check constraints.

**5**

c) What is JDBC? What are its components? Explain its architecture in detail.

**10**

Q.3 a) What is storage network technology? Differentiate between SAN and NAS.

**5**

b) Explain the following:

- i) Switched FABRIC.
- ii) FC-AL
- iii) Storage Virtualization.

**5x3**

Q.4 a) Explain in detail the concept of virtualization along with its benefits. Also, explain the role of 'Hypervisors'.

**10**

b) What are server availability concepts and techniques? Explain in detail.

**10**

### **PART-B**

Q.5 a) What do you mean by replication topologies in LDAP? Classify and explain these, in detail.

**15**

b) Explain LDIF, using example of some organization.

**5**

Q.6 a) What is routing? How different types of routing methods are useful in networking? Also, explain VLAN concepts.

**10**

b) Write short notes on the following:

- i) Loss of privacy.
- ii) Secure messaging.

**5x2**

Q.7 a) What is middleware? Explain message oriented middleware. Also, explain IBM websphere MQ.

**10**

b) What is OLAP? Explain basic OLAP operations, with the help of examples.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fifth Semester

## **OBJECT ORIENTED PROGRAMMING USING JAVA (CS-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 Answer the following questions:

- a) What is an object? How do we create an object? Give an example.
- b) Differentiate between a class and an interface.
- c) Explain the use of 'this' keyword.
- d) What do you understand by exceptions?
- e) Discuss the use of JVM in Java.
- f) Differentiate between constructors and methods.
- g) Discuss any two access modifiers in Java.
- h) What are local variables? Give an example.
- i) What do you understand by a wrapper class?
- j) Discuss any two control statements in Java.

**2×10**

### **PART-A**

Q.2 a) Discuss the organization of data and methods in an object-oriented program? Also, list a few areas of application of object-oriented programming paradigm **10**

- b) List and explain the basic concepts of Object-oriented paradigm in detail. **10**

Q.3 a) Discuss the operators used in Java, in detail, with examples. **15**

- b) What is a string? List and explain any five commonly used string class methods. **5**

Q.4 a) Define a package. How do we tell Java that we want to use a particular package in a file? How do we create and access a package? **10**

- b) Create a class rectangle having length and breadth as instance variables. Write a program in Java to calculate the area of a rectangle. **10**

### **PART-B**

Q.5 a) What is inheritance? Describe different forms of inheritance with examples. **10**

- b) Discuss method overriding with an example. **10**

Q.6 a) What do you understand by multithreading? Differentiate between multithreading and multitasking. **6**

- b) Write a program in Java to copy the contents of one file to another. **10**
- c) What is a stream? How is the concept of streams used in Java? **4**

Q.7 a) What is an applet? What do you understand by local and remote applet? **8**

- b) Write short notes on the following:
  - a) AWT package.
  - b) Graphics programming.

**6×2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

**INFORMATION SECURITY FUNDAMENTALS (CS-322)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: 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) Explain transposition technique of cryptography with example.
- b) Differentiate between Virus, Worm and Trojan.
- c) Explain Caesar Cipher.
- d) What is DoS Attack?
- e) Differentiate between Active attacks and Passive attacks.
- f) Define Physical Security.
- g) Explain Mantraps.
- h) Define SQL injection attack.
- i) List various attacks on application security.
- j) Define log management.

**2x10**

### **PART-A**

Q.2 a) Explain RSA Algorithm with example.

**10**

b) Differentiate symmetric key cryptography and asymmetric key cryptography. **10**

Q.3 a) Differentiate MD5 and SHA-I.

**10**

b) What do you mean by digital certificate? How it is used?

**10**

Q.4 a) Explain DES in detail.

**10**

b) What is the role of SSL in securing a network connection?

**10**

### **PART-B**

Q.5 a) Explain both inner layer and outer layer of physical security.

**10**

b) Define Fire Suppression. What are the various types of fire extinguishers?

**10**

Q.6 a) What are the various vulnerabilities in database? Explain in detail.

**10**

b) What are the various phases of secure software development?

**10**

Q.7 a) Define GRC. What are the various pillars of GRC?

**10**

b) What are the various approaches of Information security audit? Explain information audit process.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third Semester

### **INTRODUCTION TO GRAPHICS AND ANIMATION TOOLS USING OPEN SOURCE SOFTWARE (CS-324)**

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 briefly:

- a) What does CSG stand for? Describe briefly what it is and what it is used for in graphics and animation?
- b) What is the difference between pictographic and phonographic scripts?
- c) Name and define two types of colour harmonies.
- d) Define prototyping. List two advantages of prototyping.
- e) Describe two types of usability testing.
- f) Define animation. In Blender, while using the NISC system (30 fps) if I want to move an object from point A to B in 3.6 seconds, how should I set my keyframes?
- g) What is the "Append" operation in Blender? How do I activate it, using the menu system? What is the keyboard shortcut to activate it?
- h) What is the difference between image size and canvas size in GIMP?
- i) What is the main purpose of movie sand box?
- j) What is the node editor used for in blender?

**2×10**

#### **PART-A**

- Q.2** a) It is possible to simulate real situations through 3D graphics art, animation and modeling. This includes simulation of sexual acts, violence, war, killing and destruction. Comment on the ethical responsibilities of a professional graphics expert. **10**
- b) Define the terms typography, typeface, point-size, line-length and leading. **10**

- Q.3** a) Match each definition in the first column to its associated concept in the second column.

Divisions of space that are guides for the user interface designer.	
Classifying your site's content.	Back-end development.
Using concepts already known to the user to design UI's.	Grids
Connecting your site to databases and defining its functionality.	Site structure.
The blueprint of your entire site.	Information architecture.

**10**

- b) What are the three different types of user analysis? Explain each type briefly. **10**

- Q.4 a) Write CSS rules for achieving the following style outcomes:
- Make all paragraph elements with id = authornname have background colour “blue”.
  - Make all paragraph elements of class “authername” have background colour “blue”.
  - Make all heading 1 elements have text colour “green”.
  - Make all heading 1 element of class “special” have center alignment.
  - Make the body element have background colour “red”. **2x5**
- b) List five principles of user-interface design. **10**

### **PART-B**

- Q.5 a) The default Blender screen configuration has five editors. Name them and explain their usage and purpose briefly. **10**
- b) Define the terms modeling, rendering, animation, material and texture with respect to Blender. **10**
- Q.6 a) Define lamp, spotlight and indirect lighting in Blender. List their settings and explain their usage. **10**
- b) Explain how nodes are used in Movies and box to achieve character animation. Explain Root Nodes, Node In, Node Out. **10**
- Q.7 a) What is the use of textures in Blender? What are the different types of material textures? Explain them briefly. **10**
- b) What is a colour system? Describe additive and subtractive colour systems. Explain the terms Hue, Saturation and Value. **10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Answer the following:

- a) Differentiate between UDP and TCP.
- b) State the difference between SMTP and MIME.
- c) Write down any two differences between circuit and packet switching.
- d) Differentiate persistent and non-persistent CSMA.
- e) Define BGP.

**4x5**

#### **PART-A**

Q.2 a) What are the various networking devices? Explain.

**10**

b) Explain how to build network with TCP/IP model?

**10**

Q.3 a) Compare and contrast a Random access protocol with a Controlled access protocol.

**10**

b) What are the common standard Ethernet implementations?

**10**

Q.4 a) Mention and explain the four SONET Layers.

**10**

b) What is the relationship between TPs, VPs and VCs?

**5**

c) Why are there no sequence numbers in Frame Relay?

**5**

#### **PART-B**

Q.5 a) What is the purpose of RIP? What are the functions of a RIP message?

**10**

b) What is the difference between connection-less and connection-oriented services? Which type of service is provided by IPv4 and IPv6?

**10**

Q.6 a) Write short notes on:

- i) SMTP.

- ii) Voice over IP (VoIP)
  - iii) DNS.
- b) Why do we need POP3 or IMAP4 for electronic mail?  
**5**

**15**

Q.7 a) What is V-LAN? Explain its architecture.

**10**

- b) Write in brief about IPSec.  
**10**

## End Semester Examination, Dec. 2017

B. Tech. – Fourth Semester

### ANALYSIS AND DESIGN OF ALGORITHMS (CS-402)

Time: 3 hrs

**100**

Max Marks:

No. of pages: 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 and explain Big-oh asymptotic notation.
- b) Write steps for achieving dynamic programming.
- c) How backtracking is different from greedy approach? Explain in brief.
- d) Define and explain the term space complexity.
- e) What do you understand by minimum spanning tree?
- f) What is native string matching?
- g) Analyze the efficiency of quick sort.
- h) What is iterative algorithm?
- i) Why divide and conquer strategy is required.
- j) What is least common subsequence?

**2x10**

#### **PART-A**

Q.2 a) What are recursive equations? Solve the following recursive equation:

$$T(n) = T\left(\frac{n}{3}\right) + \frac{2n}{3} + cn$$

**10**

- b) Write and explain insertion sort algorithm. Also discuss its complexity.  
**10**

Q.3 a) Write and explain the concept of string matching with finite automata using suitable example.

**10**

b) What is rabin karp string matching? For working module  $q = 11$ , how many spurious hit does rabin karp matcher encounter in the text:

$$T = 314159263589793 \text{ when looking for pattern } P = 26$$

**10**

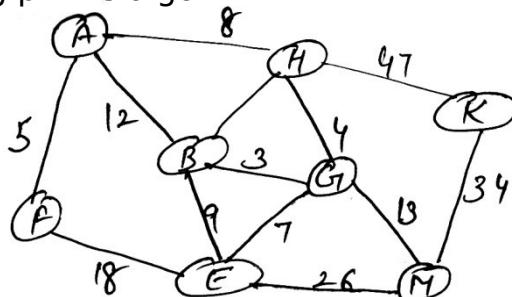
Q.4 a) Write the merge sort algorithm. Analyze its efficiency. Also, sort the following list of number using quick sort      4,6,3,2,5,1,9

**12**

b) What is divide and conquer? How binary search is different from linear search?    **8**

### **PART-B**

Q.5 a) Write Krushkal's algorithm for minimum spanning tree and solve the following, using prim's algorithm.



**12**

b) Write and explain greedy algorithm to solve Kapsack problem.

**8**

Q.6 a) How to find the single source shortest path, using dynamic programming? Explain with example.

**10**

b) Write and explain dynamic approach to find matrix chain multiplication.

**10**

Q.7 a) Explain the solution of n queen problem using backtracking.

**10**

b) What are NP problems? Differentiate between NP hard and NP complete problems. **10**

**End Semester Examination, Dec. 2017**  
B. Tech. – Third / 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.** Each question carries equal marks.

- Q.1 a) Define the following:
- i) Time sharing operating system.
  - ii) Real-time operating system.
  - b) Mention various operations on process.
  - c) Differentiate between pre-emptive and non-preemptive scheduling.
  - d) What is resource allocation graph?
  - e) Specify the necessary conditions that may lead to a deadlock situation.
  - f) Elaborate TLB.
  - g) What is virtual memory? How virtual memory techniques are implemented?
  - h) What is a file? What are its attributes?
  - i) Define buffering and caching.
  - j) Define the following terms:

## **PART-A**

- Q.2 a) Define operating system and mention the services offered by an operating system. Also, further explain the operating system architecture in detail. **12**

12

- b) What is a system program and why we need system programs? List various system calls.

8

- Q.3 a) What are schedulers? Explain each scheduler in detail.

5

- b) Explain the functionality of Process Control Block (PCB) in detail.

5

- c) What are CPU scheduling criteria? Explain different algorithms for CPU scheduling with their advantages and disadvantages.

10

- Q.4 a) Consider the following system:

	Allocation				Max			
Available	A	B	C	D	A	B	C	D
P <sub>0</sub>	0	0	1	2	0	0	1	2
P <sub>1</sub>	1	0	0	0	1	7	5	0
P <sub>2</sub>	1	3	5	4	2	3	5	6
P <sub>3</sub>	0	6	3	2	0	6	5	2
P <sub>4</sub>	0	0	1	4	0	6	5	6

Answer the following questions using the Banker's algorithm:

- Answer the following questions using the Banker's algorithm.

  - What is the content of Matrix need?
  - Is the system in a safe state?
    - If a request from process  $P_1$  arrives for  $(0, 4, 2, 0)$ , can the request be granted immediately?

12

- b) Explain in detail critical section problem. What are Semaphores?

8

PART-B

- Q.5 a) Explain in detail segmentation technique for memory management. Draw segment table and explain how logical address is converted to physical address in segmentation.

10

- b) Consider the following page references using three frames that are initially empty. Find the page faults using FIFO, LRU and optional algorithms

HS. **10**  
5 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 5 0 3

- O 6 a) What is a directory? What operations can be performed on a directory?

4

- 4**  
b) What are file allocation techniques? Explain each in detail.

6

- c) Consider the system with 150 cylinders and current head position is at 23. Find the total head movement for FCFS, SSTF, SCAN, LOOK, C-SCAN and C-LOOK algorithms considering the following queue for request-service:  
6,10,12,54,97,73,128,15,44,110,34,45

**10**

- Q.7 a) What are system components of Windows XP? How file system is handled in Windows XP?

**10**

- b) How process management and scheduling is implemented in LINUX?

**10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) Draw an automata that accept all string containing a's and b's and begin with a.
- b) Give the regular expression over the alphabet  $\Sigma = \{a, b\}$  for the string which has exactly one a or exactly one b.
- c) Define Linear Bounded Automata.
- d) Differentiate between Moore and Melay.
- e) Find a language generated by grammar  $G = (\{s\}, \{a\}, \{s \rightarrow ss\}, s)$ .
- 4x5**

### **PART-A**

- Q.2 a) State and prove equivalence of DFA and NDFA.

**5**

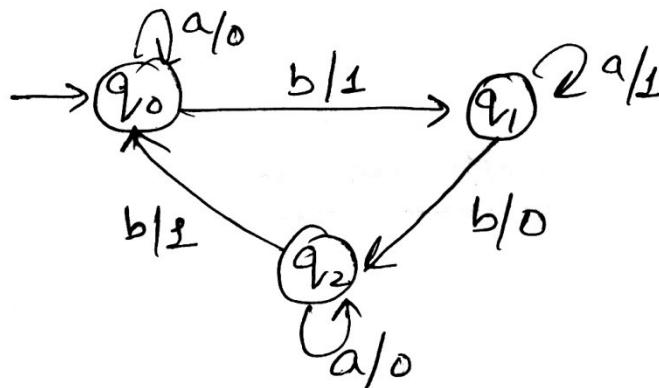
- b) Construct a DFA for the given NDFA

$$M = (\{q_1, q_2, q_3\}, \{0, 1\}, \delta, q_1, \{q_3\}) \text{ where } \delta \text{ is given by}$$

$$\begin{aligned} \delta(q_1, 0) &= \{q_2, q_3\} & \delta(q_1, 1) &= \{q_1\} \\ \delta(q_2, 0) &= \{q_1, q_2\} & \delta(q_2, 1) &= \emptyset \\ \delta(q_3, 0) &= \{q_2\} & \delta(q_3, 1) &= \{q_1, q_2\} \end{aligned}$$

**5**

- c) Construct a Melay Machine into Moore Machine.



**10**

- Q.3 a) Find a grammar generating:

$$L = \{WCW^T \mid w \in \{a, b\}^*\}$$

**5**

- b) Give Chomsky classification of Grammar and also give the relation between languages and automata.

**10**

- c) Find the language generated by the following grammar:

$$S \rightarrow 0S1 \mid 0A \mid 0 \mid 1B \mid 1$$

$$A \rightarrow 0A \mid 0$$

$$B \rightarrow 1B \mid 1$$

**5**

- Q.4 a) Prove that:

$$(1+00^*1)+(1+00^*1)(0+10^*1)^*(0+10^*1)=0^*1(0+10^*1)^* \text{ using Arden's theorem.}$$

**6**

- b) Construct the Transition system for the R.E.  $1+00+010^*$

**7**

- c) Find the R.E. for the Transition diagram given in the figure.



### **PART-B**

Q.5 a) Reduce the given grammar into Greibach Normal Form:

$$S \rightarrow AB, A \rightarrow BSB, A \rightarrow BB, B \rightarrow aAb, B \rightarrow a, A \rightarrow b$$

10

b) Find an equivalent grammar which is reduced and has no unit productions.

$$S \rightarrow AB, A \rightarrow a, B \rightarrow C/b, C \rightarrow D, E \rightarrow a, D \rightarrow E$$

10

Q.6 a) Construct the equivalent PDA for the given CFG.

$$S \rightarrow Xa | Yb$$

$$Y \rightarrow Sa | a$$

$$X \rightarrow Sb | b$$

5

b) Construct a PDA for the given language:

$$L(G) = 0^m 1^n 2^n \mid m, n \geq 1$$

5

c) Construct a context-free grammar G which accepts N(A) where:

$$A = (\{q_0, q_1\}, \{a, b\}, \{z_0, z\}, \delta, q_0, z_0, \phi)$$

and  $\delta$  is given by:

$$\delta(q_0, b, z_0) = \{(q_0, zz_0)\}$$

$$\delta(q_0, \Lambda, z_0) = \{(q_0, \Lambda)\} \quad \delta(q_0, b, z) = \{(q_0, zz)\}$$

$$\delta(q_0, a, z) = \{(q_1, z)\} \quad \delta(q_1, b, z) = \{(q_1 \Lambda)\}$$

$$\delta(q_1, a, z_0) = \{(q_0, z_0)\}$$

10

Q.7 a) Does the PCP with  $x = \{b^3, ab^2\}$  and  $y = (b^3bab^3)$  have a solution?

5

b) Prove that union of two recursive language is recursive.

5

c) Construct a Turing Machine for the language  $L = \{1^n 2^n 3^n, n \geq 1\}$

10

# **End Semester Examination, Dec. 2017**

B. Tech. - Fourth / 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**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) What is the difference between LAN and WAN?
- b) Write down the syntax of IPconfig and Tracert commands.
- c) Define sneakers and script kiddies.
- d) Give steps to make your browser secure.
- e) What is virus scanner?

**2x5**

### **PART-A**

- Q.2 a) Explain network architecture with the help of diagrams. **7**  
b) Convert the following IP address into binary form and also provide its class 172.16.20.17. **3**
- Q.3 a) What is the difference between threats, attacks and vulnerability? **6**  
b) Explain session hijacking with the help of an example. **4**
- Q.4 a) What is auction fraud? How one can protect from this kind of fraud? **6**  
b) What is the difference between investment fraud and phishing? **4**

### **PART-B**

- Q.5 a) Name the various active and passive scanning techniques. **8**  
b) What is meant by actual attack? **2**
- Q.6 a) What are the general guidelines for forensic examination? **5**  
b) Explain the steps to find evidence on PC. **5**
- Q.7 a) What is the need of protection from cyber-crime? **5**  
b) What is cyber law? Explain its importance. **5**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Answer the following:

- a) What do you mean by knowledge data discovery where data mining step occurred in KDD cycle?
- b) What is an outlier? How outlier is detected in the data set?
- c) What is the difference between supervised and unsupervised learning?
- d) Give the business applications of artificial neural networks.
- e) Explain the methods for data normalization.
- f) What is link analysis? Explain the two most common approaches to link analysis.
- g) What are the applications of data mining?
- h) What are the methods for data visualization?
- i) What is data preparation? Why it is required?
- j) Differentiate between linear regression and logistic regression.

**2x10**

### **PART-A**

Q.2 a) What is data mining methodology? Explain the phases and tasks involved in CRISP-DM method.

**10**

b) What is data mining process? Explain the various phases of it.

**5**

c) Briefly explain the challenges for mining the data.

**5**

Q.3 a) Define are the major tasks involved in data preparation. Explain in detail.

**10**

b) What is missing data? What are the reasons for the occurrence of missing data? What are the ways to handle missing data? Explain.

**10**

Q.4 a) What is duplicate data? Explain the methods to remove duplicate data.

**6**

b) What are the issues related to data quality? Explain them in brief.

**6**

c) What are the different types of data? How to re-code different data? Explain with an example.

**8**

### **PART-B**

Q.5 a) What is clustering? Explain the K-Means method to create clusters for a data set. **10**

b) What is neural network? Differentiate between feed forward and back propagation. Explain with a diagram development process of artificial neural network. **10**

- Q.6 a) What are the model development techniques? Explain the following model development techniques and their usage:
- Support Vector Machine.
  - Discriminant Analysis.
  - Bayesian Networks.

**10**

- b) What is Apriori property? Draw the association rules for the following transaction data using apriori algorithm.

T1D	List item-IDs
T100	I1, I2, I5
T200	I2, I4
T300	I2, I3
T400	I1, I2, I4
T500	I1, I3
T600	I2, I3
T700	I1, I3
T800	I1, I2, I3, I5
T900	I1, I2, I3

Generate candidate item sets and frequent item sets, where the minimum support count is 2.

**10**

- Q.7 a) Explain the analytical expression to select and assess models. Explain them with an example.

**7**

- b) Explain the mathematical formulas for measuring error rate of a regression model.

**7**

- c) What is confusion matrix? Explain the measures of accuracy.

**6**

# **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer the following:

a) What is cleansing in data warehouse?

**4**

b) Mention four descriptions on Snow Flake Schema.

**4**

c) Why we use cube services to improve ROLAP-performance?

**4**

d) Case Study: write the implementation of data warehouse project for a chain of home entertainment rental stores.

**8**

### **PART-A**

Q.2 a) Explain the different replication techniques. Justify with examples.

**8**

b) Draw a detailed diagram of data warehouse.

**12**

Q.3 a) How can we differentiate the warehouse model from the OLTP Models?

**15**

b) What is the difference between data warehouse and data mart?

**5**

Q.4 Write short notes on:

a) OLTP.

**7**

b) ETL.

**6**

c) Snow Flake Schema.

**7**

### **PART-B**

Q.5 a) Explain any two techniques in dimension oriented design.

**10**

b) What are the different benefits of cubing services?

**10**

Q.6 a) Explain the different Hints, Tips and Guidelines for developing a Multi-dimensional Models.

**12**

b) Explain the Role-based security in Cubing Services.

**8**

Q.7 a) Explain the IBM Cognos Architecture.

**12**

b) Give some description about MOLAP System.

**8**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth Semester

**IT-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**. Each question carries equal marks.

Q.1 Answer the following:

- a) Explain the impact of IT on communication.
- b) Briefly discuss the impact of service design in ITIL.
- c) What are the different phases of service transition?
- d) What are the objectives of service operation in ITIL?
- e) Why is continual service improvement needed in ITIL?

**4x5**

### **PART-A**

Q.2 a) What is Service Life Cycle Model? Draw and explain.

**10**

b) What is demand management? What are the different activities of demand management?

**10**

Q.3 a) What are the different processes in service design?

**10**

b) Explain IT Service Continuity Management in ITIL.

**10**

Q.4 a) Explain the knowledge management cycle. Give example.

**10**

b) What are the different activities involved in change management?

**10**

### **PART-B**

Q.5 a) What are the activities involved in incident management? Explain.

**10**

b) Explain the set of activities involved in access management.

**10**

Q.6 a) What is continual service improvement model? Explain.

**10**

b) What are the objectives and activities performed in continual service improvement?

**10**

Q.7 a) What does an organization achieve out of ITIL implementation? Give real life examples.

**10**

b) Write overview of ISO-20000:2011 standard.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. (CSF) - 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**. Each question carries equal marks.

Q.1 a) What do you understand by Incident Management?

b) Explain the difference between service targets and service level agreements.

c) Quote the various steps for financial management process.

- d) What are the different types of change evaluation?
- e) What activities are covered under access management?
- f) What are the various types of incidents that can be reported?
- g) What is the purpose of Information Security Management?
- h) What are the contents of Technical Service Catalogue?
- i) What are the different types of knowledge covered under knowledge management?
- j) What are the key activities covered under service asset management?

**2x10**

### **PART-A**

- Q.2 a) What are the capabilities of IT service management? Explain. **10**
- b) Discuss the various modules covered under service support. **10**
- Q.3 a) What is the objective of capacity management? Explain its functions in detail. **10**
- b) On what criterion do we classify Demand Management? Explain the various classes stating their importance in detail. **10**
- Q.4 a) What is the difference between the preventive and recovery activities of IT service continuity management? **10**
- b) What is the significance of Information Security Management Services? What are the various phases involved in it? **10**

### **PART-B**

- Q.5 a) Differentiate between service portfolio and service catalogue. Explain the complete lifecycle of service portfolio management process in detail. **10**
- b) Why do we need business relationship management? What are the broad categories under which Business Relationship Management is classified? **10**
- Q.6 a) State and explain the types of service assets? For what other process does it need to interact with and how? **10**
- b) What are the different approaches for a protect release? Explain the significance and impact of each one of them in detail. **10**
- Q.7 a) What is incident management needed for? Explain the various activities involved in it. **10**
- b) Explain the activities covered under request management? Explain the various types of requests filed in IT service management. **10**

# **End Semester Examination, Dec. 2017**

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 a) What is multi tenancy with respect to cloud model?  
b) What is the main difference between Grid computing and Cloud computing?  
c) Define BPaaS with the help of an example.  
d) Write rights of public and private cloud.  
e) Explain host based mirroring for stretched clusters.  
f) Differentiate between emulation and simulation by citing an example.  
g) Define virtualization along with its benefits.  
h) What is the primary purpose of Hypervisor?  
i) Discuss the major short comings of the conventional storage system.  
j) Differentiate between CAPEX and OPEX and how to maintain balance between these two.

**2x10**

### **PART-A**

- Q.2 a) What is virtualization? How is it different from cloud? Also explain shortcomings of physical infrastructure.

**10**

- b) Explain how virtualization can be classified based on the technology or area that is being virtualized?

**10**

- Q.3 a) What are the common considerations in server virtualization? Explain.

**10**

- b) Differentiate between the following:

- i) Type-I and Type-II Hypervisor.
- ii) Full and Para virtualization.

**5x2**

- Q.4 a) What is virtual LAN? What are its advantages?

**10**

- b) What is Network based storage virtualization?

**10**

### **PART-B**

- Q.5 a) Discuss the various steps that are required for preparation of virtualization. **10**

- b) Explain different types of cloud workloads. Also, specify on which cloud it should be hosted.

**10**

- Q.6 a) Explain in detail Anatomy of a cloud.

**10**

b) How cloud computing proves to be benefit are for end user, administrator and cloud provider? Explain with respect to each of them.

**10**

Q.7 a) What is a Paas model? Explain its components. Also discuss several keypoints that should be considered before choosing paas.

**10**

b) What are Deployment Models? Explain with the help of example. Also explain the scenarios in which an organization would migrate its infrastructure to Private cloud.

**10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Describe in brief the following:

- a) What is the need of data security?
- b) Differentiate between armored virus and macro virus.
- c) What is Hop scots?
- d) Differentiate between blue bugging and blue smack.
- e) What is TCP session stealing?
- f) How is phone phishing different from spear phishing?
- g) Name few malware countermeasures.
- h) What is ACH with suspect to banking fraud countermeasure?
- i) What is data erasure? How is it done?
- j) Explain find and classify phase in database monitoring.

**2x10**

#### **PART-A**

Q.2 a) Explain the importance of data security. What is the critical data for an organization?

**10**

b) State any three network based security threat in detail.

**10**

Q.3 a) What is SQH injection? Write down the steps involved in carrying out SQH injection.

**10**

b) What is a botnet? Explain the different stages of botnet creation.

**10**

Q.4 a) What is denial of service? Explain with an example.

**10**

b) What is session hijacking? Explain the steps involved in session hijacking.

**10**

#### **PART-B**

- Q.5 a) What is hardware based mechanism for protecting data? **10**  
 b) What are audit logs? Explain the filters deployed in three logs. **10**
- Q.6 a) What is data masking? Explain the different types of techniques in data masking? **10**  
 b) State any three banking fraud countermeasures. **10**
- Q.7 Why IBM Infosphere Guardium is a unified solution for database monitoring?  
 How database activity monitoring is done using IBM Infosphere Guardium? **20**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fifth 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:
- What are the various physical components of connectivity?
  - Write down the difference between logical and physical disk.
  - What do you mean by JBOD?
  - Differentiate between recovery point objective and recovery time objective.
  - What are the categories of backup granularity?
  - What is CIM in industry management?
  - Differentiate between active and passive threats.
  - Explain the purpose of HBA.
  - Differentiate between RAID 3 and RAID 4.
  - Explain the difference between NFS and CIFS.
- 2x10**

#### **PART-A**

- Q.2 a) What are the five pillars of technology? **6**  
 b) What are the key requirements of data center elements? **6**  
 c) What are the components of a storage system environment? **8**

Q.3 a) Explain component architecture of intelligent storage and system.

**6**

b) Explain the difference between RAID 0+1 and RAID 1+0.

**8**

c) Describe the storage system connectivity protocols.

**6**

Q.4 a) What is SAN? Explain its components in detail.

**8**

b) Explain CAS architecture in detail.

**6**

c) What is iSCSI? State with architecture.

**6**

### **PART-B**

Q.5 a) Differentiate between Disaster Restart and Disaster Recovery.

**6**

b) What are the five stages of BC planning lifecycle?

**6**

c) Explain the local replication technology in storage array based on full volume mirror.

**8**

Q.6 a) Explain provisioning and configuration change planning.

b) What are the key management metrics?

c) Explain the monitoring parameters.

d) Explain SNMP.

**5x4**

Q.7 a) Differentiate between recovery and archive.

**6**

b) What is vulnerability? Explain vulnerability management in detail.

**6**

c) What is virtualization? Explain memory and storage virtualization in detail.

**8**

## **End Semester Examination, Dec. 2017**

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 raster and random scan systems?

b) What is computer graphics? Write some applications of computer graphics.

- c) How a 2D fixed point rotation is carried out? Give the matrix representation.
- d) Write pseudo code for flood fill algorithm.
- e) What is clipping? Explain point clipping.
- f) Write the matrix representation of reflection of a 3D object.
- g) What do you mean by projection?
- h) What are polygon meshes?
- i) What do you mean by image filtering and image processing?
- j) What do you mean by hidden surface removal? Why do we need to remove hidden surfaces?

**2×10**

### **PART-A**

- Q.2 a) Define CRT. Draw and explain the labeled diagram of CRT. **8**
- b) Derive and explain Bresenham's circle drawing algorithm. Scan convert a circle with center (10, 20) and radius (5.6) using Bresenham's circle drawing algorithm. **12**
- Q.3 a) What is the need of homogeneous co-ordinates? **5**
- b) Find the transformation matrix that transforms the square ABCD whose center is at A (2, 2) and reduces it to half its size with center remaining at (2, 2). The co-ordinates of square ABCD are A (0, 0), B (0, 4), C (4, 4) and D (4, 0). Find the co-ordinates of new square. **15**
- Q.4 a) Explain 2D-viewing pipeline. What is window-to-viewpoint mapping? Give the matrix representation. **7**
- b) Explain 4-bit Cohen-Sutherland line clipping algorithm. Let R be the rectangular window whose lower left hand corner is L (-3, 1) and upper right hand corner is R (2, 6). Use the Cohen-Sutherland algorithm to clip line segments  $\overline{AB}, \overline{CD}, \overline{EF}, \overline{GH}$  where A (-4, 2), B (-1, 7), C (-1, 5), D (3, 8), E (-2, 3), F (1, 2), G (1, -2), H (3, 3). **13**

### **PART-B**

- Q.5 a) What are composite transformations? Give the matrix representation for a 3D rotation about all the three axis. **10**
- b) Differentiate between the following:
- i) Orthogonal and Oblique projections.
  - ii) Axonometric and Isometric projections. **5×2**
- Q.6 a) What are Bezier and B-spline curves? Explain with their properties. **10**
- b) What is Hermite blending functions? Derive Hermite blending functions in detail. **10**
- Q.7 a) Explain in detail Z-buffer algorithm for hidden surface removal. **10**
- b) What do you mean by illumination model? Derive and explain illumination model in detail. **10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1    a) What are major application areas of computer graphics?  
      b) Define the term resolution.  
      c) Discuss DVST graphic display device.

- d) Find the width of an image having height of 5 inches and aspect ratio 1.5.
- e) What are composite transformations?
- f) Give the 3-D rotation matrix for rotating an arbitrary point about  $x-axis$ .
- g) Scale a square with vertices  $A(0,0)$ ,  $B(0,4)$ ,  $C(4,4)$ ,  $D(4,0)$  to four times its size.
- h) What do you mean by image manipulation?
- i) Define Bezier curves.
- j) What is specular reflection?

**2x10**

### **PART-A**

- Q.2 a) Differentiate between random scan and raster scan. **5**
- b) Discuss and derive an expression for Bresenham's line drawing algorithm. Plot a line with end points (0, 0) and (6, 18) using the algorithm. **15**
- Q.3 a) Discuss 2-D transformations. Describe the transformation which reflects an object about a line  $y = x + 2$ . **12**
- b) Discuss scanline polygon filling algorithm. **8**
- Q.4 a) Discuss Cohen-Sutherland line clipping algorithm. Given a clipping window  $P(0,0)$ ,  $Q(340,0)$ ,  $R(340,340)$ ,  $S(0,340)$  find visible portions of line  $AB[(-170,595), (170,255)]$  against the given window using Cohen-Sutherland algorithm. **15**
- b) Discuss 2-D viewing pipeline. **5**

### **PART-B**

- Q.5 a) Differentiate between parallel and perspective projections. **10**
- b) Give the mathematical formulation for parallel projections. **10**
- Q.6 a) Discuss B-spline curves in detail. **10**
- b) Differentiate between Bezier and B-spline curves. **10**
- Q.7 a) Discuss Z-buffer hidden surface removal algorithm. How this algorithm is used in area subdivision algorithm. **12**
- b) What are shading models? Discuss gourad shading model. **8**

# **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

## **COMPONENT BASED PROGRAMMING TECHNOLOGY (CS-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 short questions:

- a) List out four features of .NET framework.
- b) What is the relation of C# with .NET?
- c) Name the applications that can be developed under the .NET framework.
- d) Does C# implement multiple inheritances? Justify.
- e) Define Exception handling.
- f) Explain the role of JIT compiler.
- g) Give examples of four form controls.
- h) Define the role of ADO. NET.
- i) Differentiate between windows and web applications.
- j) Discuss the use of assemblies.

**2x10**

### **PART-A**

Q.2 a) Classify data types in C#. Differentiate between value types and reference types. Explain the process of boxing and unboxing.

**10**

- b) Compare immutable and mutable strings. Give syntax/example to perform the following operations on immutable strings:
  - i) Reading string.
  - ii) Concatenating strings.
  - iii) Copying string.
  - iv) Extracting a substring.
  - v) Inserting a substring.

**10**

Q.3 a) Explain the concept of collections in .NET. List out features of collections. Discuss ArrayList and Stack collection, giving syntax/example for adding and removing elements from the collection.

**10**

- b) Explain the concept of property and indexer.

**5**

- c) Discuss the key benefits of inheritance. Explain the types of inheritance, possible in C# using classes.

**5**

Q.4 a) Give detailed .NET architecture, with neat and clean diagram. Also, explain the role of each component.

**10**

- b) Explain the process of “automatic Garbage collection” in .NET.

**5**

- c) Write short notes on the following:

- i) MSIL.
- ii) FCL.

**5**

## **PART-B**

- Q.5 a) Define the role of the following controls:  
i) Combo Box.  
ii) Dropdown List.  
iii) Check Box.  
iv) Radio Button. **10**
- b) Define MDI applications. Give examples of SDI and MDI applications. How to set MDI parent form and MDI child form?  
**10**
- Q.6 a) Differentiate among connected and disconnected data access models. **5**
- b) Give detailed ADO.NET architecture with a neat diagram. Also discuss the role of the following .NET data objects: Data set, connection object, command object, data reader object and data adapter object. **15**
- Q.7 a) Explain the concept of code based and role-based security policies in .NET. **10**
- b) Define web from. Give steps for developing simple input-output based web applications.  
**10**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Explain the follower briefly:

- a) Internet Vs intranet.
- b) Directory.
- c) <body> tag in HTML.
- d) What technologies can create dynamic web pages?
- e) WWW.
- f) What tag is used to add a link in HTML Page?
- g) Cyber-crimes.
- h) Can browser save the evidence?
- i) Use of scripting.
- j) Can cookies be attacked? Discuss.

**2x10**

### **PART-A**

Q.2 a) What is URL? Can one access a web without URL?

**7**

- b) Give different types of search engines and explain their working.

**13**

Q.3 a) Design XML schema for Book information.

**10**

- b) What are meta tags? How to give meta tags in an HTML page? Write a program in support.

**10**

Q.4 a) What is an event and explain how events can be handled in Java Script?  
Demonstrate with an example.

**10**

- b) How HTML forms can be validated with Java Script?

**10**

### **PART-B**

Q.5 a) What are the steps to configure IIS server?

**10**

- b) Discuss all server side technologies in detail.  
**10**
- Q.6 a) What is document trail? Why is it mandatory in handling cyber-crimes?  
**10**  
b) How can one find evidence in Logs?  
**10**
- Q.7 a) What is Identity theft and describe how it can be risky?  
**10**  
b) Discuss cyber laws and their scopes and coverages in detail.  
**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **BUSINESS STRATEGY AND ANALYTICS (CS-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.** Each question carries equal marks.

- Q.1 a) What are the levels of strategic management?  
b) What are the objectives of a strategy? Give an example of a good strategic objective.  
c) How to perform an internal audit in a business and why it is required to carried out?  
d) What are the attributes of a good KPI?  
e) What is the role of IT in strategic management?  
f) What are the common ways of selecting performance measures?  
g) What is scorecard? Why it is required?  
h) What is an analytical dashboard?  
i) How KPIs impact the entire organization?  
j) What is BCG analysis?  
**2x10**

#### **PART-A**

- Q.2 a) What is SWOT analysis? Design a SWOT matrix for a business situation.  
**10**  
b) Explain Porter's strategies with an example of each.  
**10**
- Q.3 a) What are the key elements of a strategic planning process? Explain them briefly. **7**

- b) What is the need for cross functional collaboration? Give an example. **6**
- c) What are the features for a good strategic planning? **7**
- Q.4 a) What is brainstorming performance measurement? How is it carried out? What are its pros and cons? **10**
- b) What is Key Performance Indicator (KPI)? What are the benefits of KPI's? **10**
- PART-B**
- Q.5 a) Explain the types of KPIs by taking an example of a startup business. **10**
- b) What are the steps in KPIs identification? Explain them with the help of a diagram. **10**
- Q.6 a) How to monitor the performance with scorecards? What are the different perspectives of measurement? **10**
- b) What is strategy implementation? How is it carried out? **10**
- Q.7 a) What are the characteristics of a well-designed dashboard? **10**
- b) What are the rules for designing a dashboard? Explain in detail. **10**

### **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **SOFTWARE TESTING AND QUALITY ASSURANCE (CS-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:
- Difference between Positive and Negative testing.
  - Difference between Alpha-Beta testing.
  - Define Test Plan.
  - What is the need of White-Box Testing?
  - What is LOC (Line of Code)?
  - Explain MTTF Metric (Mean-Time to failure).
  - Difference between Static and Dynamic testing.

- h) What is Loop Testing?
- i) Define Load Testing.
- j) Explain various activities involved in Software Quality Management.

**2x10**

### **PART-A**

Q.2 a) Explain Defect Life Cycle in detail with diagram.

**10**

- b) Explain the following types of testing:
  - i) Functional Testing.
  - ii) Performance Testing.
  - iii) Recovery Testing.
  - iv) Validation Testing.
  - v) Verification Testing.

**10**

Q.3 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 worst-case testing methods.

**12**

- b) Explain state-based testing.

**8**

Q.4 a) Explain basic path testing in detail.

**12**

- b) Explain graph metrics in detail.

**8**

### **PART-B**

Q.5 a) Write a short note on object-oriented testing.

**10**

- b) Discuss various approaches used for Software Size Metrics.

**10**

Q.6 a) Explain the different types of Quality Metrics.

**10**

- b) i) Explain the difference between Software Quality Control and Quality Assurance.
  - ii) Explain the Software Quality Assurance plan.

**5x2**

Q.7 a) Explain different types of ISO standards in detail.

**10**

- b) What is CMM (Capability Maturity Model)? What is the difference between CMMI and CMM?

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

## **IT INFRASTRUCTURE MANAGEMENT OPERATION (CS-507)**

Time: 3 hrs.

Max Marks: **100**

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 IT infrastructure? Explain briefly.  
 b) Enlist the points included to describe IT service operation.  
 c) Illustrate the various types of service operations.  
 d) Mention the various types of process associated with IT operations management.  
 e) What are the five types of service desk?  
 f) Define IT operation management.  
 g) What aspects are considered for creating an organizational structure?  
 h) Explain briefly the types of sourcing in IT infrastructure management.  
 i) What is PDCA model?  
 j) Explain the role of people when it comes to the management of processes, services or technology. **2×10**

### **PART-A**

- Q.2 a) Explain evaluation of IT operations management. **10**  
 b) Explain IT operations management in any organization. **10**
- Q.3 a) Explain service operation fundamentals in detail. **10**  
 b) How will you achieve balance in service operation? **10**
- Q.4 a) Explain event management procedure in detail. **10**  
 b) What are the elements in the process document of event management? **5**  
 c) Explain process input and output in brief. **5**

### **PART-B**

- Q.5 a) Specify the service desk pre-release requirements in brief. **5**  
 b) What are the service desk responsibilities? **5**  
 c) Explain service desk structure along with service desk interaction. **10**
- Q.6 a) Explain the functions of IT service operations that one requires to manage the steady state of IT environment. **10**  
 b) Illustrate any three metrics to measure IT operations management. **10**
- Q.7 a) Explain organization based on managing process and the types of organization structure in detail. **10**  
 b) Explain different approaches to organizing functions. Mention pros and cons of each organizational approach. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **ITIM SERVICE MODELS AND BENEFITS (CS-508)**

Time: 3 hrs.

Max Marks: **100**

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 the advantages of FMS?  
 b) Describe the types of ITSM processes.  
 c) Explain the disadvantages of shared hosting.  
 d) Differentiate between dedicated server and database server.  
 e) What are the key features of cloud infrastructure? **4x5**

### **PART-A**

- Q.2 a) What is the role of services and business drivers in remote infrastructure management services model. **10**  
 b) What is cloud model? Explain its working component and advantages in detail. **10**
- Q.3 a) Explain the different tools, that are used in knowledge management. **10**  
 b) What are the benefits of 24x7 in service operator? **10**
- Q.4 Write short notes on:  
 a) Cloud hosting.  
 b) Bandwidth.  
 c) SSL certificates.  
 d) Stakeholders. **4x5**

### **PART-B**

- Q.5 a) Explain the different types of services in infrastructure management. **10**  
 b) Define blue -ray disk. Explain with help of a diagram. **10**
- Q.6 a) Draw the framework of mobile enterprise services in detail. **10**  
 b) What are the different needs for mobile VCC? **10**
- Q.7 a) What are the different elements of cloud infrastructure services? **10**  
 b) Write short notes on:  
 i) PaaS  
 ii) IDE  
 iii) SaaS  
 iv) IAAS **2½x4**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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 grid computing.
- b) What is virtualization?
- c) Differentiate between Type-1 and Type-2 Hypervisor.
- d) What is hybrid cloud?
- e) Differentiate between interoperability and portability.
- f) What is Community Cloud?
- g) What is rapid provisioning in cloud?
- h) Name any five vendors of SaaS.
- i) Define the term resiliency.
- j) What is patch management?

**2×10**

### **PART-A**

- Q.2 a) What are the seven major components of cloud? Explain each of these in detail. **10**
- b) Explain how the cloud evolves and come into the market? Give the transformation roadmap of cloud. **10**
- Q.3 a) What is IaaS? What are the services provided by the IaaS service provider? **7**
- b) Give the advantages and disadvantages of SaaS. **7**
- c) Compare between ISP's and IaaS. **6**
- Q.4 a) What are the characteristics of PaaS? **6**
- b) Differentiate between IaaS and PaaS. **6**
- c) Explain the different services provided by Google App. engine as a PaaS service provider. **8**

### **PART-B**

- Q.5 a) What is SaaS economics and its ecosystem? **5**
- b) Explain the different types of SaaS platform. **5**
- c) What are the different services provided by the SaaS service provider? Explain each in detail. **10**
- Q.6 a) Explain the different architectural components of CCRA. **10**
- b) List the examples of services provided by each cloud services i.e., IaaS, PaaS and SaaS. **5**
- c) Give the four level of cloud taxonomy. **5**
- Q.7 Write short notes on the following:  
a) Common cloud management platform.  
b) Service orchestration.  
c) Anchored lifecycle and integrated lifecycle.  
d) Interaction among actors of CCRA. **5×4**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

**Q.1 Answer the following:**

- a) What is the difference between state chart diagram and activity diagram?  
Explain with example.
- b) Why is consistency checking important while making the model homogeneous? Explain.
- c) What is the role of Association Class? Explain.
- d) What is UML? Explain the capabilities of UML.

**5x4**

## **PART-A**

**Q.2 a) Discuss the V shaped model in detail.**

**10**

- b) What is software project management? What are the phases of software project management?

**10**

**Q.3 a) What are Swim Lanes in activity diagram? Explain their significance with the help of an example.**

**10**

- b) Draw a use case diagram for hospital management system.

**10**

**Q.4 a) Draw a class diagram for railway reservation system.**

**10**

- b) What is the difference between association and aggregation? Explain with the help of an example.

**5**

- c) Explain Multiplicity Indicator and role name with example.

**5**

## **PART-B**

**Q.5 a) How can we depict the dynamic behavior of an object in UML? Explain with example.**

**10**

- b) What is the difference between sequence and collaboration diagram? Explain by taking the scenario of ATM Machine.

**10**

**Q.6 a) What is the need of making the model homogeneous? What are the activities involved in making the homogeneous model? Discuss.**

**10**

- b) What are the different views of architecture? Discuss.

**10**

- Q.7 a) Explain the iteration planning process in detail. **10**  
 b) What is the significance of design patterns in software design? **10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) What do you understand by association class? Explain with the help of an example.  
 b) What is the difference between ‘sequence diagram’ and ‘collaboration diagram’?  
 c) What is activity diagram?  
 d) Explain the capabilities of UML.  
 e) How can we do consistency checking while making the model  
**4x5**

#### **PART-A**

- Q.2 a) Discuss the V-shape model in detail. **10**  
 b) What is the difference between ‘threw away prototyping’ and ‘evolutionary prototyping’? **5**  
 c) What are the applications of software? Discuss. **5**
- Q.3 a) What are the various development stages in object oriented software development process? Explain.  
**10**  
 b) Draw a use case diagram for Literacy management system.  
**10**
- Q.4 a) Draw a class diagram of a hotel management system. **10**  
 b) Explain the following in context with class diagram:  
 i) Association.  
 ii) Aggregation.  
 iii) Inheritance.  
 iv) Role name.  
 v) Multiplicity indicator. **2x5**

#### **PART-B**

- Q.5 a) What is interaction diagram? What are the different types of interaction diagrams? Explain with the help of an example. **12**
- b) Explain following:  
 i) Association classes.  
 ii) State transition diagram **8**
- Q.6 a) Explain the different views of system architecture in detail. **12**  
 b) What is the significance of combining and splitting the classes in model refinement? Explain with an example. **8**
- Q.7 a) Explain the iteration planning process in detail. **10**  
 b) What is the role of design classes in designing the user interface? Discuss. **10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer the following questions:
- Explain how you can index an object as an array?
  - How is array list different from an array?
  - Explain the concept of “Automatic fall through” in switch-case statement. Is it prohibited in C# language?
  - What is the role of JIT compiler?
  - Write names of namespaces, to be used for windows application development.
  - Difference between mutable and immutable strings.
  - What are the benefits of inheritance?
  - Differentiate between data grid and data grid view control.
  - Compare a for loop and a for each loop statement.
  - What do you mean by assemblies in .NET framework? **2x10**

### **PART-A**

- Q.2 a) Give a syntax/example for declaring, creating and initializing 1-D and 2-D arrays in C# language. Also, write a program for jagged array in C# language. **10**  
 b) Give detailed classification of data types in C# by specifying storage size of each data type. Is unboxing an explicit conversion? Differentiate between boxing and unboxing with example. **10**

Q.3 a) Explain the purpose of collections in .NET framework. Write name of namespace, to which collections belong. Explain how data is structured in the following collections:

- i) Stack.
- ii) Queue.

Also, give syntax for adding and removing an element from above mentioned collections. **10**

b) Explain the concept of property and indexer in C# language with the help of programming example. **10**

Q.4 a) Explain the purpose of “automatic garbage collection” in .NET framework. Is there any way to explicitly enforce garbage collection in .NET? **5**

b) What is the significance of MSIL in .NET? Discuss the stage of code compilation in .NET framework architecture. **10**

c) Write short notes on the following:

- i) Common type system.
- ii) Common language specification.

**2½×2**

### **PART-B**

Q.5 a) Define MDI applications with example. How MDI parent and MDI child are created? **5**

b) Define controls in windows application form? Explain atleast five controls with their associated events and properties. **10**

c) How to create menu in windows form application? Explain with the help of programming example. **5**

Q.6 a) Discuss completely ADO .NET architecture with diagram. Briefly explain .NET data objects, namely-command object, connection object, data-set object and data adapter. **20**

Q.7 a) Write short notes on the following:

- i) Code access security.
- ii) Role based security.

**5×2**

b) Discuss .NET security architecture, with reference to web applications, detailing four fundamental aspects of security. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester  
**PROGRAMMING WITH DOTNET AND C# (CS-529)**

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 .NET. What's the relation of C# with .NET?  
b) Give syntax/example of input and output statements in C#. **2x10**  
c) Define base class and derived class in inheritance.  
d) How to find length of an array in C#, using the property?  
e) Define property and indexer.  
f) List out applications, that can be developed under the .NET framework.  
g) Explain the role of JIT compiler.  
h) Define windows form. Give some examples of form controls.  
i) List out four features of web applications.  
j) What is the role of ADO.NET in applications development? **2x10**

### **PART-A**

- Q.2 a) Explain the process of type conversions-boxing and unboxing, with examples. **5**  
b) Does C# support “Automatic fall through” in switch case? Explain the concept, with patch of code. **5**  
c) Write a program to iterate and display array elements using for each loop. **5**  
d) What do you mean by mutable and immutable strings? List out differences between the two types of strings. **5**

- Q.3 a) Define collections in .NET and list out features of collections. Discuss various types of collections; including; Array list, Hash table, Stack and Queue. Also, give syntax or examples for creating the particular collection, inserting elements and removing elements from a collection. **15**  
 b) What is the key benefit of inheritance? Discuss various types of inheritance. **5**
- Q.4 a) Discuss the .NET framework architecture, with neat diagram. Also, discuss the usage of each component. **10**  
 b) Explain the following:  
     i) Automatic garbage collection in .NET.  
     ii) MSIL.  
     iii) CLS and CTS.  
     iv) Assemblies. **2½×4**

### **PART-B**

- Q.5 a) Give detailed steps of designing a GUI using windows form, for creating “login form”. **5**  
 b) What are form controls? Explain the use of the following controls: textbox, radio button, checkbox and combo box. **5**  
 c) Define windows application. Which Namespace is used for creating windows applications? Also list out features of windows applicatios. **5**  
 d) Differentiate between SDI and MDI applications. Explain how to set MDI parent form and MDI child form are set? **5**
- Q.6 a) Explain the concept of data binding. Discuss simple and complex data binding with examples. **6**  
 b) Differentiate between Data grid and Data grid view control. **4**  
 c) Explain the role/usage of the following .NET data objects: command object, connection object, Data Reader Object, Data Adapter Object and Data Set. **10**
- Q.7 a) Give overview of .NET security architecture, with reference to web applications. **10**  
 b) Discuss code-access and role-based security policies. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester  
**PHYSICAL SECURITY (CS-541)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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 can insider threat effect an organization?  
b) What layer of physical security limits the keys available to users, based on job function?  
c) What is regulation?  
d) What is the full form of ePHi?  
e) What does 'Class A' fire consist of?  
f) Explain convection.  
g) What is vulnerability?  
h) Discuss qualitative method.  
i) What is the prime objective of physical security audit?  
j) What is caused by lighting aimed in wrong direction? **2×10**

### **PART-A**

- Q.2 a) What are the importance of physical security? Explain in detail. **6**  
b) Discuss the relationship between physical and cyber security in detail. **6**  
c) What do you mean by physical threat? Explain the various security issues associated with physical threats. **8**

- Q.3 a) What do you mean by system engineering? Explain the relationship between system engineering and vulnerability assessment with a neat and clean diagram. **13**  
 b) Write a short note on risk management. **7**

- Q.4 a) Discuss the classification of survey recommendations with an example. **10**  
 b) Explain the fire safety inspection with planning phase and physical inspection phase. **10**

### **PART-B**

- Q.5 a) What do you mean by lighting system? Explain various lighting mechanisms in detail. **15**  
 b) Discuss the different components of alarm system. **5**
- Q.6 a) How video technology helps in physical security? Explain with an example. **10**  
 b) What do you mean by the term 'security in layers'? Discuss different types of outer layer of security and inner layer of security. **10**
- Q.7 a) Write short notes on **(any two)**:  
 i) Fire safety inspection.  
 ii) Control value inspection phase.  
 iii) Emergency drills. **10×2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester  
**PHYSICAL SECURITY (CS-541)**

Time: 3 hrs

Max Marks: **100**

No. of pages:

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 ePHI.  
 b) Write features of class II security container.  
 c) Differentiate between Class B and Class C fire.  
 d) What are the duties of a security system engineer?  
 e) What is the importance of security review?  
 f) What is the purpose of employing lighting?  
 g) What are different ways available to check authentication.  
 h) What is executive protection?  
 i) Discuss the principle of "Hazard Control".  
 j) What are the issues to be considered during planning and organizing an emergency evacuation?

**2x10**

### **PART-A**

- Q.2 a) Discuss various security tools & techniques available in detail.

**10**

b) Discuss various ISO standards to ensure physical Security.

**10**

Q.3 a) Define system engineering. How vulnerability assessment helps in system engineering.

**10**

b) Discuss Vulnerability assessment under physical security.

**10**

Q.4 a) what are the points that must be considered to set up a security system? Discuss in detail.

**10**

b) Discuss the checklist to be considered during physical security survey.

**10**

### **PART-B**

Q.5 a) Why do we need alarm systems? On what basis alarm systems has been divided? Discuss various alarm systems available under different categories in detail. **12**

b) "Lighting is Justifiable control" Justify with the reasons.

**3**

c) Enlist the types of lamps available for lighting.

**5**

Q.6 a) What are different tools and techniques available for video technology? Explain with a neat diagram.

**10**

b) Explain different standards associated to physical infrastructure for video technology. **10**

Q.7 a) What are the roles and responsibilities of a security personnel? Also discuss different types of security personnel.

**10**

b) Explain with a neat diagram how planning can be done to manage crisis.

**10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer the following questions:

a) Differentiate between compiled and interpreted languages.

b) What are the basic threats and malware that affect the security of applications?

- c) What is cryptography?
  - d) What do you mean by session Replay attack?
  - e) Which attack can be operated by sending an email?
  - f) What do you understand by denial of service?
  - g) What is grey-box testing?
  - h) What do you mean by phishing?
  - i) What are the measures that should be taken to ensure that logs are not tampered?
  - j) What is man in middle attack?
- 2×10**

### **PART-A**

- Q.2 a) What is cross-site scripting vulnerability? How to determine cross-site scripting vulnerability? Discuss the techniques for its prevention. **10**
- b) i) Discuss web application security principles. **5**  
ii) What is canonicalization? In which type of environments this attack occurs? **5**
- Q.3 a) Discuss the similarities and dissimilarities between brute force attack and dictionary attack. **10**  
b) What is credential theft attack? **5**  
c) Discuss disclosure of confidential data with the help of example. **5**
- Q.4 a) What is Session? What are the different properties associated with a session? How session hijacking occurs? **10**  
b) How can we retrieve clear text configuration data? Explain. **5**  
c) What is configuration management? Discuss requirements of configuration management. **5**

### **PART-B**

- Q.5 a) Discuss weak encryption in detail. **5**  
b) What is parameter manipulation attack? Discuss. **5**  
c) How the form fields can be protected against manipulation? Discuss. **5**  
d) How to protect query string against manipulation? Explain. **5**
- Q.6 a) Discuss the basic counter measures to provide security against web application vulnerabilities. **10**  
b) What is the need for auditing and logging? Discuss different threats related to auditing and logging. **10**
- Q.7 a) What is DNS? Explain. **5**  
b) How can you access website's source code using IBM rational Appscan? Give steps in detail. **15**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

## **CLOUD COMPUTING ARCHITECTURE AND DEPLOYMENT MODELS (CS-543)**

Time: 3 hrs

Max Marks: **100**

No. of pages: 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 SOA.

- b) Differentiate between anchored lifecycle and integrated lifecycle.
- c) What is packaged software?
- d) Is PaaS a best option?
- e) Differentiate between type-1 and type-2 hypervisor.
- f) What is virtualization?
- g) What are the primary objectives defined in SLA?
- h) Give the challenges of hybrid cloud.
- i) What are different components of openstack?
- j) What is the difference between portability and interoperability?

**2x10**

### **PART-A**

- Q.2 a) What is cloud computing? Give its key characteristics and anatomy of cloud. **10**
- b) Explain the different types of cloud service models with their benefits. **10**
- Q.3 a) What are the services provided by the SaaS service model? **7**
- b) Explain SaaS economics and ecosystem. **5**
- c) Describe the characteristics of IaaS and also give a case study on any IaaS service provider. **8**
- Q.4 a) Describe NIST'S cloud computing reference architecture in detail. **10**
- b) Explain the four level of taxonomy to describe the main concept of cloud computing. **10**

### **PART-B**

- Q.5 a) What is private cloud? Explain the steps for transition to private cloud deployment model. **10**
- b) Illustrate public cloud with its advantages and limitations. **6**
- c) Differentiate between public cloud and private cloud. **4**
- Q.6 a) What is hybrid cloud? Explain why an organization may choose private, public or hybrid cloud. **10**
- b) What are the challenges of hybrid cloud? **6**
- c) Explain, how the workload management is done in hybrid cloud. **4**
- Q.7 a) Give the case study on IBM Smart Cloud. **10**
- b) What is Openstack? What are it benefits? Also, explain the different components of Openstack. **10**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Briefly answer:
- a) Explain the ‘process choreography’.
  - b) Define degree of automation.
  - c) What is sub process?
  - d) Differentiate between activity and process.
  - e) Discuss the sequence flow of BPD.
  - f) What is same customization?
  - g) What is process centre?
  - h) Elaborate BPD.
  - i) Define ‘data mapping’.
  - j) What are the default component of BPD?
- 2×10**

### **PART-A**

- Q.2 a) What is business process? Differentiate between sub process and linked process by using process model. **10**
- b) Differentiate between organizational and operational BP. **10**
- Q.3 a) Explain the steps of business process life cycle. **10**
- b) Explain in detail BPM architecture. **10**
- Q.4 a) What is the role of implementation activity and script in BPD? **10**
- b) Create a BPD to check eligibility of a student for a particular course using input and output coach. **10**

### **PART-B**

- Q.5 a) What are business objects? Create a BPD to check eligibility of a person as senior citizen using BO. **12**
- b) Explain different types of gateways of process designer. **8**
- Q.6 a) What is business action language? How will you use BAL to calculate grade of a student from his marks. **12**
- b) Differentiate between ‘coach’ and ‘heritage coach’. **8**
- Q.7 a) Create a process model for the online shopping. **8**
- b) Model the following fragment of a business process for assessing loan applications:  
A loan application is approved if it passes two checks:  
i) The applicant’s loan risk assessment done automatically by a system, and  
ii) The appraisal of the property for which the loan has been asked, carried out by a property appraiser.

- iii) Home insurance which is offered at a discounted price. The risk assessment requires a credit history check which is performed by a financial officer. After all these three checks, a loan officer can assess the eligibility of the applicant for the loan. If the applicant is not eligible, the application is rejected otherwise the acceptance such is prepared and sent to the applicant. **12**

# **End Semester Examination, Dec. 2017**

B. Tech. - Sixth Semester  
**BUSINESS PROCESS (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.** Each question carries equal marks.

## **PART-A**

- Q.1 a) Name various products offered by SAP.  
b) What does 'R' and '3' symbolize in R/3 system?  
c) List standard menus on SAP easy access screen.  
d) What is meant by organizational element?  
e) What does a document flow show?  
f) Which SAP components are included in SAP CRM?  
g) Differentiate between sourcing and procurement.  
h) Expand the acronym US GAAP and IAS in context of financial accounting.  
i) What is SAP HCM?  
j) Stat any two differences between OLTP and OLAP. **1x10**

## **PART-B**

- Q.2 What is SAP ERP system? Discuss SAP's business suite product and its various applications in detail. **10**
- Q.3 List and describe the various forms of help options available in SAP system. **10**
- Q.4 Explain how SAP ERP support the key processes in production cycle of logistics. **10**
- Q.5 What is a purchase order? Explain in detail the tasks associated with a procurement cycle in SAP. **10**
- Q.6 Explain in detail with suitable diagram how SAP ERP HCM support to the entire recruitment process. **10**
- Q.7 Explain how SAP supports reporting, analysis and strategic planning. Also, describe the advantages of SAP Net weaver system. **10**

# **End Semester Examination, Dec. 2017**

BCA - Sixth Semester

MCA - Fourth Semester

BBA (G) / BBA (Banking) / BBA (G) IB / B. Com. (H) / I.I. – 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**. Each question carries equal marks.

### **PART-A**

- Q.1 a) Name various products offered by SAP.  
b) List atleast three cross industry applications of SAP.  
c) List standard menu's on SAP screen.  
d) What is a transactional code?  
e) What does a document flow show?  
f) Key capabilities of SAP CRM are \_\_\_\_\_ and \_\_\_\_\_.  
g) What is the difference between sourcing and procurement?  
h) What is SAP SRM?  
i) What is the primary source for management accounting?  
j) What is the significance of business intelligence tool?

**1×10**

### **PART-B**

- Q.2 What is an ERP system? Discuss the various solution incorporated in it and also discuss the evolution of SAP ERP.

**10**

- Q.3 List and describe the various forms of help available in the SAP system.

**10**

- Q.4 Explain how SAP ERP supports key processes in sales order management.

**10**

- Q.5 Explain how SAP ERP and SAP PLM supports processes in product lifecycle management.

**10**

- Q.6 Explain various tasks in financial accounting in SAP with the help of diagram.

**10**

- Q.7 Explain how SAP supports reporting, analysis and strategic planning. Also differentiate between OLTP and OLAP environment.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. (Cloud Computing) — Sixth Semester

### **CLOUD DEVELOPMENT MODEL (CS-622)**

Time: 2 hrs.

Max Marks: **100**

No. of pages: **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 essential characteristics of cloud computing?
- b) Explain the features of robust cloud development?
- c) List out the advantages of cloud computing.
- d) Explain the common pitfalls that come with virtualization.
- e) How does cloud computing help to reduce the time to market applications and to cut down capital expenses?

**4×5**

#### **PART-A**

Q.2 a) What are the various cloud computing services models? Explain in detail.  
**10**

- b) Write a brief note on the considerations that lead to the adoption of cloud.  
**10**

Q.3 a) What is a private cloud? Why does one should plan public cloud over private cloud?  
**10**

- b) Enlist and explain several advantages and limitations of a private cloud.  
**10**

Q.4 a) List the different cloud applications available in market. Briefly explain the scenario of “when to not use public cloud”.  
**10**

- b) Explain what are the challenges faced in public cloud in terms of:
  - i) Lack of control on infrastructure.
  - ii) Network latency and accessibility concerns.

**5×2**

#### **PART-B**

Q.5 a) Explain all the key points that play a major role in cloud vendor selection?  
**10**

- b) How back-up and disaster recovery plan offered by a cloud vendors works in a cloud computing environment?  
**10**

Q.6 a) What are the pros and cons of a hybrid cloud model? Explain in detail.  
**10**

- b) List out the situations/scenario where a hybrid cloud model is suitable for an organization. Give examples.  
**10**

Q.7 a) What are the key components of open stack? Explain in detail.  
**10**

- b) What storage types are allowed by open stack compute?  
**5**

- c) Define 'users', 'role' and 'tenant' in open stack.

5

## End Semester Examination, Dec. 2017

B. Tech. – Sixth / Seventh 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**. Each question carries equal marks.

Q.1 Answer the following:

- a) Differentiate Inherited and Synthesized attributes.
- b) List various compiler construction tools.
- c) Define Ambiguous grammar.
- d) What is DAG? Mention its applications.
- e) Write characteristics of a good programming language.
- f) What is code motion? Explain.
- g) Define deterministic Finite Automata.
- h) Mention the types of LR Parser.
- i) What is a basic block in code optimization?
- j) Write benefits of Intermediate Code Generation.

**2x10**

### **PART-A**

Q.2 a) How sequence is controlled between statements? Briefly explain.

**10**

b) Explain different parameter transmission schemes in detail.

**10**

Q.3 a) Write a LEX program that recognize the following:

- i) if, else then, begin, end.
- ii) relational operators <, >, <=, >=
- iii) Identifier.

**10**

b) Explain different phases of compiler with the help of block diagram.

**7**

c) Distinguish between phases and passes.

**3**

Q.4 a) Construct LALR parsing table for the following grammar:

$S \rightarrow AA$

$A \rightarrow aA$

$A \rightarrow b$

**15**

b) What are the limitations of SLR parser?

**5**

### **PART-B**

Q.5 a) Write three address codes for:

$$a = -b * (d + c) + (-b) * d$$

and also place the generated code in Triplets, Indirect Triplets and Quadruples. **12**

b) Define syntax directed translation and explain its scheme.

**8**

Q.6 a) Explain different types of error recovery techniques.

**10**

b) Define symbol table and explain how linked list and hash tables are used to represent symbol table.

**10**

Q.7 Write short notes on:

- a) Code generation.
- b) Loop optimization.

**7**

c) Register allocation for temporary variables.

**6**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer the following in brief:

- a) What is visual modeling?
- b) What do you understand by states?
- c) Define an actor?
- d) Draw and explain package with the help of UML notation.
- e) Define an association class?
- f) Explain logical view.
- g) Draw and explain boundary class.
- h) What is event tracing?
- i) How will you document the iteration?
- j) What are the benefits of iteration planning process?

**2×10**

#### **PART-A**

- Q.2 a) What are the advantages of object oriented methodologies over traditional methodologies? **10**
- b) Explain the capabilities of UML in detail. Also, explain their usage. **10**
- Q.3 a) Draw and explain object oriented software development process. **10**
- b) Draw the use-case diagram of ATM. **10**
- Q.4 a) Draw and explain class diagram for on-line shopping. **10**
- b) Explain association and aggregation relationships. **10**

## **PART-B**

- Q.5 Draw and explain the sequence diagram of university registration system. **20**
- Q.6 a) How will you make the model homogeneous? **10**  
b) Draw and explain 4+1 architecture. **10**
- Q.7 Write notes on:  
a) Adding design classes. **6**  
b) Coding, testing and documenting the iteration. **8**  
c) Designing relationships. **6**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Briefly answer:  
a) What are dynamic binders?  
b) Define pipeline and filters.  
c) What are the 3 modes of Vi?  
d) Differentiate between system software and application software.  
e) Define the function of absolute loader.  
f) What are shell variables?  
g) Difference between standard input and standard output.  
h) What are the functions of driver?  
i) Define basic operations on file.  
j) Difference between absolute and relative pathname. **2×10**

## **PART-A**

- Q.2 a) What is macro? Explain macro instruction arguments. **10**  
b) Discuss the following:  
i) Text editors.  
ii) Conditional macro expansion. **5×2**
- Q.3 a) Briefly explain the machine dependent features of assembler. **5**  
b) Explain the design of one pass assembler with the help of flowchart. **10**  
c) What are loaders? Write down its features. **5**
- Q.4 a) Write short notes on:

- |  |     |
|--|-----|
| i) Blocks and fragments.                               | 5×2 |
| ii) Inodes.  | 10  |
| b) Write down the user-to-user communication commands. |     |

### **PART-B**

- |  |     |
|--|-----|
| Q.5 a) Explain the comparing and sorting files commands with the help of an example. | 7   |
| b) What are shell variables?   | 5   |
| c) Discuss the following:  |     |
| i) Wild cards.   |     |
| ii) Shell programming constructs.  | 4×2 |
| Q.6 a) What are the basic role and responsibility of system administrator?           |     |
| b) Write down the user management commands.  |     |
| c) Write down the syntax to remove user and to give permissions to users.            |     |
| d) Define the syntax for changing permission modes on files.                         | 5×4 |
| Q.7 a) How virus management control is done in operating system?                     | 10  |
| b) Write short notes on:   |     |
| i) I/O Devices.  |     |
| ii) Drivers.   | 5×2 |

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- |   |      |
|---|------|
| Q.1 a) Differentiate between passive attacks and active attack. |      |
| b) What is denial of service attack?                            |      |
| c) Explain the purpose of S-box in DES.                         |      |
| d) What is triple encryption?                                   |      |
| e) Define 'Honeypot'.   |      |
| f) Differentiate between block cipher and stream cipher.        |      |
| g) What are the limitations of firewall?                        |      |
| h) Define the basic principle of public key cryptosystem.       |      |
| i) Give the major strength of RSA.                              |      |
| j) Define 'PGP' (Pretty Good Privacy).                          | 2×10 |

### **PART-A**

- |  |    |
|--|----|
| Q.2 a) What is the difference between substitution cipher and transposition cipher? Explain by giving an example of each one.      | 10 |
| b) What is encryption and decryption? Draw a block diagram showing plaintext, ciphertext, encrypted message and decrypted message. | 10 |
| Q.3 a) Explain the avalanche effect.   | 5  |
| b) Show that DES decryption is in fact the inverse of DES encryption.  | 10 |
| c) How does the cipher feedback mode work for the purpose of encryption and decryption?  | 5  |
| Q.4 a) What are the key principles of security?  | 5  |

- b) Explain password management scheme in detail. What are the basic techniques for generating non-guessable password? **10**  
 c) Explain the life cycle of virus. **5**

### **PART-B**

- Q.5 a) What is message authentication code? What is the difference between MAC and a one way bash function? **10**  
 b) Explain SHA in detail. **10**
- Q.6 a) Explain SSL handshake protocol. **10**  
 b) How does SET protect payment information from the merchant? **10**
- Q.7 a) Write short notes on:  
 i) SNMPVI.  
 ii) Network management model. **10×2**

## **End Semester Examination, Dec. 2017**

B. Tech. – 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.** Each question carries equal marks.

- Q.1 a) What is encryption?  
 b) Differentiate between authentication and authorization?  
 c) Define 'stream cipher'?  
 d) What is key size of double DES?  
 e) What is public key cryptography?  
 f) Discuss ECB mode of DES.  
 g) Define 'MAC'?  
 h) Give the use of SSL change cipher.  
 i) What do you meant by Envelop data?  
 j) Is group communication supported by SNMP<sub>v2</sub>? **2×10**

### **PART-A**

- Q.2 a) Solve using Caesar cipher and also show encryption and decryption in detail.  
 Key = 8  
 P.T = "I am a student". **10**  
 b) Differentiate between substitution technique and transposition technique for encryption. Give one example of each and show encryption and decryption. **10**
- Q.3 a) Solve using RSA for following parameters:  
 $p = 17, q = 11$   
 $e = 7, M = 5$  **10**  
 b) What are the principles of block cipher designing? Discuss all modes of DES. **10**

- Q.4 a) Discuss the firewall? Give all its usage and types in detail. **10**  
 b) What is password management? Can passwords protect your authentication? Explain in detail. **10**

### **PART-B**

- Q.5 a) Discuss MD5. What is length of message digest in MD5? **10**  
 b) Discuss direct digital signatures in detail by showing both sender and receiver side. **10**
- Q.6 a) Discuss PGP for mail security. **10**  
 b) What is IPSec? Also give header details of AH. **10**
- Q.7 a) Give Architecture of SNMP<sub>v1</sub>. **10**  
 b) How you do risk management for your organization? **10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Answer the following questions:  
 a) Differentiate between verification and validation.  
 b) Define 'test case'? What is the information it contains?  
 c) Differentiate quality control, quality assurance and quality management.  
 d) What are the issues involved in object oriented testing?  
 e) Differentiate between alpha and beta testing.  
 f) What is the significance of cyclomatic complexity?  
 g) How does testing help in producing quality software?  
 h) Differentiate between effective v/s exhaustive software testing.  
 i) What is manual testing?  
 j) Give the strategies of testing? **2×10**

### **PART-A**

- Q.2 a) Briefly discuss the principles of testing. **5**  
 b) What are the limitations of testing? **5**  
 c) Explain software testing life cycle (STLC). **10**
- Q.3 a) Explain the capability maturity model (CMM). **7**  
 b) Briefly explain the software quality metrics. **6**  
 c) Explain the various activities performed in the procedural approach for quality management. **7**

- Q.4 a) A program compute  $a^b$  where  $a$  lies in the range [1, 10] and  $b$  within [1, 5]. Design test cases for this program using BVC, robust testing and worst case testing methods. **10**  
 b) What are the characteristics of a good test? **10**

### **PART-B**

- Q.5 a) State and explain the guidelines for formal technical review. **7**  
 b) What do you mean by formal technical review? Discuss about review reporting. **7**  
 c) Write short notes on the following testing tools:  
   i) Load runner.  
   ii) Selenium. **3×2**
- Q.6 a) Explain the basic path testing in detail. **10**  
 b) Give graph metrics. **3**  
 c) What is mutation testing? Explain data flow testing. **7**
- Q.7 a) What are the challenges involve in testing for web based software? **10**  
 b) Write short notes on:  
   i) Inheritance testing.  
   ii) Integration testing. **5×2**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Answer the following:  
 a) Define Business Intelligence. Give an example.  
 b) What are the applications of BI?  
 c) Contrast Business Analyst with Data Scientist.  
 d) What does BI report contain?  
 e) What are the different user groups of BI?  
 f) Differentiate between dashboard and scorecard.  
 g) What is ETL?  
 h) Explain the common project risks.  
 i) What is fact table?  
 j) What is the requirement of incremental BI Road Map?
- 2x10**

### **PART-A**

- Q.2 a) Explain the architecture and components of BI in detail with the help of suitable diagram. **10**  
 b) What do you understand by analytics? Explain various types of analytics with example. **10**

- Q.3 a) How datawarehouse is different from operational database? Explain the typical architecture of data warehouse including steps involved for constructing it. **10**
- b) Explain all data warehouse schemes. **10**
- Q.4 a) State the difference between Mobile BI and Disconnected BI. **7**
- b) Explain the types of DashBoards with the help of examples. **7**
- c) What are the major reasons that make real time BI a necessity? **6**

### **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) Explain the different types of charts in a BI report and what are their applications? **10**
- b) What are the operations that can be performed on BI report? Explain. **10**
- Q.7 Write short notes on following:
- a) Authentication, Authorization and Access permission. **7**
  - b) Centralized versus Decentralized Architecture. **7**
  - c) Data Backup and Restoring. **6**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer the following question:
- a) Define cloud usage monitor.
  - b) Name the key components of smart metering.
  - c) What is the role of service catalog manager?
  - d) Give the tools for patch management.
  - e) What is the importance of cloud computing to the service ecosystem?
  - f) Define deterrent control.

- g) What is the most popular method of defense against denial of service attack?
- h) What is the need for service catalog design in cloud services deployment?
- i) Differentiate between brownfield and greenfield.
- j) What is virtualization? **2x10**

### **PART-A**

- Q.2 a) What are the key processes associated with cloud service management? **10**
- b) Write short notes on the following:  
 i) Monitoring agent.  
 ii) Resource agent. **5x2**
- Q.3 a) Briefly discuss why maintenance and outages are necessary to keep our IT system well maintained. **10**
- b) Discuss all the cloud computing benefits to a client/consumer in detail. **10**
- Q.4 a) What are the critical success factors for the service catalog management process? **10**
- b) Discuss the five aspects of design that are needed to be considered for service design process. **10**

### **PART-B**

- Q.5 a) Discuss any two business model for application hosting on cloud. **10**
- b) What are the capabilities of shared system? Briefly discuss. **10**
- Q.6 a) Discuss the service catalog role in governance and compliance. **10**
- b) What are the challenges of IT function in cloud transformation? How these challenges can be overcome? **10**
- Q.7 a) What are the securities issues associated with the cloud? **10**
- b) Discuss the cloud security threats in detail. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **CLOUD PERFORMANCE TUNING (CS-747)**

Time: 3 hrs

**100**

Max Marks:

No. of pages: 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 storage virtualization.  
 b) Explain various performance monitoring tools.  
 c) Explain Intel Smart memory access.  
 d) What are the limitations of shaved memory controller design?

- e) Explain various states of process.
- f) Comment on the term ‘memory over commitment’.
- g) What are various types of database tuning?
- h) Discuss benefits of shaved cache.
- i) What is memory interfacing?
- j) What are the components needed to calculate memory bandwidth.

**2x10**

### **PART-A**

- Q.2 a) Explain storage virtualization. Discuss main reasons of implementing storage virtualization.

**10**

- b) What are various performance monitoring tools? Discuss discovery process in detail.

**10**

- Q.3 a) Discuss advantage of AMD wide floating point accelerator and balanced smart cache.

**15**

- b) What do you mean by 64-bit computing? What are the benefits of 64 bit computing over 32-bit computing?

**5**

- Q.4 a) “Overall server throughput depends on how fast drive performs operations”. Comment on the statement and discuss what are the various components that help the disk drive to execute and complete user request.

**10**

- b) Explain the scenario in terms of write back and write through cache.

**5**

- c) Differentiate between power capping and power saving.

**5**

### **PART-B**

- Q.5 a) Define Transition look aside Buffer. Explain paging process and page faults.

**5**

- b) What are the various conditions when scheduling decisions take place?

**5**

- c) Differentiate between preemptive and non-preemptive scheduling.

**10**

- Q.6 a) Discuss architecture of VMware ESXi with a diagram.

**5**

- b) What are the various tuning practices of VM CPUs?

**5**

- c) What are thick and thin provisioning? Define reduplication in detail.

**10**

- Q.7 Explain tuning the indexes, tuning the conceptual schema and tuning the queries in detail.

**20**

# **End Semester Examination, Dec. 2017**

B. Tech. — Seventh 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) Why heuristic search is required? Discuss with the help of an example.  
b) Compare and contrast procedural and declarative knowledge.  
c) Explain monotonic system with an example.  
d) Briefly discuss min-max procedure.  
e) What are the application of AI? **4×5**

### **PART-A**

- Q.2 a) Explain any two artificial intelligence problems in detail. **10**  
b) Write a prolog program for a palindrome. **10**
- Q.3 a) Explain AO\* algorithm in detail with the help of an example. **10**  
b) Differentiate between BFS and DFS search strategies. **5**  
c) "A\* is the variant of BFS". Briefly discuss. **5**
- Q.4 a) What is forward and backward chaining? **10**  
b) Make semantic net for the following:  
    i) All the batters like the pitches.  
    ii) The dog hit the mail carrier. **10**  
c) Explain the various issues in knowledge representation. **5**

### **PART-B**

- Q.5 Write short notes on:  
a) Conjunction and disjunction of conclusion.  
b) Fuzzy based reasoning. **10×2**
- Q.6 a) Define an agent. Discuss in detail the structure of various agents with suitable diagram? **15**  
b) How knowledge-acquisition interface works in expert system? **5**
- Q.7 Write short notes on:  
a) Alpha-Beta pruning.  
b) Baye's theorem.  
c) Application of robotics.  
d) Phases in natural language processing. **5×4**

B. Tech. – Seventh 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 Answer the following:

- a) List applications of Artificial Intelligence.
- b) Define Heuristic Function.
- c) Differentiate between Informed and Uniformed Search.
- d) Explain Min-Max tree.
- e) State four categories of production system.
- f) Define constraint satisfaction.
- g) What is a closed queue in A\* algorithm?
- h) What are the limitations of Monotonic Systems?
- i) What are the requirements of Natural Language Processing?
- j) How is the system to solve particular problem built?

**2x10**

**PART-A**

Q.2 a) Explain any two Artificial Intelligence problems in detail.

**12**

b) Write a prolog program to calculate the factorial of a number.

**8**

Q.3 a) Explain and give A\* algorithm.

**10**

b) What is a heuristic search? Explain with an example.

**5**

c) What is a production system?

**5**

Q.4 a) Describe Semantic Net and Frames with an example.

**10**

b) What is forward and backward chaining?

**5**

c) Explain various issues in knowledge representation.

**5**

**PART-B**

Q.5 Write short notes on:

a) Reasoning with Uncertainty Factors.

**6**

b) Default Reasoning.

**6**

c) Fuzzy Based Reasoning System.

**8**

Q.6 a) Explain an Expert System with a neat diagram.

**8**

b) What are the different types of Agent's? Explain in brief.

**12**

- Q.7 a) What is a Game Tree? Explain how alpha-beta pruning is used in game tree? **10**  
 b) Write short notes on:  
   i) Min-Max Searching.  
   ii) Pragmatic Processing.  
**5x2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester  
**DIGITAL IMAGE PROCESSING (CS-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 Answer the following:
- What does weber ratio imply?
  - Explain the term scotopic vision and photopic vision.
  - Define contrast stretching.
  - Brightness discrimination is poor at low level of illumination. Explain.
  - What are the drawbacks of wiener filter?
  - What is pattern filtering approach?
  - State the need of image compression.
  - What is median filter? Mention its application.
  - What is meant by data redundancy and give different types of data redundancies?
  - How can you broadly classify spatial domain image enhancement? **2x10**

### **PART-A**

- Q.2 a) Explain the principle of 2 dimensional sampling and quantization in image processing. **10**  
 b) Explain and describe general purpose image processing and its components with a neat diagram. **10**
- Q.3 a) State and explain the features of median filtering. Compute the o/p of the median filter in the following cases.
- $y_{(m)} = [2, 4, 8, 3, 2]$   
 $w = [-1, 0, 1, 2]$
  - $y_{(m)} = [8, 2, 4, 3, 4]$   
 $w = [-1, 0, 1]$
- b) What are blurring and ringing effects? How can they be avoided? **8**
- Q.4 a) Explain the degradation model in detail. **10**  
 b) Derive the transfer function of wiener filter in image processing. **10**

## **PART-B**

- Q.5 a) Draw the image compression model and describe the working of each block. **10**  
b) Explain image segmentation based on discontinuities and segmentation based on similarities. **10**
- Q.6 a) What do you understand by representation of an image? Explain objective description. **10**  
b) What are the different approaches for pattern/object recognition? Compare them. **10**
- Q.7 Write short notes on **(any two)**:  
a) Edge detection.  
b) Application of image processing.  
c) Electromagnetic spectrum. **10×2**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

Q.1 Answer the following:

- a) What is full form of NLP? Which phase of NLP deals with sound?
- b) Define syntactic analyzer.
- c) What do you mean by ambiguity?
- d) Define ATN.
- e) Define stages of parser.
- f) Explain different types of grammar.
- g) Define Semantic Model.
- h) What do you mean by direct machine transformation?
- i) Explain the word level morphology.
- j) Define speech recognition concept.

**2x10**

## **PART-A**

- Q.2 a) Discuss the components of Natural Language Processing in detail. **10**  
b) Explain lexicography, in detail with the help of example. **10**
- Q.3 a) What do you mean by ambiguous grammar? Explain different types of ambiguity with the help of examples. **10**  
b) Explain Chomsky hierarchy, in detail by citing example for each grammar. **10**
- Q.4 a) What do you mean by regular expression? Explain RTN network with help of diagram. **10**

- b) What do you mean by Top-Down parser? Draw a Top-down parse tree for the sentence "Sita went to the market" using the following rules.

$S \rightarrow NP\ VP$

$NP \rightarrow N$

$NP \rightarrow DET\ N$

$VP \rightarrow V\ PP$

$PP \rightarrow PREP\ NP$

**10**

### **PART-B**

- Q.5 a) What do you mean by semantic knowledge-representation? Explain with help of example.

**10**

- b) Explain any two pragmatic approaches, in detail with the help of example.

**10**

- Q.6 a) Discuss the basic concept of machine translation, in detail with the help of an example of machine translation.

**10**

- b) What is rule-based machine-translation? Explain different phases of rule-base machine translation in detail.

**10**

- Q.7 a) What is role of knowledge representation in natural language processing? Explain any one application in detail.

**10**

- b) What do you mean concept intelligent work processors? Explain any two Natural Languages during application in detail.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. - Fifth Semester

### **DISTRIBUTED OPERATING SYSTEMS (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.** Each question carries equal marks.

Q.1 Answer the following short questions:

- a) Discuss clock synchronization in distributed systems.
- b) Explain Cristian's algorithm and why it is used.
- c) Explain dirty cache, in brief.
- d) Briefly discuss what is NUMA?

**5x4**

#### **PART-A**

Q.2 a) What is DOS? Discuss the hardware and software requirements of DOS.

**10**

b) Describe Remote procedure call in detail with suitable example.

**10**

Q.3 a) Explain Bully Election algorithm in distributed operating system and write one usage.

**10**

b) Discuss Chandy-Misra Haas algorithm for deadlock detection in DOS.

**10**

Q.4 a) Discuss process allocation models.

**10**

b) Enumerate the various issues in real time distributed systems.

**10**

### **PART-B**

Q.5 a) Explain the design and implementation issues of distributed file system.

**10**

b) Explain strict sequential and causal consistency models, in detail.

**10**

Q.6 a) Discuss various trends in distributed file systems.

**10**

b) Discuss shared variable distributed memory with its properties.

**10**

Q.7 a) Discuss architecture of MACH microkernel.

**10**

b) Discuss UNIX emulation in MACH.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fifth / Seventh / 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.** Each question carries equal marks.

Q.1 Answer the following short questions:

- a) Measurement has shown that many files have an extremely short lifetime. What implication does this observation have for caching policy at client?
- b) Give an example of an operation in Linda that does not require any searching or hashing to find a watch.
- c) Reading the first block of a file from a remote file server is an idempotent operation. What about writing the first block?

- d) Explain co-scheduling in distributed operating system.
  - e) Explain Berkley algorithm, in detail.
  - f) Explain the difference between multi-computers and multiprocessors.
  - g) Explain clock synchronization.
  - h) Explain sequential consistency.
  - i) Discuss open system.
  - j) Why does IVY use an invalidation scheme for consistency instead of an update scheme?
- 2x10**

### **PART-A**

- Q.2 a) Differentiate between distributed operating system and centralized operating system. **8**
- b) Why crossbar switches rarely used in practice irrespective of excellent performance? What is the idle solution to crossbar switch? **6**
- c) Does the centralized system has the property of concurrency transparency? Explain if not. Also discuss parallelism transparency. **6**
- Q.3 a) Explain the bully and ring algorithm in detail. **8**
- b) Differentiate between logical and physical clocks. Explain Cristian's and Berkley algorithm to synchronize the clocks. **8**
- c) Discuss implementation of atomic transaction. **4**
- Q.4 a) Explain the difference between threads and process. **6**
- b) Explain the processor allocation algorithm and models. **8**
- c) Discuss scheduling in distributed systems. **6**

### **PART-B**

- Q.5 a) Discuss page based distributed shared memory and object based distributed shared memory. **10**
- b) Explain different types of replacement strategy. **5**
- c) Briefly explain the difference between entry and release consistency models. **5**
- Q.6 a) How can the distributed file system be implemented? **8**
- b) Discuss the remote access method of the file service and methods to access file. **8**
- c) Discuss voting algorithm. **4**
- Q.7 a) Explain UNIX emulation in MACH. **10**
- b) Write short note on 'Communication in MACH'. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester  
**MOBILE COMPUTING (CS-826)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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 mobile computing?
  - b) Differentiate between HTML and WML.
  - c) What is Wireless Local Loop (WLL)?
  - d) Define a cell.
  - e) What do you understand by an A-interface?
  - f) Discuss the concept of frequency reuse.
  - g) What is pervasive computing?

- h) Differentiate between a card and a deck in WML.
- i) What is a Mobile Switching Center (MSC)?
- j) Discuss the use of Care-of-Address (COA).

**2×10**

### **PART-A**

- |     |   |           |
|-----|---|-----------|
| Q.2 | a) Explain GSM architecture in detail.  | <b>10</b> |
|     | b) Discuss the various mobile devices and mobile operating systems in detail.                       | <b>10</b> |
| Q.3 | a) Differentiate between mobile IP and IPv6.  | <b>10</b> |
|     | b) Explain the two possible methods for communication between mobile nodes and corresponding nodes. | <b>10</b> |
| Q.4 | a) Discuss the Wireless Application Protocol (WAP) in detail.                                       | <b>10</b> |
|     | b) Explain the implementation of WAP enterprise strategy.   | <b>10</b> |

### **PART-B**

- |     |  |           |
|-----|--|-----------|
| Q.5 | a) Elaborate on how an image is used as background using WML.                                  | <b>10</b> |
|     | b) List the features of XML and WML. Write a program in WML to demonstrate the use of <a> tag. | <b>10</b> |
| Q.6 | a) Explain any five WAP emulators in detail.   | <b>10</b> |
|     | b) Discuss ASP and Dynamic WAP sites along with examples.                                      | <b>10</b> |
| Q.7 | Elaborate on the various data management techniques in mobile computing.                       |           |
|     | <b>20</b>  |           |

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

**BIG DATA ANALYTICS (CS-828)**

Time: 3 hrs

**100**

Max Marks:

No. of pages: 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 short questions:
- a) What are the characteristics of big data?
  - b) What are the models used for solving classification problems?
  - c) Explain work flow engine in Hadoop.

- d) Explain mapper and reducer in detail.
- e) Write a short note on Azure ML.

**4x5**

### **PART-A**

Q.2 a) What is the need for big data? Discuss its architecture in detail.

**10**

b) Explain the data analytics life cycle in detail.

**10**

Q.3 a) What are the performance measures to evaluate clustering models? Discuss.

**10**

b) Explain the Naïve Bayes algorithm in detail.

**10**

Q.4 a) Explain Hadoop architecture in detail.

**10**

b) What are the steps to setup the Hadoop cluster? Discuss.

**10**

### **PART-B**

Q.5 a) Write map and reduce methods to count the number of occurrence of each word in a file.

**12**

b) How job gets executed using Map-Reduce?

**8**

Q.6 a) What is direct batch reporting in Hadoop? Explain.

**8**

b) What are various big data access technologies for reporting and analysis? Discuss.

**12**

Q.7 a) Why is machine learning important in big data? Explain.

**10**

b) What is Apache Spark? Discuss its features in detail.

**10**

# ADVANCED ANALYSIS AND DESIGN OF ALGORITHMS (CS-M-101)

Time: 3 hrs.

Max Marks: **75**

No. of pages: 2

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

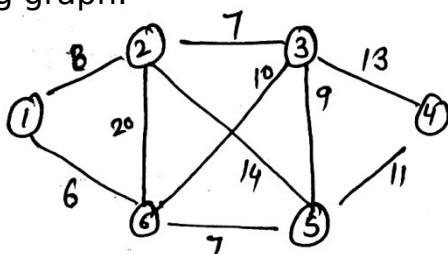
Q.1 a) State the master theorem to compute the time complexity of algorithm.

**9**

b) Write and explain the Heap sort algorithm. Use the following data set to explain the process: 9, 15, 1, 7, 8, 20, 16, 11, 2

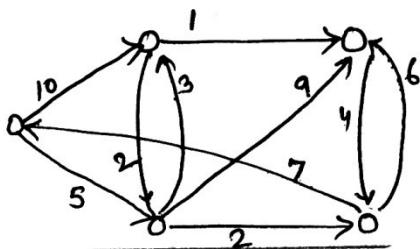
**6**

Q.2 a) Write and explain Kruskal's algorithm to find minimum cost spanning tree for the following graph:



**8**

b) What is the objective of Dijkstra's algorithm? Write and explain Dijkstra's algorithm. Use the following graph to show its working strategy:



**7**

Q.3 a) What is optimal binary search tree problem? Explain its solution using dynamic approach.

**8**

b) Explain dynamic solution for generating Huffman code for the following characters: a, b, c, d, e, f and g with frequencies:

20, 15, 25, 10, 11, 19 respectively.

**7**

Q.4 a) What is sum of subsets problem? Explain its backtracking solution.

**8**

b) What is Hamiltonian cycle? How do you find Hamiltonian cycle?

**7**

Q.5 a) What do you understand by parallel processing? How do you implement parallel processing to sort data using merge sort?

**8**

b) What is vertex covering problem? Explain its approximate solution.

**7**

Q.6 a) Write and explain the Recursive algorithm to insert an element in a binary search tree.

**5**

b) What is a Fibonacci heap? Write its characteristics.

**4**

c) Differentiate the techniques to implement BFS and DFS.

**6**

Q.7 a) Write and explain the algorithm for insertion sort. Discuss its complexity in best, worst and average cases.

**8**

b) Explain activity selection problem using greedy approach.

**7**

Q.8 Explain the following:

a) NP-hard and NP-complete problems.

b) Clique decision problem.

c) Graph coloring problem.

**5x3**

# **End Semester Examination, Dec. 2017**

M. Tech. (CSE) – First Semester

## **ADVANCED COMPUTER NETWORKS (CS-M-102)**

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) How OSI and TCP/IP models are related to each other?

**5**

b) What is congestion control? What do you mean by communication mediums? Explain.

**5**

c) What are different multiple access techniques? Explain any one in detail.

**5**

Q.2 a) What do you understand by Ethernet? Explain Gigabit Ethernet layer protocol architecture and frame format.

**10**

b) Distinguish between fast Ethernet and standard Ethernet.

**5**

Q.3 a) What strategies have been devised for the transition of IPV4 to IPV6? Discuss in detail with their architecture.

**10**

b) Why is an ARP query sent within a broadcast frame? Why an ARP response is sent within a frame with a specific destination MAC address?

**5**

Q.4 a) Compare TCP versus UDP versus SCTP with its detailed architecture.

**10**

b) What is proxy server and how it is related to HTTP?

**2½**

c) What is URL and what are its components?

**2½**

Q.5 a) What do you understand by virtual circuit? Explain.

**5**

b) Explain ATM Layer protocol and cell structure.

**5**

c) Discuss Frame Relays. Differentiate between ISDN and B-ISDN in detail.

**5**

Q.6 a) What are the different types of Wireless Networks? Explain in detail.

**5**

- b) Differentiate GSM, CDMA and LTE in detail. **5**
- c) Explain cellular network and its architecture. **5**
- Q.7 a) Discuss the Internet architecture in detail. Briefly explain routing and congestion control techniques. **10**
- b) What are the various mediums of transmission? Mention their advantages and disadvantages over each other. **5**
- Q.8 Write short notes on **(any five)**:
- a) GPRS
  - b) High speed LAN
  - c) Networking Devices
  - d) Voice over IP
  - e) LAN Emulation
  - f) Asynchronous Transfer Mode (ATM)
- 3x5**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester  
**ADVANCED OPERATING SYSTEMS (CS-M-103)**

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) What are the goals of an advanced operating system? Discuss the various design approaches followed in structuring the operating system. **10**  
b) Why is process addressing required? **5**
- Q.2 a) Why is transparency required in RPC? How is it achieved? **8**  
b) Discuss the implementation issues of RPC protocols. **7**
- Q.3 a) Discuss in detail the various issues related to thread design and usage in a thread package. **10**  
b) Explain how scheduling is achieved in a distributed system. **5**
- Q.4 Discuss the various architectures schemes used for designing DSM highlighting the features, advantages and disadvantages of each. **15**
- Q.5 a) Discuss the various algorithms used to achieve mutual exclusion in AOS. **10**  
b) Discuss the working of Cristain's clock. **5**
- Q.6 a) Discuss the various components of DCE security system. **9**  
b) What are ACLs? Explain. **6**

- Q.7 a) Discuss how deadlock can be prevented in AOS. 7  
 b) What are the various page and replacement strategies followed in case of shared memory? Explain. 8
- Q.8 Briefly answer on the following:  
 a) IPC features and issues.  
 b) Differentiate between blocking and non-blocking primitives.  
 c) Replication issues in case of shared memory. **5×3**

## **End Semester Examination, Dec. 2017**

M. Tech.—First Semester

### **ADVANCED MATHEMATICAL TECHNIQUES (CS-M-104)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **2**

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- Q.1 a) Let  $X = \{x_1, x_2, x_3, x_4, x_5, x_6\}$  and the fuzzy sets  $A, B$  defined on  $X$  as,  $A = (0.2, 0.6, 0.7, 0.9, 1.0, 1.0)$  and  $B = (0.0, 0.0, 1.0, 0.4, 0.6, 0.0)$   
 i) Compute the alpha-cuts for alpha equal to 0.2, 0.6, and 1.0;  
 ii) Compute the scalar cardinality and the fuzzy cardinality of  $A$  and  $B$ ;  
 iii) Verify that  $A \cap A$  is different from the empty set and that  $A \cup A$  is different from  $X$  in standard fuzzy set theory  
**8**

- b) Given the fuzzy sets:-

$$\begin{aligned} \text{Tall}(X) &= \{0 \text{ if } X < 1.6m \\ &\quad (X-1.6m)/0.2, \text{ if } 1.6m \leq X < 1.8 m \\ &\quad 1, \text{ if } X \geq 1.8m \} \end{aligned}$$

$$\begin{aligned} \text{Short}(X) &= \{1 \text{ if } X < 1.6m \\ &\quad (1.8m-X)/0.2, \text{ if } 1.6m \leq X < 1.8 m \\ &\quad 0, \text{ if } X \geq 1.8m \} \end{aligned}$$

- i) Sketch the graphs of  $\text{Tall}(X)$  and  $\text{Short}(X)$   
 ii) Show that the complement of  $\text{Tall}(X)$  is  $\text{Short}(X)$ .

**7**

- Q.2 a) What is the difference between?  
 i) Propositional Logic and Predicate Logic.  
 ii) Crisp Logic and Fuzzy Logic.

**6**

- b) What is Defuzzification? What are different techniques? Explain working methodology of any one.

**9**

- Q.3 Solve Using Simplex Method the Given Problem formulated as:

$$\text{Maximize: } P = 40 x_1 + 30 x_2,$$

Subject to:

$x_1$	+	$2x_2$	$\leq$
$x_1$	+	$x_2$	$\leq$
$3x_1$	+	$2x_2$	$\leq$
$x_1$	,	$x_2$	$\geq$

**15**

- Q.4 a) What are the two main properties that are used in Dynamic Programming solution? Explain briefly.

**6**

- b) **List 5- Dynamic Programming Problems and solve any one with an instance of your choice.**

**9**

- Q.5 Show a hand simulation of a G/D/1 (FIFO) queue for the following scenario and then calculate the performance measures showing Mean time waiting in queue, Mean sojourn/system time, and System utilization.

s.no	$\alpha$ (IAT)	$\mu$ service time	Time of Arrival	Start Service	End Service	Time in Queue
1	6	5				
2	4	5				
3	17	5				
4	6	5				
5	2	5				
6	3	5				
7	4	5				
8	18	5				
9	3	5				
10	6	5				
Total						

**15**

- Q.6 Strong Book Binder has one printing machine, one binding machine, and the manuscripts of a number of different books. Processing times are given in the following table:

Book	Time In Hours	
	Printing	Binding
A	5	2
B	1	6
C	9	7
D	3	8
E	10	4

Determine the order in which books should be processed on the machines, in order to minimize the total time required?

**15**

- Q.7 a) Compare the two Network Techniques PERT & CPM with their brief background and acronym expansion

**6**

- b) Develop the network for a project with following activities and immediate predecessors:

Activity	Immediate Predecessors
A	-
B	-
C	B
D	A, C
E	C
F	C
G	D, E, F

**9**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester

### **OBJECT ORIENTED MODELING AND DESIGN (CS-M-105)**

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 “aggregation” and its types with the help of suitable examples. **7**  
 b) Define abstraction and encapsulation. Explain the difference between them by taking suitable examples. **8**

- Q.2 a) Draw class diagram by taking the following objects: city, airport, pilot, airline, seat, plane, flight, etc. Add other objects if required. **7**  
 b) Differentiate between a state and an event. Draw state diagram showing change in the state of telephone line while establishing a connection. **8**

- Q.3 a) Define “overriding”. Explain its importance in modeling in detail. **7**  
 b) Define “stereotype”. Explain their importance by taking suitable examples. **8**

- Q.4 a) Discuss the importance of UML in modeling. Explain basic building blocks of UML used for constructing various models. **7**  
 b) What is use case modeling? Draw use case diagram for modeling admission enquiry at an institute of higher education. **8**
- Q.5 a) Explain the process for modeling dynamic behavior of objects. Explain any diagram used for modeling dynamic behavior with the help of an example. **8**  
 b) How structural relationships can be modeled using class diagrams by taking appropriate examples? **7**
- Q.6 a) Explain the purpose of association class. **5**  
 b) Differentiate between object model and functional model by taking suitable examples. **10**
- Q.7 Write short notes on the following:  
 a) UML.  
 b) Robustness.  
 c) Realization. **5×3**

## **End Semester Examination, Dec. 2017**

M. Tech. (CSE) - First Semester  
**NETWORKS PROGRAMMING (CS-M-106)**

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) How you can get present working shell in UNIX? Give commands. Make a shell script to find greater number among three. **8**  
 b) How UNIX is different from window OS. Give salient features of UNIX. **7**
- Q.2 a) What are different ways of IPC? Also compare shared memory with pipes. **8**  
 b) What is difference between file and record locking? Give functions for them. **4**  
 c) What is Namespace? **3**
- Q.3 a) What are POSIX message queues? Discuss all functions related to it. **6**

- b) What is FIFO? Write a program to show FIFO communication.  
**9**
- Q.4 a) What is producer-consumer problem? Why synchronization is required?  
What are different ways at synchronization?  
**8**
- b) Give a program to show use of locks.  
**7**
- Q.5 a) What is socket? Show socket communication with the help of a program.  
**8**
- b) What is asynchronous I/O? For how much time process get blocked in case of asynchronous I/O?  
**7**
- Q.6 What is TLI? Discuss TLI functions and its implementation.  
**15**
- Q.7 a) What is difference between Locking and Waiting? How to implement them, explain with a program?  
**7**
- b) What is I/O redirection? Give program in UNIX to show it.  
**8**
- Q.8 Write short notes on:  
a) Daemon processes.  
b) UNIX file system.  
c) Iterative v/s concurrent servers.  
**5x3**

**End Semester Examination, Dec. 2017**  
M. Tech. (CSE) – First Semester  
**CLOUD COMPUTING (CS-M-107)**

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) Define the term 'Cloud Computing'. Discuss the various IT challenges that have made organizations thinks about cloud computing model to provide better service to their customers. **6**  
 b) Differentiate amongst SaaS, IaaS, PaaS service delivery models. **9**
- Q.2 a) Define virtualization. Discuss various types of hardware virtualization. **10**  
 b) Differentiate between full and Para virtualization. **5**
- Q.3 a) What do you mean by a virtual machine? Discuss the files that make up a virtual machine along with virtual hardware used by virtual machine? **8**  
 b) Discuss in detail the file system used by virtual machines. **7**
- Q.4 a) What do you mean by network attached storage? Discuss its benefits and its various components. **10**  
 b) Discuss FCOE protocol for transport over ethernet networks. **5**
- Q.5 a) Discuss the use of multiple security defenses to help mitigate the risk of security threats, if one of the defense is being compromised. **5**  
 b) What do you mean by sandboxing? Explain. **4**  
 c) Discuss the security mechanisms at storage and network levels. **6**
- Q.6 a) Differentiate between synchronous and asynchronous replication. **4**  
 b) Discuss the backup design and architecture in detail. **6**  
 c) Discuss various considerations for migration to cloud. **5**
- Q.7 Discuss Aneka, framework in detail along with Aneka container and SDK. **15**
- Q.8 a) Discuss identity and access management in cloud. **8**  
 b) What do you mean by memory virtualization? **7**

## **End Semester Examination, Dec. 2017**

M. Tech. (CSE) — Second Semester

**ADVANCED COMPUTER ARCHITECTURE (CS-M-201)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **2**

Note: Attempt **ANY FIVE** questions in all. Each question carries equal marks.

- Q.1 Answer the following questions for the K-ary n-cube network:  
 a) What is the network diameter?

- b) What is the bisection bandwidth?
  - c) Define the node degree.
  - d) Explain different data routing functions.
  - e) List all network performance parameters for evaluating the efficiency of network.
- 3x5**

**Q.2** Explain different dynamic connection network for multiprocessor architecture. **15**

**Q.3** a) Analyze the data dependence among the following statement in a given program:

S1 : Load R<sub>1</sub>, 1024  
 S2 : Load R<sub>2</sub>, M(10)  
 S3 : Add R<sub>1</sub>, R<sub>2</sub>  
 S4 : Store M(1Q L4), R1  
 S5 : Store M(R2)), 1024

Draw a dependence graph to show all the dependence. **5**

b) Explain Von Neumann computational for multiprocessor architecture in detail. **5**

c) Differentiate between RISC and CISC processor in detail. **5**

**Q.4** a) Explain the structure of superscalar and VLIW processor in detail. **6**

b) Explain the following memory organization for vector access:

- i) S - access memory organization.
- ii) C - access memory organization.
- iii) C/S - access memory organization.

**3x3**

**Q.5** Explain the following terms associated with cache design:

- a) Write through v/s Write back cache.
- b) Cacheable v/s Non-cacheable data.
- c) Private caches v/s Shared caches.
- d) Cache flushing policies.
- e) Factor affecting cache hit ratios.

**3x5**

**Q.6** The main memory of a computer is organized as 64 blocks, with a block size of eight words. The cache has eight block frames. In parts (a) through (c) show the mapping from the numbered blocks in the main memory to the block frames in the cache. Draw all the lines showing the mappings as clearly as possible:

- a) Show the direct mapping and the address bits that identify the tag field, the block number and the word number.
- b) Show the fully associative mapping and the address bits that identify the tag field and the word number.
- c) Show the two-way associative mapping and the address bits that identify the tag field, the set number and the word number. **5x3**

**Q.7** a) Consider the five stages pipelined processor specified by the following reservation table:

	1	2	3	4	5	6
S1	X					X
S2		X			X	
S3			X			
S4				X		
S5		X				X

- i) List the set of forbidden latencies and the collision vector.

- ii) Draw a state diagram showing all possible initial sequences (cycles) without causing a collision in the pipeline.
  - iii) List all the simple cycles from the state diagram.
  - iv) Identify the greedy cycles from the simple cycles.
  - v) What is MAL of this pipeline? 2×5
- b) Differentiate between linear and non-linear pipeline processor. 5
- Q.8 Explain cache coherence problem and its synchronization mechanism in detail. **15**

## **End Semester Examination, Dec. 2017**

M. Tech. (CSE) – First Semester

**ADVANCED COMPUTER ARCHITECTURE (CS-M-201)**

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) Why are computers termed as parallel computer?  
**6**  
 b) Explain the condition of parallelism. What are the different Data and Resource dependencies?  
**9**
- Q.2 a) Differentiate between super scalar and vector processors.  
**5**  
 b) What are pipeline hazards? Elaborate on various types of hazards and indicate how each is controlled?  
**10**
- Q.3 a) Draw 8X8 Omega network.  
 Draw the path from input 001 to 110.  
 Draw the path from input 011 to 101.  
**7**  
 b) What do you mean by snooping protocol? Explain how it is used to maintain the coherence?  
**8**
- Q.4 a) Explain Full-map directories.  
**6**  
 b) What are the different message routing schemes used in message passing mechanism?  
**9**
- Q.5 a) Create a E-cube routing on a hypercube computer with 16 nodes. Write an algorithm for E-cube routing on hypercube to reach from source to destination node.  
**10**  
 b) Draw the path between Source node s = 0110 to destination node d = 1101 using E-cube routing algorithm on hypercube.  
**5**
- Q.6 a) Explain in detail the concept of Hierarchical Memory Technology.  
**7**  
 b) Define the following:  
 i) Inclusion Property    ii) Coherence property    iii) Locality of reference. **8**
- Q.7 a) What is Linear pipeline processor? Explain with diagram the synchronous and asynchronous model of linear pipeline process.  
**10**  
 b) Calculate the no. of page faults by taking 3 frames for following reference string using (i) LRU   (ii) FIFO.  
 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1  
**5**
- Q.8 Differentiate the terms as given below:  
 a) Grain Size and Latency.  
 b) Control flow versus Data flow.  
 c) Paging and Segmentation.  
**5x3**

# **End Semester Examination, Dec. 2017**

M. Tech. — Second Semester

## **NETWORK ADMINISTRATION AND SECURITY (CS-M-202)**

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) What do you understand by attack process? What are the different types of attackers?                         | <b>7</b>   |
|     | b) Explain the software vulnerabilities and configuration vulnerabilities in detail.                            | <b>4</b>   |
|     | c) What are the different attack results? Explain in detail.  | <b>4</b>   |
| Q.2 | a) Explain all the categories of security technologies. Also discuss the content filtering in detail.           | <b>8</b>   |
|     | b) Discuss the different types of spoofing in detail.   | <b>7</b>   |
| Q.3 | a) What are the different components of hardening strategy? Discuss.  | <b>8</b>   |
|     | b) Explain hardening of router with commands.   | <b>7</b>   |
| Q.4 | a) Discuss the application design considerations for e-mail in data.  | <b>8</b>   |
|     | b) Explain the two modes of file transfer protocol (FTP).   | <b>7</b>   |
| Q.5 | a) Differentiate between Site-to-Site and Remote V.P.N design.  | <b>7</b>   |
|     | b) Explain the different elements of IP Sec protocol.   | <b>8</b>   |
| Q.6 | a) Explain the protocol capabilities of:<br>i) Telnet.<br>ii) Netflow.  | <b>4×2</b> |
|     | b) Discuss the network security management tools in detail.   | <b>7</b>   |
| Q.7 | a) What is the role of responder, investigator and technician in network forensics?                             | <b>7</b>   |
|     | b) Explain the forensic analysis techniques in detail.  | <b>8</b>   |
| Q.8 | Write short notes on the following:<br>a) SNMP.<br>b) Rogue device detection.<br>c) VLAN hopping consideration. | <b>5×3</b> |

# **End Semester Examination, Dec. 2017**

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. Each question carries equal marks.

Q.1 a) What are the problems in Hill Climbing technique for searching? How will you overcome these?

**10**

b) Describe utility-based intelligent agent and list its goal.

**5**

Q.2 a) Explain forward and backward chaining methods for reasoning. Illustrate with examples.

**10**

b) What are the issues in knowledge representation?

**5**

Q.3 a) Give general structure of an expert system and describe its components. Discuss the methods used in the inference engine.

**10**

b) Explain State Space Formulation of a problem.

**5**

Q.4 a) How alpha and beta pruning is done in heuristic searches? Illustrate with an example.

**10**

b) Explain propositional and first order logic method for knowledge representation. **5**

Q.5 a) What is inferential logical reasoning system? Explain resolution method to draw conclusion from a knowledge base.

**10**

b) Explain Bayesian approach for uncertain knowledge representation and reasoning.

**5**

Q.6 a) Explain the importance of heuristic function.

**5**

b) Explain A\* algorithm and the steps involved in it. Compare this algorithm with best-first search. Illustrate this with examples.

**10**

Q.7 a) Explain how inference is drawn using first order logic. Illustrate with an example. **5**

b) Explain Bayesian Network. How it is used in drawing inferences?

**5**

c) Explain the concept of inductive learning. Give its form and uses.

**5**

## **End Semester Examination, Dec. 2017**

M. Tech. (CSE) - 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. Each question carries equal marks.

Q.1 a) Discuss in details the reference model of wireless communication.

**7**

b) Write in brief about:

- i) Antennas.
- ii) Multiplexing.

**8**

Q.2 a) What are the main benefits of a spread spectrum system? How can spreading be achieved? Explain DSSS giving an example. **10**

b) Compare TDMA, FDMA and CDMA.

**5**

Q.3 a) Discuss how power management is handled in case of 802.11 devices.

**7**

b) Compare the features, advantages, disadvantages and applications of GEO, LED and MEO satellites. How routing is performed in satellites?

**8**

Q.4 a) Explain the process of agent discovery and registration in mobile networking. **8**

b) Discuss the working of DHCP protocol.

**7**

Q.5 a) Name the basic applications for satellite communication and describe the trends in brief. **5**

b) How do inclination and elevation determine the use of a satellite? Explain with the help of a suitable diagram.

**10**

- Q.6 Write a brief note on the following:  
a) Wireless transaction protocol.  
b) HTML.  
c) Wireless transport layer.

**5x3**

Q.7 a) Differentiate between Infrastructure and Ad-hoc wireless LAN's.  
**4**  
b) Discuss the organization and working of a scatternet.  
**6**  
c) Draw a diagram to explain the signal exchange during inter-msc handover.  
**5**

Q.8 Write short notes on:  
a) Localization.  
b) Difference between infrastructure and ad-hoc networking.  
c) Tunneling.

**5x3**

**End Semester Examination, Dec. 2017**  
M. Tech. — Second Semester  
**SOFTWARE ENGINEERING AND TESTING (CS-M-301)**

Time: 3 hrs. Max Marks: **75**  
No. of pages: 2  
Note: Attempt **ANY FIVE** questions in all. Each question carries equal marks.

- Q.1 a) Explain the evolutionary model in detail. Also state its advantages and disadvantages. **8**  
b) Explain the different types of coupling in detail. **7**

Q.2 a) Explain how quality assurance is different from quality control. **5**  
b) Discuss in detail all the key process areas pertaining to each level of capability maturity model (CMM). **10**

Q.3 a) Explain the life cycle of a bug. Also give example of each example of each category of bug classified based on criticality. **10**  
b) “The tester’s approach should be based on effective testing, not exhaustive testing”. Comment on the statement with explanation. **5**

Q.4 a) What do you understand by static testing? What are the different types of static testing? **8**  
b) What is the need for integration testing? Discuss the different types of integration testing. **7**

Q.5 a) Consider the following program segment:

```

Main()
{
    int number, index;
    Printf ("Enter a number")
    Scanf ("%d", & number1)
    index=2;
    While (index <=number-1)
    {
        if (number % index==0)
        {
            Printf ("Not a prime number"),
            break;
        }
        index++;
    }
    if (index==number)
        Printf ("prime number"),
}

```

- i) Draw the DD graph for the program. **3**
- ii) Calculate the cyclomatic complexity of the program using all the methods. **2**
- iii) List all the independent paths. **2**
- iv) Design test cases from independent paths. **3**
- b) Explain the mutation testing and state the difference between primary and secondary mutants. **5**

- Q.6 a) A mobile phone service provider uses a program that computes the monthly bill of customers as follows:  
 Minimum ₹300 for up to 120 calls.  
 Plus ₹1 per call for the next 70 calls.  
 Plus ₹0.80 per call for next 50 calls.  
 Plus ₹0.40 per call for any call beyond 240 calls.  
 Design test cases for this program using equivalence class testing technique. **10**
- b) Discuss decision table - based testing. **5**
- Q.7 a) Discuss various levels of object oriented testing. **7**  
 b) What are the various issues in class testing? **4**  
 c) What is the need for object oriented testing? Explain. **4**
- Q.8 Write short notes on the following:  
 a) Regression testing.  
 b) System testing.  
 c) 6 Sigma.  
 d) States of bug.  
 e) Destructive approach for constructive testing. **3×5**

## **End Semester Examination, Dec. 2017**

M. Tech. – 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) Illustrate the business layer of Business Intelligence component framework.  | <b>10</b> |
|     | b) Discuss different types of decisions supported by Business Intelligence.   | <b>5</b>  |
| Q.2 | a) Cite two examples of unstructured data and mention the challenges associated while extracting information from unstructured data. Also, discuss various ways to extract information from stored unstructured data. | <b>10</b> |
|     | b) Discuss different solutions to store unstructured data.  | <b>5</b>  |
| Q.3 | a) Discuss different types of OLAP architecture in detail.  | <b>10</b> |
|     | b) How is OLAP different from OLTP?   | <b>5</b>  |
| Q.4 | a) Compare dataware house database and OLTP database.   | <b>10</b> |
|     | b) What are the challenges faced by an OLTP system?   | <b>5</b>  |
| Q.5 | a) Explain the ETL process in detail.   | <b>10</b> |
|     | b) Describe various features of federated database.   | <b>5</b>  |
| Q.6 | a) What constitutes a fact table? What are the various types of fact? Explain using example.  | <b>10</b> |

- b) Explain role changing dimension with example. 5
- Q.7 a) What is balanced scorecard? Explain different perspectives of balance scorecard. 10  
 b) Discuss balanced scorecard as strategy map. 5
- Q.8 a) Discuss the salient attributes of good metric. 10  
 b) Explain the following components of metric data using suitable example, subject, stratum, quantum and application. 5

## **End Semester Examination, Dec. 2017**

B. Tech. – First / 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) Define extrinsic and intrinsic semiconductors.  
 b) Draw the V-I characteristics of an ideal diode.  
 c) Define:  
   i) Knee voltage.  
   ii) Dynamic resistance.  
 d) Convert  $(2B9D \times FE1)_{16} = (?)_2$ .  
 e) Differentiate between unipolar and bipolar transistor.  
 f) Define virtual ground.  
 g) Which configuration is called emitter follower and why?  
 h) Derive the relation between  $\alpha$  and  $\beta$ .  
 i) Differentiate between combinational and sequential circuits.  
 j) Draw the circuit of a voltage follower. **2×10**

#### **PART-A**

- Q.2 a) Explain the working of a PN diode under unbiased; forward biased and reverse biased condition. 10  
 b) Explain various breakdown mechanisms in a diode. 10

- Q.3 a) Draw and explain static characteristics of transistor in common emitter configuration. **10**  
 b) Draw and explain the working of P-channel JFET. **10**
- Q.4 a) Convert the following:  
 i)  $(352 \times 42)_8 = (\quad)_{10}$   
 ii)  $(5000 \times 12)_{10} = (\quad)_{16}$   
 iii)  $(EFFA \times ABC)_{16} = (\quad)_2$   
 iv)  $(101 \times 10)_2 = (\quad)_{10}$   
 v)  $(888)_{10} = (\quad)_2$  **2×5**  
 b) Draw and explain the truth table of J-K flip-flop. **10**

### **PART-B**

- Q.5 a) List the ideal characteristics of an operational amplifier. **10**  
 b) Explain the working of op-amp as an  
     i) Integrator  
     ii) Differentiator **5×2**
- Q.6 a) Explain the working of D/A converter. **10**  
 b) Explain working of successive approximation type A/D converter. **10**
- Q.7 a) Explain the architecture of 8085 microprocessor. **10**  
 b) Differentiate between microprocessor and microcontroller. **10**

### **End Semester Examination, Dec. 2017**

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 a) Why diode current increases very fast after knee voltage?  
 b) Write difference between transition and diffusion capacitance of PN junction diode.  
 c) Write difference between PIV of centre tap full wave rectifier and bridge rectifier.  
 d) Derive relation between  $\alpha$  and  $\beta$ .  
 e) What is emitter follower?  
 f) How stabilization is improved by introducing  $R_E$  in the emitter circuit of emitter resister biasing circuit.  
 g) Arrange terminals of transistor in terms of increasing order of doping and size.  
 h) Find value of  $\alpha$  for a transistor having collector current 4.85 mA and emitter current of 5 mA.  
 i) Define biasing stability.  
 j) Draw circuit diagram of emitter follower regulator. **2×10**

### **PART-A**

- Q.2 a) Explain following:  
 i) PN diode formation and its V-I characteristics.  
 ii) Photodiode and Dark current of it.  
 iii) V-I characteristic of Tunnel diode. **4×3**  
 b) Explain switching time of PN junction diode. **8**

- Q.3 a) What are the differences between clipper and clamper circuit? Explain clipper with suitable circuit diagram in detail. **10**  
 b) Derive expression for calculating efficiency and ripple factor of full wave rectifier. **10**

- Q.4 Explain and draw common emitter characteristics of  $n-p-n$  transistor. Also write difference between CE, CB and CC configuration. **20**

### **PART-B**

- Q.5 a) An FET has a drain current of 4 mA, if  $I_{DSS}=6$  mA and  $V_{GS(off)}=-6$  V. Find value of  $V_{GS}$  and  $V_p$ . **6**  
 b) Tabulate difference between EMOSFET and DeMOSFET. **8**  
 c) Explain FET as VVR. **6**
- Q.6 a) Explain potential divider biasing with suitable circuit diagram. **8**  
 b) Write short notes on:  
   i) Stability factor.  
   ii) Thermistor.  
   iii) Thermal stability. **4×3**
- Q.7 a) Draw block diagram of regulated power supply and explain it. **6**  
 b) Tabulate difference between series and shunt voltage regulator. **7**  
 c) Design a  $\pm 12$  volt regulated power supply by IC voltage regulator. **7**

## **End Semester Examination, Dec. 2017**

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 Answer the following:  
 a) Why NAND and NOR gates are called as universal gates?  
 b) Differentiate between latch and flip flop.  
 c) What are the advantages of digital signal over analog signal?  
 d) Define modulus of a counter. How many flip flops are required to design MOD-13 counter?  
 e) What is priority encoder? How it is different from normal encoder?  
 f) Define step size in D/A converter.  
 g) What are FAN IN and FAN OUT in a digital IC?  
 h) What are error detection and correction codes?  
 i) Differentiate between synchronous and asynchronous counter.  
 j) What is the main advantage of flash type ADC over successive approximation type ADC?  
**2×10**

### **PART-A**

- Q.2 a) Perform the following using BCD addition:  
   i)  $(39)_{10} + (12)_{10}$ .  
   ii)  $(45)_{10} + (67)_{10}$ . **6**  
 b) Convert:

i)  $(ABCD \times FFF)_{16} = (?)_2$

ii)  $(4356 \times 421)_8 = (?)_2$

iii)  $(4FB7 \times C)_{16} = (?)_8$

iv)  $(45)_{10} = (?)_{Excess-3}$

8

c) Prove that:

i)  $(A + \bar{B} + \bar{C})(A + \bar{B}C) = A + \bar{B}C$

ii)  $(\bar{A}B + \bar{A}\bar{B} + \bar{B}) = \bar{A} + \bar{B}$

iii)  $\overline{(A + C) \times (B + D)} = A\bar{C} + \bar{B}D$

6

Q.3 a) Minimize the following using QM method:

$$F(A, B, C, D) = \sum m(1, 4, 5, 10, 12, 14)$$

12

b) Design 32:1 multiplexer using 8:1 multiplexer and some additional circuits. if required.

8

Q.4 a) Do the following flip flop conversions?

i) JK to T.

ii) D to SR.

iii) JK to SR.

8

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.

12

### **PART-B**

Q.5 a) Draw and explain the working of 3-bit ripple counter and justify why it is called asynchronous counter, modulus "8" counter and divide by '8' counter?

10

b) Draw and explain the working of universal shift register.

10

Q.6 a) What is the major advantage of R-2R ladder type DAC as compare to weighted resistor type DAC? Draw and explain 4-bit R-2R ladder type DAC.

14

b) Draw and explain successive approximation type A/D converter.

6

Q.7 a) Draw and explain circuit diagram and truth table of XOR and XNOR gates using CMOS technology.

8

b) Why ECL is called Emitter Coupled Logic? Explain the working of ECL as NOR/OR logic gates.

12

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) Draw the piecewise linear characteristics of a diode. Give the approximate cut in voltage for *Si* and *Ge* diode. **2x10**  
b) Define the term diffusion capacitance of a forward biased junction.  
c) How does a PIN photodiode differ from a conventional PN photodiode?  
d) Draw h-Parameter model of BJT.  
e) What do you mean by the term common in transistor?  
f) Derive relation between  $\alpha$  and  $\beta$  factor of transistor.  
g) What do you mean by 3dB up and 3dB down frequency?  
h) What are the role of "mixer" and "sampler" in feedback amplifier?  
i) What are the essential components of transistor oscillator?  
j) Draw a circuit diagram of crystal oscillator. Also explain its principle of working.

#### **PART-A**

- Q.2 a) Explain switching characteristics of P-N junction diode. **5**  
b) Derive an expression for diode current equation of P-N junction diode. **9**  
c) Give the construction of a semi-conductor photodiode. Draw and discuss its V-I characteristics. **6**

- Q.3 a) Differentiate between depletion mode and enhancement mode MOSFET. **8**  
 b) In a germanium transistor using potential divider biasing, the operating point is chosen such that  $I_C = 2\text{mA}$ ,  $V_{CE} = 4\text{V}$ . If  $R_L = 2\text{k}\Omega$ ,  $V_{CC} = 100\text{V}$  and  $\beta = 50$ , determine the value of  $R_1$ ,  $R_2$  and  $R_E$ . Assume  $I_I = 10I_B$ . **12**
- Q.4 Draw a circuit diagram of two-stage RC coupled amplifier. Draw its a.c equivalent circuit at mid-frequency range. Give expression for:  
 a) Input impedance.  
 b) Output impedance.  
 c) Voltage gain. **20**

### **PART-B**

- Q.5 a) Explain the difference between voltage and power amplifier. Define and explain:  
 i) collector efficiency.  
 ii) distortion.  
 iii) power dissipation capability as applied to power amplifier. Show that maximum collector efficiency of class B Push-Pull amplifier is 78.5%. **14**  
 b) Explain Harmonic distortion. Also derive expression for it. **6**
- Q.6 a) Discuss the effects of negative feedback on:  
 i) Gain  
 ii) Input impedance.  
 iii) Bandwidth with mathematical expressions. **4x3**  
 b) An amplifier having a gain of 500 without feedback has a overall negative feedback applied which reduces the gain to 100. Calculate the fraction of output voltage feedback. If due to ageing of component the gain without feedback falls by 20%. Calculate-percentage fall in gain with feedback. **8**
- Q.7 a) Draw the circuit diagram of a transistor Hartley oscillator. Explain its working and derive expression for resonance frequency. **10**  
 b) What is the basic principle of operation of RC-oscillator? **5**  
 c) A phase shift oscillator using a transistor has the parameter values  $R_L = 3.3\text{k}\Omega$ ,  
 $R = 5.6\text{k}\Omega$  and  $C = 0.01\mu\text{F}$ . Calculate frequency of oscillations and  $h_{fe}$  required for sustaining the oscillations. **5**

**End Semester Examination, Dec. 2017**  
B. Tech. – Third Semester  
**DIGITAL ELECTRONICS (EC-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**. Each question carries equal marks.

- Q.1 a) What do you understand by the term positive logic system?  
b) Prove  $A + \bar{A}B + A\bar{B} = A + B$ .  
c) Verify that Nand operation is commutative but not associative.  
d) Define figure of merit of a digital IC.  
e) Convert SR FF to JK FF.  
f) Represent data 101110 in serial form.  
g) What is noise immunity of a digital IC?  
h) List some applications of registers.  
i) Prove  $A \oplus B = \bar{A} \oplus \bar{B}$ .  
j) What is the basic difference between asynchronous and synchronous counters?
- 2×10**

**PART-A**

- Q.2 a) Construct Hamming code for BCD number 0110. Use even parity. **5**  
b) Represent decimal no. 27 in binary form using.

- i) Binary code.
  - ii) BCD code.
  - iii) Excess 3 codes.
  - iv) Gray code.
  - v) Octal code
  - vi) Hexadecimal code.
- 2×6**
- c) Find the distance between digits 1101 and 1001. **3**
- Q.3** a) Minimize the four variable logic function using K-map.  

$$f(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$$
 **10**
- b) Draw a 5 to 32 line decoder using two 4 to 16 line decoders. **5**
- c) Implement the expression using a multiplexer.  

$$f(A, B, C, D) = \sum m(0, 2, 3, 6, 8, 9, 12)$$
 **5**
- Q.4** a) Explain TTL logic in detail. **10**
- b) Draw a 2 input NMOS gate showing NOR logic. What do you understand by speed of operation and power dissipation of digital IC's? **10**
- PART-B**
- Q.5** a) Explain the working of JK flip-flop. **12**
- b) With the help of an example explain the difference between characteristics table and excitation table. **8**
- Q.6** a) With the help of a diagram explain the working of a 4 bit bidirectional shift register. **12**
- b) Explain the working of a ripple counter. **8**
- Q.7** a) With the help of a diagram explain in detail the working of R-2R ladder D/A converter. **15**
- b) What is a Sample and Hold circuit? **5**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester  
**SIGNALS AND SYSTEMS (EC-303A)**

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) For the given signal  $x[n]$ , calculate  $x(n-3)$   
 $x(n) = \{1, 2, 3, 3, 2, 1\}$

↑

- b) Explain the difference between deterministic signals and random signals with suitable examples.
- c) Differentiate between causal and anticausal systems.
- d) Test whether the system described by equation is linear or not  
 $y(n) = ax(n) + b$
- e) Find the Laplace transform of unit step signal and unit ramp signal.
- f) Write the Dirichlet conditions for Fourier series.
- g) Write the Trigonometric Fourier series representation of a continuous time periodic signal.
- h) Find the discrete time Fourier transform of following sequence:

$$x(n) = \{1, -1, 2, 2\}$$

↑

- i) State and prove time shifting property of DTFT.
- j) Find fourier transform of  $\delta(t)$  and  $u(t)$ .

**2x10**

**PART-A**

- Q.2 a) Find whether the following signals are energy or power signals. Find appropriate value.

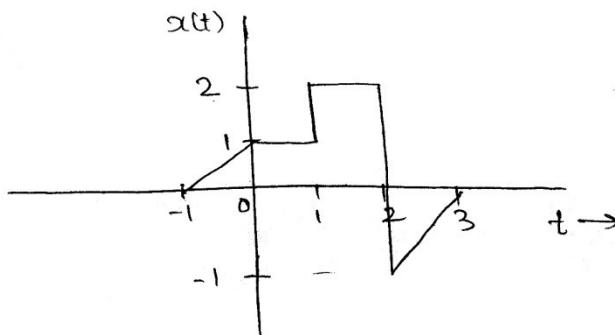
$$x(n) = \cos(\pi n) \quad \text{for } -4 \leq n \leq 4$$

i)  $= 0$ , otherwise

ii)  $x(t) = (2e^{-t} - 6e^{-2t}) u(t)$

**10**

b)



Carry out the following operations on the given signal with neat sketches.

i)  $x(t-2)$

ii)  $x\left(\frac{t}{2}\right)$

iii)  $x(1-t)$

iv)  $[x(t) + x(1-t)] u(t-1)$

v)  $x(t) \left[ \delta\left(t + \frac{3}{2}\right) - \delta\left(t - \frac{3}{2}\right) \right]$

**10**

- Q.3 a) Test whether the system described by following equations are linear and time invariant:

i)  $y(n) = a[x(n)]^2 + bx(n)$

ii)  $y(n) = ax(n-1) + bx(n-2)$

**10**

$$h(n) = [3, 2, -2, 1]$$

- b) A system having impulse response  $\uparrow$  is initiated with an input  $x(n) = [1, 2, -2, 1]$

input  $\uparrow$ . Calculate its output  $y(n)$ .

**10**

- Q.4 a) The output  $y(t)$  of a continuous time LTI System is found to be  $2e^{-3t}(ut)$  when the input is  $u(t)$ .

i) Find the impulse response  $h(t)$  of the system.

ii) Find the output  $y(t)$  when the input  $x(t)$  is  $e^{-t}u(t)$

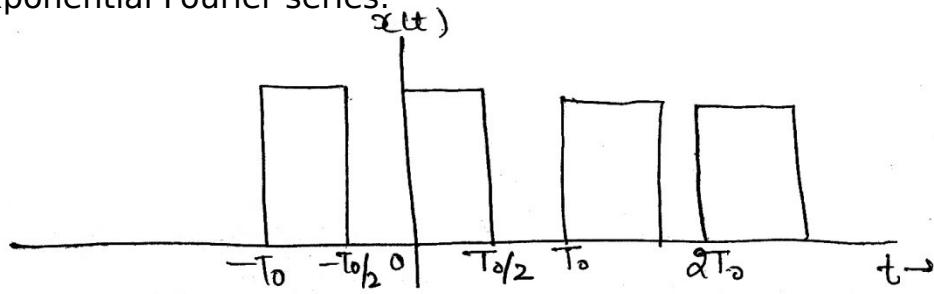
**10**

b) Using various properties of Laplace transform derive the Laplace transform of the following signals from the Laplace transform of u(t).

- i)  $\delta(t)$       ii)  $tu(t)$       iii)  $e^{-at}u(t)$       iv)  $e^{-at}\cos w_0 t u(t)$       **10**

### **PART-B**

Q.5 a) For the given periodic square wave  $x(t)$ , determine the complex exponential Fourier series.



**10**

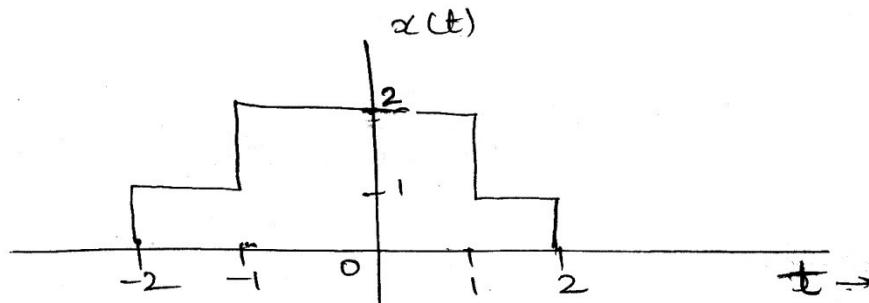
b) State and verify time differentiate property of Fourier Transform.

**10**

Q.6 a) Prove Parseval's Identity or Parseval's theorem for Fourier transform.

**10**

b) Determine the Fourier transform of the signal shown in given figure:



**10**

Q.7 a) Find the discrete time Fourier transform of following signals:

$$i) \quad x(n) = \left(\frac{1}{2}\right)^{n-1} u(n-1)$$

$$ii) \quad x(n) = 2^n u(n)$$

**10**

b) Find the convolution of the signals given below using DTFT.

$$x_1(n) = \left(\frac{1}{3}\right)^n u(n), \quad , \quad x_2(n) = \left(\frac{1}{4}\right)^n u(n)$$

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester  
**SIGNALS AND SYSTEMS (EC-303A)**

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.

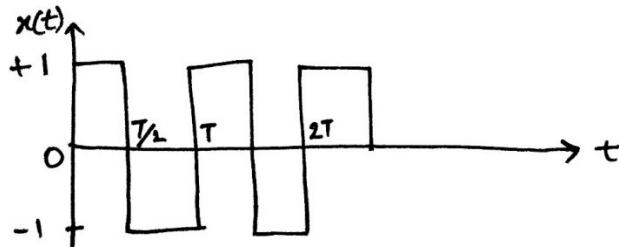
- Q.1 a) Define causal and anti causal signal.  
b) What is unit step function? How can it be obtained from unit impulse function?  
c) State superposition principle.  
d) Find Laplace transform of  $e^{10t}$ .  
e) State Dirichlet's condition.  
f) What is ROC?

- g) Calculate DTFT of  $a^n \cdot u(n)$ .  
 h) What are LTI systems?  
 i) Differentiate between 'time variant' and 'time invariant system'.  
 j) State and prove frequency shifting property of DTFT.

**2x10**

### PART-A

Q.2 a) Calculate the average power of the square wave shown as:



**5**

b) Determine whether the following signal is periodic or not. If periodic, find periodicity  $x(t) = 2\cos 1.5\pi t + \sin 3.5\pi t$ .

**7**

c) Explain basic manipulations on discrete time signals.

**8**

Q.3 a) Check whether the following systems are linear and time invariant:

i)  $y(n) = n[x(n)]^2$

ii)  $y(n) = a[x(n)]^2 + bx(n)$

**10**

b) Compute convolution of

$$x(n) = [1, 2, 3, 4] \quad \text{and} \quad h(n) = [1, 2, -1, 2]$$

**10**

Q.4 a) Determine the partial fraction expansion and hence inverse Laplace transform of following function.

$$X(S) = \frac{S^2 + 2S - 2}{S(S+2)(S-3)} \quad \text{ROC: } \text{Re}(S) > 3.$$

**10**

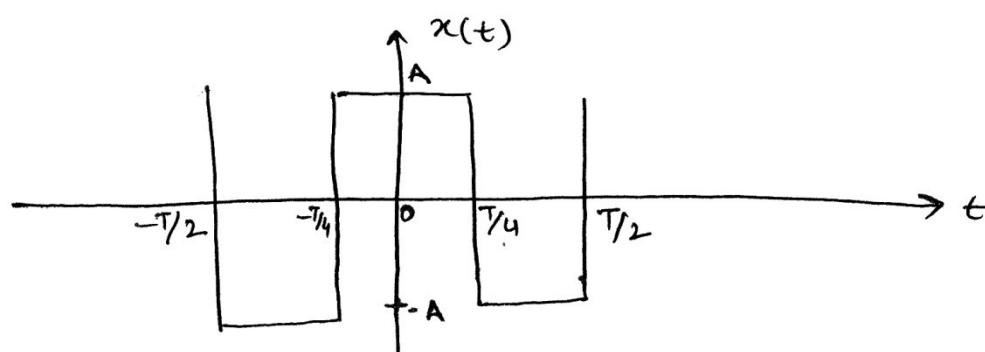
b) Determine the Laplace transform of following sinusoidal function:

$$x(t) = A \sin \omega_0 t \cdot u(t)$$

**10**

### PART-B

Q.5 a) Obtain trigonometric Fourier series representation of periodic rectangular waveform given as:



**10**

b) Determine power spectrum of a periodic function.

**10**

Q.6 a) A certain function of time has the following Fourier transform.

$$F(j\omega) = \frac{1}{\omega^2 + 1} e^{-2\omega^2 / (\omega^2 + 1)}$$

Using the properties of Fourier transform, write the Fourier transforms of:

i)  $f(2t)$       ii)  $f(t-2)e^{jt}$       iii)  $4 \frac{d}{dt} f(t)$

**12**

b) State and prove Rayleigh's energy theorem for Fourier transform.

**8**

Q.7 a) Find the discrete time Fourier Transform (DTFT) of the discrete time signal

$x(n) = r^n u(n)$  for  $|r| < 1$ . Also calculate amplitude and phase spectrum. **10**

$$x_1(n) = \left(\frac{1}{5}\right)^n u(n) \quad \text{and} \quad x_2(n) = \left(\frac{1}{3}\right)^n u(n)$$

b) Find the convolution of signal discrete time Fourier transform.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third / Fourth Semester

### **ELECTROMAGNETIC FIELD AND WAVES (EC-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 the following:

- Find the location of point  $P(2, -1, 3)$  in cylindrical coordinate system.
- Write down the divergence of a vector in cylindrical coordinate system.
- Define Electrostatic energy.
- Five equal point charges of  $Q = 20 \times 10^{-9} C$  are placed at  $x = 2, 3, 4, 5$  and  $6 \text{ cm}$ . Calculate the potential at origin.
- State Ampere's circuital law.
- Determine the magneto motive force (mmf) generated by a multilayer coil of 1000 turns of fine wire carrying a current of 1.0 mA.
- If the electric field strength of a plane wave is  $1V/m$ , what is the strength of magnetic field  $H$  in free space?
- State and explain Faraday's law of electromagnetic induction.
- A 300 ohm transmission line is terminated in a load impedance of  $(100 + j200)$  ohms. Calculate the voltage reflection coefficient.
- What do you mean by characteristic impedance of transmission line?

**2x10**

### **PART-A**

Q.2 a) Express the vector:

$$\vec{B} = \frac{10}{r} \hat{a}_r + r \cos \theta \hat{a}_\theta + \hat{a}_\phi \quad \text{in cartesian and cylindrical coordinates.}$$

$$\vec{B} = (-3, 4, 0) \text{ & } \vec{B} \left( 5, \frac{\pi}{2}, -2 \right)$$

Find

**10**

- Show that the vector field  $\vec{F} = yz \hat{a}_x + xz \hat{a}_y + xy \hat{a}_z$  is both solenoidal and conservative.

**5**

- Explain the physical significance of curl of a vector.

**5**

Q.3 a) State and prove uniqueness theorem.

**10**

- State and explain Gauss's law. Derive an expression for potential at a point inside a solid sphere having a uniform volume charge density.

**10**

Q.4 a) State Biot-Savart's law and deduce from it an expression for magnetic field intensity  $\vec{H}$  at a point located at a distance of  $r$  meters from an infinitely long straight conductor carrying a current  $I$  amperes.

**10**

- Explain magnetic boundary conditions in detail.

**10**

### **PART-B**

Q.5 a) State Maxwell's equations and explain their physical significance. Derive the wave equation in an infinity extending homogeneous conduction medium.

**10**

- Given  $\vec{E} = 10 \cos(10^6 t - \beta x) \hat{a}_y$  at a point in air. Find  $\vec{H}$  and the pointing vector at that point.

**7**

c) Explain the term skin depth.

**3**

Q.6 a) Find the conditions for which a uniform plane wave in free space is linearly, circularly or elliptically polarized.

**10**

b) Show that the surface impedance of a plane conductor that is very much thicker than the skin depth is just equal to the characteristic impedance of the conductor.

**10**

Q.7 a) Derive an expression for the input impedance of a distortionless R.F. transmission line of length  $l$  and characteristic impedance  $Z_0$ , when it is tuned by an impedance  $Z_R$ . Hence discuss the impedance transforming property of a quarter wave line. **10**

b) Explain the meaning of terms 'Reflected wave' and 'Standing wave ratio' with reference to a transmission line.

**10**

# End Semester Examination, Dec. 2017

B. Tech. – Third Semester  
**ANALOG ELECTRONICS CIRCUITS-I (EC-321)**

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 are  $h$  parameters? What are their advantages and limitations?
- b) What is  $\beta$  cut off frequency? Why is it called 3dB frequency?
- c) Differentiate between BJT small signal model and FET small signal model and justify that BJT is a current controlled device and FET is a voltage control device.
- d) What is the role of emitter bypass capacitor in R-C coupled amplifier?
- e) What are linear and non-linear distortions? Explain with example.
- f) What is the role of coupling network in multistage amplifier? Differentiate between various coupling methods in terms of advantages and disadvantages.
- g) What is pinch off voltage in field effect transistor? Mark pinch off voltage in drain and transfer characteristics.
- h) What is early effect or base width modulation? What is its effect in common base configuration?
- i) What is cross over distortion in amplifiers?
- j) Draw a circuit diagram of cascode amplifier for Common Base-Common Emitter Configuration.

**2×10**

## **PART-A**

- Q.2** a) Draw and explain Eber's moll model of transistor. **10**  
b) Draw and explain input and output characteristics of common emitter transistor configuration. Also, draw its hybrid model with  $h$ -parameter equations. **10**
- Q.3** a) Draw approximate hybrid Pi model and derive expression for common emitter short circuit current gain as a function of frequency. Also, draw frequency response curve for the same. **10**  
b) Explain emitter follower at high frequency and calculate its voltage gain, upper 3dB frequency and input admittance. **10**
- Q.4** a) Draw and explain construction of n-channel depletion MOSFET alongwith its working and characteristics. **10**  
b) Give the detailed analysis of common source and common drain amplifier, using generalized equivalent circuit. Also, draw its thevenin equivalent circuit to find open circuit voltage and resistance. **10**

## **PART-B**

- Q.5 a) Give the approximate analysis of common emitter amplifier:  
i) Without  $R_E$   
ii) With  $R_E$   
and discuss the effect of emitter resistance on amplifier performance. **10**
- b) For CE amplifier,  $h_{ie} = 2000\Omega$ ,  $h_{re} = 1.6 \times 10^{-4}$ ,  $h_{fe} = 49$ ,  $h_{oe} = 50\mu\text{A/V}$ . Determine the current gain, voltage gain, input resistance and output resistance if  $R_L = 30\text{k}\Omega$ ,  $R_S = 600\Omega$ . **10**
- Q.6 a) Draw and explain two stage R-C coupled amplifier with expression of lower and upper cut-off frequency. Also, draw frequency response curve for it. **12**  
b) Draw and explain Darlington amplifier. **8**
- Q.7 a) Explain class B Push-Pull amplifier with the help of a circuit diagram. Also, calculate its efficiency. **12**  
b) What is harmonic distortion in amplifier? Derive expression for it. **8**

# **End Semester Examination, Dec. 2017**

B. Tech. – Fourth Semester

## **MICRO PROCESSORS AND INTERFACING (EC-401B)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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 the difference between STA and STAX instructions of 8085? Explain with an example.  
b) Differentiate between vectored and non-vectored interrupts of 8085 microprocessor.  
c) Differentiate between 8085 and 8086 microprocessors.  
d) What is pipelining? What are its advantages?  
e) How many address lines are required to point four gigabyte memory?  
f) What is the difference between single PIC and cascaded PIC? How 8259 can be operated in cascaded mode?  
g) What are input and output ports? Justify advantage of 8255 IC with its features.  
h) What is physical address in 8086 microprocessor? How is it computed?  
i) What are processor control instructions in 8086? Explain with an example.  
j) What is the difference between hardware triggered strobe and software triggered strobe mode of operation of 8253/8254?

**2x10**

### **PART-A**

- Q.2 a) Draw and explain architecture of 8085 microprocessor. **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 minimum and maximum mode configuration of 8086 microprocessor. **10**  
b) Explain the concept of memory banking in 8086 microprocessor. **5**  
c) What is the role of coprocessor 8087? How it is interfaced with 8086 microprocessor? **5**
- Q.4 a) Write a program in 8086 to find largest number from an array. **8**  
b) Explain the following instructions of 8086 microprocessor with an example:  
i) XLAT ii) LAHF iii) AAA iv) SHR v) CWD vi) REPNE

**2x6**

## **PART-B**

- Q.5 a) Interface i) 2K RAM ii) 4K EPROM with 8085 microprocessor. **12**  
b) Differentiate between memory mapped I/o and I/o mapped I/o. **8**
- Q.6 a) Draw and explain architecture of 8255 IC. **8**  
b) Draw and explain control word and status word of mode 2 operation of 8255. **8**  
c) Write a BSR control word subroutine to reset bits PC1, PC3 and PC5 and set them after 100 ms. **4**
- Q.7 a) Explain Mode2 and Mode 4 operation of 8253 IC. **8**  
b) Explain priority modes of 8259 IC. **5**  
c) Explain DMA operation of 8237 with diagram. **7**

## **End Semester Examination, Dec. 2017**

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) Draw a circuit diagram of level shifter.  
b) Current mirror provide \_\_\_\_\_ voltage across output because \_\_\_\_\_.  
c) Draw a circuit diagram of voltage follower.  
d) Why sample hold circuit is essential part of any communication (digital) network?  
e) What is the difference between ideal and practical differentiator?  
f) Why timer is known as 555 timer?  
g) Why positive feedback is used in oscillator circuit?  
h) What is analog multiplier? Also write its application.  
i) Which circuit is known as super diode and why?  
j) Define classification of a filter.

**2x10**

## **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**

Q.4 a) Explain grounded load voltage to current converter with the help of a circuit diagram.

**10**

b) Explain OTA with the help of a circuit diagram.

**10**

### **PART-B**

Q.5 a) Derive an expression for transfer function of Sallen Key High Pass filter.

**10**

b) Draw a circuit diagram of state variable filter. Also explain its working.

**10**

Q.6 a) Explain triangular wave form generator with the help of a circuit diagram.

**10**

b) What is function generator? Explain with the help of a circuit diagram.

**10**

Q.7 a) Design a  $\pm 12$  volt fixed power supply.

**10**

b) Explain SMPS with the help of a circuit diagram.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third / Fourth 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**. Each question carries equal marks.

Q.1 Answer the following:

- Find the energy of the signal  $x(t) = e^{-2t}u(t)$ .
- What are the Dirichlet conditions under which a periodic signal can be represented by a Fourier Series?
- State and prove time shifting property of Fourier transform.

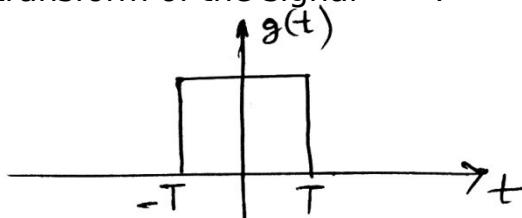
- d) An AM transmitter produces 15 kW with 60% modulation. How much of it is carrier power? How much power is saved if SSB transmission takes place?  
e) Explain a square law modulator with neat block diagram.  
f) Find the maximum frequency deviation  $\Delta f$  and modulation index  $\beta$  for an FM modulator with a deviation sensitivity of 6 KHz/V and a modulating signal  $m(t) = 3\cos(18,850)t$ .  
g) How do you get FM from PM and vice versa?  
h) Explain TRF receiver.  
i) Why is pre-emphasis/de-emphasis network used in FM receiver?  
j) Find the equivalent noise temperature for a noise figure of 15 dB. **2x10**

### **PART-A**

- Q.2 a) Define modulation. Why is modulation necessary in a communication system? List the different types of modulation schemes. **10**  
b) Plot the signal  $u(t) - u(t-\tau)$ , where  $\tau$  is a positive constant. **4**  
c) Explain the following properties of a system:  
i) Memorylessness.  
ii) Linearity.  
iii) Causality. **3x2**

- Q.3 a) Prove the following property of the Fourier Series:

- i) If the periodic signal  $g(t)$  is even, then the Fourier coefficients,  $c_n$ , are purely real and even. **6**  
b) Find the Fourier transform of the signal  $g(t)$ :



- c) Discuss convolution theorem in frequency domain. **6**

- Q.4 a) 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. **8**  
b) How is SSB signal generated by the filter method? Explain in detail with a block diagram and necessary equation. Give the advantages and disadvantages of this method. **8**  
c) The carrier frequency for an AM modulator is 500 KHz. The maximum modulating signal is 1 KHz. Find:  
i) the upper and lower sideband frequencies and  
ii) the bandwidth.  
Draw the spectrum of AM wave. **4**

### **PART-B**

- Q.5 a) Determine the carrier and modulating frequencies and the maximum deviation for an FM wave  $f(t) = 15\sin(8 \times 10^8 t + 6\sin 1300t)$ . What is the power dissipated by this FM wave in a  $12\Omega$  resistor? Assume the modulation index  $\beta$  to be 3. **4**

- b) Explain in detail Armstrong method for generation of FM wave. **8**  
 c) Describe ratio detector method for FM detection. **8**
- Q.6 a) Describe with the help of a block diagram, the working of a super-heterodyne receiver. Explain the function and purpose of each block. Describe how image signal is formed and how it can be minimized? **12**  
 b) Explain threshold effect in FM. **4**  
 c) What is the purpose of limiter in an FM receiver? **4**
- Q.7 a) Explain thermal noise. Derive expression for thermal noise voltage generated by resistor of  $R$  ohms and at temperature  $T$  kelvin. **10**  
 b) When the value of the resistor creating thermal noise is doubled, what happens to the noise power? **4**  
 c) A mixer stage has a noise figure of 25 dB and a stage before it is an amplifier with a noise figure of 7 dB and an available power gain of 15 dB. Find out the overall noise figure referred to input. **6**

## **End Semester Examination, Dec. 2017**

B. Tech. - Fourth Semester

### **ELECTROMAGNETIC THEORY (EC-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 a) Points P and Q are located at (0, 2, 4) and (-3, 1, 5). Calculate the position of vector  $r_P$  and the distance between P and Q.  
 b) What do you mean by vector cross product?  
 c) State and prove Laplace equation.  
 d) What is method of image?  
 e) Define inductor and inductance.

- f) Prove that  $\nabla \cdot \vec{B} = 0$ .  
 g) Write the expression for magnetic vector potential and scalar potential.  
 h) Define the primary and secondary constant of a transmission line.  
 i) What is the need of impedance matching?  
 j) Calculate the skin depth of current penetration in copper at a frequency of  $2.5 \times 10^3$  MHz and resistivity is  $2.5 \times 10^{-6}$  ohm-cm.

**2x10**

### **PART-A**

- Q.2 a) Which of the following field are solenoidal and irrotational:

i)  $A = xa_x + ya_y + za_z$

ii)  $C = \sin \theta a_r + r \sin \theta a_\phi$

**6**

- b) State and prove stoke's theorem.

**8**

c) Prove that  $\nabla \cdot (\nabla \times \vec{A}) = 0$  &  $\nabla \times \nabla \phi = 0$

**6**

- Q.3 a) Two point charges  $Q_1=2$  nC and  $Q_2=-4$  nC are located at (1, 0, 3) and (-2, 1, 5) respectively. Determine the potential at P(1, -2, 3).

**10**

- b) Obtain an expression for E and V due to electric dipole.

**10**

- Q.4 a) Derive an expression for magnetic field intensity of a linear conductor of infinite length.

**10**

- b) State and explain Ampere's force law, and Ampere's circuital law.

**10**

### **PART-B**

- Q.5 a) Write down the Maxwell's equations in integral and differential form for static electric and magnetic fields and also prove any two equations.

**10**

- b) What is displacement current? Derive the equation of continuity for time varying field.

**10**

- Q.6 a) The electric field intensity of a uniform plane wave in air is  $7500 \text{ V/m}$  in y direction. The wave is propagating in x direction at a frequency of  $2 \times 10^9$  rad/sec. Find:

i) Wavelength

ii) Frequency

iii) Time period

iv) Amplitudes of H.

**10**

- b) Derive an expression for surface impedance.

**5**

- c) Differentiate between circular and elliptical polarization.

**5**

- Q.7 a) Derive an expression for input impedance of a transmission line terminated with its characteristic impedance.

**10**

- b) Write a short note on smith chart.

**5**

c) What are the conditions for open circuit, lossless and distortionless line?

**5**

B. Tech. — Fourth Semester  
**HARDWARE DIGITAL DESIGN (EC-422)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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 VHDL? Why it is used?  
b) Why is structural modeling required?  
c) List the CAD tools for designing the digital circuits at various phases of design flow.  
d) What is sensitivity list? Can a process be there without a sensitivity list? Justify.  
e) Perform the following operation:  
i) 10110010 srl +3  
ii) 10110010 sla -3.  
f) What is deferred constant? Give an example.  
g) Differentiate functions and procedures.  
h) Why do we need to write a test bench? Give an example.  
i) Differentiate between signal and variable.  
j) What is the difference between Mealy and Moore state machines?

**2x10**

**PART-A**

- Q.2 a) Explain various design steps required for designing a digital integrated circuit. **8**

- b) Differentiate sequential and concurrent style of modeling with examples. **6**

- c) Write VHDL code of half adder in:  
i) Structural modeling.  
ii) Behavioral modeling.

**6**

- Q.3 a) Why is access data type used? Discuss the allocation and de-allocation of objects to access the objects. **10**

- b) Define resolution function. How are multiple signal drivers evaluated in dataflow architectures? Explain with examples. **10**

- Q.4 a) Why is generate statement used? Write VHDL code of 4-bit full adder using generate statement. **12**

- b) Write VHDL code of 4:1 multiplexer using behavioral style of modeling. **8**

**PART-B**

- Q.5 a) Write VHDL code of 3 bit up counter using structural modeling. **12**

- b) Write VHDL code of 4-bit SIPO shift register using behavioral modeling. **8**

- Q.6 a) Implement a state machine modeling for simple multiplication algorithm in VHDL. **12**  
 b) What are conversion functions? Why are they required? Explain with examples. **8**
- Q.7 a) Implement 16-bit ALU using VHDL model. **10**  
 b) Describe the architecture of CPLD in detail. **10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Answer the following questions:
- What is feedback in amplifiers? What is the need of using feedback?
  - Differentiate between current and voltage feedback amplifier.
  - What is the effect of negative feedback on the gain of an amplifier?
  - Draw circuit diagram of voltage follower.
  - What is Barkhausen criterion for oscillator?
  - What is full power Bandwidth of operational amplifier?
  - What is the difference between balanced and unbalanced differential amplifier?
  - Given common mode gain is 0.01 and differential gain is 100. Calculate CMRR in dB.
  - Draw circuit diagram of sample and hold circuit.
  - Write features of comparator.
- 2x10**

### **PART-A**

- Q.2 a) List various types of feedback configuration in series and shunt. Explain any two types of feedback amplifier. Also, derive expression for voltage gain, input and output impedance.  
**10**
- b) What are the advantages of negative feedback in amplifier? Explain them in brief.  
**10**
- Q.3 a) Explain the working of Hartley oscillator and calculate the frequency of oscillation. Also show the condition to keep loop gain greater than or equal to unity. **10**  
 b) In a transistorized colpitt's oscillator, the tank circuit has  $L=100\mu H, C_1 = 0.001\mu F, C_2 = 0.01\mu F$ . Determine the:

- i) Operating frequency  
 ii) Feedback fraction ( $\beta = h_{fe}$ )  
**5**
- c) What are the essentials of transistor oscillator?  
**5**
- Q.4 a) What is differential amplifier? Analyze the voltage gain, input-resistance and output resistance for dual input balanced output differential amplifier with suitable equivalent circuit.  
**12**
- b) Calculate the operating point for dual input balance output differential amplifier configuration. Given:  
 $V_{CC} = 12V, V_{EE} = -12V, R_C = 10k\Omega, R_E = 10k\Omega, R_B = 20k\Omega, \beta = 75$ , and  $V_{BE} = 0.7V$   
**8**
- PART-B**
- Q.5 a) Draw block diagram of an operational amplifier and explain its each block. List ideal characteristics of an op-amp.  
**10**
- b) Explain working of following operational amplifier configuration:  
 i) Differentiator.  
 ii) Summing Amplifier.  
**10**
- Q.6 a) Draw and explain the working of Precision rectifier for full wave configuration. **6**  
 b) Explain all the working of Schmitt Trigger with proper waveform.  
**6**  
 c) Explain working of comparator. Also, tabulate difference between comparator and Schmitt Trigger.  
**8**
- Q.7 a) Differentiate between Active and Passive filter. Explain the working of Sallen Key filter for Low Pass configuration. Analyze its various parameters. **12**  
 b) Analyze the working of first order High Pass Butterworth filter. Draw frequency response for it.  
**8**

**End Semester Examination, Dec. 2017**  
B. Tech. — Fifth Semester  
**ANTENNA AND WAVE PROPAGATION (EC-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** Answer the following:

- a) Write the Maxwell's equations for time varying fields.
- b) If the electric field strength of a plane wave is 2 V/m, what is the strength of the magnetic field H in free space?
- c) Define following terms:
  - i) Radiation resistance.
  - ii) Radiation pattern.
- d) Differentiate between board side and end fire array.
- e) What is meant by similar point sources?
- f) What are electrical small loop antennas?
- g) List applications of helical antenna.
- h) Write different types of reflectors and their applications.
- i) Define wave velocity and ground velocity.
- j) Define skip distance.

**2×10**

## **PART-A**

- Q.2** a) Derive an expression for wave equation in terms of EM potential. **12**  
 b) A short dipole with a triangular current distribution radiates  $P_{\text{rad}}$  watts in free space. Show that the magnitude of the maximum electric field at a distance ' $r$ ' is given by  

$$E_\theta = \frac{\sqrt{90} P_{\text{rad}}}{r} \text{ v/m}$$
**8**

- Q.3 a) Calculate the directivity of an antenna, the power pattern of which is given by:

$$U(\theta, \phi) = \begin{cases} \sin\phi & ; \quad 0 \leq \theta \leq \pi ; \quad 0 \leq \phi \leq \pi \\ 0 & ; \quad 0 \leq \theta \leq \pi ; \quad 0 \leq \phi \leq 2\pi \end{cases}$$

- b) Derive expression for noise figure and noise temperature of an antenna.

- Q.4 a) Explain the array of N-sources of equal magnitude and spacing – board side case:

- i) Direction of pattern maxima.
  - ii) Direction of pattern minima.

- b) Show that the radiation resistance of half wave dipole is  $73\Omega$ .

## **PART-B**

- Q.5 a) Explain the working principle of loop antenna. What are the advantages and disadvantages of loop antenna? 12  
b) Design a 3 – element Yagi – Uda antenna to operate at a frequency of 172 MHz. 8

- Q.6 a) Describe different layers of atmosphere, in detail. Also, explain various modes of propagation. 12  
 b) Determine the change in the electron density of the E-layer when critical frequency changes from 4 MHz to 1 MHz between mid-day and sunset. 8

- Q.7**    a) Describe the method of measuring the gain of the antenna.  
          b) Explain the procedure for measuring radiation pattern of an antenna.

## **mester Examination, D**

B. Tech. — Fifth Semester

卷二 8-1

3.5 - 3.5 - 1 1.8.2

**Max Marks:** **100**

No. of pages: 2

- ### **Q1 Answer the following questions:**

- Calculate Z-transform of  $x(n) = 3\delta(n+3) - 4\delta(n+5) + 6\delta(n+3)$

- b) Given  $x_1(n) = \begin{bmatrix} 1, 2, 1, 0 \end{bmatrix}$  and  $x_2(n) = \begin{bmatrix} 2, -1, 1 \end{bmatrix}$  find  $x_1(n) + 4x_2(n)$

- b) Given  $[ \quad ]$  . Calc  
c) State and prove time reversal property of Z transform.

- c) State and prove time reversal property of Z-transform
  - d) Differentiate between truncation and rounding off

- d) Differentiate between truncation and rounding.  
e) What is twiddle factor? Write expression.

- e) What is twiddle factor? Write expression.  
f) What is the basic difference between Chebyshev and inverse Chebyshev filter?

- g) What do you mean by linear phase filter?

- g) What do you mean by linear phase filter?  
 h) State advantage of parallel form filter structure.

- ii) State advantage of parallel form Intel structure realization.  
 i) Compare computational complexity of DFT and FFT

- i) Compare computational complexity of DFT and FFT  
 ii) Write expression for hamming window function

- jj) Write expression for hamming window function.

2×10

## PART-A

- Q.2 a) List the advantages and disadvantages of DSP and ASP. **10**  
 b) Explain the process of multi rate DSP. **10**

Q.3 a) A system has impulse response  $h(n) = \begin{bmatrix} 1, 2, 3 \\ \uparrow \end{bmatrix}$  and output response  $y(n) = \begin{bmatrix} 1, 1, 2, -1, 3 \\ \uparrow \end{bmatrix}$ .  
 Find the input sequence  $x(n)$ . **10**

b) Find  $x(n)$  if  $X(Z) = \log(1 - az^{-1})$ ; given that  $|z| > |a|$ . **10**

- Q.4 a) Use 4 – point DFT and IDFT to determine circular convolution of following sequences:

$$x_1(n) = [1, 2, -1, 3]$$

$$x_2(n) = [2, 1, 4, 2]$$

**10**

$$x(n) = \left[ \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 0, 0, 0, 0 \right]$$

- b) Find 8 point DFT using DIF – FFT algorithm: **10**

**PART-B**

- Q.5 a) Derive mapping formula and mapping graph for IIR filter designing using impulse invariant technique. **10**

- b) Differentiate bilinear transformation from other transformations based on their stability. **10**

- Q.6 a) A LPF is to be designed with the following desired frequency response:

$$H_d(e^{jw}) = \begin{cases} e^{-j2w}, & -\pi/4 \leq w \leq \pi/4 \\ 0, & \pi/4 < |w| \leq \pi \end{cases}$$

Determine filter coefficients  $h_d(n)$  if the window function is defined as  $w(n) = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & otherwise \end{cases}$ . Also determine frequency response of designed filter. **12**

- b) Explain the magnitude and phase response of digital filters and the necessary condition to prove that phase of FIR filter is linear. **8**

- Q.7 a) Obtain cascade form realization for the following system:

$$y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$$

**10**

$$H(z) = \left( 1 + \frac{1}{2}z^{-1} + z^{-2} \right) \left( 1 + \frac{1}{4}z^{-1} + z^{-2} \right)$$

- b) Realize linear phase FIR filter for the system

Also write the advantage of this realization over all other realizations. **10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

**Q.1** Answer the following:

- a) What is VHDL? Why is it used?
- b) What is delta delay? Why is it required?
- c) Write the syntax of case statement.
- d) Define configuration.
- e) Write VHDL code of full adder in data flow modeling.
- f) Write the entity of 2-Bit Comparator.
- g) What is the difference between synchronous and asynchronous counter?
- h) Write the component declaration of T flip-flop designed using J-K flip-flop for structural modeling.
- i) List various types of operations that can be performed by ALU.
- j) What are the advantages of CPLD over PLD?

**2×10**

### **PART-A**

- Q.2 a) What is the difference between VHDL and Verilog? **5**  
b) What is a signal driver? When is it created and how is it appended? **5**  
c) What are the differences between behavioural modeling and dataflow modeling? Explain with example. **10**
- Q.3 a) Why are generics used? Write VHDL code for an n-input AND gate using the concept of generics. **15**  
b) Explain conditional signal assignment statements with example. **5**
- Q.4 a) Write VHDL code for 1:4 demultiplexer using behavioural modeling. **10**  
b) Write VHDL code for 2 to 4 line decoder using behavioural modeling. **10**

### **PART-B**

- Q.5 a) Write VHDL code for description of a 3-bit up counter using behavioural modeling. **10**  
b) Write VHDL code for 4-bit down counter. **10**
- Q.6 a) Write VHDL code for arithmetic logic unit (ALU). **10**  
b) Write short note on various types of memories used by computer. **10**
- Q.7 a) Implement full adder using ROM. **10**  
b) Describe the architecture of CPLD in detail. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fifth / 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 a) List the traffic and control channels in GSM system.  
b) Define FDD and TDD.  
c) Define Co-channel re-use ratio.  
d) What are forward link, reverse link, uplink and downlink?  
e) Write the expression for power received in a two ray ground reflection model.  
f) List factors affecting small scale fading.  
g) Define coherence bandwidth and coherence time.  
h) If  $P_t = 50W$ ,  $f_c = 900MHz$ , gain is unity, calculate the power received in a free space propagation model.  
i) Calculate the number of physical channels supported in a GSM system.  
j) How do you define effective isotropic radiated power, 'EIRP'? **2×10**

### **PART-A**

Q.2	a) Explain the architecture of GSM system with the help of a block diagram. b) Differentiate between cordless and paging system.	14 6
Q.3	a) Write a brief note on 2G and 2.5G standards. b) Give an overview on: i) IEEE 802.11 WLAN standards. ii) Bluetooth.	10  <b>5×2</b>
Q.4	a) What is the basic propagation mechanisms? b) Discuss the signal prediction in HATA model. c) Calculate the path loss $P_L$ (dB); if $P_t = 50\text{W}$ and $P_r = 25\text{W}$ .	6 10 4

### PART-B

Q.5	a) Explain linear equalization and derive the output of the equalizer. b) What are diversity techniques? List them all and explain any one briefly?	10 10
Q.6	a) How to increase the coverage and capacity in a cellular system? b) Briefly discuss the channel assignment strategies. c) Given path loss exponent $n=4$ , find the frequency re-use factor 'Q', for $N=7$ cell re-use pattern. Calculate $\frac{S}{I}$ (dB) if there are six cells in the first tier. Use suitable approximations.  <b>4</b>	10 6  <b>4</b>
Q.7	a) Differentiate between FDMA, TDMA and CDMA systems. b) Write a note on packet radio protocol, ALOHA and slotted ALOHA.	10 10

## End Semester Examination, Dec. 2017

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) Slope overload problem in delta modulation can be overcome by increasing the step size. Justify it.

- b) Consider an audio signal comprised of the sinusoidal term:

$$s(t) = 4 \cos 800\pi t$$

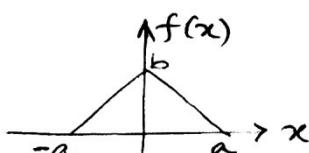
How many bits are needed to achieve a signal to quantization noise ratio atleast 40 dB?

- c) Explain binary PSK modulation scheme.

- d) Give the equation for average probability of error for baseband signal receiver.

- e) Explain the difference between bit rate and baud rate.

- f) For the PDF shown below, find the relation between a and b.



g) Explain Gaussian probability density function.

h) Define autocorrelation function. Show that  $R_X(-\tau) = R_X(\tau)$

$$P\left(\frac{Y}{X}\right) = \begin{bmatrix} 0.8 & 0.2 \\ 0.2 & 0.8 \end{bmatrix}$$

i) Find the channel capacity

j) A system has a bandwidth of 4 kHz and a SNR of 28 dB at the receiver. Calculate its information carrying capacity.

**2x10**

### **PART-A**

Q.2 a) What is pulse modulation? What are different pulse modulation techniques? Give the differences between PAM and PTM.

**5**

b) With the help of suitable block diagram and waveforms, explain pulse code modulation (PCM). Explain the coding and decoding techniques in PCM. **10**

c) Explain the working of differential pulse code modulation (DPCM). Write its advantages.

**5**

Q.3 a) Draw the block diagram of QPSK transmitter and receiver and explain its working.

**10**

b) Describe MSK modulation scheme.

**10**

Q.4 What is a matched filter? Derive an expression for the probability of error  $P_e$  and transfer function  $H(f)$  of the matched filter.

**20**

### **PART-B**

Q.5 a) A binary channel has the following noise characteristics:

$$P\left(\frac{X}{Y}\right) = \begin{bmatrix} 2 & 1 \\ 3 & 3 \\ 1 & 2 \\ 3 & 3 \end{bmatrix}$$

i) If the input symbols are transmitted with probabilities  $\frac{3}{4}$  and  $\frac{1}{4}$

respectively, calculate  $H(X), H(Y), H(X,Y), H\left(\frac{Y}{X}\right)$  and  $I(X,Y)$

ii) Find the channel capacity.

**10**

b) State and prove Shannon-Hartley Theorem.

**6**

c) Apply Shannon Fano encoding procedure to the message ensemble given:

$$X = \{x_1, x_2, x_3, x_4, x_5, x_6, x_7\}$$

$$P(x) = \{0.4, 0.2, 0.12, 0.08, 0.08, 0.08, 0.04\}$$

Determine coding efficiency.

**4**

Q.6 a) The joint PDF  $f_{xy}(x, y)$  of two joint random variables X and Y is given by:

$$f(x, y) = K xy, \quad 0 < x < 2 \text{ & } 1 < y < 3.$$

0 , otherwise

i) Find K.

ii) Find  $f_x(x)$  and  $f_y(y)$

iii) Are X and Y independent?

**8**

b) State and explain Central Limit Theorem.

**6**

c) A random variable  $V = b + x$ , where  $x$  is a Gaussian distributed random variable with mean 0 and variance  $\sigma^2$ , and  $b$  is a constant. Show that  $V$  is a Gaussian distributed random variable with mean  $b$  and variance  $\sigma^2$ .

**6**

Q.7 a) The autocorrelation function of a WSS process  $X(t)$  is given by:

$$R_X(\tau) = a^2 e^{-b|\tau|}, \quad b > 0$$

Find the power spectral density of the process.

**8**

b) Write short notes on:

- i) Random process transmission through linear filters.
- ii) Cross-Spectral density.

**12**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **MICROCONTROLLER AND INTERFACING (EC-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 a) What do you mean by active register bank?  
b) Describe the function of PSEN signal of 8051 microcontroller.  
c) Write an instruction to write the contents of accumulator an external data memory location 0020H.  
d) Differentiate between LJMP and SJMP instruction of 8051 microcontroller.  
e) Why mode-3 operation of timer is known as split-timer mode?  
f) Write the instructions to start and stop timer 0.  
g) What is meant by term interrupt vector?  
h) What address in interrupt vector table is assigned to the serial interrupt? How many bytes are assigned to its interrupt service routine?  
i) What is the role played by timer-1 in serial communication?  
j) What is the function of E pin in LCD?

**2×10**

### **PART-A**

- Q.2 a) Draw the pin diagram of 8051 microcontroller. Also explain its various signals. **12**  
b) Draw and explain the internal RAM structure of 8051 microcontroller. **8**
- Q.3 a) Write a program to add first 10 natural numbers. **5**  
b) Explain direct addressing mode of register addressing modes with examples. **5**  
c) Explain following instructions with examples:  
i) CLR  
ii) CPL  
iii) RETI  
iv) ADDC **10**
- Q.4 a) Explain Mode-1 and Mode-2 operation of timer of 8051 microcontroller. **12**  
b) Explain the function of following registers:  
i) TMOD  
ii) TCON **4×2**

### **PART-B**

- Q.5 Explain various modes of operation of serial port of 8051 microcontroller. **20**
- Q.6 a) Write a note on 'interrupt structure of 8051 microcontroller'. What do you mean by interrupt priority? **10**  
b) Write a program to generate 100 KHz square wave on pin P<sub>1.2</sub> using interrupt. **10**
- Q.7 a) Interface ADC with 8051 microcontroller. **10**  
b) Interface 32K external RAM with 8051 microcontroller. Draw interfacing diagram of address mapping. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester  
**COMMUNICATION SYSTEMS-I (EC-522)**

Time: 3 hrs.

Max Marks: **100**

**403/5**

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 modulation and state its need.  
 b) Explain the difference between low level and high level modulation.  
 c) An amplitude modulated amplifier provided an output of 106 watts at 100% modulation. Calculate:  
   i) Unmodulated carrier power.  
   ii) Sideband power.  
 d) Explain the relationship between phase modulation and frequency modulation.  
 e) A FM signal is defined by:  

$$V(t) = 10 \cos(2\pi \times 10^8 t + 20 \sin 2\pi \times 10^3 t)$$
.  
   Find the total power and the bandwidth required.  
 f) What is AGC? How AGC is obtained in a practical diode detector?  
 g) Draw the block diagram of AM radio transmitter and explain it.  
 h) Explain pre-emphasis and de-emphasis.  
 i) Define thermal noise. Write the expression for thermal noise voltage generated by resistor of R ohms and at temperature, T kelvin.  
 j) Define noise figure. Noise figure of a cascade system comprising three stages with parameters  $(F_1, A_1), (F_2, A_2)$  and  $(F_3, A_3)$  is given by \_\_\_\_\_.  
**2x10**

### **PART-A**

- Q.2 a) Define signal. How can an analog signal be converted into digital signal?  
 Enumerate the advantages and disadvantages of a digital communication system. **10**  
 b) Draw the block diagram of a communication system and explain its each block in detail. **10**
- Q.3 a) Describe in detail filter method for generation of SSB signal. How SSB modulation is different from VSB transmission. **12**  
 b) An amplitude modulated voltage is given by  

$$s(t) = 5(1 + 0.2 \cos 100t + 0.01 \cos 350t) \cos 10^4 t$$
. State all frequency components (in Hz) present in the signal and effective modulation index of  $s(t)$ . **8**
- Q.4 a) A carrier is frequency modulated with a sinusoidal signal of 2KHz, resulting in a maximum frequency deviation of 5KHz.  
   i) Find the bandwidth of the modulated signal.  
   ii) The amplitude of the modulating sinusoid is increased by a factor of 3, and its frequency is lowered to 1 KHz. Find the maximum frequency deviation and the bandwidth of the new modulated signal. **10**  
 b) Explain indirect method for FM generation. Why is it called indirect method? **10**

### **PART-B**

- Q.5 a) Explain super heterodyne receiver. How is it different from TRF receiver? **10**  
 b) What is image frequency? How can it be avoided? **4**  
 c) Describe in detail FM radio transmitter. **6**

- Q.6** a) Explain in detail different types of internal noise in a communication system. **10**
- b) Given a receiver connected to antenna whose resistance is  $75\Omega$ . The equivalent noise resistance of receiver is  $25\Omega$ . Calculate the noise figure of the receiver and its equivalent noise temperature. Assume, ambient temperature of  $17^\circ\text{C}$  for the various components of system. **10**
- Q.7** a) Compare the performance of AM, DSB-SC and SSB-SC system in the presence of noise. **10**
- b) What do you mean by FM threshold effect? **5**
- c) Why FM is more immune to noise than AM? **5**

# **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester  
**COMMUNICATION SYSTEMS-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**. Each question carries equal marks.

- Q.1** Briefly answer:
- a) What are the functions of a transmitter in communication system? Draw the block diagram of a transmitter.
  - b) Define ‘amplitude modulation’. Draw the spectrum of AM wave. (Assume modulating signal to be sinusoidal).
  - c) A transmitter radiates 10 kW with the carrier unmodulated and 11.5 kW when it is sinusoidally modulated. Calculate the modulation index and the total radiated power.
  - d) Given an angle modulated signal  $s(t) = 10 \cos [(10^8) \pi t + 5 \sin 2 \pi (10^3) t]$  Determine the maximum frequency deviation and bandwidth.
  - e) Distinguish between ‘Narrowband’ and ‘Wideband FM’.
  - f) What is the significance of RF section in superheterodyne receiver?
  - g) What is intermediate frequency and what is its significance.
  - h) Define ‘noise figure’. What is its value for an ideal source?
  - i) An amplifier is operating at 17° C with a bandwidth of 15 KHz. Find thermal noise power in Watts and rms noise voltage for a 60Ω internal resistance and a 60Ω load resistance.
  - j) What do you mean by FM threshold effect? **2×10**

## **PART-A**

- Q.2** a) Define ‘modulation’. Why is it needed? **10**
- b) What are the elements of digital communication system? What are the advantages of digital communication system over analog communication system? **10**
- Q.3** a) Describe the square law method for generating AM signal. Also explain envelope detector method for demodulation. **10**
- b) Draw the block diagram of phase cancellation SSB generation method and explain how the carrier and unwanted sideband are suppressed. What change is required to suppress the other sideband? **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. **6**
- b) Discuss with suitable block diagram, Armstrong method for FM generation. Why is it called indirect method? **7**
- c) Draw a circuit of Foster Seeley discriminator and explain it in detail. **7**

## **PART-B**

- Q.5 a) Name the constituent stages of AM radio transmitter and briefly give the function of each stage. **7**
- b) What is AGC? How AGC is obtained in a practical diode detector? Explain with a neat diagram. **7**
- c) What is the difference between low level and high level modulation? **6**
- Q.6 a) Explain the following terms:  
i) Noise figure.  
ii) S/N ratio.  
iii) Noise temperature.  
Derive the expression of noise temperature in terms of noise figure. **10**
- b) What are the types of noise that effect a communication system? Explain different types of external noise. **10**
- Q.7 a) Find the expression of SNR for coherent reception with SSB modulation. **10**
- b) What is the need for pre-emphasis and de-emphasis in FM? Explain with suitable diagram. **10**

# End Semester Examination, Dec. 2017

## 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**. Each question carries equal marks.

- Q.1 a) Define 'modulation'. Discuss various types of modulation techniques.  
b) Give some applications of communication systems.  
c) What is the percentage of power saving in SSB transmission as compared to DSB signal (Take modulation index as '1')?  
d) A 400W carrier is modulated to a depth of 75 percent. Find the total power in the AM wave. Assume that the modulating signal is sinusoidal.  
e) A FM signal is given by:

$$v(t) = 10\cos(2\pi \times 10^8 t + 20\cos 2\pi \times 10^3 t)$$

Find its bandwidth.

- f) What is the need for sampling? What is Nyquist interval for the signal,  
 $x(t) = 5\cos(2\pi \times 500t)$  ?  
g) If the encoding bits per sample in PCM is increased from 6 bits to 8 bits, what will be the increase in SNR?  
h) Differentiate between ASK and FSK.  
i) Mention the significance of spread spectrum modulation.  
j) The noise figure of an amplifier is 0.2 dB. Find the equivalent temperature. **2x10**

### **PART-A**

- Q.2 a) Define 'signal'. Explain different types of signals with examples. **10**  
b) Explain the working of a communication system with the help of block diagram. **10**
- Q.3 a) A carrier wave with amplitude 12V and frequency 10 MHz is amplitude modulated to 50% level with a modulated frequency of 1 KHz. Write down the equation for the above wave and sketch the modulated signal in frequency domain. **7**  
b) Explain the balanced modulator method of generating DSBSC wave with a neat block diagram. **6**  
c) Derive the expression for the transmission efficiency of AM wave. **7**

- 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.

**8**

b) Explain the principle and working of phase locked loop FM demodulator.

**7**

c) Discuss with suitable block diagram Armstrong method for FM generation.  
Why is it also called in direct method?

**5**

### **PART-B**

Q.5 a) Explain PCM. Derive the relation for signaling rate and transmission bandwidth in a PCM system.

**10**

b) Explain delta modulation. How can we overcome slope overload error?

**5**

c) Explain different types of comprenor characteristics in detail.

**5**

Q.6 a) Define 'spread spectrum'. List the two spread spectrum techniques and explain any one of them in detail.

**10**

b) Explain the working of QPSK and list its advantages and disadvantages.

**10**

Q.7 a) Explain the following terms:

i) Noise figure.

ii) S/N ratio.

iii) Noise temperature.

Derive the expression of noise temperature in terms of noise figure.

**10**

b) Two resistors  $50\text{k}\Omega$  and  $100\text{k}\Omega$  are at room temperature ( $290\text{K}$ ). For the bandwidth of 50 KHz, calculate the thermal noise for the following conditions:

i) For each resistor

ii) Two resistors in parallel.

iii) Two resistors in series.

**10**

**End Semester Examination, Dec. 2017**  
**B. Tech. (ECE) — 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.** Each question carries equal marks.

- Q.1 a) BWO stands for \_\_\_\_\_.  
b) Name the technique used for measurement of low microwave power.  
c) What are active microwave devices? Give two examples.  
d) Define maximum unambiguous range with reference to a radar.  
e) Mention two properties of scattering matrix.  
f) Define dominant mode in a waveguide.  
g) Give two applications of GUNN diode.  
h) Define velocity modulation.  
i) What is a cavity resonator?  
j) Calculate the wavelength of a microwave signal having a frequency of 10 GHz.

## PART-A

- |     |   |              |
|-----|---|--------------|
| Q.2 | a) Explain in detail the various applications of microwaves.<br>b) What are the various advantages of microwaves?   | 10<br>10     |
| Q.3 | a) Give points of differences and similarities between waveguides and transmission lines.<br>b) The $TE_{10}$ mode is propagated in a rectangular waveguide of dimensions $a=6$ cm and $b=4$ cm. By means of a travelling detector, the distance between a maxima and minima is found to be 4.55 cm. Find the frequency of the wave | 10<br>10     |
| Q.4 | a) Derive the scattering matrix of a directional coupler.<br>b) Explain two applications of E-H plane tee.<br>c) Calculate the resonant frequency of a circular resonator having diameter =12.5 cm and length=5 cm for $TM_{012}$ mode.   | 10<br>6<br>4 |

PART-R

- Q.5 a) Explain the construction and working of magnetron. **10**  
b) What are the limitations of conventional tubes at microwave frequencies? Explain any five in detail. **10**

Q.6 Write short notes on (*any two*): **10×2**  
a) PIN diode.  
b) IMPACT diode.  
c) VARACTOR diode.

Q.7 a) Explain the electronic technique for measurement of frequency. **5**  
b) Two identical directional couplers are used in a waveguide to sample the incident and reflected powers. The output of the two couplers is found to be 2.5 mW and 0.15 mW. Find the value of VSWR in the waveguide. **5**  
c) Derive the simple form of radar range equation in detail. **10**

**End Semester Examination, Dec. 2017**  
**B. Tech. (ECE) — Sixth Semester**  
**MICROWAVE DEVICES AND CIRCUITS (EC-621)**

Time: 3 hrs.	Max Marks: 100
	No. of pages: 1

- Q.1 a) What are active microwave devices? Give two examples.  
b) Define wave impedance of a waveguide.  
c) Give two points of difference between TED's and microwave transistor.  
d) Define 'current modulation'.  
e) BWO stands for \_\_\_\_\_.  
f) Two identical directional couplers are used in a wave guide to sample the incident and reflected power. The O/P of two couplers is found to be 2.5 mW and 0.15 mW. Find the value of reflection coefficient.  
g) Define maximum unambiguous range of a radar.  
h) Mention two properties of scattering matrix.  
i) Define microwave junction.  
j) A cylindrical waveguide has a radius of 2 cm. Find the cut off wave length for the guide operating in  $TE_{11}$  mode.

## **PART-A**

- Q.2**

  - a) Explain in detail the advantages of microwaves. **10**
  - b) What are the various applications of microwaves? Discuss in detail. **10**

**Q.3**

  - a) Show that a TEM wave cannot propagate through a wave guide. **10**
  - b) The  $TE_{10}$  mode is propagated in a rectangular waveguide of dimensions  $a=6$  cm and  $b=4$  cm. By means of a travelling detector the distance between a maximum and minimum is found to be 4.55 cm. Find the frequency of the wave. **10**

**Q.4**

  - a) Derive the scattering matrix of directional coupler. **10**
  - b) Explain in detail the working of an isolator. **6**
  - c) Calculate the lowest resonant frequency of a rectangular cavity resonator of dimension  $a=2$  cm,  $b=1$  cm and  $d=3$  cm for the dominant  $TE_{101}$  mode. **4**

### **PART-B**

- Q.5 a) Explain the construction and working of a two cavity klystron amplifier. **10**  
 b) What are slow wave structures? Explain how a helical TWT achieves amplification. **10**
- Q.6 Write short notes on (*any two*):  
 i) PIN diode.  
 ii) IMPATT diode.  
 iii) Varactor diode. **10×2**
- Q.7 a) Explain the technique for measurement of low power. **5**  
 b) A slotted line is used to measure the frequency and it was found that the distance between nulls is 1.85 cm. Given the guide dimensions as 3 x 1.5 cm, calculate the value of frequency. **5**  
 c) Explain the principle of operation of radar with the help of a block diagram. **10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 a) What are the advantages and disadvantages of digital communication?  
 b) If the Nyquist samples are quantized into 256 levels, determine the number of binary digits required to encode the quantized samples.  
 c) Explain ASK.  
 d) What is a matched filter? Write the expression of probability of error in matched filter.  
 e) Define cumulative distribution function (CDF). Write properties of CDF.  
 f) Explain Gaussian pdf.  
 g) 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.
- h) Find the channel capacity of binary symmetric channel as shown below:  
**Fig.**
- i) What is autocorrelation function? State its various properties.  
 ii) Find the constant  $C$  so that the function
- $$f(x) = c(x-1), 1 < x < 4 \\ 0, \text{ otherwise}$$
- is a density function. Also find  $P(2 < x < 3)$ . **2×10**

### **PART-A**

- Q.2 a) Explain pulse code modulation in detail. Derive the expression for signal to quantization noise ratio for a PCM system that employs linear

- quantization technique. Assume, input to the PCM system is a sinusoidal signal. 10
- b) What is aliasing effect? Suggest methods to eliminate it. 4
- c) Explain DPCM in detail. What is the need for predictor in DPCM? 6
- Q.3 a) Discuss QPSK modulator and demodulator in detail. What are its advantages over BPSK? 10
- b) Explain MSK modulation scheme. 10
- Q.4 a)
- PART-B**
- Q.5 a) Consider a random variable  $x$  defined by
- $$f(x) = \begin{cases} \frac{1}{b-a}, & a < x < b \\ 0, & \text{otherwise} \end{cases}$$
- Find i) The corresponding CDF  
ii) The mean and variance of  $x$ . 10
- b) State and explain Central Limit Theorem. 5
- c) Let,  $z$  be a random variable with probability density function  $f(z) = \frac{1}{2}$  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. 5
- Q.6 a) Write short notes on:  
i) Random process transmission through linear filters.  
ii) Cross spectral density. 6×2
- b) Explain the term power spectral density,  $S_{xx}(f)$ . Show that the power spectrum of a (real) random process is given by  

$$S_{xx}(f) = A, -K < f < K$$

$$0, \text{ otherwise}$$
Determine the autocorrelation function. 8
- Q.7 a) A transmitter has an alphabet of three letters  $[x_1, x_2, x_3]$  and the receiver has an alphabet of three letters  $[y_1, y_2, y_3]$ . Given  $P(x) = \left[ \begin{array}{ccc} \frac{1}{8} & \frac{1}{8} & \frac{6}{8} \end{array} \right]$ . The joint probability matrix is
- $$P\left(\frac{y}{x}\right) = \left[ \begin{array}{ccc} 0.6 & 0.2 & 0.2 \\ 0.2 & 0.6 & 0.2 \\ 0.2 & 0.2 & 0.6 \end{array} \right]$$
- Calculate all the entropies. 8
- b) State and prove Shannon Hartley Theorem. Show that the channel capacity of an ideal AWGN channel with infinite bandwidth is given by  $C = 1.44S/\eta$ . 6
- c) A source  $x$  generates five symbols with probabilities 0.4, 0.19, 0.16, 0.15 and 0.1. Construct Huffman code and calculate code efficiency. 6

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester  
**COMMUNICATION SYSTEMS-II (EC-622)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

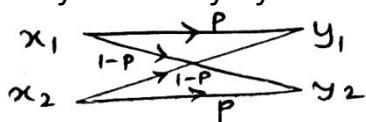
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Q5 having probabilities respectively every microsecond.  
Calculate the information rate.

- h) Find the channel capacity of binary symmetric channel as shown below:



- i) What is autocorrelation function? State its various properties.  
j) Find the constant  $C$  so that the function
- $$f(x) = c(x-1), 1 < x < 4 \\ 0, \text{ otherwise}$$

is a density function. Also find  $P(2 < x < 3)$ .

**2×10**

### **PART-A**

- Q.2 a) Explain pulse code modulation in detail. Derive the expression for signal to quantization noise ratio for a PCM system that employs linear quantization technique. Assume, input to the PCM system is a sinusoidal signal. **10**
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- c) Explain DPCM in detail. What is the need for predictor in DPCM? **6**
- Q.3 a) Discuss QPSK modulator and demodulator in detail. What are its advantages over BPSK? **10**
- b) Explain MSK modulation scheme. **10**
- Q.4 a) Derive the expression for probability of error and transfer function of an optimum filter. **20**

### **PART-B**

- Q.5 a) Consider a random variable  $x$  defined by

$$f(x) = \begin{cases} \frac{1}{b-a}, & a < x < b \\ 0, & \text{otherwise} \end{cases}$$

Find i) The corresponding CDF  
ii) The mean and variance of  $x$ . **10**

- b) State and explain Central Limit Theorem. **5**

- c) Let,  $z$  be a random variable with probability density function  $f(z) = \frac{1}{2}$  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. **5**

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$$S_{xx}(f) = A, -K < f < K$$

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- Q.7 a) A transmitter has an alphabet of three letters  $[x_1, x_2, x_3]$  and the receiver has an alphabet of three letters  $[y_1, y_2, y_3]$ . Given  $P(x) = \begin{bmatrix} \frac{1}{8} & \frac{1}{8} & \frac{6}{8} \end{bmatrix}$ . The joint probability matrix is
- $$P\left(\frac{y}{x}\right) = \begin{bmatrix} 0.6 & 0.2 & 0.2 \\ 0.2 & 0.6 & 0.2 \\ 0.2 & 0.2 & 0.6 \end{bmatrix}$$
- probability matrix is  
Calculate all the entropies. **8**

- b) State and prove Shannon Hartley Theorem. Show that the channel capacity of an ideal AWGN channel with infinite bandwidth is given by  $C = 1.44S/\eta$ . 6
- c) A source  $x$  generates five symbols with probabilities 0.4, 0.19, 0.16, 0.15 and 0.1. Construct Huffman code and calculate code efficiency. 6

## **End Semester Examination, Dec. 2017**

### 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**. Each question carries equal marks.

- Q.1** a) What is the difference between bipolar and MOS IC's?  
 b) Explain the difference between dry and wet oxidation.  
 c) What is ion implantation?  
 d) Describe the limitations of MBE.  
 e) Give the advantages of Ion Beam lithography.  
 f) What is reactive plasma etching?  
 g) What is the difference between depletion and enhancement MOSFET?  
 h) What are the different operating regions for an MOS transistor? Give the current equation in all three regions.  
 i) Define latch up in CMOS.  
 j) What is dynamic RAM? **2×10**

### **PART-A**

- Q.2** a) Describe the classification of IC's. **10**  
 b) Describe the y-chart in detail. **10**
- Q.3** a) What is diffusion? Discuss the mechanisms of diffusion process. **12**  
 b) What are the different processes used for cleaning of a wafer? **8**

- Q.4 a) Define Epitaxy? What is vapor phase Epitaxy? Why is it used? **10**  
 b) What is lithography? Describe the steps followed for optical lithography process. **10**

### **PART-B**

- Q.5 a) Describe various techniques for doping the process of metallization. **10**  
 b) What is etching? Explain plasma properties in detail. **10**
- Q.6 a) What is channel length modulation? Discuss its impact on saturation region in MOSFET. **10**  
 b) Derive the current equation for saturation and non-saturation region of operation in MOSFET. **10**
- Q.7 a) Design a function F1 using CMOS logic  

$$F_1 = \overline{\{ (A \times B) + C \}} \quad \text{also draw its stick diagram.} \quad \text{10}$$
  
 b) Implement 6 transistor static RAM cell. **10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) What is the difference between bipolar and MOS ZC's?  
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 c) What is ion implantation?  
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 e) Give the advantage of Ion Beam lithography.  
 f) What is reactive plasma etching?  
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 h) What are the different operating regions for an MOS transistor? Give the current equation in all three regions.  
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- Q.7 a) Design a function  $F_1$  using CMOS logic  

$$F_1 = \overline{(A \times B) + C}$$
 **D**  
 also draw its stick diagram. **10**  
 b) Implement 6 transistor static RAM cell. **10**

## **End Semester Examination, Dec. 2017**

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 a) Define second time around echo.  
 b) List any two remedial measures to overcome blind speed problem in an MTI radar.  
 c) PPI means \_\_\_\_\_.  
 d) Tracking radar acquires target first before tracking. **(True or False)**  
 e) A radar operates at a PRF of 1000 Hz with a pulse width of  $2\mu s$  at an average power of 100w. Find its peak power.  
 f) Mention the various system losses in a radar.  
 g) A non coherent MTI radar has COHO. **(True or False)**  
 h) What is the advantage of using staggered frequency in MTI radar?  
 i) Define how noise front end?  
 j) Calculate the range of a target if the time taken by radar signal to travel to the target and back is  $80\mu s$ . **2x10**

### **PART-A**

- Q.2 a) Draw and explain the block diagram of a conventional radar with a super heterodyne receiver. **10**

- b) What are the major applications of radar? Discuss each application in detail. **10**
- Q.3** a) Derive the simple form of radar range equation. **12**  
 b) Calculate the maximum range of a radar that operates at a radar that operates at a frequency of 10GHz and has a peak power of 400kW. Its minimum power of 400kW. Its minimums receivable power is 0.1pW. Its antenna has a capture area of 6m<sup>2</sup> and rear cross section of the target is 18m<sup>2</sup>. **8**
- Q.4** a) Describe the principle of operation of multiple frequency CW radar with the help of a block diagram. **10**  
 b) Explain the operation of frequency modulated continuous wave radar. **10**

### **PART-B**

- Q.5** a) What is an MTI radar? Draw its block diagram and explain its principle of operation. **12**  
 b) If an MTI radar operates at 10GHz with a PRF of 0.8 KHz. Find two lowest blind speeds of the radar. **8**
- Q.6** a) Describe the operation of an amplitude comparison Monopulse tracking Radar with the help of a block diagram. **10**  
 b) Explain the operation of a conical scan tracking radar. **10**
- Q.7** Write short notes on:  
 a) Mixer.  
 b) Duplexer.  
 c) Synthetic aperture radar.  
 d) Receiver protectors. **5×4**

## **End Semester Examination, Dec. 2017**

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:  
 a) Define second time around echo.  
 b) List any two remedial measures to overcome blind speed problem in an MTI radar.  
 c) PPI means \_\_\_\_\_.  
 d) Tracking radar acquires target first before tracking. (**True or False**)  
 e) A radar operates at a PRF of 1000 Hz with a pulse width of 2μs at an average power of 100 W. Find its peak power.  
 f) Mention the various system losses in a radar.  
 g) A non-coherent MTI radar has COHO. (**True or False**)  
 h) What is the advantage of using staggered frequency in MTI radar?  
 i) Define low noise front end.  
 j) Calculate the range of a target if the time taken by radar signal to travel to the target and back is 80μs. **2×10**

## **PART-A**

- Q.2 a) Draw and explain the block diagram of a conventional radar with a super heterodyne receiver. **10**  
b) What are the major applications of radar? Discuss each application in detail. **10**
- Q.3 a) Derive the simple form of radar range equation. **12**  
b) Calculate the maximum range of a radar that operates at a frequency of 10GHz and has a peak power of 400kW. Its minimum receivable power is 0.1pW. Its antenna has a capture area of  $6\text{m}^2$  and radar cross section of the target is  $18\text{m}^2$ . **8**
- Q.4 a) Describe the principle of operation of multiple frequency CW radar with the help of a block diagram. **10**  
b) Explain the operation of frequency modulated continuous wave radar. **10**

## **PART-B**

- Q.5 a) What is an MTI radar? Draw its block diagram and explain its principle of operation. **12**  
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- Q.7 Write short notes on:  
a) Mixer.  
b) Duplexer.  
c) Synthetic aperture radar.  
d) Receiver protectors. **5×4**

## **End Semester Examination, Dec. 2017**

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 a) Define piezoelectric effect.  
b) Aspect ratio for TV picture frame is \_\_\_\_\_.  
c) Field frequency is \_\_\_\_\_ Hz in India.  
d) What are different frequency bands used in dish TV and cable TV?  
e) Define is Hue.  
f) What do you mean by secondary colours?  
g) What is a CCD?  
h) Why picture signal is AM modulated and sound signal is FM modulated?  
i) If the power of a signal is halved, then the dB decrease is \_\_\_\_\_.  
j) Name the major components of a microwave oven. **2×10**

## **PART-A**

- Q.2 a) A microphone has an output of -60dB and is connected to the  $0.5\text{ M}\Omega$  input of a preamplifier. The preamplifier has a gain of +40dB. The signal then passes through an equalizer with an insertion loss of -15dB and through a main amplifier with a gain of +65dB. If the output to the speaker is 6 watt, find the total power gain and the input voltage to the preamplifier. **10**
- b) Explain the characteristics of an ideal microphone. **10**
- Q.3 a) What do you mean by composite video signal, Sketch and explain all its components. **10**
- b) Justify the BW requirement of a monochrome TV signal. **10**
- Q.4 a) Explain various attributes of color. **6**
- b) Explain delta gun picture tube. **10**
- c) What are the compatibility considerations between a monochrome and colour TV signal? **4**

## **PART-B**

- Q.5 a) Explain the process of video signal recording on magnetic tapes. **10**
- b) Explain the technology of VCD and DVD. **10**
- Q.6 Write short notes on **(any two)**:
- a) Facsimile (FAX) machine.
- b) Calculator.
- c) Bar code reader. **10×2**
- Q.7 a) Explain the principle and operation of microwave ovens. **10**
- b) Explain the working of digital clocks with the help of a suitable diagram. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester

## **CONSUMER ELECTRONICS (EC-625)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **1**

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- h) Why picture signal is AM modulated and sound signal is FM modulated?
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- j) Name the major component of a microwave oven. **2×10**

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- b) Explain delta gun picture tube. **10**
- c) What are the compatibility considerations between a monochrome and colour TV signal. **4**

## **PART-B**

- Q.5 a) Explain the process of video signal recording on magnetic tapes. **10**
- b) Briefly explain the technology -VCD and DVD. **10**
- Q.6 Write short notes on **any two** electronic gadgets and office equipments.
- a) Facsimile (FAX) machine.
  - b) Calculator.
  - c) Bar code reader. **10×2**
- Q.7 a) Explain the principle and operation of microwave ovens. **10**
- b) With the help of suitable diagram explain the working of digital clocks. **10**

## **End Semester Examination, Dec.2017**

B. Tech. – Sixth Semester  
**EMBEDDED SYSTEMS (EC-626)**

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) Draw the block diagram of a microcontroller with built-in-circuitry to access external memory devices.
- b) Explain the Harvard and Princeton computer architecture with the help of their block diagram.
- c) What are the advantages of ICSP programming method? Is their feature available in Low-end PIC microcontroller?
- d) What is the status of zero flag after ANDing of OX05A & Ox0A5? Justify your answer.

- e) Write a program to subtract two 8 bit numbers.
- f) What do you understand by Structures and Arrays?
- g) What is the difference between Defines and Macros?
- h) How many analog inputs are there in PIC16F877A microcontroller?
- i) How many timers and interrupts are there in PIC16F877A?
- j) What value should be loaded in TMRO register to achieve the delay of 180  $\mu$ s using 4 MHz frequency and 1:1 prescaler?

**2x10**

### **PART-A**

- Q.2 a) What are the features of PIC microcontroller? Explain in detail. **8**
- b) Explain microchip's MPASM Assembler. Also, define the files produced by microchip's MPASM Assembler. **6**
- C) What is the Intel Hex file format? Identify the all fields in following HEX record. **6**  
 : 020000021200EA
- Q.3 a) What are the benefits of interrupts in any application? Discuss all interrupts available in PIC16F877A MCU. **10**
- b) What is the need of program counter and stack in any MCU? **6**
- c) How many register banks are there in PIC16F877A? What do you understand by the term file register? **4**

- Q.4 a) Write a program to multiply two 8 bit numbers using addition. Also, draw the flow chart. **15**
- b) How many instructions are there in PIC16F877A? Discuss all bit oriented instructions with the help of example. **5**

### **PART-B**

- Q.5 a) Explain in detail the operation of timer 1 with the help of its block diagram. **10**
- b) Explain the following registers:
- i) OPTION Register
  - ii) T2CON
  - iii) T1CON
  - iv) INTCON.
- 10**
- Q.6 a) How many modes of operation are available in master synchronous serial port module? Explain all in detail with the help of block diagram. Also, explain the registers used in these modes. **15**
- b) Which part of PIC16F877A is assigned to analog I/O? Also, explain how many channels are available? **5**
- Q.7 Explain (**any two**) interfacing with PIC MCU:
- i) Relay
  - ii) LED's & Switch Bounces.

- iii) DC Motor.
- iv) Analog I/O.

**10x2**

**End Semester Examination, Dec.2017**  
B. Tech. - Sixth 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 Oscillators.  
      c) Mention any two properties of S Matrix?

- c) Define Microstripline.
- d) What is the technique for measurement of medium microwave power called as?
- e) Define frequency pulling with reference to a magnetron.
- f) A rectangular cavity has dimension  $a = 4$  cm,  $b = 2$  cm and  $d = 6$  cm. Calculate the resonant frequency of the cavity for the dominant mode.
- g) Define transferred electron device.
- h) Calculate the frequency of a electromagnetic wave having a wave length of 3 cm.
- i) Define maximum unambiguous range.
- j) The X band frequency range is \_\_\_\_\_.

**2x10**

### **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) Describe the construction and working of a two cavity klystron in detail.

**10**

- b) Explain the limitations of conventional tubes at microwave frequencies.

**10**

- Q.6 a) Write short notes on (**any two**):

- i) TRAPATT Diode
- ii) Varactor Diode
- iii) PIN diode
- iv) TUNNEL Diode.

**2x10**

- Q.7 a) A slotted line is used to measure the frequency and it was found that the distance between nulls is 1.85 cm. Given the waveguide dimensions as 3x1.5 cm, calculate the value of frequency.

**5**

- b) Explain the technique for measurement of high microwave power.

**5**

c) Derive the simple form of radar range equation.

**10**

# **End Semester Examination, Dec. 2017**

B. Tech. – Fifth / Seventh 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**. Each question carries equal marks.

**Q.1** Answer the following:

- a) Find the period of machine cycle if crystal frequency for an 8051 based system is 11.0592 MHz.
- b) Explain OV flag of 8051 microcontroller.
- c) Give examples of direct addressing mode and indirect addressing mode.
- d) Show the contents of registers A and B after execution of following instructions.  
MOV A, # 37H  
Add A, # 24H  
DA A
- e) What is the function of bit TFI in the special function register TCON?
- f) What will be contents of TMOD register to configure Timer-0 in Mode-1?
- g) Which mode of timer is used for baud rate programming and how?
- h) With a single instruction, show how all the interrupts can be disabled?
- i) Which register caters to the function of changing interrupt priorities and how?
- j) What is the function of EOC pin in ADC? **2×10**

### **PART-A**

- Q.2** a) Draw and explain the architecture of 8051 microcontroller. **10**
- b) Explain following signals for an 8051 microcontroller:  
ALE, RXD, TI, INTI **10**
- Q.3** a) What are various addressing modes supported by 8051 microcontroller?  
Explain with examples. **10**
- b) Explain following instructions with examples:  
i) DIV  
ii) RR  
iii) SUBB  
iv) CPL **2½×4**

- Q.4** a) Write a program to generate a square wave of 10 KHz on pin P1.2.  
Assume crystal frequency of 12 MHz. **10**
- b) Write a short note on timer clocking sources. **6**
- c) Explain TMOD register of 8051 microcontroller. **4**

### **PART-B**

- Q.5** a) Explain Mode-0 operation of serial port. **8**
- b) Write a note on serial port baud rates. **6**
- c) Explain SCON register in detail. **6**
- Q.6** a) Define interrupt. What are various interrupts of 8051 microcontroller?  
Explain in detail. **10**
- b) Explain IE and IP registers of 8051 microcontroller. **10**
- Q.7** Interface (**any two**) of the following with 8051 microcontroller:

- a) 8255 (Programmable peripheral interface)
- b) ADC
- c) DAC

**10×2**

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.** Each question carries equal marks.

**Q.1** Briefly answer:

- a) Differentiate between half duplex and full duplex modes of transmission.
- b) What is the main advantage of spreading bandwidth?
- c) What is reverse channel?
- d) Discuss why CDMA is preferred over GSM.
- e) Discuss interference in co-channel cells.
- f) Why equalization is needed in a communication system?
- g) Define diversity and list various diversity techniques.
- h) Write any two characteristics of speech signal.
- i) What do you mean by frequency reuse concept?
- j) Name any two 2.5 G standards.

**2×10**

**PART-A**

- Q.2** a) Describe the process of call made from a mobile user to a landline user. **10**  
b) What do you understand by mobile cellular systems? Discuss **10**
- Q.3** a) Differentiate between scattering and diffraction in radio propagation. **10**  
b) What are different types of fading? Explain them briefly. **10**
- Q.4** a) Draw and explain the architecture of GSM in detail. **10**  
b) Discuss any one 3 G standard in detail. **10**

**PART-B**

- Q.5** a) Discuss Handoff in cellular systems and its various strategies in detail. **10**  
b) Explain various techniques used for enhancing capacity and coverage in cellular systems. **10**
- Q.6** What are vocoders? Name different types of vocoders. Also, discuss LPC (linear predictive coders) vocoder in detail. **20**
- Q.7** Write short notes on:  
a) DS-SS.  
b) RAKE receiver. **10x2**

**B. Tech. — Sixth Semester**  
**RADAR ENGINEERING (EC-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) What will be the range resolution of radar having a pulse width of 5  $\mu$ sec?
  - b) Which types of tracking radar gives better accuracy?
  - c) A radar operates at a peak power of 500KW and has a duty cycle of 0.001. Find its average power.
  - d) What will be the effect on maximum unambiguous range of a radar when its PRF is reduced?
  - e) Define ‘system losses of a radar’.
  - f) A PPI scope is a polar coordinate display. (**TRUE / FALSE**)
  - g) The patterns used by the tracking radar have equal beam widths in elevation angle and azimuth angle. (**TRUE / FALSE**)
  - h) What is a pulse Doppler radar?
  - i) Why should the first stage of a RADAR receiver always have a low noise figure?
  - j) Define ‘low noise front end’.
- 2×10**

**PART-A**

- Q.2
- a) Explain the working of a simple RADAR with the help of a block diagram. **10**
  - b) What are the major applications of RADAR? Discuss each application in detail. **10**
- Q.3
- a) A radar operates at a frequency of 10 GHz and has a peak power of 500 KW. The minimum detectable signal for the radar is 0.1pw. Its antenna has a capture area of  $5 \text{ m}^2$  and the radar cross section of the target is  $20 \text{ m}^2$ . Find the maximum range of radar. **8**
  - b) Explain the following terms:
    - i) Range ambiguities.
    - ii) Multiple time around echoes.
    - iii) Pulse repetition frequency.**4×3**
- Q.4
- a) Describe the principle of operation of a FMCW radar with the help of a block diagram. **12**
  - b) Derive the expression for Doppler frequency. **8**

**PART-B**

- Q.5
- a) What are the three lowest blind frequencies of the radar when it is operating at 10 GHz with a PRF of 1000 HZ? **10**
  - b) Explain the operation and working of a non-coherent MTI radar with the help of a block diagram. **10**
- Q.6
- a) Explain the principle of operation of conical scan tracking radar. **10**
  - b) What is range tracking? What is its significance in radar? Explain the process of range tracking in detail. **10**
- Q.7
- Write short notes on (**any two**):
    - a) SAR.
    - b) Radar displays.
    - c) SONAR.**10×2**

**B. Tech. — Sixth Semester**  
**ELECTRONIC SYSTEM DESIGN (EC-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**. Each question carries equal marks.

**Q.1** Answer the following:

- a) Convert  $(3C5A)_{16} = (?)_2 = (?)_8$
- b) Why are NAND and NOR gates called universal gates?
- c) What do you mean by factoring?
- d) What is gray code? Why is it important?
- e) Solve using Demorgan's theorem  $(A + B + C)' = A'B'C'$
- f) What is race around condition in JK flip flop and how can it be avoided?
- g) What is the difference between latch and flip flop?
- h) Explain the term state minimization.
- i) Define one hot encoding.
- j) Define hazard.

**2×10**

**PART-A**

**Q.2** a) Convert the following equation into POS form:

$$F(A, B, C) = \overline{A}B\overline{C} + AB\overline{C} + \overline{A}\overline{B}C + ABC$$

**4**

b) Perform the following:

- i) Convert  $[11\ 0\ 11\ 1\ 0\ 11]_2$  to decimal.
- ii) Convert  $[1\ 0\ 11\ 0\ 11\ 0]_2$  to gray code.
- iii) Subtract  $(73)_8$  from  $(25)_8$  using 2's complement.

**3×2**

c) Explain the various development steps for designing any digital circuit.

**10**

**Q.3** a) By using fractional decomposition, find minimum cost circuit for function:

$$F[A, B, C, D] = \sum m(1, 2, 3, 8, 12, 14, 15)$$

b) Explain the architecture of FPGA in detail.

**10×2**

**Q.4** a) Implement 16:1 multiplexer using 8:1 multiplexer.

b) Explain tri state bus system and logic in detail.

**10×2**

**PART-B**

**Q.5** a) Draw a circuit diagram of universal shift register and explain it.

**10**

b) Convert SR flip flop to JK flip flop.

**5**

c) Convert T FF to SR FF.

**5**

**Q.6** a) Design a serial adder using mealy FSM.

**10**

b) Derive a mealy type FSM that can act as a sequence detector which produces Z=1, when previous 2 values of w are 00 or 11; otherwise Z=0.

**10**

**Q.7** Write short notes on:

- a) Cycle and races.
- b) Types of hazards.
- c) State assignments.

**7**

**7**

**6**

# **End Semester Examination, Dec. 2017**

B. Tech. — Sixth Semester

## **OPTICAL COMMUNICATION (EC-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**. Each question carries equal marks.

- Q.1 a) Define acceptance angle and explain with the help of a sketch.  
 b) List components used in an optical communication system.  
 c) A multimode step index fiber with core diameter 50mm. relative refractive index difference 1% has a normalized frequency of 52.1. Calculate the approximate number of modes.  
 d) Define population inversion with the help of a suitable diagram.  
 e) What do you understand by the term external quantum efficiency?  
 f) Differentiate between intermodal and intramodal scattering.  
 g) For a specific fiber numerical aperture (NA) = 0.275 and refractive index of core ( $n_{core}$ ) = 1.4. Find the critical propagation angle.  
 h) Discuss the various characteristics of semiconductor LASER.  
 i) Discuss briefly types of fiber connectors.  
 j) Define the principle of detection used in an optical communication system. **2×10**

### **PART-A**

- Q.2 a) Explain the block diagram of optical fiber communication system for an analog link. **7**  
 b) Sketch the electromagnetic spectrum for optical communication system. **3**  
 c) Discuss advantages, disadvantages and applications of optical communication system. **10**
- Q.3 a) What is the difference between acceptance angle, critical angle and numerical aperture? A step index fiber has a core and cladding refractive index of 1.50 and 1.46 respectively. Find the value of numerical aperture (NA) and acceptance angle of the fiber. **10**  
 b) Explain the transmission characteristics of optical fibers. **4**  
 c) Differentiate between step index and graded index fiber. How does the rays propagates in graded index fiber? **6**
- Q.4 a) Differentiate between homo structure and hetro structure LED's with the help of suitable diagrams. **10**  
 b) Derive an expression for internal quantum efficiency showing its relationship with power generated internally pnt to the LED. **10**

### **PART-B**

- Q.5 a) Discuss briefly the characteristics of an injection LASER diode. **10**  
 b) Explain the working of distributed feedback LASER with a suitable diagram. **6**  
 c) State and explain the basic principle of LASER action in semiconductors. **4**
- Q.6 a) Explain the detection process in avalanche photodiode and compare this device with the PIN photodiode. **10**  
 b) Derive an expression for the responsivity of an intrinsic photo detector in terms of quantum efficiency. **10**
- Q.7 a) What is the digital modulation formats used in optical fiber communication system? Explain briefly any two. **12**  
 b) Write short notes on:  
   i) Intensity modulation.  
   ii) Wavelength division multiplexing of light signal. **4×2**

# **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester  
**OPTICAL COMMUNICATION (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 a) List components used in optical communication system.  
b) Sketch optical bandwidth and electrical bandwidth in an optical communication system.  
c) Define population inversion with the help of a characteristic diagram.  
d) Determine signal attenuation in dB through the fiber with mean output optical power of  $3\mu\text{W}$  and mean input optical power of  $90\mu\text{W}$ .  
e) A multimode step index fiber with core diameter  $65\mu\text{m}$  relative refractive index difference 1% has a normalized frequency of 52%. Calculate the approximate number of modes.  
f) What is numerical aperture of an optical fiber and how is it related to normalized difference  $\Delta$ ?  
g) What are photo conductors?  
h) Diagrammatically show how LED are coupled with a fiber.  
i) List merits of LASER w.r.t. LED.  
j) Define sensitivity of optical detectors. Which of the two photo defectors i.e. APD or PIN will improve sensitivity of the receiver? **2x10**

**PART-A**

- Q.2 a) Explain the block diagram for a digital link of optical fiber communication. Enlist few applications of optical fiber communication system. **10**  
b) With the help of diagrams discuss intensity modulation in analog optical fiber communication system. **10**
- Q.3 a) Using ray theory, describe the mechanism for the transmission of light within an optical fiber. Briefly discuss with the aid of suitable diagram acceptance angle. How is it related to numerical aperture of the fiber? **10**  
b) Estimate the maximum core diameter with relative refractive index difference 1.5% and core refractive index 1.5 when a wavelength 850 nm propagates. Also find the core diameter if relative refractive index difference is further reduced by a factor 10. **5**  
c) Differentiate between multimode step index and graded index optical fiber. **5**
- Q.4 a) Describe linear scattering losses in optical fibers w.r.t.  
i) Rayleigh  
ii) Mie Scattering. **5x2**  
b) Briefly discuss the reason for pulse broadening due to material dispersion in optical fibers. **5**  
c) Discuss manufacturing materials used for optical fibers. **5**

**PART-B**

- Q.5 a) Draw schematic representation of surface-emitting LED and explain its operation in detail. **8**  
b) Derive an expression for internal and external quantum efficiency of light emitting diodes. **12**

- Q.6 a) Draw representative diagram of Fabry-Perot laser and explain its operation. **8**
- b) Discuss briefly the injection laser characteristics. **7**
- c) Differentiate between spontaneous and stimulated emissions for optical sources. **5**
- Q.7 a) Discuss in detail PIN photodiode. How does it differ from the avalanche photodiode? **10**
- b) A photodiode has a quantum efficiency of 65% when photons of energy  $1.5 \times 10^{-19}$  are incident upon it.
- i) At what wavelength is the photodiode operating?
  - ii) Calculate the incident optical power required to obtain a photo current of 2.5  $\mu\text{A}$ . **10**

**End Semester Examination, Dec. 2017**  
 B. Tech. — Sixth /Seventh/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) What is the difference between bipolar and MOS IC's?  
 b) What is lithography? Describe its types.  
 c) What is etching? Why is it used?  
 d) Draw and name the various forms of pull ups for inverters.  
 e) Why depletion MOSFET is known as ON device?  
 f) What is stick diagram?  
 g) Draw NAND gate using CMOS.  
 h) Why BiCMOS is faster than CMOS technology?  
 i) Write difference between PLA and PAL.  
 j) What is pull up to pull down ratio in CMOS inverter?

**2×10**

**PART-A**

- Q.2 a) Describe monolithic integrated circuit technology with suitable process flow diagram.  
 b) Explain Y chart in details. **10×2**
- Q.3 a) What is ion implantation? Compare ion implantation with diffusion giving its merits and demerits.  
 b) What are the different processes used for cleaning a wafer? **10×2**
- Q.4 Compare:  
 i) Dry etching and wet etching.  
 ii) Positive and negative photoresist.  
 iii) Yield and reliability.  
 iv) DeMOSFET and EMOSFET. **5×4**

**PART-B**

- Q.5 a) Using CMOS combinational logic design, draw stick diagram and layout for:  
 i) AND gate.  
 ii) OR gate.  
 iii) ExOR gate.  
 iv)  $(A+B+C) \times D$ . **12**  
 b) What is channel length modulation? Discuss its impact on saturation region in MOSFET. **8**
- Q.6 a) Explain the working of BiCMOS inverter.  
 b) What do you understand by latch up in CMOS technology? Explain it in detail. **10×2**
- Q.7 a) Design 3-bit adder circuit using CMOS technology. **10**  
 b) Write detail notes on:  
 i) ROM.  
 ii) FPGA. **5×2**

# **End Semester Examination, Dec. 2017**

B. Tech. - Seventh Semester

## **DATA COMMUNICATION AND NETWORKING (EC-725)**

Time: 3 hrs

**100**

Max Marks:

No. of pages: 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) Differentiate between simplex, half duplex and full duplex transmission modes.
- b) Define topology. List the various types of topologies used for communication.
- c) Draw the frame format for 'X' modem.
- d) List the various standard organization used for data communication.
- e) Differentiate between LAN, MAN and WAN.
- f) List the various protocols for internet layer in TCP/IP model.
- g) Write the full form of i) IGMP ii) TFTP
- h) Draw the Manchester pattern for the 1110010 data signal.
- i) Define the term VLAN and its usage in communication.
- j) Differentiate between TCP and UDP protocols of transport layer.

**2x10**

### **PART-A**

Q.2 a) Draw and explain TCP/IP model in detail.

**8**

b) Explain the various types of transmission media in detail.

**8**

c) Write a short note on various types of networking devices.

**4**

Q.3 a) Discuss various error detection methods in detail.

**10**

b) Write short notes on:

- i) RS-323
- ii) Go-back-N ARQ protocol.

**5x2**

Q.4 a) Explain various channel access methods of LAN with suitable examples.

**10**

b) Explain in detail the architecture and layer of SONET/SDH technology.

**10**

### **PART-B**

Q.5 a) For the binary bit sequence:111001101011, draw the timing diagram for NRZ(I), NRZ(L), differential Manchester and BP-AMI.

**10**

b) Draw and explain the block diagram of PCM based TDM system.

**10**

Q.6 a) Write short notes on:

- i) RIP.
- ii) OSPF.

**5x2**

b) Explain the header format and addressing mode of IPV4.

**10**

Q.7 Write short notes on (**any four**):

- i) DNS
- ii) SMTP
- iii) WWW
- iv) FTP
- v) Firewall
- vi) IPSEC

**20**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **DATA COMMUNICATION AND NETWORKING (EC-725)**

Time: 3 hrs

**100**

Max Marks:  
**100**  
No. of pages: 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) Name some services provided by the transport layer in the Internet Model.
- b) A digital signal has 16 levels. How many bits are needed per level?
- c) Draw the Manchester pattern for the 1101101 data signal.
- d) Differentiate between Hub and Switch.
- e) Draw the frame format for 'X' Modem.
- f) Mention various protocols for Internet layer in TCP/IP Model.
- g) How is ATM different from ISDN?
- h) Write the full form of:
  - i) ICMP              ii) VOIP
- i) Check whether the codeword 0100011 contains error or not. If error, then find the correct codeword using Hamming Method.
- j) List the advantages of parallel interface over serial interface.

**2x10**

### **PART-A**

Q.2 a) Draw and explain the OSI model in detail.

**7½**

b) Discuss various types of guided media in detail.

**7½**

c) Write note on various types of standard organization used for data communication.

**5**

- Q.3 a) Draw and explain the HDLC protocol in detail.  
**8**  
b) Compare and contrast the Go-back-N ARQ protocol with Selective Repeat ARQ. **7**  
c) Compare and contrast the concept of byte stuffing and bit stuffing. Which technique is used in byte oriented protocol?  
**5**

Q.4 a) Explain in detail the architecture of ISDN with its classification.  
**10**  
b) Discuss various channel access methods of LAN.  
**10**

## **PART-B**

- Q.5 a) Draw and explain the structure of PCM-based TDM system.  
**7**

b) For the following bit sequence, draw the timing diagram for UPRZ, UPNRZ, BPRZ for the given data: 1110010101100.  
**5**

c) Explain the formation of group in FDM hierarchy.  
**8**

Q.6 a) Explain in detail different types of IP routing protocols.  
**10**

b) Do the comparison:

  - i) IPV4 versus IPV6
  - ii) TCP versus UDP.

**10**

Q.7 a) Discuss various types of application layer protocol in TCP/IP model.

10

- b) Write short note on:  
i) Firewall.  
ii) FTP.

10

# **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) Define mobility and portability.  
b) Define forward channel, reverse channel, downlink and uplink in mobile communication.  
c) What does ARFCN stand for in GSM? How many users are supported by one ARFCN?  
d) Define following terms in mobile fading channels:  
    i) Coherence bandwidth.  
    ii) Coherence time.  
e) What is duplex mode of communication? Define FDD.

- f) If 40 MHz of spectrum is allotted from the band of 800 MHz for a cellular operator; with channel bandwidth of 60 KHz for full duplex communication. Calculate the total number of channels allotted.
  - g) What is the concept of frequency re-use?
  - h) Define foot print in a cellular system.
  - i) What is EIRP?
  - j) Draw the plot between throughputs and delay for ALOHA and slotted ALOHA packet radio protocol.
- 2×10**

### **PART-A**

- Q.2 a) Explain the working of the:  
 i) paging system  
 ii) cordless system. **5×2**  
 b) Explain signal processing in GSM system with a neat diagram. **10**
- Q.3 a) What is multiple access technique? List them all and explain in brief the features of  
 i) TDMA  
 ii) CDMA **10**  
 b) What is packet radio protocol? Determine maximum throughput for pure ALOHA. **10**
- Q.4 a) Draw the various upgrade paths from 2G to 3G technology and explain the evaluation of 2.5G TDMA standards. **10**  
 b) Write short notes on:  
 i) 4G  
 ii) 3GPP2 group. **5×2**

### **PART-B**

- Q.5 a) What are various channel assignment strategies in a cellular system? **5**  
 b) If total of 30 MHz of bandwidth is allotted to a particular FDD telephone system which uses two 15 KHz simplex channels to provide full duplex voice channels, calculate the number of channels available in the system per cell, if the system uses:  
 i) 4-cell re-use  
 ii) 7-cell re-use **5**  
 c) List various techniques to improve coverage and capacity in a cellular system. Discuss any two techniques in detail. **10**
- Q.6 a) Derive an expression for received signal level  $P_r(d)$  for two ray propagation model; where  $d$  is the distance of separation between transmitter and receiver. **15**  
 b) Calculate the path loss for an antenna with unity gain. Operating frequency  $f = 900 \text{ MHz}$ ;  $d = 6\text{m}$ . **5**
- Q.7 a) Explain with the help of a block diagram; simplified communication system using adaptive equalizer at the receiver. **12**  
 b) What are diversity techniques? List them all. Explain any one briefly. **8**

## **End Semester Examination, Dec. 2017**

B. Tech. - Seventh Semester

### **MICRO ELECTRO MECHANICAL SYSTEM (MEMS) (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.** Each question carries equal marks.

- Q.1 a) Define micro electro mechanical system.  
b) Compare MEMS with microelectronics.  
c) Define the process of doping. List some materials generally used for doping for the fabrication of micro electro mechanical system devices.  
d) Define sputtering.  
e) How is the dopant distribution in a substrate controlled ion-implantation process?  
f) What are the advantages of CVD processes over PVD processes?

- g) Compare negative and positive photoresists.
- h) What is a smart sensor?
- i) What is the principle of operation of a simple biomedical sensor?
- j) Differentiate microelectronics and nano-electronics. **2×10**

### **PART-A**

- Q.2 a) Explain the significance of micro electro mechanical systems. **5**
- b) Define micro electro mechanical system miniaturization. Why is it required to miniaturize the micro electro mechanical system devices? **5**
- c) Discuss the working principles of any two micro electro mechanical system applications with the help of a neat labeled diagram. **10**
- Q.3 a) What are piezoresistive materials? Give some examples and their applications in micro electro mechanical system. **5**
- b) Discuss in detail the preparation, fabrication, applications and advantages of silicon as substrate material. **12**
- c) Why are conductive polymers used in micro electro mechanical system? **3**
- Q.4 a) Explain the process of photolithography with a neat labeled diagram for fabricating micro electro mechanical system devices. **10**
- b) Compare wet etching and dry etching techniques. **5**
- c) Explain isotropic and anisotropic technique. **5**

### **PART-B**

- Q.5 a) Explain various sensing mechanisms in detail. **10**
- b) Explain the following in detail.
- i) Thermistors.
  - ii) Thermocouple and thermopile. **5×2**
- Q.6 a) Explain the principle and working of micro grippers in detail. **8**
- b) Explain the working of a micro-pump with a neat sketch. **10**
- c) What is the working principle of a micro-valve? **2**
- Q.7 a) Discuss the social impacts of nano-scale engineering. **5**
- b) Explain the principle and flow of nano-fabrication in detail. **10**
- c) Differentiate between nano and micro-scale techniques. **5**

### **End Semester Examination, Dec. 2017**

B. Tech. (ECE) — 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**. Each question carries equal marks.

- Q.1 a) Define micro electro mechanical system miniaturization. **2×10**
- b) List any three applications of MEMS.
- c) Compare Gallium Arsenide's property with silicon.
- d) List the different steps involved in photolithography process.
- e) Explain diffusion process used in MEMS industry.
- f) Explain the principle of sensing and actuation.
- g) List any two sensors that could help to measure temperature.
- h) What do you understand by piezoelectric effect?
- i) Discuss the significance of nanoscale technology.
- j) State the principle of nanofabrication. **2×10**

### **PART-A**

- |     |   |    |
|-----|---|----|
| Q.2 | a) Distinguish between MEMS technology and microelectronics.  | 8  |
|     | b) Explain in detail at least four applications of MEMS in industry.  | 7  |
|     | c) Discuss the challenge faced by the MEMS industry.  | 5  |
| Q.3 | a) Discuss in detail the preparation, fabrication and applications of silicon as substrate material for MEMS. | 10 |
|     | b) List the properties of piezoelectric materials.  | 4  |
|     | c) What are the different materials used in MEMS fabrication processes and explain their properties?          | 6  |
| Q.4 | a) Explain various deposition methods used in micro fabrication and explain any one in detail.                | 10 |
|     | b) Explain the working principle of sputtering.   | 5  |
|     | c) Differentiate between diffusion and ion implantation.  | 5  |

### **PART-B**

- |     |  |    |
|-----|--|----|
| Q.5 | a) Write down the principle of operation of a biosensor and explain its working with suitable diagram. | 8  |
|     | b) Classify various types of sensing mechanisms in MEMS industry.                                      | 4  |
|     | c) Write short notes on:<br>i) Photodiode as optical sensing device.<br>ii) Thermo couple.             | 8  |
| Q.6 | a) Explain the principle and working of micromotor in detail.  | 10 |
|     | b) Distinguish between the principle of operation of microvalve and micro pump.                        | 10 |
| Q.7 | a) List various applications of nanoproducts in detail.  | 8  |
|     | b) Differentiate between micro and nanoscale technologies.   | 7  |
|     | c) Discuss social impacts of nanoscale engineering in brief.   | 5  |

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) What is Android Virtual Device (AVD)?  
b) Enlist some native android libraries which are used in android architecture.  
c) What is the role of fragments in android programming?  
d) What is intent filter?  
e) Which method is used to involve the click event of a button?  
f) What is the significance of manifest file in android app?  
g) Which class is used to insert and fetch the data in an android application?  
h) Write a short note on date picker view.  
i) How status bar notification can be created in an android application?

j) Briefly discuss SQLite database of android operating system.

**2×10**

### **PART-A**

- Q.2 a) What is android? Enlist the features of android operating system. **10**  
b) What is API level and why it is very important? **7**  
c) Which library handles the entire multimedia feature by deploying media codecs? **3**
- Q.3 a) Write Java code for android application that displays the message “Hello World” on button press. **15**  
b) What is an activity? How it is created? **5**
- Q.4 a) Explain the life cycle of an activity in detail. **8**  
b) What are view and view group? **5**  
c) Describe the role of adapter view class in android. **7**

### **PART-B**

- Q.5 a) Explain how Radio Button view can be used in an android application? **10**  
b) Explain about preference fragment in detail. **10**
- Q.6 a) What are analog clock and digital clock views? How analog clock view can be used in an android application? **12**  
b) What is the role of image switcher view? **8**
- Q.7 a) Enlist various data storage mechanisms in android development. **10**  
b) How is the user defined data stored for long term using preferences? **10**

## **End Semester Examination, Dec. 2017**

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.** Marks are indicated against each question.

- Q.1 a) Why is FM preferred for sound signal transmission?  
b) Define gross structure.  
c) Calculate percentage interlaces error if 2<sup>nd</sup> field starts with a delay of  $32 \mu s$ .  
d) What is contrast?  
e) What is DC component of the video signal?  
f) Why is TV transmission carried out in the UHF and VHF band?  
g) What is meant by deflection angle of a picture tube?  
h) What do you understand by dark current in a vidicon camera tube?  
i) Mention any two requirements that must be met to make a color system fully compatible.  
j) Give two advantages of HDTV. **2×10**

### **PART-A**

- Q.2 a) Draw the block diagram of a TV transmitter system and explain each block. **10**  
b) Justify the choice of 625 lines for TV transmission. Why is the total number of lines kept odd in all TV 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 are the demerits of vestigial side band transmission? **10**
- Q.4 a) Explain why electrostatic focusing is preferred over magnetic focusing. **10**  
b) Why is electromagnetic deflection preferred in TV picture tube? **10**

### **PART-B**

- Q.5 a) Explain the following terms:  
i) Primary colors.  
ii) Complementary colors.  
iii) Additive color mixing.  
iv) Chrominance.  
v) Luminance. **2×5**
- b) Explain with a diagram the working and construction of delta gun color picture tube. **10**
- Q.6 a) Compare positive and negative amplitude modulation in TV systems. **10**  
b) Describe 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) Digital TV.  
b) Cable TV.  
c) Remote control.  
d) Television via satellite. **5×4**

## **End Semester Examination, Dec. 2017**

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 Answer the following questions:  
a) Draw the frame format for an I frame in SDLC?  
b) How many voice band carriers are required for the formation of T1 carrier system?  
c) Draw the Manchester pattern for 101101 data.  
d) For an 8 KHz sample rate and an eight bit PCM code, determine the line speed.  
e) Describe the relationship between bit rate, bandwidth and baud rate for ASK.  
f) List the application of combo chips.  
g) Give an example of parallel interface.  
h) What are the various services provided by data link layer?  
i) Draw the block diagram of data communication system.  
j) Explain the terms SONET and IPTV. **2×10**

### **PART-A**

- Q.2 a) Explain the cooperative study of various types of transmission media. 8  
 b) What do you mean by transmission impairment? What are the factors that affect transmission impairment? 7  
 c) List various advantages of digital transmission over analog transmission. 5
- Q.3 a) For the binary bit sequence, draw the timing diagram for UPRZ, UPNRZ, BPRZ, BPNRZ and BPRZ-AMI: 111001101011 10  
 b) Discuss various types of bipolar encoding methods? 10
- Q.4 a) Discuss various error detection methods in detail. 10  
 b) Explain the pin configuration of RS-232 serial interface in detail. 5  
 c) Check whether the code word 0100011 contains error or not. If error, then find the correct code word using hamming methods. 5

### **PART-B**

- Q.5 a) Draw and explain the frame format for HDLC in detail. 10  
 b) Determine the bit pattern for the control field of an information frame sent from a secondary station to the primary for the following conditions:  
   i) Secondary is sending information frame 7. 5  
   ii) Secondary is not sending its final frame.  
   iii) Secondary is confirming correct reception of frames 2 and 3 from the primary (nr-4). 5  
 c) Compare and contrast byte stuffing and bit stuffing. Which technique is used in byte oriented protocol and bit oriented protocol? 5
- Q.6 a) Draw the block diagram of PCM-based TDM system and also mention its line speed. 8  
 b) What is interleaving? Discuss its various types in brief. 5  
 c) Explain the formation of super group in FDM hierarchy. 7
- Q.7 a) Draw the architecture of ISDN network. 7  
 b) Explain various channels in ISDN. 5  
 c) Write short notes on the following:  
   i) ADSL.  
   ii) HDTV. 4×2

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer the following:
- Define satellite. Which frequency bands are commonly used in satellite communication?
  - What are the advantages and disadvantages of satellites in GEO?
  - A low orbit satellite has an altitude of 400 km. Find the period of this satellite assuming the radius of earth as  $6.37 \times 10^6$ m and mass equal to  $5.98 \times 10^{24}$  kg.
  - What is free space loss and on what factors does it depend?
  - A satellite transmits 1W power at 4GHz with an antenna having a diameter of 1.4m. Find the EIRP of the satellite.

- f) Why was FM preferred as modulation technique in analog satellite communication systems?
  - g) A speech signal with 3 KHz bandwidth frequency modulates an RF carrier with 30 KHz deviation. What is the FM improvement obtained?
  - h) Describe the advantages and disadvantages of FDMA.
  - i) What is processing gain and how is it used in multiple access?
  - j) What is a VSAT? What are the advantages of VSAT?
- 2×10**

### **PART-A**

- Q.2 a) Explain in detail the elements of satellite communication system. What are the services provided by satellites? **10**
- b) What are the major differences between active and passive satellite systems? **5**
- c) What are the functions of attitude and orbit control sub-system? **5**
- Q.3 a) In a satellite link the uplink C/N is 20dB and the downlink C/N is 16dB. Find the overall C/N for this link. **5**
- b) Derive general link equations. Find out expression for C/N and G/T ratios. Explain the importance of these ratios on satellite link design. **10**
- c) The input S/N ratio at the LNA is 10dB and the noise figure of the amplifier is 0.6dB. Find the output SNR and noise temperature of the amplifier. **5**
- Q.4 a) What are the various orbital elements which are required to specify the location of a satellite in its elliptic orbit around the earth? Explain them in detail. **8**
- b) A satellite moves around the earth in an elliptical orbit with an eccentricity of 0.2. The major axis has a length of 22,500 km. Find the apogee and perigee heights for this satellite. **6**
- c) Explain as to how does the solar eclipse affect the working of a communication satellite? **6**

### **PART-B**

- Q.5 a) What is the purpose of pre-emphasis and de-emphasis in FM transmission? **5**
- b) An FM-SCPC channel has 200 KHz bandwidth and carries a FM-modulated speech signal band limited to 4 KHz. If the received carrier-to-noise ratio is 10dB, what is the output signal-to-noise ratio obtained from the demodulator? **8**
- c) Derive the expression for a digital satellite link and explain as to how is it dependent on the system bandwidth? **7**
- Q.6 a) What are the advantages of TDMA system? What is frame efficiency in TDMA and what factors contribute to it? **8**
- b) What is meant by burst time plan? Explain its structure and importance. **6**
- c) Explain TDMA frame acquisition and frame synchronization techniques. **6**
- Q.7 Write short notes on:
- a) GPS.
  - b) MSAT and INMARSAT.
  - c) Laser satellite communication.
  - d) Earth sensing satellite. **5×4**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- |     |  |             |
|-----|--|-------------|
| Q.1 | a) Compare Harvard architecture and Princeton architecture in brief.<br>b) Explain with an example the function of 'P' flag.<br>c) Differentiate between MOV and MOVX instruction.<br>d) Draw PSW (program status word) register in context of 8051.<br>e) What is the function of GIE and PEIE in INTCON register?<br>f) What is DPTR and how it is related to program counter?<br>g) What is the function of INDF in PIC microcontroller?<br>h) What do you mean by watch dog timer reset?<br>i) Explain the contents of SSPCON register.<br>j) Why is PIC program memory 14-bit wide? | <b>2×10</b> |
|-----|--|-------------|

## **PART-A**

- Q.2 a) Differentiate between microprocessor and microcontroller. **6**  
b) Differentiate between CISC and RISC processor. **7**  
c) Explain various addressing modes of 8051 microcontroller with examples. **7**
- Q.3 a) Draw and explain the architecture of 8051 microcontroller with an example. **10**  
b) Explain the function of following pins:  
i) ALE  
ii) PSEN  
iii) TXD  
iv) RXD **10**
- Q.4 a) Write a program to generate a square wave of 1 KHz at pin P<sub>3.0</sub> using interrupts. Assume crystal frequency of 12 MHz. **10**  
b) Write a note on 'interrupt structure of 8051 microcontroller'. **5**  
c) Explain the function of IP register for 8051 microcontroller. **5**

## **PART-B**

- Q.5 a) What is the PIC microcontroller? How it is different from 8051 microcontroller? **6**  
b) Explain the concept of pipelining in PIC microcontroller. **4**  
c) Explain following instructions:  
i) decf f, F/W  
ii) addlw k  
iii) btfsc f, b  
iv) sleep **10**
- Q.6 a) Write a subroutine for timer 2 to produce 2 second delay. **10**  
b) Explain synchronous port module in context of PIC microcontroller. **10**
- Q.7 Write short notes on:  
a) I/P port expansion.  
b) PWM motor control.  
c) ADC  
d) Loop time subroutine. **5x4**

## **End Semester Examination, Dec. 2017**

**B. Tech. (ECE) — Seventh / Eighth 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.** Each question carries equal marks.

**Q.1** Answer the following questions:

- a) Define mobile computing.
- b) List various registers of a GSM system.
- c) Define broadcast disk.
- d) What do you understand by spread spectrum techniques? List any two.
- e) List various layers of WAP1.x.
- f) What is frequency reuse?
- g) Define triangular routing.

- h) What is WATM?  
 i) Define reintegration process in CODA.  
 j) What is class 0 and class 1 WTP? **2×10**

### **PART-A**

- |     |   |           |
|-----|---|-----------|
| Q.2 | a) Describe briefly the architecture of GSM system with special emphasis on the role of HLR, VLR and AUC. | <b>12</b> |
|     | b) Explain cellular IP with a neat diagram.   | <b>8</b>  |
| Q.3 | a) Discuss the generic model of WATM and discuss various access scenarios in detail.                      | <b>15</b> |
|     | b) Explain reverse tunneling in brief.  | <b>5</b>  |
| Q.4 | a) Discuss snooping TCP along with its advantages and disadvantages with the help of a diagram.           | <b>8</b>  |
|     | b) Explain role of push access protocol in brief.   | <b>5</b>  |
|     | c) Explain architecture of WAP1.x briefly.  | <b>7</b>  |

### **PART-B**

- |     |   |             |
|-----|---|-------------|
| Q.5 | a) What is the role of Venus in CODA file system? Explain the three states of client in CODA in detail.   | <b>12</b>   |
|     | b) What are the major transport mechanisms used in digital audio broadcasting.  | <b>8</b>    |
| Q.6 | a) Give an overview of adhoc routing protocol in detail.  | <b>10</b>   |
|     | b) What is adhoc network? Explain the working of destination sequence distance vector protocol in detail.   | <b>10</b>   |
| Q.7 | Write short notes on ( <b>any two</b> ) of the following:<br>a) Kangaroo Joey transaction model.<br>b) IP packet delivery to and from the mobile node.<br>c) WSP/B session establishment and termination.<br>d) Team transaction model. | <b>10×2</b> |

## **End Semester Examination, Dec. 2017**

B. Tech. — Seventh 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.  
 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, Dec. 2017**

B. Tech. – First Semester

**INTERNET OF THINGS (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:
- Define internet of things.
  - What is MQTT?
  - Name two measurement devices used in IOT.
  - What is RFID?
  - Give the full form of LAN and ARPA.
  - Define game changers.
  - What is a value chain?

- h) Define logical address.
- i) What is the unit of communication at the network/internet layer called as?
- j) Give one point of difference between IPV<sub>4</sub> and IPV<sub>6</sub>.

**2x10**

### **PART-A**

- Q.2 a) Explain in detail the advantages of IOT.

**10**

- b) Explain in detail the challenges of IOT.

**10**

- Q.3 a) Explain in detail the basic building blocks of IOT Hardware.

**10**

- b) Explain the major features of M2M communication.

**10**

- Q.4 a) Explain the major points of difference between M2M and IOT.

**10**

- b) Explain with a block diagram a simplified Global Value Chain.

**10**

### **PART-B**

- Q.5 a) Explain in detail the TCP/IP Protocol suite.

**15**

- b) Write a short note on DNS.

**5**

- Q.6 a) Explain in detail static and dynamic IP address assignment.

**10**

- b) Write short notes on:

- i) HTTP
- ii) SMTP

**5x2**

- Q.7 Explain in detail the following applications of IOT.

- a) Intelligent Home.

**7**

- b) Smart City.

**7**

- c) Wearables.

**6**

## **End Semester Examination, Dec. 2017**

B.Tech. (Integrated) – Fifth Semester

**OPTICAL COMMUNICATION (EC-I-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**. Each question carries equal marks.

- Q.1

  - a) Define critical angle.
  - b) Define responsivity of a photodetector.
  - c) List various types of connectors.
  - d) Define scattering.
  - e) What is basic principle of photodetector?
  - f) Define quantum efficiency.
  - g) Which one of LEDs or laser will have more spectral width, and which one will be more suitable for transmission of high data rate?
  - h) List two advantages of optical-fibre communication system.
  - i) What is homo-dyne-detection?
  - j) List various modulation techniques used in optical communication.

2x10

## **PART-A**

- Q.2 a) Explain the working of an optical fibre communication system with the help of a block diagram.

10

- b) Discuss advantages and applications of an optical communication system.**  
**10**

10



5x2

- b) Write down relationship between numerical aperture (NA) and acceptance angle. Also, derive the requirement expression.

10

- Q.4 a) List various types of losses in silica glass fibre and explain material absorption losses in silica glass fibre.

12

- b) Discuss inter modal dispersion in detail

8

PART-R

- Q.5 a) Explain the working of avalanche photodiode. List the factors which limit its response time. What are the benefits and drawback of avalanche photodiode? **10**

b) Briefly describe the principle of operation of injection laser diode.

- Q.6 a) Explain three port coupler with help of a suitable diagram.

ain

- b) Discuss any one of the butt joint connectors.

Dis  
13

- ### Q.7 a) Discuss optical power budgeting

18

- ## **10**

b) Explain the concept of multiplexing.

10

**End Semester Examination, Dec. 2017**  
 M. Tech. — Third Semester  
**ADAPTIVE SIGNAL PROCESSING (EC-M-C-301)**

Time: 3 hrs.	Max Marks:	<b>75</b>
	No. of pages:	<b>1</b>

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- |  |                       |
|--|-----------------------|
| Q.1 What do you mean by adaptive signal processing? Explain the process using an example.  | <b>15</b>             |
| Q.2 Derive equations for Wiener Hopf filter which utilizes concept of adaptive signal processing.  | <b>15</b>             |
| Q.3 State advantages of state space model and derive state space equation for a system given by<br>$H(z) = \frac{6z^4 + 8z^3 + 9z^2 + 4z + 11}{z^4 + 7z^3 + 18z^2 + 9z + 8}$ | <b>15</b>             |
| a) What do you mean by principle of orthogonality? Derive expression.<br>b) Explain the concept of minimum mean square error.  | <b>10</b><br><b>5</b> |
| Q.5 Derive an expression for steepest descent adaptation algorithm to determine performance of a system.   | <b>15</b>             |
| a) Explain LMS (Least mean square) algorithm.<br>b) Explain the term: rate of convergence associated with any algorithm.   | <b>10</b><br><b>5</b> |
| Q.7 Write short notes on ( <b>any two</b> ) of the following:<br>a) Equalization.<br>b) Echo cancellation.<br>c) Noise cancellation.   | <b>7½×2</b>           |
| Q.8 Derive equation for Kalman filter and discuss its relation with RLS filter.  | <b>15</b>             |

# **End Semester Examination, Dec. 2017**

M. Tech. – Third Semester

## **IMAGE PROCESSING (EC-M-C-322A)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- Q.1 a) With a neat diagram, explain the fundamental steps involved in digital image processing. **7**
- b) Describe, how the image is digitized by sampling and quantization? Differentiate between uniform sampling and non-uniform sampling. **8**
- Q.2 a) Explain properties of Fourier transform and discuss the relevance of each in digital image processing. **10**
- b) What is the advantage of processing an image in the frequency domain? Discuss. **5**
- Q.3 a) Perform histogram stretching on the given data so that the new image has a dynamic range of [0, 7]

Gray level	0	1	2	3	4	5	6	7
Number of pixels	10	90	85	70	0	0	0	0

- b) Compare and contrast average filtering and median filtering. **5**
- Q.4 a) Generate the basic block diagram of image restoration process and explain each block. **8**
- b) What are pseudo inverse filters and how are they different from inverse filters? **7**
- Q.5 a) Discuss run-length encoding with suitable examples. How does it remove interpixel redundancy? **7**
- b) Determine the Huffman code assignment procedure for the following data

Symbol	Probability
$a_0$	0.1
$a_1$	0.4
$a_2$	0.06
$a_3$	0.1
$a_4$	0.04
$a_5$	0.3

- 8**
- Q.6 a) Explain how image segmentation algorithm are categorized? Discuss how point detection and line detection algorithms work? **8**
- b) Explain the principle of region based segmentation algorithm. **7**
- Q.7 a) Determine the DFT of the following image:

0	1	2	1
1	2	3	2

2	3	4	3
1	2	3	2

9

6

b) Explain the homomorphic filtering concept for image enhancement.

Q.8 Write short notes on (**any two**):

a) Pattern/object recognition.

b) Error free compression.

c) Applications of digital image processing.

7½×2

# **End Semester Examination, Dec. 2017**

M. Tech. (VLSI & ES) – First Semester

## **SEMICONDUCTOR DEVICE MODELING (EC-M-VE-101)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- |     |  |            |
|-----|--|------------|
| Q.1 | a) What is built in voltage?   | <b>5</b>   |
|     | b) What are the two essential SPICE parameters that determine the current voltage characteristics of diode?                            | <b>5</b>   |
|     | c) Explain various features of SPICE software.   | <b>5</b>   |
| Q.2 | a) Explain the following SPICE commands with examples:<br>.AC, .TRAN, .PRINT, .PARAM   | <b>8</b>   |
|     | b) Enlist various objectives of circuit simulation in detail.  | <b>7</b>   |
| Q.3 | a) What are the differences between BJT and MOSFET?  | <b>7</b>   |
|     | b) Explain Ebers-Moll model in detail.   | <b>8</b>   |
| Q.4 | a) Explain high frequency model of a MOSFET in detail.   | <b>8</b>   |
|     | b) What is trans-conductance in MOSFET?  | <b>5</b>   |
|     | c) Explain is substrate bias effect in MOSFET?   | <b>2</b>   |
| Q.5 | a) Explain MOSFET channel mobility model in detail.  | <b>8</b>   |
|     | b) What is device scaling? Explain different types of device scaling in detail.  | <b>7</b>   |
| Q.6 | a) What is MESFET? Explain the structure and characteristics of MESFET in detail.  | <b>10</b>  |
|     | b) What is Drain Induced Barrier Lowering (DIBL)?  | <b>5</b>   |
| Q.7 | a) Write short notes on the following:<br>a) HEMT structure and its characteristics.<br>b) MOS capacitor.<br>c) Narrow channel MOSFET. | <b>5×3</b> |

**End Semester Examination, Dec. 2017**  
M. Tech. – Third Semester  
**REAL TIME OPERATING SYSTEMS (EC-M-VE-201A)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- |     |   |                                  |
|-----|---|----------------------------------|
| Q.1 | a) What should be the goal of an operating system?<br>b) When do we need on real time operating system?<br>c) What are the challenges faced in designing an embedded system?                              | <b>5x3</b>                       |
| Q.2 | a) Compare two scheduling strategies for the real time scheduling preemptive mode and round robin scheduling.<br>b) Explain SPI in detail.  | <b>10</b><br><b>5</b>            |
| Q.3 | a) Explain periodic task model in detail.<br>b) Explain functional parameter of a real time work load model.  | <b>8</b><br><b>7</b>             |
| Q.4 | a) Differentiate between online and offline scheduling.<br>b) Differentiate between static and dynamic system.  | <b>10</b><br><b>5</b>            |
| Q.5 | a) What is a mailbox? How does a mailbox pass a message during an IPC?<br>b) List the features of P and V semaphores and how these are used as a resource key, as a counting semaphore and as a mutex.    | <b>8</b><br><b>7</b>             |
| Q.6 | a) What are the analogies between process task and thread?<br>b) Explain the following $\mu$ COSII functions:<br>OS Sem Pend(    )<br>SO Sem Post(    )<br>c) Write a short note on ‘deadlock situation’. | <b>5</b><br><b>5</b><br><b>5</b> |
| Q.7 | a) Explain the case study of smart card using RTOS.<br>b) Explain the features of VX works RTOS.  | <b>10</b><br><b>5</b>            |
| Q.8 | Write short notes on:<br>a) $\mu$ COSII RTOS.<br>b) Inter-process communication.  | <b>7½x2</b>                      |

**End Semester Examination, Dec. 2017**  
M. Tech. (VLSI & ES) – Third Semester  
**DISTRIBUTED EMBEDDED SYSTEM (EC-M-VE-322)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- |     |   |            |
|-----|---|------------|
| Q.1 | a) How does a DSP differ from a General Purpose Processor (GPP)?  | <b>7</b>   |
|     | b) Define design metrics in embedded systems. What are the different competing design metrics? What are the constraints of an embedded system design? | <b>8</b>   |
| Q.2 | a) What is I <sup>2</sup> C? Explain the use of each control bit of I <sup>2</sup> C bus protocol.  | <b>8</b>   |
|     | b) What are timers? Explain different applications of timers.   | <b>7</b>   |
| Q.3 | a) Differentiate between synchronous and asynchronous communication.  | <b>7</b>   |
|     | b) Discuss RS232C communication in detail.  | <b>8</b>   |
| Q.4 | a) Compare memory mapped IO and IO-mapped IOs.  | <b>5</b>   |
|     | b) How does a decoder help in memory and IO device interfacing?   | <b>5</b>   |
|     | c) What is watch dog timer?   | <b>5</b>   |
| Q.5 | a) List the functions of a kernel.  | <b>8</b>   |
|     | b) Write a short note on simulation and emulation of embedded systems.  | <b>7</b>   |
| Q.6 | a) How interrupts are handled in RTOS environment?  | <b>8</b>   |
|     | b) What are the states of a task? What are the parameters at a TCB of a task?   | <b>7</b>   |
| Q.7 | a) What do you understand by task scheduling? Explain various scheduling algorithms in detail.  | <b>10</b>  |
|     | b) Why is Java popular for smart card applications?   | <b>5</b>   |
| Q.8 | Write short notes on the following:   |            |
|     | a) Embedded systems in automobile.  |            |
|     | b) Device programmer.   |            |
|     | c) USART.   | <b>5×3</b> |

# End Semester Examination, Dec. 2017

B. Tech. — First / Second 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**. Each question carries equal marks.

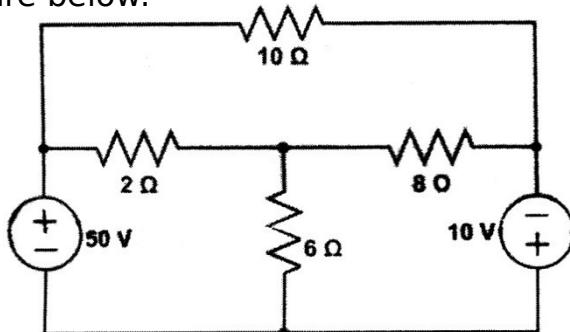
Q.1 Explain the following questions:

- State Kirchoff's voltage Law.
- Can three phase induction motor run at synchronous speed? If not, what is its speed?
- \_\_\_\_\_ is the dual of Thevenin's theorem.
- State two differences between a two winding transformer and an auto transformer.
- Define inductive reactance.
- Derive the expression for resonant frequency of an RLC series circuit
- Write the relation between primary emf per turn and secondary emf per turn of a transformer.
- Write the relation between phase current and line current in a delta connected system.
- In a DC machine \_\_\_\_\_ is stationary, and \_\_\_\_\_ is rotating.
- Draw the impedance triangle of RL circuit.

**2×10**

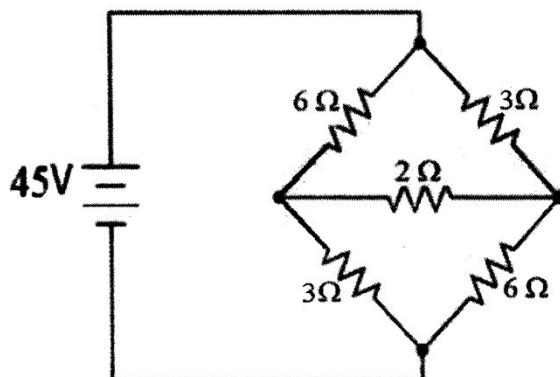
### **PART-A**

Q.2 a) Find the current in the  $6\ \Omega$  resistor using mesh analysis for the network shown in the figure below:



**10**

b) Find the current in  $2\ \Omega$  resistor of network shown in the figure below using Thevenin's theorem.



**10**

- Q.3 a) An impedance of  $4-j10 \Omega$  is connected in series with impedance  $6+j8 \Omega$ . The circuit is fed from 220 V, 50 Hz supply. Find the impedance, current, power factor and the power dissipated in the network. **10**  
b) Derive the relation between line voltage and phase voltage in a star connected system. Draw the phasor diagram also. **10**
- Q.4 a) With the help of a neat diagram explain the construction and principle of permanent magnet moving coil instruments. **10**  
b) With the help of neat diagram, explain the working of an induction type Wattmeter. **10**

### **PART-B**

- Q.5 a) Explain the different losses occurring in a transformer. **10**  
b) Define efficiency of transformer. Derive the condition for maximum efficiency of a transformer. **10**
- Q.6 a) Explain the working of DC generator. **10**  
b) Draw the parts of a DC machine and briefly explain. **10**
- Q.7 a) Explain the working principle of  $3\phi$  induction motor. **10**  
b) Explain the working principle of any two types of single phase induction motor. **10**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

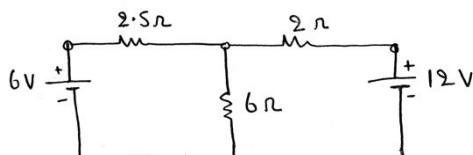
**Q.1** Answer the following questions:

- Define Mesh and node of a network.
- State and explain KVL.
- Draw symbol for:
  - Zener diode.
  - LED.
- The resonance curve is sharply peaked for \_\_\_\_\_ value of resistance.
- Define RMS value in connection with AC circuit.
- Develop the truth table of NAND gate with 2 inputs.
- On what principle does DC motor operate?
- What do you mean by an oscillator?
- List the advantages of bridge rectifier over centre tap full wave rectifier.
- What is the difference between combinational and sequential circuit?

**2×10**

### **PART-A**

**Q.2** a) State and explain maximum power transfer theorem. **10**  
 b) Find current flowing through  $6\Omega$  resistance using superposition theorem.



**10**

**Q.3** a) An alternating current is represented by  $i = 2000 \sin(314t + 60)$ . Find:
 

- Peak value.
- Average value.
- RMS value.

**6**  
 b) Define power factor. Also, explain the significance of power factor. **6**  
 c) Derive the relation between line voltage and phase voltage in a star connected system. **8**

**Q.4** a) Derive the EMF equation of a transformer. **8**  
 b) Explain construction and operating principle of 3 phase induction motor.

**12**

### **PART-B**

**Q.5** a) Differentiate between half wave, center tap full wave and full wave bridge rectifier with circuit diagram and working. **10**  
 b) What is clipping circuit? Give various configuration of clipping circuit. **10**

**Q.6** a) Explain how transistor is used as an amplifier. **10**  
 b) Write a short note on N-channel JFET. **10**

**Q.7** a) Convert decimal number (756) into:
 

- Binary.

**3½**

- ii) Hexa decimal.  
iii) Octal.
- b) Write short notes on the following:  
i) BCD to seven segment decoder.  
ii) Flip-flops and its types.
- 3½**  
**3**
- 5×2**

# End Semester Examination, Dec. 2017

B. Tech. – Third Semester

## NETWORK ANALYSIS AND SYNTHESIS (EE-301B /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**. Each question carries equal marks.

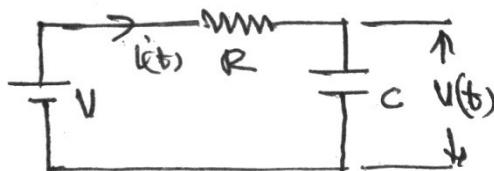
**Q.1** Attempt the following:

- Explain the Kirchhoff's law applied in nodal analysis.
- What is the characteristic of a mesh?
- What is the time constant of RC network?
- Explain driving point impedance of a network.
- Draw the equivalent circuit of z-parameters.
- Differentiate between Twig and link.
- Determine the characteristic impedance of T-section low pass filter.
- What is the cut-off frequency of high pass filter?
- Write the laplace transformation of L and C.
- Write two properties of positive-real function.

**2×10**

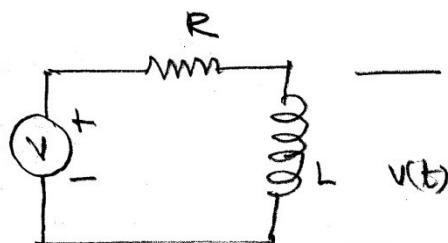
### **PART-A**

**Q.2** a) Determine the voltage  $v(t)$  in the figure given below:



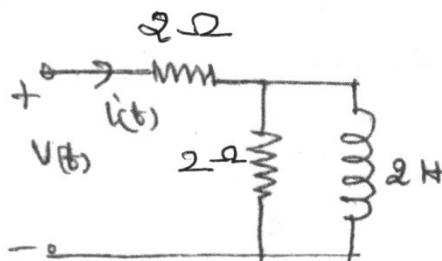
**10**

b) Transform the network in S-domain and determine  $v(t)$  in the given figure below:



**10**

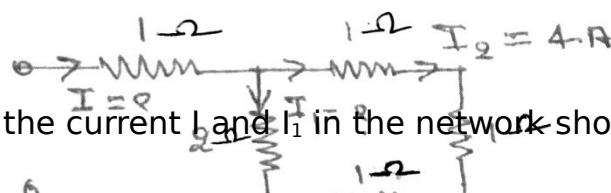
**Q.3** a) Determine the driving point impedance of the network given below:



**10**

b) Determine  $\gamma$ -parameters in terms of ABCD parameters.

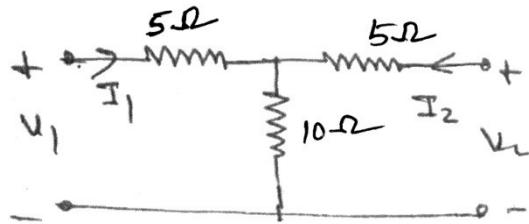
**10**



**Q.4** a) Determine the current  $I_1$  and  $I_2$  in the network shown below:

**10**

- b) Determine the  $y$ -parameters of the network given below:



**10**

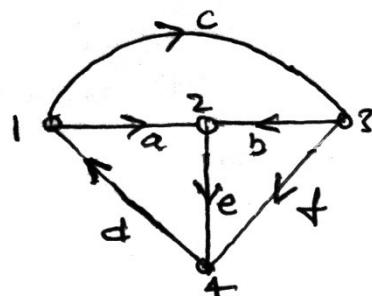
**PART-B**

- Q.5 a) Write the property of  $RC$  impedance and  $LC$  admittance function. **10**  
b) For a given function:

$$Z(s) = \frac{2(s+1)(s+3)}{(s+2)(s+4)}$$

Synthesize the network using Foster-I and Foster-II form of realization. **10**

- Q.6 a) In the given graph below obtain incident matrix and write its property. **10**  
b) In this given graph, for a tree with branch  $a, b$  and  $e$  determine the fundamental cutset matrix and write the equation of KCL from cutset matrix.



**10**

- Q.7 a) What is high pass filter? For a  $\pi$  section high pass filter, determine cut off frequency and graphically represent stop band and pass band. **10**  
b) What is constant K-type low pass filter? For a T-section low pass filter, determine the cut-off frequency and graphically represent pass band and stop band. **10**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 a) Why short circuit test is conducted an L.V side of transformer.  
 b) State the condition for maximum efficiency of transformer.  
 c) Draw the following connection diagram for  $3-\phi$  transformer.  
     i)  $Y_0-d_0$   
     ii)  $d_{11}-Y_0$   
 d) Why is the testier winding of a transformer delta connected?  
 e) "Main flux in transformer is constant". Justify this statement.  
 f) What is function of OLRC coil in 3-point starter?  
 g) List application of DC series motor.  
 h) Draw external characteristics of DC shunt generator.  
 i) Define 'co-energy'.  
 j) What is the function of compensating winding is a DC machine?

**2×10**

### **PART-A**

- Q.2 a) A 200 kVA, 2000/440V, 50 Hz single phase transformer give the following test results:  
     i) OC test (h.v side):- 2 kV, 1.75 kW, 1.8 A  
     ii) SC test (L.V side) :- 13 V, 1 kW, 300 Amp  
 Find:  
     a) Parameters of equivalent circuit as referred to hv side.  
     b) Regulation and efficiency at full load, 0.8 p.f lagging.

**12**

- b) Why Sumper's back-to-back test is done. Explain in detail. **8**

- Q.3 a) Explain Scott connection in detail. Prove that if primary is balanced then secondary side is also balanced. **10**  
 b) Write notes on (**any two**):  
     i) Auto transformer.  
     ii) Welding transformer.  
     iii)Open delta connection.

**5×2**

- Q.4 a) Differentiate between singly excited and doubly excited system. **10**  
 b) Derive an expression for electromechanical energy conversion. **10**

### **PART-B**

- Q.5 a) What is armature reaction? Describe the effects of armature reaction on the operation of DC generator. How armature reaction is minimized **10**  
 b) Explain parallel operation of shunt generator and compound generator with suitable diagram. **10**
- Q.6 a) A DC shunt motor connected to 125 V DC supply line is found to have a back emf of 90 V and 1200 rpm. Find the speed of this machine when it develop a torque of 30 Nm;  $R_a=0.20$  ohm. **10**

b) Draw and explain the circuit diagram of Ward Leonard method for speed control. **10**

Q.7 a) What is braking? Explain the principle of regenerative braking of a DC motor. **10**

b) Explain briefly Hopkinson's test for determination of efficiency of a dc machine. What are main advantages and disadvantages of it? **10**

# **End Semester Examination, Dec. 2017**

B. Tech. — Third / Fourth Semester  
**POWER SYSTEM-I (EE-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 a) What factors influence the site of hydro power plants?  
b) What is meant by 'Load forecasting'?  
c) Differentiate between base and peak load.  
d) Name few properties that a conductor material should posses for power transmission.  
e) Define GMD and GMR.  
f) Explain why skin effect is absent in DC system?  
g) The chances of fault in underground system are \_\_\_\_\_ as compared to overhead system.  
h) What important points should be taken into consideration while selecting the size and number of units for generation?  
i) Why string efficiency of dc is 100%?  
j) Why suspension type insulators are preferred over pin type insulators?

**2x10**

## **PART-A**

- Q.2 Give the comparison of steam, hydroelectric, diesel and nuclear power plant on the basis of site, initial cost, running cost, cleanliness and simplicity, overall efficiency, maintenance cost, stand by loss, transmission and distribution cost, starting time. **20**

- Q.3 a) A generating station has the following data:

Plant capacity = 50 MW; Annual load factor = 40%

Capital cost = 1.2 Crores, annual cost of wages, taxation = Rs. 4 lakhs; cost of lubrication = 1.0 paise/Kwh generated. Interest 5% per annum, depreciation 6% per annum of initial value.

Calculate the annual generation cost of the plant.

**15**

- b) What is tariff and what are its desirable characteristics?

**5**

- Q.4 a) Explain various methods of improving string efficiency.

**10**

- b) Deduce expression for sag in overhead line when support are at unequal level. **10**

## **PART-B**

- Q.5 a) Derive expression for inductance of a single phase Two-wire line.

**10**

- b) Write short notes on:

i) Transposition of conductors.

ii) Corona.

**5x2**

- Q.6 a) A 2-wire dc distributor AB is 300 m long. It is fed at point A. the various loads and their positions are given below:

At Point Amps	Distance from A in meters	Concentrated load in
------------------	---------------------------	----------------------

C	40	30
D	100	40
E	150	100
F	250	50

If the maximum permissible voltage drop is not to exceed 10V find the cross-sectional area of the distributor. Take  $\rho = 1.78 \times 10^{-8} \Omega m$ .

**10**

- b) Compare overhead system with underground system.

**10**

- Q.7 a) What is neutral grounding? Give its advantages.

**10**

- b) Write short notes on:

- i) Equipment grounding.
- ii) Ungrounded neutral system.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. - Third / Fourth Semester

### **POWER SYSTEM-I (EE-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 a) Give the comparison of steam power plant, hydroelectric power plant and diesel power plant.  
b) Discuss the factors for the choice of site for a nuclear power plant.  
c) What is the significance of depreciation in the economics of power generation?  
d) What is the significance of load factor in the economics of power generation?  
e) Give reason why ACSR conductors preferred over copper or aluminum conductors for transmission?  
f) Why do we use 3 single core cables and not 3-core cables for voltage beyond 66 kV?  
g) What is skin effect? Why it is absent in dc system?  
h) What is the controlling factor in determining the size of distributor?  
i) Why is ground wire used in equipment grounding?  
j) Write equation of nuclear fission process. **2×10**

#### **PART-A**

- Q.2 a) Explain with the schematic diagram the working of various parts of nuclear power station. **10**  
b) Explain the layout of substation? Also draw the key diagram for 11 kV/400V indoor substation. **10**
- Q.3 a) Write short notes on:  
i) Two part tariff.  
ii) Power factor tariff.  
iii) Three part tariff. **10**  
b) A power station has a daily load cycle as under:  
260 MW for 6 hrs, 200 MW for 8 hrs, 160 MW for 4 hrs, 100 MW for 6 hrs.  
If the power station is equipped for 4 sets of 75 MW each.  
Calculate :

- i) daily load factor.
  - ii) plant capacity factor
  - iii) daily requirements if the calorific value of oil used were 10,000 Kcal/kg  
and  
heat  
rate of station were 2860 kcal/kwh. **10**
- Q.4 a) Deduce an approximate expression for sag in overhead lines when supports are at equal levels. **10**
- b) Explain briefly various systems of ac distribution. **10**
- PART-B**
- Q.5 a) Derive an expression for inductance per phase for a 3-phase overhead transmission line when conductors are symmetrically placed. **10**
- b) Discuss the factors which affects corona loss. **5**
- c) Differentiate between stranded conductor and bundled contractors. **5**
- Q.6 a) Write short notes on:
  - i) Current distribution in 3-wire dc system.
  - ii) Balancers.**6×2**
- b) Distinguish between radial and ring main distribution system. **8**
- Q.7 Discuss the phenomena of neutral earthing. Also explain types of neutral earthing in detail. **20**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

**Q.1** Answer the following questions:

- a) Explain Piezo resistive effect.
- b) A thermistor has a resistance temperature coefficient of -5% over a temperature range of 25°C to 50°C. If the resistance of the thermistor is 100 Ω at 25°C then what is the resistance at 35°C.
- c) Draw the block diagram of EMG measurement.
- d) List different types of sweeps generated in CRO.
- e) For what purpose horizontal and vertical deflection plates are provided in a CRO?
- f) Explain the rise time and fall time of a pulse.
- g) What is harmonic distortion? Also write different types of distortion caused by amplifier.
- h) What is signal conditioning and why it is required?
- i) What do you mean by decade counting assemblies?
- j) Define sensitivity of digital meters.

**2×10**

#### **PART-A**

- Q.2** a) Explain the construction and principle of working of a linear voltage differential transformer (L.V.D.T). Explain how the magnitude and direction of the displacement of core of an L.V.D.T detected? **10**
- b) Describe the properties of materials used for Piezo electric transducers. Derive expressions for voltage and charge sensitivities. **10**
- Q.3** a) Draw and explain the block diagram of ECG measurement. **10**
- b) Explain instrumentation amplifier with its diagram. **10**
- Q.4** a) Draw the block diagram of general purpose CRO and explain the functions of following controls:
  - i) Synchronization.
  - ii) Blanking circuit.
  - iii) Focus.**5×3**

- b) What is Lissajous pattern? Obtain Lissajous pattern with equal frequency voltages and different phase shifts. 5

### **PART-B**

- Q.5 What do you mean by wave analyzers? Describe the circuits and working of wave analyzers used for audio frequency and megahertz range. 20
- Q.6 a) Explain data acquisition system (DAS) with its neat and clean block diagram. 10  
b) Explain the working principle of voltage controlled oscillator (VCO). What are its applications? 10
- Q.7 a) What are the different types of digital voltmeters (DVMs). Discuss any two. 10  
b) Draw and discuss the circuit for measurement of time interval. 10

## **End Semester Examination, Dec. 2017**

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:**

- a) Why an induction motor called rotating transformer?
- b) State the advantages of skewing.
- c) A 50 Hz, 6 pole, 3 phase I.M runs at 970 rpm. Find slip.
- d) What happens when the field current of a synchronous motor is increased beyond the normal value at constant input?
- e) Why an Induction motor at no load, operates at very low power factor?
- f) List the advantages of slip power recovery scheme.
- g) What are the advantages and disadvantages of three dark lamp method of synchronizing?
- h) Why is the stator core laminated?
- i) Define voltage regulation.
- j) Define:
  - i) Pitch factor.
  - ii) Distribution factor.

**2x10**

### **PART-A**

**Q.2 a) Explain blocked rotor and no load test performed on induction motor.**

**10**

- b) A 3-d, 50 Hz, 4 pole induction motor has slip of 4%. Find:
  - i) Speed of motor.
  - ii) Frequency of rotor emf.
  - iii) If rotor has resistance of  $1\Omega$  and standstill reactance of  $4\Omega$ , calculate power factor i) at standstill. ii) at a speed of 1400 rpm.

**10**

**Q.3 a) Explain briefly the various speed control schemes of induction motor.**

**10**

- b) Explain in detail slip power recovery scheme.

**10**

- Q.4** a) Describe the theories for working of single phase induction motor.  
**10**

b) Explain construction and working of capacitor start run single phase induction motor. List its application also.  
**10**

## **PART-B**

- Q.5 a) Derive emf equation of alternator. **8**  
b) Explain sub synchronous method of voltage regulation along with its limitation. **12**

Q.6 a) Explain with neat sketch the principle of operation 3-phase synchronous motor. Also, explain why it will not run at other than synchronous speed. **12**  
b) What is synchronous condenser? Explain with phasor diagram its operation. What are its applications? **8**

- Q.7** Write notes on (**any two**):

  - a) Reluctance Motor.
  - b) PMLDC Motor.
  - c) Hysteresis Motor.

**10x2**

**End Semester Examination, Dec. 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

  - a) Where is strain gauge used?
  - b) Enumerate the desired properties of thermocouple metals.
  - c) List the types of electrodes used for ECG measurement.
  - d) How is CRO superior to ordinary measuring instruments?
  - e) What are the various focusing techniques in CRO?
  - f) What are the used of waveform analyzers?
  - g) Give the advantages and disadvantages of integrating the A/D converters under the following heads:
    - i) Speed of operation.
    - ii) Change in RC values.
    - iii) Presence of periodic noise.
    - iv) Offset voltage.
  - h) Why hysteresis is desirable in a Schmitt trigger?
  - i) What is the difference between Time Division Multiplexing and Frequency Division Multiplexing?
  - j) Explain the principle of working of thermocouples.

2x10

## **PART-A**

- Q.2 a) What is piezoelectric transducer? Give its equivalent circuit. Derive an expression for the output voltage by making suitable simplifying assumptions. **10**  
 b) Obtain an expression for the gauge factor in terms of Poission's ratio  $\mu$ . Discuss the merits and demerits of the various materials used for the strain gauge. **10**

Q.3 a) Write a note on 'amplifiers' used in biomedical applications.

**10**

b) Draw and explain block diagram of EEG measurement.

**10**

Q.4 Draw the block diagram of a CRO and explain briefly the functions of each block. **20**

### **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, Dec. 2017**

B. Tech. — Fourth / Fifth 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.

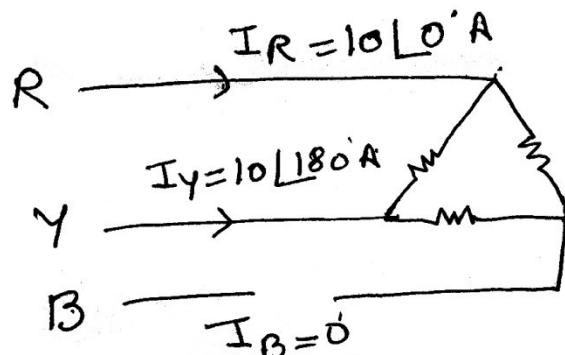
- Q.1 a) What is the significance of ' $\alpha$ '? Also mention its value.  
 b) What is the difference between symmetrical and unsymmetrical faults?  
 c) Define subtransient reactance?  
 d) What are negative sequence components?  
 e) What is meant by 'arc voltage'?  
 f) What is meant by time grading of relays?

- g) What are essential requirements of a relay?
- h) Explain in brief principle of operation of differential relay during a fault.
- i) Sketch typical Time/P.S.M curve.
- j) What are switching surges?

**2x10**

### **PART-A**

- Q.2 a) One conductor of a 3-phase line is open. The current flowing to the  $\Delta$ -connected line load through the line R is 10A with the current in line R as reference and assuming that line B is open. Find the symmetrical components of the line currents.



**10**

- b) Explain phase shift in Star-delta transformation.

**10**

- Q.3 a) Derive an expression for fault current for single line to ground fault by symmetrical components method.

**10**

- b) A 3 phase, 11 KV, 25 MVA generator with  $X_0 = 0.05$  pu,  $X_1 = 0.2$  pu and  $X_2 = 0.2$  pu is grounded through a reactance of  $0.3 \Omega$ . Calculate the fault current for a single line to ground fault.

**10**

- Q.4 a) Discuss the construction ad working principle of  $SF_6$  circuit breaker with proper diagram.

**10**

- b) Write short notes on:

- i) Current Chopping.
- ii) Resistance switching.

**10**

### **PART-B**

- Q.5 a) Explain operating principle and condition of operation of reactance relay supported by proper mathematical equations.

**10**

- b) Explain the working of Buchholz's relay with a neat diagram.

**10**

- Q.6 a) Derive torque equation for an induction relay.

**10**

b) A relay is connected to a 400/5 CT with current setting of 150%. Calculate PSM when fault current is 2400 A.

**10**

Q.7 Explain the phenomenon of lightning. What different methods are employed for protection of power system equipment's against lightning?

**20**

**End Semester Examination, Dec. 2017**

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:

- a) What are the function of communication system? Draw the block diagram of a communication system.
- b) An audio signal of 1 kHz is used to amplitude modulate a carrier of 500 kHz. Determine:
  - i) Sideband frequency.
  - ii) Bandwidth required.
- c) What is the significance of SSB modulation? Give the frequency domain description of the same.
- d) A FM signal is given by:
$$v(t) = 10 \cos(2\pi \times 10^8 t + 2 \sin 2\pi \times 10^3 t)$$
 Find its bandwidth.
- e) Draw the block diagram for generation of PM signal using FM modulator.
- f) Define pulse modulation. What are different pulse modulation techniques?
- g) The number of bits per sample in a PCM system with sinusoidal input is increased from n to n+1. What will be the improvement in signal to quantization noise ratio?
- h) Explain binary PSK modulation scheme.
- i) Define spread spectrum technique. List the two spread spectrum techniques.
- j) The noise figure of an amplifier is 0.2 dB. Find the equivalent temperature,  $T_e$ .

**2x10**

### **PART-A**

Q.2 a) Define Modulation. Discuss various types of modulation techniques. Why is it needed?

**8**

b) What is the difference between a continuous-time signal and a discrete-time signal? Give example of each.

**6**

c) Explain the following:

- i) Baseband signal.
- ii) Passband signal.

**6**

Q.3 a) How is SSB signal generated by the filter method? Explain in detail with suitable block diagram and necessary equations.

**7**

b) An AM wave is given by:

$$s(t) = 10 \cos(2\pi \times 10^6 t) + 5 \cos(2\pi \times 10^6 t) \cos(2\pi \times 10^3 t)$$

Find the various frequency components present and the corresponding modulation index. Draw the line spectrum and find bandwidth.

**6**

c) Explain envelope detector method for demodulation of AM wave.

**7**

Q.4 a) A FM signal is represented by:

$v(t) = 12 \cos(2\pi \times 10^8 t + 5 \sin 1250t)$ . Determine the following:

- i) Carrier frequency.
- ii) Modulating frequency.
- iii) Modulation index.
- iv) Power dissipated in  $10\Omega$  resistor.
- v) Bandwidth required.

**5**

b) Discuss in detail Armstrong method for FM generation. Why is it also called indirect method?

**8**

c) Explain ratio detector.

**7**

### **PART-B**

Q.5 a) Derive the expression for signal to quantization noise ratio for a PCM system that employs linear quantization technique. Assume that the input to the PCM system is a sinusoidal signal.

**10**

b) What is companding? Explain different types of compressor characteristics.

**5**

c) Explain delta modulation. How can we overcome slope overload error?

**5**

Q.6 a) Explain QPSK modulator and demodulator, in detail. Compare the bandwidth of QPSK system with that of BPSK system.

**10**

b) Describe OFDM technique. What are the advantages of this technique?

**10**

Q.7 a) Explain the following terms:

- i) Noise figure.
- ii) S/N ratio.
- iii) Noise temperature.
- iv) Thermal noise.

**10**

b) Derive an expression for voltage model of a noisy resistor. An amplifier is operating over the frequency range of 450 kHz to 500 kHz and it has  $100\text{ k}\Omega$  input resistance. Find the rms noise voltage at the input to this amplifier. Assume ambient temperature of  $17^\circ\text{C}$ .

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fourth Semester

### **POWER SYSTEM ENGINEERING (EE-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.** Each question carries equal marks.

- Q.1 a) Why is electrical energy preferred over other forms of energy?  
b) Why is the overall efficiency of a steam power station very low?  
c) What do you mean by base load and peak load on power station?  
d) The maximum demand on a power station is 100 MW. If the annual load factor is 40%, calculate the total energy generated in a year.  
e) Define 'corona effect'.  
f) What is mean by transmission efficiency?  
g) Explain Kelvin's law.  
h) What do you understand by GMD?  
i) What is skin effect?  
j) What are the advantages of bundled conductor used for overhead lines?

**2x10**

#### **PART-A**

- Q.2 a) Explain the function of the following:  
i) Dam                   ii) Spillways                   iii) Penstock  
iv) Surge Tank           v) Headwork's.
- 10**
- b) Draw the flow diagram of a diesel power station and discuss its operation in detail. **10**
- Q.3 a) What is tariff? Explain its different types.  
**10**  
b) A generating station has a maximum demand of 25 MW, a load factor of 60%, a plant capacity factor of 50% and a plant use factor of 72%. Find:  
i) The reserve capacity of the plant.  
ii) The daily energy produced.  
iii) Maximum energy that could be produced daily if the plant while running as per schedule, was fully loaded.
- 10**
- Q.4 a) Derive an expression for sag when supports are at equal levels and at unequal levels.  
**10**

b) Explain different types of insulators of overhead lines.

**10**

**PART-B**

Q.5 a) Give comparison between A.C and D.C distribution system.

**10**

b) What do you understand by distribution system? Explain the terms: feeder, distribution and service mains.

**5**

c) Explain 'Ring main system'.

**5**

Q.6 a) Show how regulation and transmission efficiency are determined for medium lines using:

- i) Nominal T method.
- ii) Nominal  $\pi$  method.

Illustrate your answer with suitable vector diagrams.

**10**

b) Discuss the concept of self GMD and mutual GMD of bundled conductors.

**10**

Q.7 Write short notes on the following:

- a) Resistance earthing.
- b) Reactance earthing.
- c) Resonant earthing.
- d) Neutral grounding.

**5x4**

## **End Semester Examination, Dec.2017**

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.

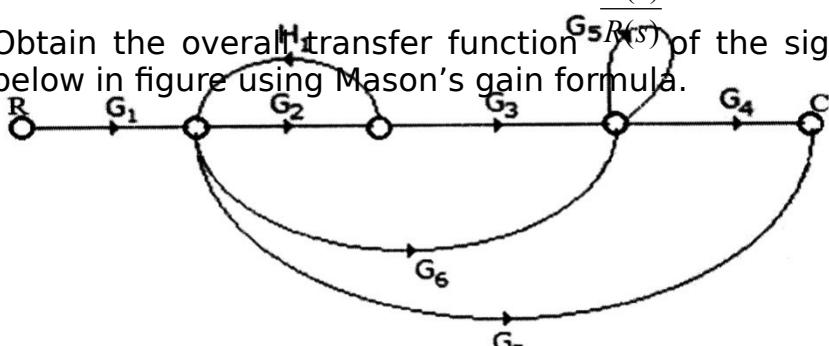
**Q.1 Answer the following:**

- a) Differentiate between linear and nonlinear system.
- d) What do you mean by type 2 system?
- c) What is gain cross over frequency?
- d) Define peak overshoot of a second order system.
- e) Define BIBO stability.
- f) What do you mean by break away point in root locus analysis?
- g) Draw an electrical network for lag compensation.
- h) Define gain margin.
- i) Draw the polar plot of transfer function  $K/(1+sT_1)(1+sT_2)$ .
- j) Define state of a system.

**2x10**

### **PART-A**

**Q.2 a) Obtain the overall transfer function  $\frac{C(s)}{R(s)}$  of the signal flow graph shown below in 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

$$r(t) = a_0 + a_1 t + \frac{a_2}{2} t^2$$

**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**

$$G(s) H(s) = \frac{K}{(s+1)(s-2)(s+3)}$$

- b) Draw the root locus of a system with  $K$  is varied from 0 to  $\infty$

### **PART-B**

Q.5 a) A unity feedback control system has  $G(s) = \frac{20}{(s+5)(s+10)}$  Draw the bode plot.

**10**

- b) Using Nyquist stability criterion, find the stability of closed loop system with

$$G(s) = \frac{10}{s(s+1)}$$

**10**

Q.6 a) Write short notes on (Any two):

- i) Stepper Motor and its applications.
- ii) Ac Servomotor.
- iii) Synchros.

**10x2**

Q.7 a) Discuss a 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

$$\frac{d^3y}{dt^3} + \frac{8d^2y}{dt^2} + 5\frac{dy}{dt} + 7y = 9u(t)$$

differential equation  $\frac{d^3y}{dt^3} + \frac{8d^2y}{dt^2} + 5\frac{dy}{dt} + 7y = 9u(t)$ . Where  $y$  is the output and  $u$  is the input to the system.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fourth / Fifth Semester  
**POWER ELECTRONICS (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.** Each question carries equal marks.

**Q.1** Briefly answer the following questions:

- a) What are the applications of power electronics?
- b) Define holding current.
- c) What is snubber circuit?
- d) List the semiconductor devices which can withstand i) unipolar voltage ii) bipolar voltage.
- e) Why free-wheeling diode used in converter?
- f) What is circulating current?
- g) Define duty cycle of chopper.
- h) List the application of cycloconvertor.
- i) Define extinction angle.
- j) Explain string efficiency.

**2×10**

### **PART-A**

- Q.2 a) Explain the construction detail of MOSFET. Draw its transfer and output characteristics. Also, enumerate the application of MOSFET. **10**  
 b) What are the types of power diodes? **10**
- Q.3 a) What do you mean by commutation? What are its various types? Explain any one forced commutation technique in detail. **12**  
 b) S.C.R with voltage rating of 1000 V and current rating of 200 A are available to be used in string to handle 6 KV and 1 KA. Calculate the number of series and parallel unit required, if the derating factor is 0.6. **8**
- Q.4 a) Explain the working of single phase full wave converter with R-L-E load. Illustrate the appropriate waveforms of load voltage and load current. Also, find the expression of average load voltage and rms voltage. **10**  
 b) Explain the working of single phase dual converter with both modes. **10**

### **PART-B**

- Q.5 a) Describe the working of three phase bridge inverter in 180° conduction mode. Draw the appropriate load voltage waveform. **15**  
 b) Compare voltage source inverter and current source inverters. **5**
- Q.6 a) Explain the working of four quadrant chopper. **10**  
 b) What is buck converter? Explain its modes of operation with appropriate expression of output voltage and waveform. **10**
- Q.7 a) What is cycloconverter? Explain its working with suitable waveforms. **8**  
 b) Explain the working of single phase voltage controller with R load. **7**  
 c) Write a short note on UPS. **5**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer in brief:
- List important specifications as per ISI for transformer and DC machine.
  - Define window space factor in design of transformer.
  - Discuss the factors which govern the choice of number of poles for a dc machine.
  - What is the function of commutating poles in dc machines?
  - List advantages of computer aided design of electrical machines.
  - How synchronous curps can be avoided?
  - Name the winding used for transformers up to the 750 KVA rating.
  - How output of water wheel alternator is expressed?
  - Explain leakage coefficient.
  - Why should the number of slots in stator be not equal to rotor slots for an induction motor?

**2x10**

### **PART-A**

Q.2 a) Derive an expression for the temperature rise of electrical machines in terms of its heating time constant and final temperature rise.

**10**

b) Discuss various types of enclosures used in electrical machines and their influence upon the temperature rise attained during the service conditions.

**10**

Q.3 a) Derive the output equation of a 3-phase transformer in terms of design constants and hence deduce the equation for single phase transformer.

**10**

b) Calculate the core and window areas required for 1000 KVA, 6600/400 volts, 50 Hz, 3 phase, core type power transformer. Assume flux density in the core as 1.38 Tesla, current density of  $2.35 \text{ A/mm}^2$  and window space factor of 0.32.

**10**

Q.4 a) Describe the effect of slot opening on the flux distribution in the air gap of an electrical machine.

**10**

b) Discuss a method of estimation of reluctance of the air gap in slotted armature.

**10**

### **PART-B**

Q.5 a) Define specific magnetic loading and specific electric loading and obtain an expression for the output coefficient for a dc machine.

**10**

b) Find the following details for 7.4 kW, 1450 rpm, 200 volts dc shunt motor:

- i) Output coefficient.
- ii) Diameter of armature.
- iii) Length of armature core.
- iv) Total number of armature conductors.

**10**

Q.6 a) Deduce for  $3-\phi$  induction motor an expression showing relationship between output, its diversion speed, specific electric loading, magnetic loading efficiency and power factor.

**10**

b) Derive the expression for the current in end rings and area of end rings of the squirrel cage motor.

**10**

Q.7 Write short notes on **(any two)**:

- a) Damper winding.
- b) Stator winding of turbo alternators.
- c) Design of salient pole machine.

**10x2**

**End Semester Examination, Dec. 2017**  
**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:
- Write down the expression for transient current on transmission line.
  - What is the significance of operator ' $\alpha$ ' and what is its value?
  - State why 3- $\phi$  faults is more severe than three phase unsymmetrical fault.
  - Why do we prefer to analyze unsymmetrical faults by symmetrical component methods?
  - Mention the different methods of high resistance arc interruption.
  - What are different zones of protection?
  - Why Buchholz's relay is used?
  - Why it is necessary to protect the transmission line of power system against over voltages?
  - What is meant by voltage surge?
  - Explain the working principle of distance relay.
- 2×10**

### **PART-A**

- Q.2 a) Discuss short circuit of a synchronous machine at no load. **15**
- b) Define sub-transient, transient and synchronous reactance. **5**
- Q.3 a) A 15 MVA, 6.9 kV generator, star-connected has +ve, -ve and zero sequence reactance of 25%, 25% and 8% respectively. A reactor with 6% reactance based on rating of the generator is placed in line from neutral to ground. A line to line fault occurs at the terminals of the generator when it is operated at rated voltage and disconnected from the system. Find the initial symmetrical r.m.s line and ground wire current and line to neutral voltage if fault does not involve ground. **10**
- b) Derive an expression for fault current for double line to ground fault by symmetrical component method. **10**
- Q.4 a) Discuss the operating principle of SF<sub>6</sub> circuit breaker with proper diagram. **7**
- b) What are the advantages of SF<sub>6</sub> circuit breaker over other type of circuit breaker and for what range it is recommended? **3**
- c) Write short notes on the following:  
 i) Current chopping.  
 ii) Resistance switching. **5×2**

### **PART-B**

- Q.5 a) Derive the expression for torque developed in an induction relay. **10**
- b) Discuss the working of different types of electromagnetic attraction relays. **10**
- Q.6 a) Explain operating principle and condition of operation of reactance relay supported by proper mathematical equation. **10**
- b) Draw and explain the merz-price protection of alternator stator winding. **10**
- Q.7 a) Discuss the mechanism of lightning discharge. **10**
- b) What is surge diverter? Why it is needed? What is the basic principle of operation of a surge diverter? **10**

## **End Semester Examination, Dec. 2017**

### 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.** Each question carries equal marks.

- Q.1 Answer the following:
- What do you mean by global warming?
  - Discuss the disadvantages of OTECH plants.
  - Define solar insolation.
  - List the applications of tidal power.
  - What do you mean by photovoltaic cell?
  - Define the term solar constant.
  - What are the various materials used in manufacturing of solar cell?
  - Define the term thermal energy storage in the form of latent heat.
  - Explain greenhouse effect.
  - Give the names of various instruments used for measuring solar radiation.

**2×10**

### **PART-A**

- Q.2 a) Discuss the performance analysis of flat-plate collectors in detail. **10**  
 b) What do you mean by conventional sources of energy production? Discuss the various sources in brief. **10**
- Q.3 a) Discuss the construction and characteristics of silicon PV cells. **10**  
 b) Discuss the following:  
   i) Photovoltaic effect.  
   ii) Materials used for the construction of solar cells. **5×2**
- Q.4 a) Discuss horizontal axis and vertical axis wind turbines in detail. **10**  
 b) Explain lift force and drag force in detail. **10**

### **PART-B**

- Q.5 a) Derive an expression for energy stored in wave. **10**  
 b) Explain the principle of operation and open cycle method of power generation of OTEC. **10**
- Q.6 a) Define anaerobic digestion system of biogas technology in details and what are its advantage? **10**  
 b) Explain how biomass conversion takes places? **10**
- Q.7 a) Explain the working principle and operation of fuel cell with a neat diagram. **10**  
 b) Write short notes on the following:  
   i) Power from nuclear fusion.  
   ii) Power from satellite stations. **5×2**

## **End Semester Examination, Dec. 2017**

### **B. Tech. — Sixth Semester ELECTRICAL DRIVES (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:
- What is an electric drive?
  - What is vintage torque?
  - What is plugging?
  - Name two methods of speed control of a dc motor.
  - Regenerating braking works in which quadrant.
  - Give the relation between firing angle in a dual converter.
  - What is duty cycle in a chopper?
  - What is slip?
  - Which motor is used in a crane system?
  - What are the sources employed in an electrical drives?
- 2×10**

### **PART-A**

- Q.2
- Give block diagram representation of an electric drive and explain the function of each block.
  - A 220V, 70A dc series motor has combined resistance of armature and field of  $0.12 \Omega$  (ohm). Running on no load with the field winding connected to a separate source it gave following magnetizing characteristic at 600 rpm:

Field Current, A	10	20	30	40	50	60	70	80
Terminal Voltage, V	64	118	150	170	184	194	202	210

Motor is controlled by a chopper with a source voltage = 220V calculate:

- Motor speed for a duty ratio of 0.6 and motor current of 60A
  - Torque for a speed of 400 rpm and duty ratio of 0.65.
- 5×2**

- Q.3
- Explain the speed control of a separately excited dc motor fed by single phase fully controlled rectifier.
  - Explain various breaking methods of dc motors.
- Q.4
- Explain the working of a dual converter fed separately excited DC motor drive.
  - Explain how the speed of a dc series motor is controlled with the help of a chopper.

### **PART-B**

- Q.5
- Explain stator voltage control method for speed control of induction motor.
  - A 200 V., 1500 rpm, 15 A, separately excited dc motor is fed from a single phase fully controlled rectifier with an ac source voltage of 230 V, 50 Hz,  $R_a = 2.2 \Omega$  (ohm) Conduction can be assumed to be continuous. Calculate firing angle for:
    - Half and rated motor torque and 600 rpm.
    - Rated motor torque and (-1200 rpm)
- 5×2**
- Q.6
- Explain the variable frequency control method of speed control of induction motor below base speed.
  - Derive torque equation of an induction motor. Give the condition for maximum torque.
- Q.7
- Explain current loop control of speed of an electric drive.
  - Explain the variable frequency control of a synchronous motor.

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester  
**POWER SYSTEM-II (EE-603A)**

Time: 3 hrs.

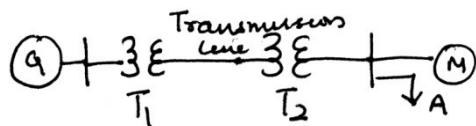
Max Marks: **100**

No. of pages: **2**

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

Q.1 Answer briefly:

- a) Draw the impedance diagram for the given single line representation of the system.

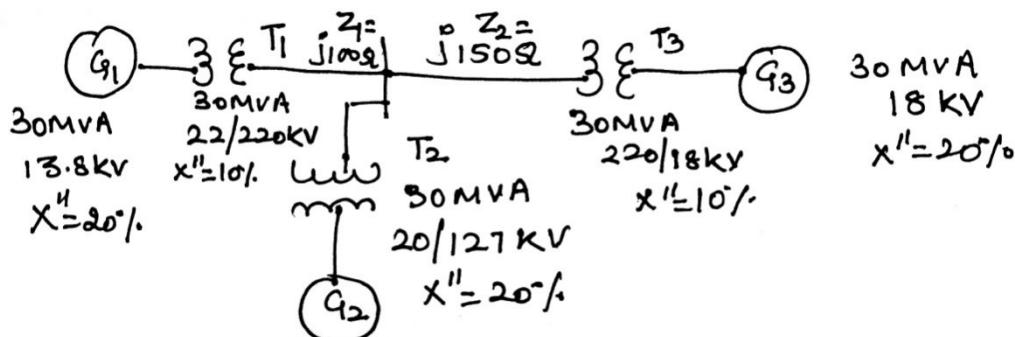


- b) What is the role of swing bus in power flow study?  
 c) Differentiate between augment incidence matrix and incidence matrix.  
 d) At what condition generator bus is treated as load bus?  
 e) Define dynamic stability.  
 f) What is the function of tie-line in two area power system network?  
 g) What are the fact controllers?  
 h) Define critical clearing angle.  
 i) What are the advantages of per unit system?  
 j) What is Jacobian matrix?

**2x10**

### **PART-A**

- Q.2 a) Write a short note on the reactance of an alternator when sudden 3-phase short circuit occurs on its terminals. **7**  
 b) The single line diagram of a power system is shown in figure along with components data. Determine the per unit values and draw the reactance diagram. Assume 25MVA and 20KV a new base on generator  $G_1$ .



Where  $Z_1$  and  $Z_2$  are impedances for transmission lines.

**13**

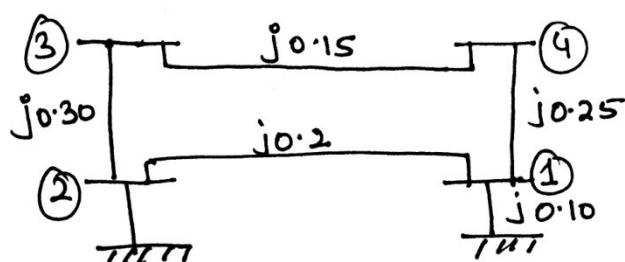
- Q.3 a) Derive the expression for formulation of network matrices

$$Y_{BUS} = A^t Y A$$

$$Y_{BUS} = A^t Y A$$

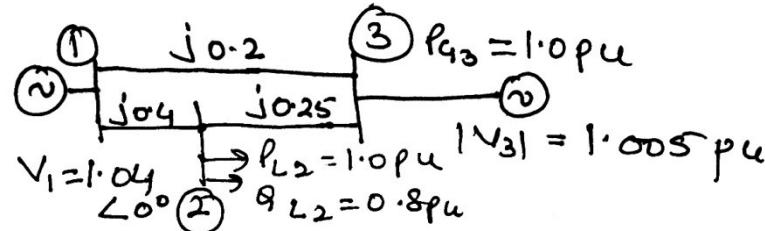
**10**

- b) Assemble the  $Z_{BUS}$  for the following power system network using step by step method.



**10**

- Q.4 a) With neat flow chart explain the computational procedure for load flow solution using fast decoupled method when the system contains all types of the buses. **10**
- b) For the power system network shown in figure, compute the bus voltage using the Guass-Seidal iteration method. Line reactance and loads are shown in figure. Bus 1 is the slack bus and buses 2 and 3 are the load and voltage control buses, respectively. Assume tolerance equal to 0.00001.



**10**

### **PART-B**

- Q.5 What is load frequency control in power systems? Explain and derive equations of transfer function for each component in automatic generation control block diagram. **20**
- Q.6 What is equal area criterion? Discuss its application for the system stability study, when.
- Sudden increase in load takes place. **10**
  - A short circuit on one of the parallel feeders takes place, which is cleared after certain time. **10**
- Q.7 Write short notes on the following:
- Power quality and its issues.
  - Shunt controllers.
  - Series controllers.
  - Combined series-shunt controllers. **5x4**

## **End Semester Examination, Dec. 2017**

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 in brief:
- Explain the real and apparent flux densities.
  - How does the specific magnetic loading affect the design of electrical machines?
  - Write the various methods adopted to cool the transformer.
  - Define 'window space factor'.
  - Write down the advantages of computer aided design of electrical machines.
  - Write down the output equation of DC machine.
  - What are the functions of conservator and breather in a transformer?
  - What method should be adopted to avoid synchronous curps?
  - What is the advantage using stepped core in transformer?
  - What do you mean by runway speed?

**2x10**

### **PART-A**

- Q.2 a) Write a short note on enclosures of electric machines. **8**  
 b) Derive the equation of temperature rise with time in electric machine. What is heating time constant? **12**
- Q.3 a) Develop the output equation of single and three phase transformer. **8**  
 b) The ratio of flux to full load mmf in a 400 kVA, 50 Hz, single core type power transformer is  $2.4 \times 10^{-6}$ . Calculate the net iron area and the window area of the transformer. Maximum flux density in the core is  $1.3 \text{ wb/m}^3$ , current density  $2.7 \text{ A/mm}^2$  and window space factor is 0.26. Calculate full load m.m.f. **12**
- Q.4 a) Derive an expression for overall design of electromagnetic coil. **8**  
 b) Derive an expression of m.m.f. of air gap of magnetic circuit. **12**

### **PART-B**

- Q.5 a) Derive the output equation of dc machine and explain the significance of specific electrical and magnetic loading on DC machine. **10**  
 b) Find the main dimensions of 200 kW, 250 V, 6 pole and 1000 rpm generator. The maximum value of flux density in the gap is  $0.87 \text{ wb/m}^2$  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 Write short notes on:  
 a) Damper winding.  
 b) Design of salient pole machine.  
 c) Short circuit ratio.  
 d) Stator winding of turboalterattors. **5x4**
- Q.7 a) Derive an expression for current in end rings and area of end rings for a squirrelcage induction motor. **15**  
 b) How do you select the number of rotor slots and area of rotor bars **5**

**End Semester Examination, Dec. 2017**  
B. Tech. – Sixth Semester  
**CONTROL ENGINEERING (EE-606)**

Time: 3 hrs.

Max Marks: **100**  
**495/5**

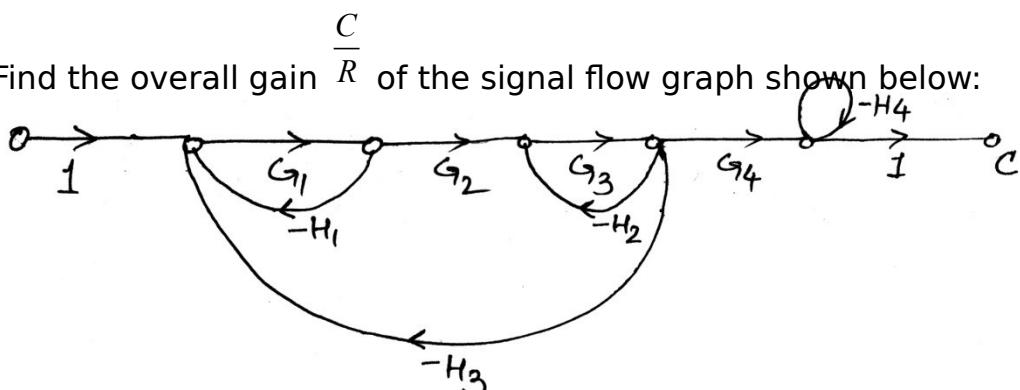
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B.** Each question carries equal marks.

- Q.1 a) Define transfer function.  
 b) Explain Mason's gain formula.  
 c) Define non-touching loop and transmittance in context with signal flow graph.  
 d) Define type and order of a system.  
 e) What is the function of derivative controller?  
 f) Explain the characteristic equation of a closed system.  
 g) What will be the initial slope of the bode magnitude plot for type 0 system.  
 h) Define phase and gain cross over frequency.  
 i) State Nyquist stability criterion.  
 j) Draw the circuit diagram of lag compensator.

**2×10**

### **PART-A**

- Q.2 a) Find the overall gain  $\frac{C}{R}$  of the signal flow graph shown below:

**12**

- b) Discuss the linear time invariant and time varying systems with an example.

**8**

- Q.3 a) What are position, velocity and acceleration error constants? Find the value of steady state error with unit step and unit ramp input for type 0, 1 and 2 systems.  
**10**  
 b) Derive an expression for peak overshoot for second order system subject to unit step input.

**10**

- Q.4 a) Explain Routh stability criterion. Using this criterion find the range of  $K$  for

which the system with transfer function  $\frac{S^4 + 6S^3 + 30S^2 + 60S + K}{S^4 + 6S^3 + 30S^2 + 60S + K}$  is stable. **10**

$$G(s) H(s) = \frac{K}{S(S+1)(S+2)}$$

- b) Draw the root locus of a system with  $K$  as  $K$  is varied from 0 to  $\infty$ .

**10**

### **PART-B**

- Q.5 a) Applying Nyquist stability criterion, determine the closed loop stability for open loop transfer function.

$$G(S) H(S) = \frac{1}{s(1+s)(1+2s)}$$

**10**

- b) Explain the various steps involved to draw bode plots for a given transfer function.

**10**

Q.6 Write short notes on (**any two**):

- a) D.C servo motors.
- b) Magnetic amplifier.
- c) Stepper motor and its applications.

**10×2**

Q.7 a) Discuss phase lead compensation with the help of circuit diagram and also finds its transfer function. **10**

b) Explain proportional derivative integral control action. State the merits of this multiple controller over the systems that incorporate each mode individually. **10**

**End Semester Examination, Dec. 2017**  
**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**. Each question carries equal marks.

- Q.1 a) Draw a circuit diagram of Cockcroft-Walton voltage multiplier.  
b) What are different forms of high voltage?  
c) Define basic impulse level.  
d) Write down methods of reducing switching over voltages.  
e) What is the purpose of insulation coordination?  
f) What is partial discharge?  
g) State Paschen's Law.  
h) What precautions are taken for live line maintenance?  
i) What is the use of Tesla coil?  
j) Explain indirect stroke of lightning. **2×10**

**PART-A**

- Q.2 a) Explain the working of a resonant transformer. How it is advantageous over cascaded transformer?  
b) Discuss the working of VandeGraff generator with its proper diagram. **10×2**
- Q.3 a) Give Marx circuit arrangement for a multistage impulse generator. How is the basic arrangement modified to accommodate the time wave control resistance? **15**  
b) Discuss the advantages of high frequency transformer. **5**
- Q.4 a) Discuss the phenomenon of lightning discharge in detail.  
b) What is surge arrester and why it is used? **10×2**

**PART-B**

- Q.5 a) Discuss the following terms:  
i) Self restoring insulation.  
ii) Basic impulse level.  
iii) Switching impulse level. **5×3**  
b) Explain different methods of reducing switching over voltages. **5**
- Q.6 a) Derive an expression to find dielectric constant and loss factor.  
b) Write a short note on 'suspended particle mechanism'. **10×2**
- Q.7 Explain the principles of line maintenance and also write in detail about tools used in the maintenance. **20**

# End Semester Examination, Dec. 2017

B. Tech. — Seventh Semester

## COMPUTER APPLICATION AND 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 load bus and give its importance.
- b) State drawbacks of Newton-Raphson method.
- c) Define primitive network.
- d) What is a contingency?
- e) List advantage of pre unit system.
- f) State significance of positive and zero sequence components.
- g) State importance of penalty factor.
- h) Define contingency.
- i) List the methods to solve optimal power flow problem.
- j) Define power quality.

**2×10**

### PART-A

**Q.2** Discuss the load frequency control problem in two area connected system. Hence derive expression for tie line power flow. **20**

**Q.3** a) Explain reactance of an alternator when sudden 3 phase short circuit occurs on its terminal. **10**  
 b) Explain  $T$  and  $\pi$  model used for representation of transmission lines. **10**

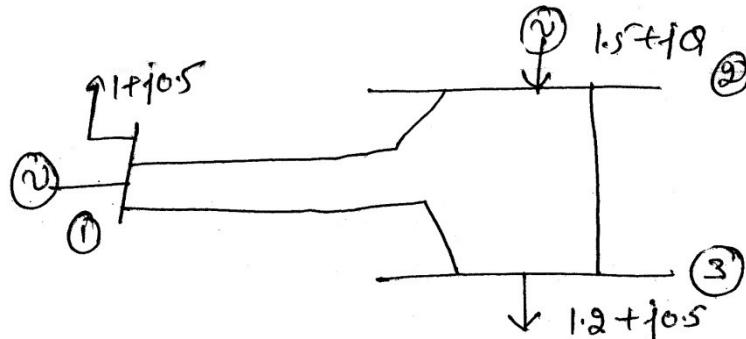
**Q.4** Discuss the  $Z_{BUS}$  building algorithm in detail. How can the  $Z_{BUS}$  matrix be updated, if any line is removed from the previously existing network or the impedance value of existing line get modified? Include the effect of mutual coupling. **20**

### PART-B

**Q.5** a) Derive expression for double line to ground fault. **10**  
 b) A  $3 - \phi$ , 33 kV, 50 MVA generator with  $X_0 = 0.25\text{pu}$ ,  $X_1 = 0.2\text{pu}$  and  $X_2 = X_1$  is grounded through a reactance of  $0.3 \Omega$ . Calculate the fault current for SLG fault. **10**

**Q.6** For the system given below, compute:

- a) Bus voltages.
- b) Slack bus power. Assume bus 1 as slack bus. Use Gauss Seidel method.



The series admittance of each line are  $0.26 + j0.11\text{pu}$  and  $j0.04\text{pu}$  respectively.

**20**

**Q.7** a) Derive condition for economic load dispatch neglecting transmission line losses. **10**

- b) A constant load of 300 MW is supplied by two 200 MW generator for which respective IFC are:

$$\frac{dc_1}{dp_{G1}} = 0.1P_{G1} + 20$$

$$\frac{dc_2}{dp_{G2}} = .12P_{G2} + 15$$

Where  $P_G$  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**

B. Tech. – Sixth Semester  
**NEW AND RENEWABLE ENERGY RESOURCES (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**. Each question carries equal marks.

- Q.1 a) List the applications of tidal power.  
b) Define global warming.  
c) Discuss the advantages of OTech plants.  
d) What is the total power generation in India?  
e) What are the different types of photovoltaic cells?  
f) Define solar constant.  
g) What is biofuel and how is it better than others?  
h) Define the term ‘nuclear fusion’.  
i) How is biomass related to solar energy?  
j) What are the advantages of wind energy?

**10x2**

**PART-A**

- Q.2 a) How solar power can be used to generate electricity?  
**10**  
b) How do you design and fabricate a flat plate collector?  
**10**
- Q.3 a) Explain the construction and working of a photovoltaic cell. What are the different ways of using a PV cell/module to provide power?  
**10**  
b) Explain the following devices used for the measurement of solar radiations:  
i) Pyranometer  
ii) Pyrheliometer.  
**10**
- Q.4 a) Why do we prefer ocean energy over wind energy?  
**10**  
b) Explain the construction and working of horizontal axis wind turbine generator system with diagrams.  
**10**

**PART-B**

- Q.5 a) Derive the relation for yearly power generation from a tidal project.  
**10**  
b) How do you define tidal power plants on the basis of basins?  
**10**
- Q.6 a) Explain the construction and working of different types of turbines used in small hydro power plants.  
**10**  
b) Give the detail classification of small hydro power stations.  
**10**

- Q.7 a) Name the various components of fuel cell and then explain its working in detail. **10**  
 b) Write short notes on:  
   i) Power from nuclear fusion.  
   ii) Power from satellite stations.
- 5x2**

## **End Semester Examination, Dec. 2017**

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: **2x10**  
 a) List various resources of energy.  
 b) What are the energy conservation opportunities in our day to day life?  
 c) What is HVAC?  
 d) Why is energy management needed for electric heating?  
 e) What is an electrical load?  
 f) What is meant by delamping?  
 g) Name the methods used for calculating rate of return.  
 h) How do you define electrical load analysis?  
 i) Why is peak demand controlled?  
 j) What is meant by least cost power planning?

#### **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? Describe the role of energy manager for energy management in an organization. **10**  
 b) Discuss the various instruments used for energy auditing. **10**

- Q.4 a) What is the significance of second law 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) What are the various measures which can be adopted for energy management in an electric drive system? **10**  
 b) Discuss how electrical load analysis can be done? **10**

- Q.6** a) Write a note on life cycle costing approach. **10**  
b) Differentiate between:  
    i) Average rate of return method and internal rate of return method.  
    ii) Payback method and present value method. **5×2**

**Q.7** a) Discuss the following:  
    i) DEFENDUS strategy.  
    ii) Co-generation of electricity.  
    iii) Use of computers in energy management. **5×3**  
b) What is meant by power planning? How it is linked with energy management? **5**

**End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1** Answer the following in brief:

  - a) Name conventional sources of energy.
  - b) What are the advantages of hydropower plants?
  - c) What is meant by demand factor?
  - d) What is meant by load factor?
  - e) What is meant by plant factor?
  - f) What are the factors to be considered for site selection?
  - g) What are the advantages of non-conventional sources of energy?
  - h) What are the limitations of solar energy?
  - i) What is meant by energy management?
  - j) What is meant by cogeneration?

**2×10**

## **PART-A**

- Q.2 Explain construction and working of hydro power plant.

20

- Q.3 a) Explain load duration curve and mass curve with their complete information. **10**

b) The maximum demand of a power plant is 40 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.

**10**

10

- Q.4 a) What do you understand by tariff? Explain briefly various types of tariffs. **10**  
b) The daily load of an industrial consumer is:

100 kW for 9 hours, 125 kW for 6 hours, 50 kW for 7 hours; and 5 kW for 2 hours.

The tariff rate is Rs. 800/- per kW of maximum demand per year plus Rs. 2.50/- per kWh.

Determine the energy consumption per year (365 days) and yearly bill. **10**

### **PART-B**

- Q.5 Explain construction and working of nuclear power plant. **20**
- Q.6 a) How can solar energy be converted into electric energy? Give a diagram showing the elements of such a plant. **10**  
b) Describe the layout of wind power generation. What are the technical problems that may arise? **10**
- Q.7 a) What do you mean by energy audit? What are the objectives of energy audit? **8**  
b) What are energy efficient motors? Explain factors affecting its efficiency. **12**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Answer the following:

- Differentiate between PLC based and microprocessor based systems.
- Write the languages mostly used in PLC Programming.
- Convert the following binary numbers into hexadecimal:  
i) 100101010011      ii) 001011101111
- Write the truth table for AND and OR Gate.
- What are different types of switches used for PLC?
- What is the purpose of the pushbutton used for PLC?
- Write full form of SCADA.
- State the advantages and disadvantages of SCADA.
- List the advantages of PLC over conventional relay logic.
- State the need of HMI.

**2x10**

### **PART-A**

- Q.2 a) Draw the block diagram of PLC and label it. Also explain the function of each block in detail. **10**  
b) Describe the classification of Input / Output Module of Mitsubishi PLC. **10**
- Q.3 a) Draw the ladder diagram for the following function table:

Inputs-  $X_1, X_2$       Output-  $Y_1, Y_2$

$X_1$	$X_2$	$Y_1$	$Y_2$
0	0	1	0
0	1	0	1
1	0	0	1
1	1	1	0

**10**

b) Explain different types of timers in detail.

**10**

Q.4 a) Explain of PID control using PLC.

**10**

b) What is tuning of PID? Explain in detail.

**10**

### **PART-B**

Q.5 Explain with a block diagram how SCADA system is used in automation.

**20**

Q.6 a) Explain how communication takes place between PLC and SCADA.

**10**

b) Explain how SCADA is implemented in water purification?

**10**

Q.7 a) Draw the ladder diagram to control the three motor running sequentially, the running time of each motor is 10 sec.

**10**

b) Write the ladder logic to control traffic lights.

**10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Answer the following:

- a) What is state?
- b) Write two advantages of state space analysis.
- c) Write two properties of state transition matrix.
- d) Define controllability.
- e) What is the effect of pole-zero cancellation in transfer function?
- f) What is sampled data control system?
- g) What is sampler?
- h) Define Z-transform at unit step signal.
- i) What are linear and non-linear systems?
- j) What are limit cycles?

**2x10**

## **PART-A**

Q.2 a) Obtain the state model of the system whose transfer function is given as:

$$\frac{Y(s)}{U(s)} = \frac{10}{S^3 + 4S^2 + 2S + 1}$$

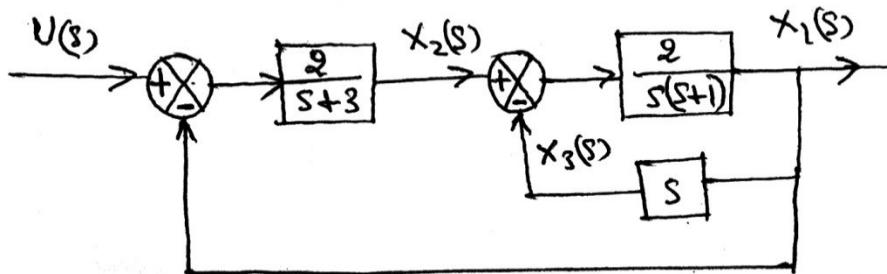
10

b) Consider the state equation with forcing function:

$$\dot{\mathbf{X}}(t) = A\mathbf{X}(t) + BU(t) . \text{ Obtain the solution of state equation.}$$

**10**

Q.3 Write the state equation for the system shown in the figure below:



Where  $X_1$ ,  $X_2$  and  $X_3$  constitute the state vector.

Determine whether the system is completely controllable.

**20**

Q.4 a) Define Zero-order hold and first order hold.

**5**

b) Define one sided and two-sided Z-transform. Also explain region of convergence.

**5**

c) Determine the mirror Z-transform of the following Z-domain function:

$$F(z) = \frac{3z^2 + 2z + 1}{z^2 + 3z + 2}$$

10

## **PART-B**

Q.5 a) Check the stability of the sampled data control system represented by the following characteristic equation:

$$5z^2 - 2z + 2 = 0$$

10

b) What is Jury's stability test? Give necessary and sufficient conditions.

**10**

$$y = ax + b \frac{dx}{dt}$$

Q.6 a) The response of a system is,  $y = ax + b \frac{dx}{dt}$ . Test whether the system is linear or non-linear.

**10**

b) Determine the describing function of relay with dead-zone.

**10**

Q.7 Explain any two of the following:

- a) Lyapunov stability.
- b) Sliding mode control.
- c) Asymptotic stability.

**10x2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

## **ELECTRIC POWER APPLICATION 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.** Each question carries equal marks.

**Q.1 Answer the following:**

- a) Explain Stroboscopic Effect.
- b) What do you mean by Polar Curve?
- c) Why sodium discharge lamps are not used for general lighting?

- d) What are the factors on which dielectric heating depends?
  - e) Discuss the specification for AC transformer used in metallic arc welding.
  - f) How carbon arc welding differs from common shielded metal arc welding?
  - g) What do you mean by anodizing?
  - h) Why DC series motor is ideally suited for traction purpose?
  - i) What are the various passenger services?
  - j) Explain in brief vapour absorption system.
- 2×10**

### **PART-A**

- Q.2 a) A room of size  $10 \text{ m} \times 5 \text{ m}$  to be illuminated by twenty 200 w lamps. The MSCP of each lamp is 250. Assume depreciation factor 1.2 and utilization factor as 0.6. Find the average illumination produced on the floor. **10**
- b) Compare tungsten filament lamp with incandescent lamp. **10**
- Q.3 a) Discuss the design of heating element for both circular wire and ribbon type of conductor. **10**
- b) Give the classification of electric heating methods. **5**
- c) What is the main difference between power frequency and high frequency heating? **5**
- Q.4 a) Discuss the principle of arc welding and explain how projection welding is done? **10**
- b) Give some advantages of resistance welding. **5**
- c) What is the fundamental difference between electric arc welding and resistance welding? **5**

### **PART-B**

- Q.5 a) A copper refining plant, using 500 electrolytic cells carries a current of 6000 A, voltage per cell being 0.25 V. If the plant were to work 40 hrs/week. Calculate the energy consumption per ton. Assuming ECE of copper is 0.328/mg of electricity. **10**
- b) Explain the principle of electrolysis with proper diagram and also discuss some of its applications. **10**
- Q.6 a) The distance between two stops is 5 Km. A train has a schedule speed of 50 kmph. The train accelerates at 2.5 kmph and retards at 3.5 kmph and duration of stop is 55 sec. Determine the crest speed over the run, assuming trapezoidal speed time curve. **10**
- b) Discuss various types of current collectors used in electric traction. **10**
- Q.7 a) What do you mean by water cooler? Discuss in detail its various types. **15**
- b) What are the factors that lead to efficient air conditioning? **5**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer the following:

- a) What do you understand by scattered radiation?

- b) What is meant by spectrum?
  - c) What is a sunshine recorder?
  - d) What is meant by diffused radiation?
  - e) Describe Reynold's number and its usefulness.
  - f) Define flat plate collector.
  - g) What do you understand by U factor?
  - h) Why is storage of solar energy essential?
  - i) On what factor does optimum capacity of energy storage depend on?
  - j) What is meant by photovoltaic?
- 2×10**

### **PART-A**

- Q.2 a) Calculate zenith angle, solar azimuth angle for a place with latitude of  $43^{\circ}$  at 9:00 AM solar time on February 11. **10**
- b) Explain the structure of Sun. **5**
- c) Explain solar constant. **5**
- Q.3 a) Name the instrument used to measure direct radiation. Explain its construction and working. **10**
- b) Name and explain different type of solar collectors classified on the basis of orientation with Sun. **10**
- Q.4 a) Derive the expression of  $\Delta T$  for air transfer system. **10**
- b) Explain the effect of changing heat transfer fluid. **10**

### **PART-B**

- Q.5 a) Differentiate between liquid heating and air heating flat plate collector. **10**
- b) Describe in detail the non-convective salt gradient solar pond with the help of neat sketch. **10**
- Q.6 a) Explain how is thermal energy storage done. **10**
- b) Discuss in detail the process of sensible heat storage in water. **10**
- Q.7 Write short notes on any two of the following:  
 a) Solar cells.  
 b) Solar water pumping.  
 c) Pool heating with solar energy. **10×2**

## **End Semester Examination, Dec. 2017**

B. Tech - Seventh Semester

### **CONTROL 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.** Each question carries equal marks.

- Q.1 a) What do you understand by scattered radiation?  
 b) What is meant by spectrum?

- c) What is a sunshine recorder?
- d) What is meant by diffused radiation?
- e) Describe Reynold's number and its usefulness.
- f) Define flat plate collector.
- g) What do you understand by U factor?
- h) Why is storage of solar energy essential?
- i) On what factor does optimum capacity of energy storage depend on?
- j) What is meant by photovoltaic? **2x10**

### **PART-A**

- Q.2 a) Calculate zenith angle, solar azimuth angle for a place with latitude of  $43^{\circ}$  at 9:00 AM solar time on February 11. **10**  
 b) Explain the structure of sun. **5**  
 c) Explain solar constant. **5**
- Q.3 a) Name the instrument used to measure direct radiation. Explain its construction and working. **10**  
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- Q.4 a) Derive the expression of  $\Delta T$  for air transfer system. **10**  
 b) Explain the effect of changing heat transfer fluid. **10**

### **PART-B**

- Q.5 a) Differentiate between liquid heating and air heating flat plate collector. **10**  
 b) Describe in detail the non-convective salt gradient solar pond with help of neat sketch. **10**
- Q.6 a) Explain how thermal energy storage is done. **10**  
 b) Discuss in detail the process of sensible heat storage in water. **10**
- Q.7 Write short notes on any two of the following:  
 a) Solar cells.  
 b) Solar water pumping.  
 c) Pool heating with solar energy. **10x2**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer the following:  
 a) Define the term "Energy Efficiency".  
 b) What is Total Quality Management?

- c) What is meant by feasible energy?
  - d) What is the need of energy conservation?
  - e) Explain the concept of energy effectiveness.
  - f) How do you define energy management?
  - g) What do you understand by compensator in heating?
  - h) Develop the mathematical relation of the internal rate of return method.
  - i) What is least cost power planning?
  - j) Explain co-generation of energy.
- 2×10**

### **PART-A**

- |     |  |            |
|-----|--|------------|
| Q.2 | a) Explain GDP coupling with energy intensity.   | <b>5</b>   |
|     | b) What are the general principles of energy management?   | <b>15</b>  |
| Q.3 | a) Explain the term “Energy Audit”. Discuss the types and need for energy audit in detail.   | <b>10</b>  |
|     | b) Explain the steps involved in identifying feasible energy conservation opportunities.   | <b>10</b>  |
| Q.4 | a) Define the following: <ul style="list-style-type: none"> <li>i) The first law of thermodynamics.</li> <li>ii) The second law of thermodynamics.</li> <li>iii) Boyle’s law.</li> </ul> | <b>2×3</b> |
|     | b) Draw neat and clean block diagram of refrigeration. Explain each block in detail.   | <b>14</b>  |

### **PART-B**

- |     |  |             |
|-----|--|-------------|
| Q.5 | a) Define the following terms: <ul style="list-style-type: none"> <li>i) Load factor.</li> <li>ii) Diversity factor.</li> <li>iii) Base load.</li> <li>iv) Peak demand.</li> </ul> | <b>2½×4</b> |
|     | b) What are the various measures which can be adopted for energy management in electric drive system?  | <b>10</b>   |
| Q.6 | a) Discuss life cycle costing approach in detail.  | <b>10</b>   |
|     | b) Discuss the various factors to be considered for payback period approach.   | <b>10</b>   |
| Q.7 | a) Write short note on DEFENDUS strategy.  | <b>4</b>    |
|     | b) Explain the use of computers in energy management.  | <b>4</b>    |
|     | c) Discuss the types of cogeneration cycles in detail.   | <b>12</b>   |

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **POWER SYSTEM MANAGEMENT (EE-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**. Each question carries equal marks.

- Q.1 a) What is the total installed capacity of electricity sector in India?

- b) What is meant by power trading?
- c) What is the purpose of providing controls in a power station?
- d) What are the various costs involved in steam station?
- e) What do you mean by fuel generator cost?
- f) What is meant by time series forecasting?
- g) Define the term 'peak demand'.
- h) What do you mean by long term load forecasting?
- i) What is pattern based trend forecasting?
- j) What is generation planning?

**2×10**

### **PART-A**

- |     |   |           |
|-----|---|-----------|
| Q.2 | a) Briefly explain the scope of various conventional sources in India.    | <b>10</b> |
|     | b) What do you mean by grid management? Explain in detail.                | <b>10</b> |
| Q.3 | a) What are the various steps for designing of a power station?           | <b>10</b> |
|     | b) Give and explain the complete layout of a hydroelectric power plant.   | <b>10</b> |
| Q.4 | a) Under which conditions quantitative forecasting can be applied?        | <b>10</b> |
|     | b) What is the need of forecasting? How forecast methods are categorized? |           |
|     |   | <b>10</b> |

### **PART-B**

- |     |   |            |
|-----|---|------------|
| Q.5 | a) What are the current areas of application of forecasting?              | <b>10</b>  |
|     | b) Explain extrapolation of annual peak demands technique of forecasting. |            |
|     | <b>10</b>   |            |
| Q.6 | a) What do you mean by the long term load forecasting? Explain.           | <b>7</b>   |
|     | b) Explain the end use models for load forecasting.                       | <b>7</b>   |
|     | c) What do understand by multivariate procedure for load forecasting?     | <b>6</b>   |
| Q.7 | a) What are the challenges in load forecasting?                           | <b>8</b>   |
| b)  | Write short notes on:   |            |
|     | i) Generation planning.   |            |
|     | ii) Least cost power planning.  |            |
|     |   | <b>6×2</b> |

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh / Eighth Semester  
**ADVANCED CONTROL SYSTEMS (EE-801)**

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 two properties of a state transition matrix.  
 b) What are the limitations of a transfer function model?  
 c) Define controllability.  
 d) Define a limit cycle.  
 e) Write an expression of describing function of saturation nonlinearity.  
 f) Find Z-transform of  $kT$ .  
 g) Determine inverse Z-transform of  $e^{az^{-1}}$ .  
 h) What is bilinear transformation?  
 i) How non linearity are introduced in the systems?  
 j) What is saturation and dead-zone?

**2x10**

### **PART-A**

- Q.2 a) Obtain the state model of a closed loop system whose transfer function is

$$\text{given by: } \frac{y(s)}{u(s)} = \frac{1}{s^3 + 7s^2 + 20s + 25}.$$

**10**

- b) Write down the state equations and output equations for a generalized phase canonical form with a block diagram.
- 10**

- Q.3 a) Obtain the transfer function of a system given by the following A, B, C, D

$$\text{matrices. } A = \begin{bmatrix} -4 & 1 \\ 0 & -1 \end{bmatrix}, B = \begin{bmatrix} 2 \\ 2 \end{bmatrix}; C = [1 \ 1], D = 0$$

**10**

$$\begin{aligned}\dot{x}_1 &= x_2 \\ \dot{x}_2 &= -2x_1 - 3x_2 + 4\end{aligned}$$

- b) Check whether the system is observable or not  $y = x_1 + x_2$
- 10**

- Q.4 a) The input-output relation of a sampled data system is described by the equation:

$$c(k+2) + 3c(k+1) + 2k = r(k+1) - r(k)$$

Determine Z-transfer function and weighting sequence of the system.

**10**

- b) Determine the inverse Z-transform of the following function:

$$\text{i) } F(z) = \frac{1+z^{-1}}{1-z^{-1}+0.5z^{-2}} \quad \text{ii) } F(z) = \frac{1}{(1+z^{-1})(1-z^{-1})^2}$$

**10**

### **PART-B**

- Q.5 a) Check the stability of the system using Jury's test

$$f(z) = z^4 - 1.2z^3 + 0.07z^2 + 0.3z - 0.08$$

**10**

- b) State and prove sampling theorem.

**10**

- Q.6 a) Derive an expression of describing function for an ideal relay.

**10**

b) What is autonomous system? How will you study its stability using describing function?

**10**

Q.7 a) Describe Lyapunov's stability criterion for stability of a non-linear system.

**10**

b) Differentiate between stability and instability. Also explain asymptotic stability.

**10**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

**Q.1 Answer the following:**

- a) What is difference between illumination and light?
- b) Define and explain candela and lux.
- c) What are the causes of failure of heating elements?
- d) What properties are considered for selecting material for heating element?
- e) What are the qualities of good weld?
- f) What type of dc generator is used in electric arc welding?
- g) What is the use of electroplating?
- h) Why is ammonia the only common refrigerant used in the absorption system?
- i) Which of the system is preferred for main line railway service?
- j) Define solid angle.

**2×10**

### **PART-A**

**Q.2** a) Describe the construction and principle of operation and application of fluorescent lamp. **10**

b) A minimum illumination of  $80 \text{ lumen/m}^2$  is required in a factory shed of  $100m \times 10m$ . Calculate the number, location and wattage of the units to be used. Assume that the depreciation factor is 0.8, coefficient of utilization is 0.4 and efficiency of the lamp is 40 lumens/watt. **10**

**Q.3** a) Describe with neat sketch the working of high frequency induction heating. Discuss the factors affecting the depth of penetration of heat. **10**  
b) Compare induction heating and dielectric heating. Discuss different applications where dielectric heating and induction heating are used. **10**

**Q.4** Explain with neat sketches, the construction, principle of operation and applications of three different types of resistance welding. Give its demerits with respect to arc welding. **20**

### **PART-B**

**Q.5** a) What is electrolysis? State Faraday's laws of electrolysis and explain them clearly. **10**  
b) A copper refining plant, using 500 electrolytic cells, carries a current of 6,000 A, voltage per cell being 0.25 volt. If the plant were to work 40 hours/week, calculate the energy consumption per tonne, assuming ECE of copper as 0.3281 mg/coulomb of electricity. **10**

**Q.6** Write short notes on:

- a) Thermoelectric refrigeration.
- b) Water cooler.
- c) Air conditioning.

d) Window air conditioner.

**5x4**

- Q.7 a) What are the different systems of railway electrification? Under what conditions is diesel electric traction preferred to track electrification? **10**
- b) Write short notes on:
- i) Metadyne control.
  - ii) Speed control and starting of single phase ac series motors. **10**

# **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) – Fifth Semester

## **POWER ELECTRONICS (EE-I-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 a) Define latching current as applicable to an SCR.  
b) Draw symbols of MOSFET and IGBT.  
c) Explain the need of commutation in thyristor circuits.  
d) Why freewheeling diodes are used in converters?  
e) Describe the principle of a dc chopper operation.  
f) What are line commutated inverters?  
g) What is the purpose of connecting diodes in antiparallel with thyristors in inverter circuits?  
h) Enumerate some of industrial applications of a cycloconverter.  
i) Describe basic principle of working of single phase to single phase step up cycloconverter.  
j) Name two methods of speed control normally employed for dc motors.

**2x10**

### **PART-A**

- Q.2 a) Discuss the two transistor model of a thyristor. Using this model, describe the various mechanisms of turning on a thyristor.

**10**

- b) Compare an UJT firing circuit with R and RC firing circuits.

**10**

- Q.3 a) Explain how two 3-phase full converters can be connected back to back to form a circulating current type of dual converter.

**10**

- b) A resistive load of 10 ohms is connected through a half-wave SCR circuit to 220 V, 50 Hz, single phase source. Calculate the power delivered to load for firing angle of  $60^\circ$ . Find also the value of input power factor.

**10**

- Q.4 a) Describe the working of a single phase parallel inverter with relevant circuit and waveforms.

**10**

- b) Distinguish between current source inverter and voltage source inverter.

**10**

### **PART-B**

- Q.5 a) Describe the principle of operation of a step-up chopper. Also find its output voltage equation.

**10**

- b) A step-up chopper has input voltage of 220 V and output voltage of 660 V. If the non-conducting time of thyristor chopper is  $100 \mu s$ , compute the

pulse width of output voltage.

**10**

- Q.6 Describe the operating principle of single phase step-up cycloconverter with the help of midpoint and bridge type configurations. Illustrate your answer with appropriate circuit and waveforms.

**20**

- Q.7 a) Describe with appropriate voltage and current waveforms, the working of a single-phase full converter fed dc drive.

**10**

- b) Describe stator frequency control for the speed control of a 3-phase induction motor.

**10**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester

### **ADVANCE POWER ELECTRONICS (EE-M-102)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ANY FIVE** questions in all. Each question carries equal marks.

- Q.1 What is IGBT? Give its basic structural features and working. Also derive the equivalent circuit of IGBT from its structural details. Describe input and transfer characteristics of an IGBT.

**15**

- Q.2 a) Explain the dynamic characteristics of SCR with reference to turn on and turn off times.

**10**

- b) List various driving circuits used for SCR.

**5**

- Q.3 a) The trigger circuit of a thyristor has a source voltage of 15 V and the load line has a slope of -120 V per ampere. The minimum gate current to turn on the SCR is 25 mA. Calculate:

i) Source resistance required in the gate circuit.

ii) The trigger voltage and trigger current for an average gate power dissipation of 0.4 watts.

**4x2**

- b) How heat gets transferred via conduction, radiation and convection?

**7**

- Q.4 a) Describe the basic structure of field control thyristor. Draw its equivalent circuit and explain turn-on and turn-off processes.

**10**

- b) What are the commonly used conducting layers used in IC fabrication?

**5**

- Q.5 Why snubber circuits are required with semiconductor devices? Explain in detail turn-on and turn-off snubber circuit for thyristor.

**15**

- Q.6 a) What are design considerations while designing gate and basic drive circuits?

**7½**

- b) How power devices used in drive circuits are protected?

**7½**

- Q.7 a) Explain DC-coupled drive circuits with unipolar output.

**8**

- b) How drive circuits are connected in cascade? Explain in detail.

**7**

- Q.8 Write short notes on the following:

- a) Magnetic materials and cores.
- b) Transformer design procedure and K-factor.

**7½×2**

## **End Semester Examination, Dec. 2017**

M. Tech. – First Semester

### **POWER SYSTEM DYNAMICS AND STABILITY (EE-M-103)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- Q.1 Define power system stability and explain in detail different types of stability. **15**
- Q.2 a) Explain the IEEE ST1A excitation system. **7½**  
b) Explain the effect of AVR on synchronizing and damping torque components. **7½**
- Q.3 Explain the small signal stability of single machine infinite bus system. Develop the block diagram of SMIB using classical Generator model for small signal stability analysis. **15**
- Q.4 a) Describe the power system stabilizer design and analyze the same also. **10**  
b) Define voltage stability for power system. **5**
- Q.5 Explain and define SSR. How SSR problems can be solved? **15**
- Q.6 What is voltage collapse? List and explain various reasons for it. **15**
- Q.7 Derive the voltage equation of generator. Explain the generator linear model using d-q transformation. **15**
- Q.8 Explain turbine and speed governing system in generator using mathematical modeling of different components. **15**

## **End Semester Examination, Dec. 2017**

M. Tech. (PS & ED) – First Semester

### **COMPUTER AIDED POWER SYSTEM ANALYSIS (EE-M-104)**

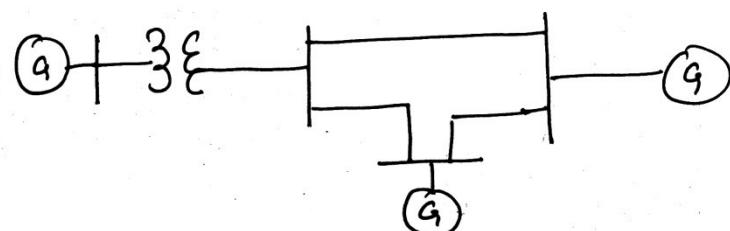
Time: 3 hrs.

Max Marks: **75**

No. of pages: **2**

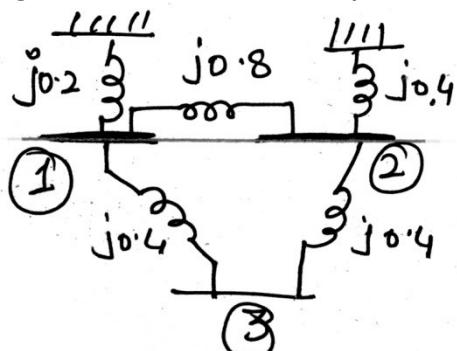
Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

- Q.1 a) Draw the equivalent circuit of synchronous motor, generator, transformer and transmission lines. Also write the equations of e.m.f and voltage for all cases. **7**  
b) For the following power system network develop the incidence matrix A, basic cut-set matrix B and loop incidence matrix C by choosing a tree.



**8**

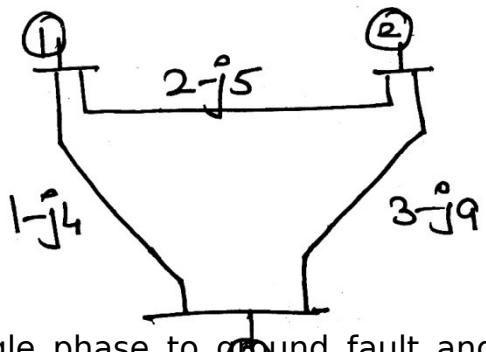
- Q.2 Explain the Z-bus building algorithm using step by step method without considering the effect of mutual coupling. Construct the Z-bus using step by step method for the given network. All impedances are in p.u. **15**



**15**

- Q.3 a) Explain the Newton Raphson technique for load flow studies and then deduce the expression for fast decoupled method of load flow studies. **8**  
b) For the given system, shown, the generators are connected at all three buses, while the load is at bus 3. Assuming a flat voltage start, find bus

voltages and bus angles at the end of first Gauss Seidel iteration, and consider the reactive power limit as  $0 \leq \theta_2 \leq 4$ . Take  $\alpha=1$ .



7

- Q.4 a) Explain the single phase to ground fault and develop the algorithm to calculate the bus voltage and fault current. **8**
- 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  $0.3\Omega$ . Calculate the fault current for single line to ground fault. **7**
- Q.5 a) Derive an expression for 3- $\phi$  fault current using Z-bus. **7**
- b) Explain the modeling of power system for contingency analysis using sensitivity factors method. **8**
- Q.6 a) Develop the concept of power system security levels and explain the same. **7**
- b) Explain the least square estimation method for state estimation in a power system. **8**
- Q.7 a) Explain different type of applications of state estimation in load frequency control or load voltage control problems in power system. **8**
- b) Explain how Matlab can be used for solution of load flow studies or short circuit studies in power system? **7**
- Q.8 Explain load flow study. What is the significance of slack bus in load flow study? Develop an algorithm for fast decoupled of load flow studies. **15**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester

### **INDUSTRIAL DRIVES (EE-M-105)**

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 how the rating of a motor is selected for a particular drive. **10**  
b) Draw speed-torque characteristics for different types of loads. **5**
- Q.2 a) Explain the speed control of a DC drive using the Ward-Leonard method. **8**  
b) A 200V, 10.5A, 2000 rpm. Shunt motor has the armature and field resistance of  $0.5\Omega$  and  $400\Omega$  respectively. It drives a load whose torque is constant at rated motor torque. Calculate motor speed, if the source voltage drops to 175(v). **7**
- Q.3 a) Explain the speed control of an induction motor using cycloconverter. **8**  
b) A 440V, 50Hz, 6-pole, 950 rpm, Y-connected induction motor has following parameters referred to the stator,  
 $R_s = 0.5\Omega$ ,  $R'_r = 0.4\Omega$ ,  $X_s = X'_r = 1.2\Omega$ ,  $X_m = 50\Omega$ . Motor is driving a fan load, the torque of which is given by  $T_L = 0.0123 \text{ N}_m$ . Now one phase of the motor fails. Calculate motor speed and current. Will it be safe to allow the motor to run for a long period? **7**
- Q.4 a) With the help of a diagram explain variable frequency control of multiple synchronous motors. **7**  
b) Write a short note on self-controlled synchronous motor drive, employing load commutated thyristor inverter. **8**
- Q.5 What are the various components of automation and explain different sensors used in automation. **15**
- Q.6 a) What is programmable logic controller and explain its block diagram. **8**

- b) What are various rules for drawing ladder diagram? Explain with the help of one example. 7
- Q.7 a) Write different methods of braking of an induction motor. Elaborate any one, in detail. 7  
 b) Explain how the speed of an induction machine is done by eddy current coupling. 8
- Q.8 Write short notes on **(any two)** of the following:  
 a) Recent trend in power electronics and drives.  
 b) Dual converter DC drive.  
 c) Adaptive control.  
 d) Steady state control.  $7\frac{1}{2} \times 2$

### **End Semester Examination, Dec. 2017**

M. Tech. (P.S.E.D.) - Third Semester

### **HVDC AND EHVAC TRANSMISSION SYSTEMS (EE-M-301)**

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) Compare HVDC and EHVAC system for power transmission. **10**  
 b) In which case EHVAC is better than HVDC and why? **5**
- Q.2 Explain the theory of travelling and standing waves. Derive an expression for travelling waves when line is open circuited. **15**
- Q.3 Describe detailed working of an SVC and explain how reactive power is improved with the help of SVC? **15**
- Q.4 a) How are harmonics generated? **5**  
 b) Explain filters used in DC transmission and AC transmission. **10**
- Q.5 a) Explain corona and the factors which affect corona. **10**  
 b) Define the following terms:  
 i) Critical disruptive voltage.  
 ii) Visual critical voltage.  $2\frac{1}{2} \times 2$

Q.6 Explain the principles of DC Link Control and also explain converter control characteristics.

**15**

Q.7 a) Calculate electrostatic field of single circuit 3 phase line. Derive a general expression.

**8**

b) Derive an expression for voltage gradient of a sphere gap.

**7**

Q.8 Explain radio and TV interference due to EHVAC and HVDC systems and methods to reduce them.

**15**

## **End Semester Examination, Dec. 2017**

M. Tech. (P.S.E.D.) - 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. Each question carries equal marks.

Q.1 a) A power station has a maximum demand of 15000 kW. The annual load factor is 50% and plant capacity factor is 40%. Determine the reserve capacity of the plant.

**8**

b) Explain how load curves help in the selection of size and number of generating units.

**7**

Q.2 a) Describe various methods for short, medium and long range load forecasting in power system. What is the significance of these forecasting for various type of power system operation and control?

**10**

b) State different load mode used in load forecasting. What are the limitations? **5**

Q.3 a) Write short notes on:

i) Two part tariff.

- ii) Power factor tariff.
- iii) Three part tariff.

**8**

b) A factory has a maximum load of 240 W at 0.8 pf lagging with an annual consumption of 50,000 units. The tariff is Rs. 50 per KVA of maximum demand plus 10 paise per unit. Calculate the flat rate of energy consumption. What will be annual saving if p.f is raised to unity?

**7**

Q.4 a) Explain the details of energy growth scenario in India with some details of state of Haryana.

**10**

b) Explain future trends for energy management in India.

**5**

Q.5 a) Explain basic features of energy audit. Why measurements are essential part of an energy audit.

**8**

b) An industrial installation has a load of 1 MW at power factor 0.78 lagging. The tariff is Rs. 200 per KVA of maximum demand per year plus. Rs. 3.50 per KWh. The cost of installation of capacitors is Rs. 500 per KVAr. The interest and depreciation is 15%. Find:

- i) Most economic power factor.
- ii) Capacitor KVAr to improve the power factor to this value.
- iii) Annual electricity bill before installation of capacitors.
- iv) Annual electricity bill after installation of capacitors.

Assume that load factor of installation is 0.8.

**7**

Q.6 a) Explain various government policies regarding captive power development.

**8**

b) Why are energy banking and energy wheeling very important for captive power plants. How do you calculate wheeling charges?

**7**

Q.7 a) Explain the role of central electricity regulatory commission of implementation of deregulation in India.

**8**

b) Explain power system restructuring efforts made in foreign countries.

**7**

Q.8 a) Explain the concept of demand side management (DSM) with various planning stages.

**8**

b) Explain load management as a DSM strategy.

**7**

**End Semester Examination, Dec. 2017**  
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.** Each question carries equal marks.

- Q.1 a) Explain video on demand with examples.

- b) Explain 410 colour model.  
 c) Differentiate between shape tweening and motion tweening.  
 d) Explain briefly various elements of multimedia.  
 e) What is the role of multimedia in animation? Discuss. **4×5**

### **PART-A**

- Q.2 a) Explain various multimedia devices in detail. **10**  
 b) Explain the design goals of ATM. and various layers with functionality. **10**
- Q.3 a) Explain different techniques of creating still images. **10**  
 b) Explain JPEG-objectives and its architecture. **10**
- Q.4 a) Write various applications of multimedia with brief explanation. **10**  
 b) Mention applications of virtual environment. What are the requirements of virtual coupled systems and why are they needed? **10**

### **PART-B**

- Q.5 a) What are the different methods of encoding the analog signals? Explain each in detail. **10**  
 b) Explain the audio compression of MPEG layer-1 and layer-2 in detail. **10**
- Q.6 a) Explain briefly DVI technology. **8**  
 b) Differentiate between compression and decompression. **6**  
 c) What is digital audio? Explain in detail. **6**
- Q.7 a) Explain various principles and techniques of animation in detail. **10**  
 b) Write short notes on:  
   i) Acrobat Photoshop.  
   ii) Macromedia Flash Professional. **5×2**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third / 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.** Each question carries equal marks.

- Q.1 a) Explain the advantages of network.

- b) What do you mean by digital signal?
- c) Discuss ATM layers.
- d) What do you mean by cryptography?
- e) What is the purpose of a firewall?
- f) Define Bus topology.
- g) Explain Wave-Division Multiplexing.
- h) Discuss Rs 232 physical layer interface.
- i) Discuss Virtual LAN.
- j) Explain UDP protocols in brief.

**2x10**

### **PART-A**

Q.2 a) What do you mean by line configuration? Explain its types in detail.

**7**

b) What do you mean by communication modes? Explain.

**6**

c) Discuss Synchronization in detail.

**7**

Q.3 a) Write short notes on the following:

- i) Nyquist Theorem.
- ii) Shannon Limit.

**10**

b) What do you mean by transmission impairments? Explain in detail.

**10**

Q.4 a) Differentiate between run length encoding and Huffman encoding.

**7**

b) What are various error detection and error correction techniques? Explain them.

**13**

### **PART-B**

Q.5 a) Discuss the architecture of TCP/IP protocols. Do they follow OSI reference model?

**15**

b) Discuss domain name system (DNS).

**5**

Q.6 a) Explain the frame format of frame relay with a suitable diagram.

**8**

b) What is meant by routing algorithm? Explain its types.

**12**

Q.7 a) Give a survey of Remote Monitoring Techniques (RMT).

**10**

b) Write short notes on the following:

- i) Proxy Servers.
- ii) Quality of Service.
- iii) Class of Service.

**10**

# **End Semester Examination, Dec. 2017**

B. Tech. — Third / 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.** Each question carries equal marks.

Q.1 Answer the following:

- a) What is the difference between baseband and broadband?
- b) What is MAC address?
- c) Define slotted ALOHA.
- d) What do you understand by CSMA protocol?
- e) Discuss BUS Topology.
- f) Compare logical address and physical address in brief.
- g) What are the various types of network?
- h) Write two disadvantages of twisted pair cables.
- i) Explain DQDB.
- j) Discuss public key cryptography with an example.

**2x10**

### **PART-A**

Q.2 a) What is network? What are its goals and applications?

**10**

b) Describe Simplex, Half Duplex and Full Duplex methods of data flow.

**10**

Q.3 a) Describe optical fiber cable. What is the purpose of cladding in OFC?

**5**

b) Explain the performance of twisted pair cable, coaxial cable and fiber optic cable. **10**

c) Explain about Manchester encoding with a suitable example.

**5**

Q.4 a) Explain the concept of packet switching and state the advantages of packet switching over circuit switching.

**10**

b) Explain the concept of synchronous time division multiplexing with a neat diagram.

**10**

### **PART-B**

Q.5 a) What is TCP/IP Model? Explain the functions and protocols and services of each layer. Compare it with OSI model.

**10**

b) What is IP addressing? How it is classified? How is subnet addressing performed? **10**

Q.6 a) List the various congestion control mechanisms. Explain any one in detail.

**8**

- b) Write a short note on ATM protocol architecture and bring out the relation between TPs, VPs and VCs.

**12**

Q.7 Write short note on (**any two**) of the following:

- a) Security Management.
- b) Firewall and its types.
- c) Remote Monitoring Techniques.

**10x2**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks

- Q.1 a) What is the difference between Application and Applet?  
b) Write a small java Program containing user defined exceptions.  
c) Briefly discuss Garbage Collection in Java.  
d) What are the steps involved in establishment of a JDBC connection?  
e) Give the features of swings.  
f) Write down the special properties of constructor, explain constructor overloading with an example.  
g) What are Pros and Cons of logging?  
h) Explain the use of super keyword in Java.  
i) How does Multi-threading take place on a computer with a single CPU?  
j) Define Wrapper Classes in Java.

**2x10**

#### **PART-A**

- Q.2 a) Explain method overloading and method overriding with suitable example. Can you overload operators in Java?

**10**

- b) Explain how packages can be created, imported and used with suitable example? **10**

- Q.3 a) Write a program to read ten elements and store them in an array. Try to access 12<sup>th</sup> elements in same array. If there is any error handle it using exception handling techniques of Java.

**10**

- b) Write an applet which displays the x-y coordinates of mouse, when it is clicked. Use event handling mechanism.

**10**

- Q.4 a) Explain the importance of Graphics, Color and Font class of java.awt package with its methods. Also write a program to display "Hello India" on frame. **10**  
b) What are swings in Java? Write a program to illustrate the use of one swing control.  
**10**

### **PART-B**

- Q.5 a) What is SOAP and how we can utilize this with web components?  
**10**  
b) Differentiate between stub and skeleton in Reference to RMI in Java. Write steps for setting up Remote Method Invocation.  
**10**
- Q.6 a) Explain synchronization in Java. Discuss with an examples.  
**10**  
b) Explain the two ways of creating a thread in java and role of start, run and stop methods.  
**10**

- Q.7 a) Discuss the usage of prepared statement. Discuss with an example.  
**5**  
b) Explain how scrollable and updatable ResultSets are created in java.  
**5**  
c) Write a program to connect to a database and retrieve all the data stored in the table of database.  
**10**

## **End Semester Examination, Dec. 2017**

B.Sc. (Information Technology) - Fourth Semester

### **PERSONALITY DEVELOPMENT-IV (IT-403)**

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.** Each question carries equal marks.

- Q.1 Write short notes on (**any two**) of the following:  
a) Emotional Intelligence.  
b) Customer Satisfaction.  
c) Interview Appearance. **5x2**

### **PART-A**

- Q.2 Explain the importance of objection handling skills in sales and what are the methods of handling objections? **10**
- Q.3 What is effective customer service skills? What are the techniques of handling irate customers? **10**
- Q.4 What is Time Management? Why is it important for your career? How can you manage your time well? **10**

### **PART-II**

- Q.5 Explain cover letter and how it is different from CV? **10**

- Q.6 What are the Do's and Don'ts of writing an e-mail? **10**
- Q.7 List down the differences between CV and Resume. What are the qualities of good resume? **10**

**End Semester Examination, Dec. 2017**  
 B. Tech. – Fifth Semester  
**INTERNET AND WEB TECHNOLOGY (IT-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 a) Differentiate between active hub and passive hub.  
 b) What is range of LAN?  
 c) Define port address?  
 d) What are plug-ins?  
 e) Give an example of meta tag.  
 f) What are hidden fields?  
 g) Define form?  
 h) Briefly explain client-server architecture in WWW?  
 i) What is cipher text?  
 j) What do you understand by interactive web pages?

**2x10**

**PART-A**

- Q.2 a) Give TCP/IP model in detail. Explain also layer wise protocols in detail. **10**  
 b) Differentiate between terms Network, Internet and intranet. Give supporting or conflicting statements. **10**

Q.3 a) What are different method types of HTTP? How HTTP can be made secure? **10**  
b) Explain working of search engine? Give priority criterias.  
**10**

Q.4 a) How to make list in HTML? Give tags for ordered and unordered list. Explain with a program.  
**10**  
b) How to write a XML schema? What is the advantage of using XML over HTML? **10**

### **PART-B**

Q.5 a) What are different options for handling an event in Javascript? Give examples. **10**  
b) What are cookies? Where they are stored?  
**10**

Q.6 a) Give steps to configure your server for CGI applications.  
**10**  
b) What are servlets? Explain life cycle of servlets.  
**10**

Q.7 a) How software complexity is calculated? Give all formulas in support.  
**10**  
b) What are digital signatures? How they can be used to ensure security?  
**10**

## **End Semester Examination, Dec. 2017**

B. Sc. (Information Technology) – Sixth Semester  
**MOBILE COMMUNICATION (IT-606)**

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.** Each question carries equal marks.

Q.1 **Explain:**

- a) Cell.
- b) Wireless application protocol.
- c) Medium access control.
- d) GPRS.
- e) GSM.

**Expand following:**

- f) PSTM.
- g) HLR.
- h) VLR.
- i) TCP.
- j) WSP.

**1×10**

**PART-A**

Q.2 Explain the network structure of cellular systems in detail with diagrammatic representation. **10**

Q.3 a) What is modulation? Explain the types of modulation in brief. **5**  
b) Explain localization and calling in GSM in brief. **5**

Q.4 Explain system architecture of GSM in detail. **10**

**PART-B**

Q.5 Explain protocols of mobile computing in detail. **10**

Q.6 What is WAP? Explain logical layers and protocol architecture of wireless application protocols in detail. **10**

Q.7 Write short notes on:  
a) Architecture of PALMOS.  
b) Symbian OS architectures and features. **5×2**

**End Semester Examination, Dec. 2017**

B. Sc. (Information Technology) – Sixth Semester

**PROGRAMMING WITH JAVA (IT-607)**

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.** Each question carries equal marks.

Q.1 **Answer (any two):**

- a) What is operator precedence?
- b) What are the different methods of creating an object?
- c) What is encapsulation?
- d) Explain the concept of function overloading.

**5×2**

**PART-A**

- Q.2 What are the different features of Java? Explain platform independence in Java in detail. **10**
- Q.3 Differentiate between 'abstract class' and 'interface'. Give examples of both. **10**
- Q.4 Write short notes on the following:  
 a) This keyword.  
 b) Finalize.  
 c) Static. **10**

### **PART-B**

- Q.5 Explain the concept of inheritance with examples. What are the different types of inheritance in Java? **10**
- Q.6 Write short notes on the following:  
 a) Super  
 b) Finally  
 c) Synchronize **10**
- Q.7 What are threads? Explain the concept of thread synchronization in detail. Give suitable example. **10**

## **End Semester Examination, Dec. 2017**

**B. Sc. (Information Technology) – Sixth Semester**

**PERSONALITY DEVELOPMENT-VI (IT-609)**

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.** Each question carries equal marks.

- Q.1 Analyze the following case and give your interpretation in 100 words:  
 Deepak has been serving as the Chief Fire Officer in city for over 3 years. Because of his efficient management, there were very few fire incidents, no lives were lost and property damage was minimum. He enjoys almost a celebrity like status in local media and city dwellers. As the election year comes, Mayor Prem, with an aim to garner goodwill among voters, frames a

budget with 10% pay raise to fire brigade staff and 25% pay raise for Deepak. Should Deepak accept it or not/Why? **10**

### **PART-A**

- Q.2 As your company is doing good business and expanding; your company is relocating its office to a new address. Using the following phrases, write an email with a minimum of 50 words and a maximum of 80 words to your customer informing the change in address and sign the email as Roy.

Near outer ring road - shifting to - bigger office space - May 10 - change in telephone number -new address is provided below - fourth floor - ABC Consultants.

**10**

- Q.3 Why are group discussions used as a part of the selection process by companies? What are the do's and don'ts to be kept in mind while participating in a GD? **10**

- Q.4 What are the various telecommunication skills required at the workplace? Explain the basic tele-etiquettes required in an office set-up. **10**

### **PART-B**

- Q.5 What are the main elements of a good resume? What tips would you give to a fresh graduate with regards to the resume writing? **10**

- Q.6 What are cover letters? Explain their importance. You are S. Sharma. Write a cover letter to Ms. Rama Goyal, Head, HR, submitting your candidature for a post, about which you came to know from an acquaintance. **10**

- Q.7 Discuss - "Recycling - The need of the hour" in 100 words. **10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 Answer the following:

- Describe the use of ping command.
- Explain range and subnet mask of class B.
- What is use of 'accept( )' schet function call?

- d) Define stream socket.
  - e) What is TCP?
  - f) Discuss client stub.
  - g) What is RPC retransmit?
  - h) What is subnet mask?
  - i) What do you understand by stateful servers?
  - j) Mention interactive servers.
- 2×10**

### **PART-A**

- |     |   |                      |
|-----|---|----------------------|
| Q.2 | a) Discuss how ARP protocol works'.<br>b) Discuss RIP protocol, in detail.<br>c) What is network address and last address if one of the address is 167.199.170.82/27? | <b>6<br/>6<br/>8</b> |
| Q.3 | a) Explain the use of select and poll functions? Also, differentiate them.<br>b) Show client – server communication, using UDP sockets.                               | <b>10<br/>10</b>     |
| Q.4 | a) Discuss interactive connection orientation server algorithm along process structure.<br>b) What are single thread multiprotocol servers?                           | <b>10<br/>10</b>     |

### **PART-B**

- |     |   |                      |
|-----|---|----------------------|
| Q.5 | a) What is RPC? Explain in detail its functionality.<br>b) Differentiate between RPC program and procedure. Explain how are multi versions of RPC dealt?                            | <b>10<br/>10</b>     |
| Q.6 | a) Mention the steps to configure a web-server.<br>b) Mention the different routing protocols. Also, illustrate their roles.  | <b>10<br/>10</b>     |
| Q.7 | a) What is the role of passwords in security?<br>b) Differentiate between authentication and authorization?<br>c) What do you understand by access control? Also, discuss Kerberos. | <b>6<br/>6<br/>8</b> |

## **End Semester Examination, Dec. 2017**

B. Tech. — Seventh 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 | a) What are the responsibilities of data link layer in the internet model?<br>b) Change the IP address 114.34.2.8, from dotted-decimal notation to binary notation to binary notation.<br>c) Find the net-id and host-id of 132.52.8.6 IP address.<br>d) ARP lies on which layer of TCP/IP and what is its main function. |
|-----|---|

- e) What is the usage of “Finger” troubleshooting command?
- f) Define socket.
- g) What is mutual exclusion in RPC?
- h) Explain client server communication?
- i) What is DNS?
- j) What do you mean by TCP echo service?

**2×10**

### **PART-A**

- Q.2 a) What is distance vector routing? How RIP implements it? Discuss in detail. **10**
- b) Explain complete TCI/IP model and draw its layered architecture also. **10**
- Q.3 a) Discuss UDP client server communication using functional block diagram. Implement connectionless client server communication in Java language. **15**
- b) What are select ( ) and poll ( ) functions? Explain them using examples and write their syntax too. **5**
- Q.4 Write short notes on the following:
- a) Interactive TCP and UDP servers. **12**
  - b) Network file system. **8**

### **PART-B**

- Q.5 a) What is dynamic port mapping? Explain with help of algorithm. How RPC is retransmitted? **14**
- b) Explain mutual exclusion communication semantics. **6**
- Q.6 a) What is PPP? Explain in detail. Differentiate static and dynamic routing. **12**
- b) What is DNS server? Write the steps to configure it. **8**
- Q.7 a) Explain C1, C2, C3 and C4 categories of security in detail. **12**
- b) What is a firewall and what are its advantages? **8**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third / 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.** Each question carries equal marks.

- Q.1 Answer the following:
- a) Explain ‘bath tub curve’.
  - b) Define modularity?
  - c) Explain the difference between verification and validation testing.

- d) What is risk analysis?  
e) Briefly explain behavioural modeling?

**4x5**

### **PART-A**

Q.2	a) Explain spiral model in detail alongwith its advantages and disadvantages. b) What are the various applications of SE? c) Explain the various type of softwares used.	<b>10</b> <b>5</b> <b>5</b>
Q.3	Write short notes on: a) Requirement elicitation. b) Data flow diagram. c) Control flow diagram. d) Functional modeling.	<b>5x4</b>
Q.4	a) Explain COCOMO heuristic estimation techniques. b) Explain in detail various levels of staffing.	<b>10</b> <b>10</b>

### **PART-B**

Q.5	a) What is functional independence? Explain various types of coupling and cohesion techniques. b) Explain various design concepts and principles of system design.	<b>10</b> <b>10</b>
Q.6	a) Write a program to find factorial of a number and calculate its cyclomatic complexity. b) Differentiate 'black box' and 'white box testing'.	<b>10</b> <b>10</b>
Q.7	a) Briefly explain formal technical reviews. b) What is CASE? Explain its architecture in detail.	<b>10</b> <b>10</b>

## **End Semester Examination, Dec. 2017**

B. Tech. — 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 indicator against each question.

- Q.1 Answer the following questions:  
a) Explain briefly different components of MIS.  
b) Explain various advantages and disadvantages of MIS.

- c) What do you understand by scheduling of activities in development of MIS? Discuss.  
 d) Explain the application of MIS to electronic business system. **5×4**

### **PART-A**

- Q.2 a) What is the need of automated MIS? In support of your answer give relevant examples. **10**  
 b) Explain the role of DBMS, data warehouse and data mining in MIS. **10**
- Q.3 a) Explain information concepts briefly and justify the term 'information' as quality product. **10**  
 b) Write short notes on the following:  
   i) MIS software and MIS team.  
   ii) Design of MIS as a system. **5×2**
- Q.4 Write short notes on **(any two)** of the following:  
 a) Reporting system and reporting specification.  
 b) Implementation and testing of MIS.  
 c) Staff training and functional manuals. **10×2**

### **PART-B**

- Q.5 a) Explain different models of DSS along with their working. **10**  
 b) How could you transform different strategies into MIS activities? **10**
- Q.6 Explain MIS for service sector and business environment for an organization. **20**
- Q.7 Write short notes on **(any two)** of the following:  
   i) Security and strategies.  
   ii) Privacy issues of MIS.  
   iii) Ethical and societal challenges of IT. **10×2**

## **End Semester Examination, Dec. 2017**

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 Answer the following questions:  
 a) Define 'information system'.

- b) List four MIS softwares.
- c) What is the need of automated MIS?
- d) Define data mining.
- e) What are the advantages of DSS?
- f) What are the management activities?
- g) Briefly discuss conventional system.
- h) Give the responsibilities of MIS team.
- i) Why customization of MIS software is required?
- j) Give the objectives of MIS in service sector.

**2x10**

### **PART-A**

- Q.2 a) Define 'MIS'. How MIS emerged as a functional unit in an organization? Discuss business sector functionality with respect to MIS in detail.

**15**

- b) What is the role of DBMS in MIS? Briefly explain.

**5**

- Q.3 a) Define information concept and discuss the attributes affecting the quality of information.

**7**

- b) Explain different types of information.

**6**

- c) How can you design MIS as a system? Discuss it in detail.

**7**

- Q.4 a) How is information requirement classified at various levels in an organization? Describe it.

**10**

- b) What are the different types of control? Specify them and discuss in detail. **10**

### **PART-B**

- Q.5 a) What is the role of MIS and decision system? Explain with the help of example. **10**

- b) How can strategies be transformed into MIS activities? Discuss it.

**10**

- Q.6 a) What are the objectives of MIS in service sector? Explain with the help of example. **10**

- b) Discuss in detail the development of procedures, manuals and documents. **10**

- Q.7 Write short notes on:

- a) Security threats of MIS.

**8**

- b) General model of information processing.

**7**

- c) Organising software support for MIS.

**5**

# **End Semester Examination, Dec. 2017**

B. Tech. – Sixth / Seventh 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**. Each question carries equal marks.

- Q.1 a) How is a smart card different from a debit card?  
b) Describe a digital wallet.  
c) Explain customer relationship management.  
d) Differentiate between e-governance and e-government.  
e) How is a digital certificate different from a digital signature?  
f) How ERP is different from SAP?  
g) Define social network marketing.  
h) Define the role of e-strategy in e-commerce.  
i) What are the advantages of ERP?  
j) Why we need security standards in e-commerce? **2×10**

## **PART-A**

- Q.2 a) Compare B2B, B2C, C2B, C2C with the help of suitable examples. **10**  
b) Define and illustrate the transactional model of ERP with an example. **10**
- Q.3 a) What is a digital payment system? Also explain cyber cash model in detail. **10**  
b) Write short notes on:  
i) Virtual internet payment system.  
ii) E-Commerce services. **5×2**
- Q.4 Write short notes on:  
a) Risk associated with e-commerce. **6**  
b) Firewall. **7**  
c) Cryptography. **7**

## **PART-B**

- Q.5 a) What is the importance of ERP in business era? State advantages and disadvantages of an ERP in detail. **10**  
b) Write short notes on:  
i) Business process redesign.  
ii) Re-engineering for IT applications. **5×2**
- Q.6 a) Differentiate between production planning and production scheduling. **7**  
b) “Requirement of Resource Management in Global Scenario”. Discuss briefly. **7**  
c) “Customer’s Relationship Management is the heart of ERP”. Comment. **6**
- Q.7 a) How can we say that an ERP system is an integrated system? **10**  
b) Explain the working of the product life cycle management with the help of an example. **10**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 a) What are the benefits of e-market over traditional markets?  
b) What are the risks with e-commerce?  
c) What are the advantages of ERP?  
d) Differentiate between e-cheque and e-cash.  
e) What are the disadvantages of e-commerce?  
f) What is knowledge engineering?  
g) Explain the operational process of digicash.  
h) Explain the term OLAP.  
i) What are the characteristics of data in data warehouse?  
j) What is online commerce?

**2×10**

## **PART-A**

- Q.2 a) What are the 4C's of e-commerce, explain each with an example? **10**  
b) Explain e-commerce organization model based on transaction party. **10**
- Q.3 a) What are different types of electronic payment systems? Explain. **10**  
b) Explain cyber cash model in detail. **10**
- Q.4 a) Explain the security standards that are implemented for e-commerce. **10**  
b) Write short notes on:  
i) Operational process of digicach.  
ii) EDI **5x2**

## **PART-B**

- Q.5 a) Explain briefly different modules of ERP. **10**  
b) List various advantages and disadvantages of ERP. **5**  
c) Explain origin of term SCM. **5**
- Q.6 a) Compare production planning, production scheduling and production control. **10**  
b) Explain various function and application of resource management. **5×2**
- Q.7 Write short notes on:  
a) Critical success factors of ERP implementation.  
b) Information system planning.  
c) HRD module in ERP.  
d) Product life cycle management. **5×4**

# **End Semester Examination, Dec. 2017**

B. Tech. – Fifth / Sixth / Seventh 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.** Each question carries equal marks.

Q.1 Answer the following in brief:

- a) What is socket time-out?
- b) Explain list control in swings.
- c) Explain prepared statement.
- d) How to set the progress of a program in Java?
- e) Explain the need of MVC architecture.

**4×5**

### **PART-A**

Q.2 a) Explain IDBC driver types. Write a Java Bean to connect to database and insert in the database. Query will be passed as a message to bean.

- b) Explain different types of Rowset and write a program to implement Cached Rowset.

**10×2**

Q.3 a) Write a program to accept the request of multiple clients by the server to display “Welcome to the Java World.”

**10**

- b) Explain how to get information about a given URL.

**5**

- c) Explain the need of JNDI with diagram.

**5**

Q.4 a) Write a program to perform tree events and working with rows and columns in tables.

**15**

- b) Write a program to create a split pane.

**5**

### **PART-B**

Q.5 a) Write a program to display all the coordinate transformations and explain these in detail.

**10**

- b) Write a program to drag and drop an object.

**10**

Q.6 a) Discuss naming patterns for bean properties and events in detail.

**10**

- b) State the bean-writing process with the usage of bean to build an application.

**10**

Q.7 Write short notes on:

- a) Byte code verification.

**7**

- b) Digital signatures.

**7**

- c) Encryption.

**6**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Answer in brief **2×10**
- a) What is a SRS document?
  - b) State the importance of process planning.
  - c) List any five important project management skills required.
  - d) How does quality planning help software development?
  - e) Define 'risk exposure'.
  - f) What is the importance of change management?
  - g) Why is schedule management required?
  - h) Define bottom-up estimation approach.
  - i) What are the components of risk management?
  - j) Give the structure of group review meeting.

### **PART-A**

- Q.2 a) Differentiate between standard and customized process for software development. Explain each phase in detail. **10**
- b) List the various KPAs for level 2 of CMM model stating the functions of each. **10**
- Q.3 a) Compare the features and working at prototype and RAD model. Which one is better and why? **10**
- b) What do you mean by software testing plan? State its importance and utility in detail. **10**
- Q.4 a) Why do we need project planning? Explain. **10**
- b) What is schedule estimation? Explain the concept using a suitable example. **10**

### **PART-B**

- Q.5 a) How do we define quality? State the procedural approach used for quality management. **10**
- b) What is risk management? Discuss its classification in detail. **10**
- Q.6 a) What do you understand by project crashing? How is it different from fast tracking? **10**
- b) Explain in detail the milestone list analysis technique followed for project tracking. **10**
- Q.7 a) What is the advantage of designing and using fishbone diagram? Discuss how it is designed. **10**
- b) Explain all the major components of closure analysis report? **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh 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) List the different operations in OLAP. Explain each one of them with the help of an example. **10**  
b) Explain the following terms:  
i) Data marts.  
ii) Fact constellation schema for multi-dimensional database. **5×2**

- Q.3 a) What are different extraction and data cleaning techniques? **10**  
b) Suppose a data warehouse of sales consists of four dimensions; namely time, item branch and location and two measures: Dollars and units sold. Draw a star schema and snowflake schema for the given data warehouse. **10**

- Q.4 a) Write short notes on:  
i) Discovery driven cube.  
ii) Multi feature cube. **5×2**  
b) Consider the following data for the attribute age:  
 $\{13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 30, 33, 33, 35, 35, 35, 40, 45, 46, 52, 70.\}$   
Use smoothing by bin means to smooth these data, with a bin depth of 3. Illustrate your steps. Comment on the effect of this technique for the given data. **10**

#### **PART-B**

- Q.5 a) How are data mining systems classified? **6**  
b) Explain integration of a data mining system with a database or a data warehouse. **6**  
c) What are the different data mining techniques and their applications? **8**

- Q.6** Briefly explain the following: **7**  
a) Method for mining multiple-level association rules. **8**  
b) Grid based partitioning method in details. **5**  
c) Hierarchical Clustering.
- Q.7** Write short notes on Mining the following: **6**  
a) Graphs and networks. **7**  
b) Sequenced data. **7**  
c) Multimedia databases.

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh / 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) Describe multi-dimensional data model.  
b) What is the role of Meta data in data warehouse?  
c) Explain roll-up and drill-down operations.  
d) List the advantages of ROLAP over OLAP.  
e) What do you understand by correlation analysis?  
f) Define base and apex cuboids.  
g) What does slice and dice means? Give an example.  
h) Differentiate between 'data warehouse' and 'data mart'.  
i) Define 'data transformation'.  
j) List out two different types of reporting tools.

**2x10**

#### **PART-A**

- Q.2 a) Explain and compare fact constellation, star and snowflake schemas in detail. **10**  
b) What are the data warehouse measures? Explain their categorization and computation. **10**
- Q.3 a) Explain 3-tier data warehouse architecture with a neat sketch. **10**  
b) Write short notes on the following:  
i) Virtual Warehouse.  
ii) Types of OLAP servers.

**5x2**

- Q.4 a) Explain data aggregation and transformation processes using suitable examples. **10**  
b) How to process the OLAP queries efficiently? Explain. **5**  
c) Explain data warehouse back-end tools and utilities. **5**

#### **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.

**5x2**

Q.6 a) Explain classification using decision-tree induction. What is the role of tree-pruning?

**10**

b) A database has four transactions. Let minimum support =60% and minimum confidence=80%

TID	Items-bought
T100	{K, A, B, D}
T200	{D, A, C, E, B}
T300	{C, A, B, E}
T400	{B, A, D}

Find all frequent item sets using Apriori algorithm.

**10**

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, Dec. 2017**

B. Tech. – First / 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 the following terms:  
i) Stress.  
ii) Thermodynamic system.  
iii) Lifting machine.  
iv) Brittleness.  
v) Spark plug. 2×5

b) Write down the units of the following:  
i) Strain.  
ii) Pressure.  
iii) Force.  
iv) Moment.  
v) Temperature.  
vi) Young's modulus. 1×6

c) Define Poisson's ratio. 2

d) Differentiate between pressure and stress. 2

## **PART-A**

- Q.2 a) What are the limitations of 1<sup>st</sup> law of thermodynamics? **10**  
b) Differentiate between Heat Engine and Heat Pump. **10**

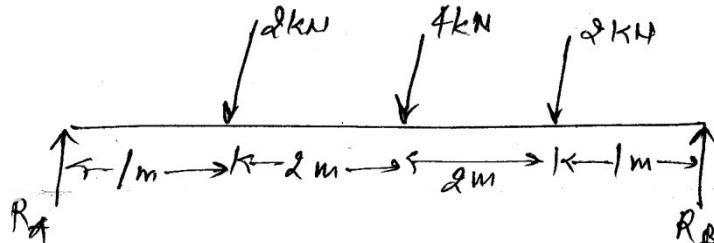
Q.3 a) Explain the working of two stroke petrol engine with the help of suitable line diagrams. **15**  
b) Differentiate between EC engines and IC engines respectively with the help of suitable examples. **5**

Q.4 Derive an expression for an open belt system for obtaining length of belt. **20**

PART-B

- Q.5 a) Derive the relation between E, K and C. 14  
b) Define the following term:  
i) Hook's law.  
ii) Yield point.  
iii) Ultimate strength.  $2 \times 3$

- Q.6 Draw the shear force and bending moment diagram for the following system.



- Q.7 a) What are engineering materials? Classify them in details. 10  
b) Explain the gas welding technique with the help of suitable diagrams. 10

## **End Semester Examination, Dec. 2017**

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 question:

- a) Write the statement for "force transmissibility law".
- b) What is Vavignon's principle of moments?
- c) Explain the "perpendicular axis theorem".
- d) Explain Lami's theorem.
- e) Write down the steps being followed for solving a truss using method of joint.
- f) What is projectile?
- g) What is radius of gyration?
- h) Obtain the relation between the linear acceleration and angular acceleration of rotating.
- i) Differentiate between translation and rotation.
- j) Define the concept of virtual work.

**2×10**

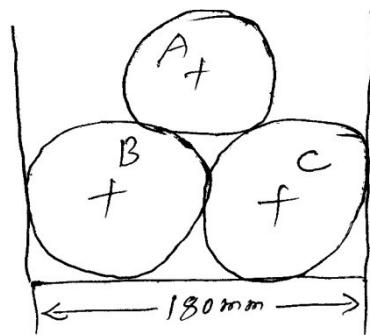
### **PART-A**

**Q.2** a) State and prove parallelogram law of forces.

**10**

b) Three cylinders weighing 100 N each and of 80 mm diameter are placed in a channel of 180 mm width. Determine the pressure exerted by:

- i) The cylinder A on B at the point of contact.
- ii) The cylinder B on the base and wall.

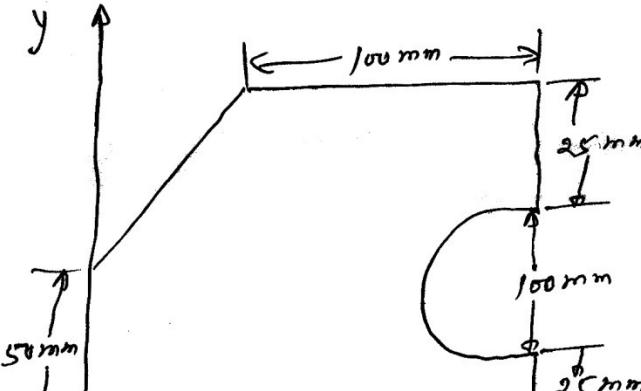


**10**

**Q.3** a) Explain the method of finding out the moment of inertia of a composite section.

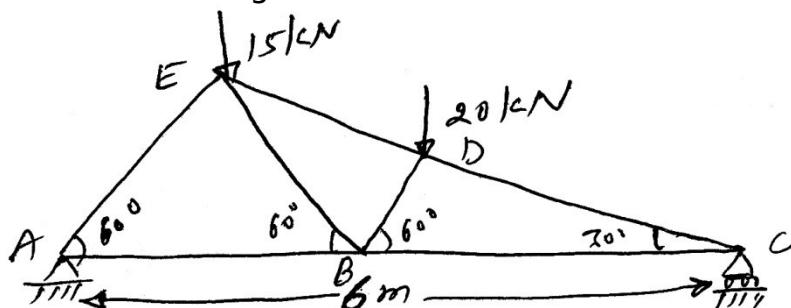
**6**

- b) Find the moment of inertia of the given section about centroidal X and Y axis.



14

- Q.4 a) What is difference between method of joint and method of section? 5  
 b) Determine the forces in all the members of the truss loaded and supported as shown in the figure.

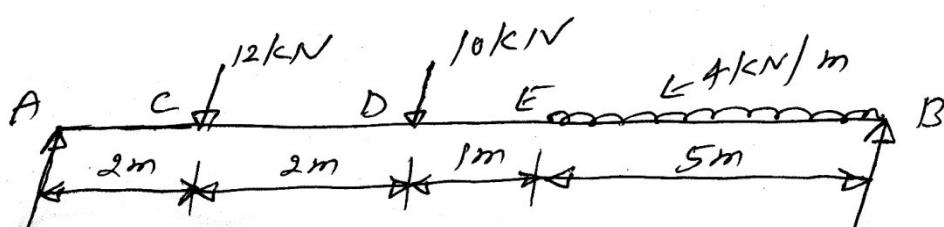


15

### PART-B

- Q.5 a) 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. 8  
 b) A particle starts from rest, moves in a straight line, whose acceleration is given by equation:  $a = 10 - 0.006S^2$  where 'a' is in m/s<sup>2</sup> and 's' is in meters. Determine:  
 i) Velocity of the particle when it has travelled 50 metres.  
 ii) Distance travelled by the particle when it comes to rest. 12
- Q.6 a) Explain general plane motion with suitable diagrams. 5  
 b) 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 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

- Q.7 a) By the principle of virtual work, find the values of reactions at A and B.



15

- b) Explain the concept of work done by couple. 5

**End Semester Examination, Dec. 2017**  
B. Tech. - Second Semester  
**ENGINEERING MATERIALS AND HEAT TREATMENT (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 a) What is the area of application of tool steel?  
b) What is the area of application of stainless steel?  
c) Define limitation of composite materials.  
d) Define optical fibre.  
e) Differentiate between pearlite and bainite.  
f) Distinguish between plastic deformation and fracture.  
g) Write a short note on 'sarbite'.  
h) What are allotropes of iron?  
i) Define pearlite.  
j) What is surface hardening process? **2×10**

**PART-A**

- Q.2 a) Discuss the effects of chemical composition and cooling rate on the structure and properties of cast irons. Briefly describe the malleable iron and modular iron. **12**  
b) Explain metals and alloys of zn, cr, Ni and its applications in detail. **8**
- Q.3 a) Discuss advantages and limitations of composite materials with its applications in detail. **10**  
b) Write short notes on the following:  
i) Optical fibre.  
ii) Refractory material. **5×2**

- Q.4 a) Name five important mechanical tests which give variable information about metals and alloys. **12**  
b) What are the mechanical properties of metals? **8**

**PART-B**

- Q.5 a) Explain the C-curve and its advantages in detail. **10**  
 b) What is the effect of alloying element on iron carbon equilibrium diagram? Draw a well labeled diagram to show the various changes. **10**
- Q.6 a) Explain annealing and types of annealing process in detail. **10**  
 b) Write short notes on the following:  
   i) Mortempering.  
   ii) Decarburization.  
   iii) Quench crack. **10**
- Q.7 a) Explain induction hardening process with a neat sketch in detail. **10**  
 b) What is case hardening? Why it is important? Give its advantages and procedure in detail. **10**

### **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Explain (**any five**) terms in detail:  
 a) Parallelogram law of forces.  
 b) Newton's law of motion.  
 c) Moment of a couple.  
 d) Virtual work principle.  
 e) Impulse-momentum equation.  
 f) Instantaneous Centre.

**4x5**

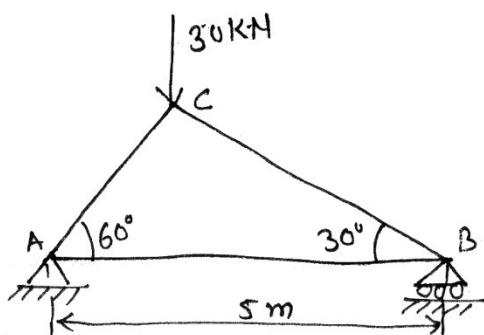
#### **PART-A**

- Q.2 The resultant of two forces P and Q acting at a point is R. The resultant R gets doubled when Q is either doubled or its direction is reversed. Show that P, Q and R confirm to the ratio.

$$P:Q:R = \sqrt{2}:\sqrt{3}:\sqrt{2}$$

**20**

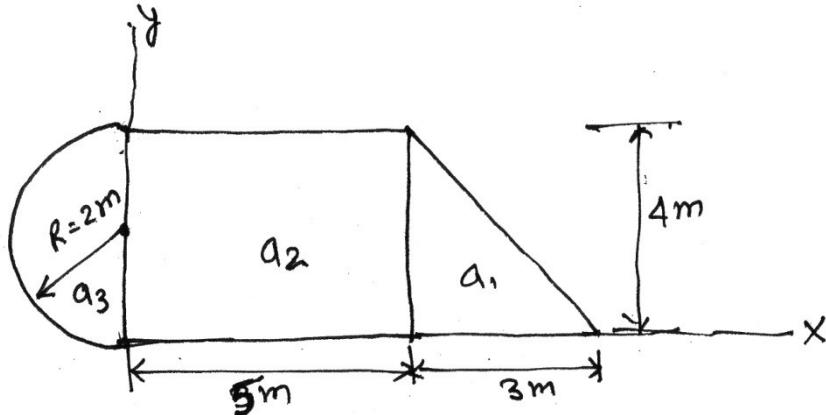
- Q.3 a) Explain method of joints in detail to find force in members of a truss. **8**  
 b) Determine the force in all the members of a truss with the loading and support system shown in figure.



**12**

555/5

- Q.4 Locate the centroid of the area shown in figure, with respect to axes indicated in the figure.



20

### **PART-B**

- Q.5 A particle moving in a straight line is subjected to a resistance which produces a retardation of  $kv^3$  where  $v$  is the velocity and  $k$  is constant. Show that  $v$  and time  $t$  are given term of  $x$  (distance) by the equation:

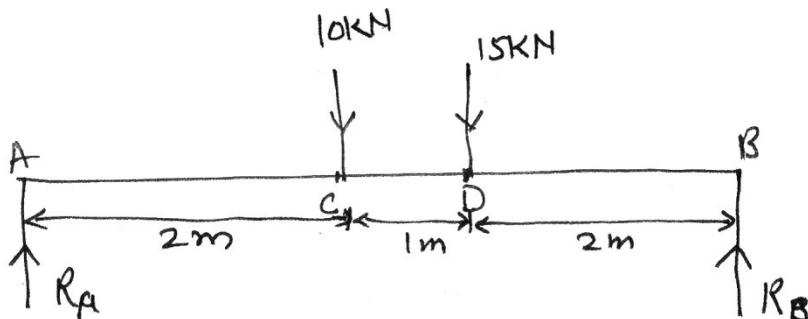
$$v = \frac{u}{1+kux} \quad \text{and} \quad t = \frac{kx^2}{2} + \frac{x}{u}$$

20

- Q.6 Aman throws a 10 kg suitcase with a horizontal velocity of 4 m/s into a 25 kg platform trolley. Determine the velocity of trolley after the suitcase has collide to stop on trolley

20

- Q.7 A beam has been loaded and supported as shown in figure. Use the method of virtual work to determine the reaction at the end supports.



20

**End Semester Examination, Dec. 2017**  
B. Tech. — Third Semester  
**THERMAL ENGINEERING-I (M-302 / M-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.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) State the Zeroth law of thermodynamics.
- b) Write the expression of work done for polytrophic process.
- c) What is free expansion?
- d) Explain throttling process.
- e) Draw T-S chart for the steam formation.
- f) Explain critical point.
- g) What are the limitations of first law of thermodynamics?
- h) What is entropy?
- i) What is enthalpy?
- j) Define the coefficient of volume expansion.

**2×10**

**PART-A**

Q.2 a) The properties of a closed system change following the relation between pressure and volume as  $PV = 3.0$  where P is in bar and V is in  $m^3$ . Calculate the work done when the pressure increases from 1.5 bar to 7.5 bar. **10**

- b) Write short notes on the following:
  - i) Thermodynamic system.
  - ii) Work transfer.

**5×2**

Q.3 a) When a stationary mass of gas was compressed without friction at constant pressure, its initial state of  $0.4\ m^3$  and  $0.015\ MPa$  was found to change to final state of  $0.20\ m^3$  and  $0.150\ MPa$ . There was a transfer of  $45.5\ kJ$  of heat from the gas during the process. How much did the internal energy of gas change? **10**

b) Explain the general equation for steady flow system and simplify when applied for steam turbine. **10**

- Q.4 a) Two Carnot engines work in series between the source and sink temperature of 550 K and 350 K. If both engines develop equal power determine the intermediate temperature. **10**
- b) Write short notes on the following:  
 i) Clausius inequality.  
 ii) Availability. **5×2**

### **PART-B**

- Q.5 a) Saturated liquid at high pressure  $P_1$  and enthalpy of saturated liquid as 1000 kJ/kg is throttled into a lower pressure  $P_2$ . The enthalpy of saturated liquid and saturated vapor at  $P_2$  are 800 kJ/kg and 2800 kJ/kg. Find the dryness fraction of vapor after throttling. **10**
- b) Draw a neat sketch of throttling calorimeter and explain how dryness fraction of steam is determined. **10**
- Q.6 a) Using the cyclic equation, proves that:
- $$\left( \frac{\partial P}{\partial T} \right)_v = \frac{\beta}{KT} .$$
- b) For second T-ds equation proves that:
- $$Tds = C_p dT - T \left( \frac{\partial V}{\partial T} \right)_P dp .$$
- Q.7 a) State Boyle's and charle's laws and derive on equation of the state for a perfect gas. **10**
- b) Explain the following:  
 i) Equation of state.  
 ii) P-V-T surfaces. **5×2**

## **End Semester Examination, Dec. 2017**

B. Tech-Third Semester

### **MANUFACTURING TECHNOLOGY-I (M-303A)**

Time: 3 hrs

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.** Each question carries equal marks.

- Q.1 a) What is green sand?  
b) What are the main constituents of moulding sand?  
c) What is riser?  
d) What is hot working and cold working?  
e) What are chaplets?  
f) What is indirect extrusion?  
g) What is wire drawing?  
h) What is coining?  
i) What is resistance welding?  
j) What is brazing?

**2x10**

#### **PART-A**

- Q.2 a) Explain the various types of patterns used in foundry.  
**10**  
b) What are the common allowances provided to the pattern? Explain in detail. **10**
- Q.3 a) Sketch and explain the construction and operation of a cold chamber die casting machine.  
**10**  
b) Explain the cleaning of castings in detail.  
**10**
- Q.4 a) What are the different types of forging? Explain drop forging and press forging in detail.  
**10**

- b) What is rolling? Explain 3-high rolling mill, 4-high rolling mill and cluster-rolling mill in detail.

**10**

**PART-B**

- Q.5 Explain the following with neat sketches:

- a) Progressive die.

**10**

- b) Stretch forming and bending.

**10**

- Q.6 a) Explain the construction and operation of an oxy-acetylene welding process. **10**

- b) Explain the principle of electric arc welding the help of a neat sketch. What is straight polarity and reverse polarity?

**10**

- Q.7 a) Explain with a neat sketch the TIG welding process in detail.

**10**

- b) Explain with a neat sketch the submerged arc welding process in detail.

**10**

**End Semester Examination, Dec. 2017**

B. Tech. – Third / 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 centre of pressure and centre of buoyancy.
- b) State the condition for stable, unstable and neutral equilibrium for submerged bodies.
- c) What is stream function?
- d) Define rotational flow and irrotational flow.
- e) What is orifice and mouthpiece?
- f) Define Froude's number and Euler's number.
- g) What is water hammer?
- h) What is equivalent pipe and write its expression?
- i) State Buckingham's  $\pi$ -theorem.
- j) What is the condition for maximum power transmission in case of liquid flowing through pipe?

**2x10**

## **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  $30^\circ$  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 nanometer 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. **2x5**
- 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) Derive the expression for shear stress distribution and velocity distribution for laminar flow through stationary parallel plates. **10**
- b) Water at  $15^\circ\text{C}$  flows between two large parallel plates at a distance of 1.6mm apart. Determine:  
i) The maximum velocity.  
ii) The pressure drop per unit length.  
iii) The shear stress at the walls of the plates if the average velocity is 0.2m/s.  
The viscosity of water at  $15^\circ\text{C}$  is given as 0.01 poise. **10**
- Q.6 a) Discuss the Prandtl mixing length theory for turbulent shear stress. **10**
- b) For the velocity profile in laminar boundary layer as,  $\frac{u}{U} = \frac{3}{2} \left( \frac{y}{\delta} \right)^2 - \left( \frac{1}{2} \right) \left( \frac{y}{\delta} \right)^3$ . Find the thickness of boundary layer and the shear stress 1.5m from the leading edge of a plate. The plate is 2m long and 1.4m wide and is placed in water which is moving with a velocity of 200mm per second. Find the total drag force on the plate if  $\mu$  for water = 0.01 poise, and  $\mu$  is viscosity. **10**
- Q.7 a) What are dimension less numbers and discuss it. Also write their significance. **10**

- b) An oil of specific gravity 0.7 is flowing through a pipe of diameter 300mm at the rate of 500 liters/sec. Find the head lost due to friction and power required to maintain the flow for a length of 1000m. Take kinematic viscosity  $\nu = 0.29$  stokes. **10**

**End Semester Examination, Dec. 2017**  
B. Tech. - Third / 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 a) What is a manometer?  
b) What is the difference between dynamic viscosity and kinematic viscosity?  
c) Define weight density.  
d) Explain the term: streak line.  
e) What do you understand by laminar flow?  
f) State the equation of continuity.  
g) What do you mean by pressure gradient?  
h) What is a velocity defect?  
i) What do you mean by equivalent pipe?

j) State Rayleigh's method.

**2x10**

### **PART-A**

Q.2 a) Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid.

**8**

b) A rectangular pontoon  $10.0\text{ m}$  long,  $7\text{ m}$  broad and  $2.5\text{ m}$  deep weighs  $686.7\text{ kN}$ . It carries on its upper deck an empty boiler of  $5.0\text{ m}$  diameter weighing  $588.6\text{ kN}$ . The centre of gravity of the boiler and the pontoon are at their respective centers along a vertical line. Find the meta-centric height. Weight density of sea water is  $10.104\text{ kN/m}^3$ .

**12**

Q.3 a) Explain uniform flow with source and sink. Obtain expressions for stream and velocity potential functions.

**10**

b) Water flows through a pipe AB of  $1.2\text{ m}$  diameter at  $3\text{ m/s}$  and then passes through a pipe BC of  $1.5\text{ m}$  diameter. At C, the pipe branches. Branch CD is  $0.8\text{ m}$  in diameter and carries one third of the flow in AB. The flow velocity in branch CE is  $2.5\text{ m/s}$ . Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.

**10**

Q.4 a) A  $30\text{ cm} \times 15\text{ cm}$  venturimeter is provided in a vertical pipeline carrying oil of specific gravity  $0.9$ , the flow being upwards. The difference in elevation of the throat section and entrance section of the venturimeter is  $30\text{ cm}$ . The differential U-tube mercury manometer shows a gauge deflection of  $25\text{ cm}$ . Calculate:

i) The discharge of oil and

ii) The pressure difference between the entrance section and the throat section. Take the co-efficient of meter as  $0.98$  and specific gravity of mercury as  $13.6$ .

**12**

b) Obtain an expression for absolute pressure head at vena-contracta for an external mouthpiece.

**8**

### **PART-B**

Q.5 a) What is Hagen Poiseuill's formula? Derive an expression for Hagen Poiseuille's formula.

**8**

b) A fluid of viscosity  $0.7\text{ Ns/m}^2$  and specific gravity  $1.3$  is flowing through a circular pipe of diameter  $100\text{ mm}$ . The maximum shear stress at the pipe wall is given as  $196.2\text{ N/m}^2$ , find (i) the pressure gradient (ii) the average velocity and (iii) reynold number of the flow.

**12**

Q.6 a) A smooth pipe of diameter  $400\text{ mm}$  and length  $800\text{ m}$  carries water at the rate of  $0.04\text{ m}^3/\text{s}$ . Determine the head lost due to friction, wall shear stress, centre-line velocity and thickness of laminar sub-layer. Take the kinematic viscosity of water as  $0.018\text{ stroke}$ .

**15**

b) What are the different methods of preventing the separation of boundary layers? **5**

Q.7 a) What do you mean by equivalent pipe? Obtain an expression for equivalent pipe. **10**

b) The pressure difference  $\Delta P$  in a pipe of diameter  $D$  and length  $l$  due to turbulent flow depends on the velocity  $v$ , viscosity  $\mu$ , density  $\rho$  and roughness  $k$ . Using Buckingham's  $\pi$ -theorem, obtain an expression for  $\Delta P$ .

**10**

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**. Each question carries equal marks.

- Q.1 a) How are crystallographic planes in HCP unit cells?  
b) Define atomic packing factor (APF).  
c) What is multiphase solid solution?  
d) Write the importance of phase and phase diagrams to a material scientist.  
e) Why heat treatment is done on engineering materials?  
f) Why normalizing process is done?  
g) What is plastic deformation of metal?  
h) Why the study of corrosion is important for engineer?  
i) How ceramics are classified?  
j) What are fiber-reinforced composites (FRC)? **2×10**

**PART-A**

- Q.2 a) Differentiate between HCP and FCC structure with the help of diagram. **8**  
b) What is imperfection in crystal? Discuss point, line and surface defects in detail. **12**
- Q.3 a) Draw binary phase diagram of any component. **4**  
b) Draw Fe-C equilibrium diagram and explain in detail. **16**
- Q.4 a) What is need for hardening? Explain the various requirements of the hardening reaction. **10**  
b) Describe the effects of heat-treatment on the mechanical properties of steel. **10**

**PART-B**

- Q.5 a) Distinguish between the term ‘recovery’ and recrystallization in the process of heating cold-worked metals. **10**  
b) Explain the yield point phenomenon in materials in terms of dislocation. **10**
- Q.6 a) Explain the term ‘corrosion’ and describe the mechanism of corrosion in detail. **10**  
b) Draw a typical creep curve and explain the different stages of creep in detail. **10**
- Q.7 a) What are metal-matrix-composites (MMC)? Describe the methods for preparing fiber-reinforced MMC. **10**  
b) What are the advantages and disadvantages of polymeric materials? Differentiate between thermosetting and thermoplastics. **10**

# **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) Write composition of low carbon steel and high carbon steel.
- b) What are advantages of using Zn as a coating for steel?
- c) List the major limitations of ceramics.
- d) What is creep failure?
- e) Why impact test is preformed?
- f) What is corrosion?
- g) What is meant by phase transformation?
- h) Why is heat treatment important?
- i) Under what condition post heat treatment is required?
- j) What is flame hardening?

**2×10**

### **PART-A**

- Q.2 a) What is the difference between grey cast iron and malleable cast iron? What are the applications of each? **10**
- b) Name different types of cu-alloys. Write advantages and their applications in detail. **10**
- Q.3 a) How reinforced ceramics are classified? Write the properties and uses of each. **10**
- b) Discuss the mechanical behavior of ceramic ball bearing. **10**
- Q.4 a) What do you mean by mechanical properties of a material? Explain hardness test procedure in detail. **12**
- b) Write a short note on ‘creep phenomenon’. **8**

### **PART-B**

- Q.5 Draw a CCT diagram for eutectoid steel. In what way it differs from a eutectoid TTT diagram for steel. Which type of transformation diagram is more important and why? **20**
- Q.6 a) Describe the austempering process for plain carbon steel. Draw a cooling curve showing austempering process of eutectoid plain carbon steel. **10**
- b) Why heat treatment is done on engineering materials? Discuss the process of annealing in detail. **10**
- Q.7 a) Discuss the process of chemical heat treatment in detail. **10**
- b) Explain the process of salt bath nitro carburizing heat treatment process in detail. **10**

# **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester  
**METROLOGY (M-308)**

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 mean by unilateral and bilateral system of tolerance?
- b) What is meant by hole basis and shaft basis system?
- c) What are different grades of slip gauges?
- d) What is the principle of sine bar?
- e) What do you mean by  $R_a$  and  $R_z$  value?
- f) Enumerate various types of pitch errors found in the screw thread.
- g) State the principle of auto collimator.
- h) Define straightness and flatness.
- i) What do you mean by cycloidal profile of gear tooth?
- j) Define circular pitch and module of gear.

**2×10**

## **PART-A**

**Q.2** a) Find values of allowance, hole tolerance and shaft tolerance for following dimensions of mated parts according to basic hole system:

Hole: 37.50 mm.

37.52 mm.

Shaft: 37.47 mm.

37.45 mm.

**5**

- b) Calculate the fundamental deviation and tolerances and hence the limits of size for shaft and hole for fit 60 H8 f7. Diameter steps are 50 – 80 mm. Fundamental deviation for 'f' shaft is  $-5.5D^{0.41}$ .

**15**

**Q.3** a) What is difference between line standard and end standard?

**5**

- b) Explain with neat sketch the working principle of autocollimator.

**15**

**Q.4** a) Define the following:

- i) Roughness.
- ii) Waviness.
- iii) Lay.
- iv) Sampling length.
- v) CLA value.

**1×5**

- b) Describe the working principle and operation of Tylor – Hobson – Talysurf roughness instrument.

**15**

## **PART-B**

**Q.5** a) Discuss the effect of pitch error.

**5**

- b) Explain three wise methods for measuring effective diameter of external thread.

**15**

**Q.6** a) Explain briefly the types of irregularity of a circular part.

**5**

- b) Describe method of checking straightness of a surface by straight edge and autocollimator method. **15**
- Q.7 a) Describe one method for checking involute profile of a spur gear. **5**  
b) Explain the principle and operation of parkins on gear tester with neat sketch. **15**

# End Semester Examination, Dec. 2017

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) What do you mean by unilateral and bilateral system of tolerances?
- b) What is meant by hole basis and shaft basis system?
- c) What are different grades of slip gauges?
- d) What is the principle of sine bar?
- e) What do you mean by  $R_a$  and  $R_z$  value?
- f) Enumerate various types of pitch errors found in the screw thread.
- g) State the principle of autocollimator.
- h) Define straightness and flatness.
- i) What do you mean by cycloidal profile of gear tooth?
- j) Define circular pitch and module of gear.

**2×10**

## **PART-A**

**Q.2** a) Find values of allowance, hole tolerance and shaft tolerance for following dimensions of mated parts, according to basic hole system:

Hole: 37.50 mm.

37.52 mm.

Shaft: 37.47 mm.

37.45 mm.

**5**

- b) Calculate the fundamental deviation and tolerances and hence the limits of size for shaft and hole for fit 60 H8 f7. Diameter steps are 50 – 80 mm. Fundamental deviation for 'f' shaft is  $-5.5D^{0.41}$ .

**15**

**Q.3** a) What is the difference between line standard and end standard? **5**

- b) Explain with neat sketch the working principle of autocollimator. **15**

**Q.4** a) Define the following:

- i) Roughness.
- ii) Waviness.
- iii) Lay.
- iv) Sampling length.
- v) CLA value.

**1×5**

- b) Describe the working principle and operation of Tylor – Hobson – Talysurf roughness instrument. **15**

## **PART-B**

**Q.5** a) Discuss the effect of pitch error. **5**

- b) Explain three wire methods for measuring effective diameter of external thread. **15**

**Q.6** a) Explain briefly the types of irregularity of a circular part. **5**

- b) Describe the method of checking straightness of a surface by straight edge and autocollimator method. **15**

- Q.7** a) Describe one method for checking involute profile of a spur gear. **5**  
b) Explain the principle and operation of Parkinson gear tester with neat sketch. **15**

# **End Semester Examination, Dec. 2017**

## **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 a) What is meant by TDC and BDC? In a suitable sketch mark the two dead centres  
b) Draw the P-V and T-S diagram of Diesel Cycle.  
c) What are the functional requirement of fuel injection system?  
d) What is the function of carburetor?  
e) What do you mean by Brake Power and Indicated Power?  
f) Write a short note on 'C.O.P. of the refrigerator'.  
g) Deduce the designation of refrigerants from to the following chemical formula:  
 $\text{NH}_3, \text{CCl}_2\text{F}_2$   
h) What do you mean by DBT and WBT?  
i) Define sensible cooling.  
j) Enumerate the major refrigeration components of Vapor Compression System.

**2x10**

### **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  $27^\circ\text{C}$ . The maximum pressure reached is 42 bar and the maximum temperature is  $1500^\circ\text{C}$ . 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) Explain briefly with a neat sketch “simple vapor absorption system”.  
**10**
- b) One kg of air at a pressure of 1.05 bar and a temperature of  $20^{\circ}\text{C}$  is compressed to 6 bar. It is then cooled to  $27^{\circ}\text{C}$  in the cooler before entering the expansion cylinder. Assuming compression and expansion as isentropic processes, determine:  
i) Refrigerating effect per kg of air.  
ii) Theoretical C.O.P. **10**
- Q.6 a) The atmospheric conditions are  $20^{\circ}\text{C}$  and specific humidity of 0.0095 kg/kg of dry air. Calculate the following:  
i) Partial pressure of vapor.  
ii) Relative humidity.  
iii) Dew point temperature. **10**
- b) Define the following terms:  
i) Specific humidity.  
ii) Relative humidity.  
iii) Dew point temperature.  
iv) Heating and humidification. **10**
- Q.7 Write short notes on:  
a) Thermostatic expansion valve.  
b) Flooded type evaporator.  
c) Water-cooled condenser.  
d) Reciprocating compressor. **5x4**

## **End Semester Examination, Dec. 2017**

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:

- a) Explain Impulse Momentum Principle.
- b) A jet of diameter 5cm strikes a flat vertical stationary plate with 10cm/s.  
Find the work done by the jet on the plate.
- c) Define specific speed of turbine.
- d) Differentiate between Impulse and Reaction turbine.
- e) State the purpose of draft tube in reaction turbine.
- f) Why are casing in reaction turbine spiral in shape?
- g) Explain multistaging of centrifugal Pumps.
- h) Define NPSH and Thoma's Cavitations factor.
- i) Why is reciprocating pump called positive displacement pump.
- j) Briefly explain hydraulic press.

**2x10**

#### **PART-A**

Q.2 a) Find the expression for angle of swing of a vertical hinged plate when struck by a jet of water?

**10**

- b) A jet of water moving at 12 m/s impinges on vane shaped to deflect through  $120^\circ$  when stationary. If the vane is moving at 5 m/s, find the angle of the jet so that there is no shock at the inlet. What is the absolute velocity of the jet at exit in magnitude and in direction? Also, calculate the work done per second per unit weight of water striking per second. Assume the vane is smooth.

**10**

Q.3 a) Define the following terms:

- i) Gross Head.
- ii) Net Head.
- iii) Hydraulic Efficiency.

- iv) Overall Efficiency.
- v) Jet ratio and speed ratio.

**10**

- b) A Pelton wheel working under a head of 60 m when running at 200 rpm develops 95.6475 kW shaft power. The velocity of buckets = 0.45 times the velocity of jet. Overall efficiency = 85% and  $C_v = 0.98$ . Determine:
- i) Diameter of jet.
  - ii) Diameter of wheel.
  - iii) Width and depth of buckets.
  - iv) Number of buckets on wheel.

**10**

- Q.4 The following data corresponds to an inward flow reaction turbine:

Net Head = 60m; Width ratio = 0.1; Speed = 650rpm.

Flow ratio = 0.17; Shaft power = 275 KW.

Ratio of inner diameter to outer diameter = 0.5;

Hydraulic Efficiency = 95% ad overall Efficiency = 85%

The velocity of flow remains constant and discharge at the outlet is radial.

Determine:

- a) Guide blade angle.
- b) Runner blade angle at inlet and outlet.
- c) Diameter of blade at inlet and outlet.
- d) Width of blade at inlet and outlet.
- e) Specific speed of turbine.

**20**

### **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  $40^\circ$  set backwards and manometric efficiency is 75%. Determine:
- 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.
- b) Hydraulic Ram.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth 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 the following (any ten)

- a) Elastic Limit.
- e) Force Vs Stren.
- c) Bulk modules.
- d) Lateral strain.
- e) Section Modules.
- f) Torsional rigidity.
- g) Proof resilience.
- h) Strenes setup in thin cylinder.
- i) Thick compound cylinder.
- j) Hoop stren
- k) Column Vs Sturts
- l) End conditions of a column.

**2x10**

#### **PART-A**

Q.2 A tensile load of 40 KN is acting on a rod of diameter 40mm and of length 4m. A bore of diameter 20 mm is made centrally on the rod. To what length the rod should be bored so that the total extension will increase

30% under the same tensile load. Take E-  $2 \times 10^5$  N/mm<sup>2</sup>.

**20**

Q.3 Derive the expression for bending stren

$$\frac{6}{Y} = \frac{E}{R} = \frac{M}{I}$$

**20**

Q.4 a) Find the maximum torque transmitted by a circular solid shaft?

**12**

b) In a hello circular shaft of outer and inner diameter of 20mm and 10cm respectively, the stren is not to exceed 40 N/mm<sup>2</sup>. Find the maximum torque which the shaft can safely transmit?

**8**

### **PART-B**

Q.5 a) If the extension produced in a rod due to impact load is very small in comparison with theheight through which the load falls, prove that the stren induced in the body will be given by;

$$P = -\sqrt{2EP_h}$$

A.L

**12**

b) Prove that the maximum stren induced in a body due to suddenly applied load is twice the stren induced when the same load is applied gradually.

**8**

Q.6 a) A cylinder of internal diameter 0.50m contains air at a prem. Of 7 N/mm<sup>2</sup> (guage). If the maximum permissible stren induced in the material in 80 N.mm<sup>2</sup>, find the thickness of the cylinder.

**12**

b) What do you mean by Iamc's equations? How will you drive these equations? **8**

Q.7 a) Prove that crippling stren by Euler's formula is given by

$$\frac{\pi r^2 E}{(L/R)^2}$$

**12**

b) Explain how the failure of a short and of long column takes place?

**8**

## **End Semester Examination, Dec. 2017**

B. Tech. — Third / Fourth Semester  
**STRENGTH OF MATERIALS (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 a) Answer the following questions:**

- |   |          |
|---|----------|
| i) Define strain energy in any two load condition.    | <b>2</b> |
| ii) What is Lame's theory for thick pressure vessels? | <b>2</b> |
| iii) What are the limitations of pure torsion theory? | <b>2</b> |
| iv) Which of the following is more elastic?           |          |
| 1) Rubber.  |          |
| 2) Glass.   |          |
| 3) Steel.   |          |
| 4) Wood.  | <b>1</b> |
| v) The shear stress is minimum at:                    |          |
| 1) Axis of shaft.                                     |          |
| 2) Outer surface of shaft.                            |          |
| 3) Anywhere inside the shaft.                         |          |
| 4) None of these.                                     | <b>1</b> |

vi) The energy stored in a body when strained within elastic limit is known as:

- 1) Resilience.
- 2) Proof resilience.
- 3) Strain energy.
- 4) All.

1

vii) In a thin cylindrical pressure vessel, the ratio of hoop to longitudinal stress is:

- 1) 4
- 2)  $\frac{1}{4}$
- 3)  $\frac{1}{2}$
- 4) 2

1

viii) Euler's formula holds good only for:

- 1) Short columns.
- 2) Long columns.
- 3) Both.
- 4) Weak columns.

1

b) **Fill in the blanks:**

- i) In a composite body, consisting of two different materials \_\_\_\_\_ will be same in both the materials. 1
- ii) Bending moment at a point on beam is \_\_\_\_\_ of all moments on either side of a point. 1
- iii) Modulus of resilience is the ratio of \_\_\_\_\_ / \_\_\_\_\_. 1
- iv) The shear stress in a circular shaft under torsion varies \_\_\_\_\_. 1
- v) Euler's buckling formula is applicable for \_\_\_\_\_. 1

c) **State whether the following statements are TRUE or FALSE:**

- i) The deformation per unit length is called stress.
- ii) The point of contraflexure is a point where shear force is maximum.
- iii) The longitudinal stress in a thin cylinder of mean radius 'R' and thickness 'T' under pressure 'P' is given by  $PR/2t$ .
- iv) Leaf springs are used where space is a problem. 1x4

### **PART-A**

Q.2 a) Define the following:

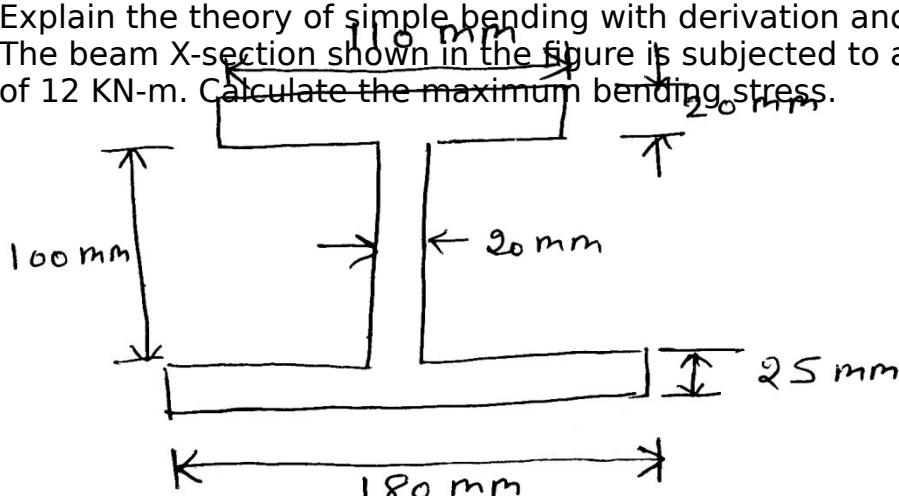
- i) Principal plane.
- ii) Poisson's ratio.
- iii) Thermal stress.

2x3

b) At a point in a material, there are two normal tensile stress of magnitude 20 MPa and 10 MPa acting mutually perpendicular to each other. There is also a positive shear stress of 5 MPa acting at that point. Determine the normal and shear stress on a plane whose normal is inclined at  $60^\circ$  to 20 MPa stress. 14

Q.3 a) Explain the theory of simple bending with derivation and assumptions. 10

b) The beam X-section shown in the figure is subjected to a bending moment of 12 KN-m. Calculate the maximum bending stress.



- Q.4 a) Derive the expression for angle of twist of tapered circular shaft subjected to a constant torque 'T' at the ends. **10**  
b) What diameter of the shaft will be required to transmit 80 KW at 60 rpm, if the maximum torque is 30% greater than the mean, limit of torsional stress is 56 MPa? Also, find maximum angle of twist in 3 m length.  $G = 84$  GPa. **10**

**PART-B**

- Q.5 a) Derive the expression for strain energy due to:  
i) Bending.  
ii) Torsion. **5x2**  
b) A bar 1.2 cm internal diameter and 2 cm. external diameter gets stretched by 0.3 cm under a steady load of 8 kN. What stress would be produced in the bar by a weight of 800 N which falls 8 cm. before commencing the stretching of the rod which is initially unstretched.  $E = 200$  GPa. **10**
- Q.6 a) Explain Lame's theory for thick pressure vessels and derive Lame's equation. **10**  
b) A steel cylinder 90 cm long, 15 cm internal diameter is made from plates of 5 mm thick. It is subjected to an internal pressure 7 MPa, the increase in volume due to internal pressure is  $16 \text{ cm}^3$ . Estimate the value of Poisson's ratio and modulus of rigidity. Take,  $E=210$  GPa. **10**
- Q.7 a) Derive an expression for buckling load of a column hinged at both ends. **10**  
b) A railway wagon weighting 6.5 KW and moving with the speed of 10 km/hr. is to be stopped by four buffer springs in which the maximum compression allowed is 20 cm. Calculate the number of turns in each spring for which diameter of wire is 2 cm. and that of coil is 20 cm.  $G = 840$  GPa. **10**

**End Semester Examination, Dec.2017**  
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.** Each question carries equal marks.

- Q.1 a) Describe the sequence of angle in single cutting tool nomenclature.  
f) Explain the difference between three Jaw chuck and four Jaw chuck in lathe machine.  
c) List the name of machining operations performed on a lathe machine.  
d) Name the basic parts of a radial drilling machine.  
e) Explain functions of cutting fluid.  
f) Is it possible to make a hole in sheet without using a drill or punch? If yes, How?  
g) Explain the difference between continuous chips and continuous chips with built up edge.  
h) Explain the term cutting speed for lathe machine.  
i) Explain the difference between shaper and planner.

j) Describe down milling operation.

**2x10**

### **PART-A**

Q.2 a) Derive an expression to show the relationship between chip thickness ratio, shear angle and rake angle.

**12**

b) Describe various types of chip formed during machining processes with the help of neat sketch.

**8**

Q.3 a) Explain Taylor's tool life equation and various parameters affecting tool life.

**12**

b) Explain crater wear and flank wear in detail with help of neat sketch.

**8**

Q.4 a) Derive an expression for optimum cutting speed in turning for maximum production rate.

**16**

b) Explain the terms machinability and machinability index.

**4**

### **PART-B**

Q.5 a) Explain in detail various operations performed on a lathe machine with help of neat sketches.

**15**

b) Describe the specifications of a lathe machine.

**5**

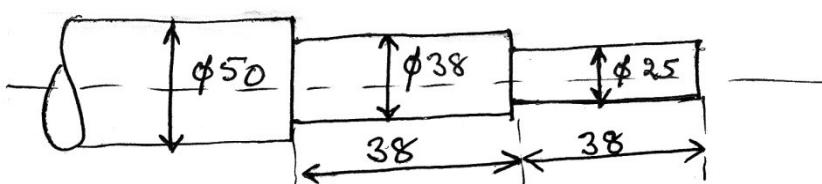
Q.6 a) With the help of neat sketch, explain the constructional details of a knee and column vertical milling machine.

**12**

b) Explain the Geometry of drill with the help of neat sketch.

**8**

Q.7 a) What is the machining time to turn the dimensions given in figure? The material is brass and cutting speed with HSS tool is 100 m/min and feed is 0.7 mm/revolution.



**15**

b) Derive an expression to determine machining time on lathe machine.

**5**

## **End Semester Examination, Dec.2017**

B. Tech. - Fourth Semester

**KNIMATICS 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**. Each question carries equal marks.

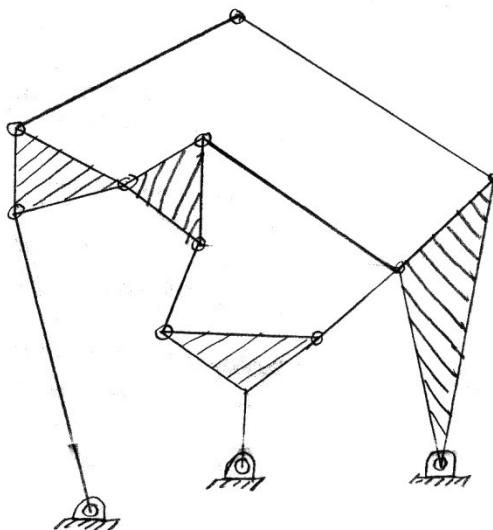
Q.1 Briefly describe:

- a) Successfully constrained motion.
- g) Kinematic chain.
- c) Circular pitch of a gear.
- d) Contract ratio of gear.
- e) Reverted gear train.
- f) Train value of a gear train.
- g) Pressure angle of a cam and follower system.
- h) cylindrical cam.
- i) Type and number synthesis of mechanism.
- j) Instantaneous centre.

**2x10**

### **PART-A**

Q.2 a) Explain, with a neat sketch, principle and working of slotted lever type quick return mechanism. Identify links and determine the expression for stroke length. **13**  
b) Find the degrees of freedom of the mechanism shown in the figure.



**7**

Q.3 a) State and prove law of gearing.

**13**

b) Compare involute and cycloidal tooth profiles of gears.

**7**

Q.4 a) Describe the table method of analyzing an epicyclic gear train problem considering two gears A and B in mesh, connected by an arm C.

**6**

b) A compound gear train consists of four gears A, B, C and D. The number of teeth on these gears are 54, 75, 36 and 81 respectively. Gears B and C constitute a compound gear. Find the torque on the output shaft if gear A transmit 12kw at 200 rpm and the train efficiency is 80%.

**14**

### **PART-B**

Q.5 The following data refer to a cam profile in which the follower moves with uniform acceleration and deceleration during ascent and descent. Minimum radius of cam = 30mm, roller diameter = 10 mm, follower lift = 30mm,

offset of the follower = 10 mm towards right. Speed of cam = 200 rpm, angle of ascent and descent are  $90^\circ$  and  $70^\circ$ .respectively. Angle of dwell between ascent and descent =  $60^\circ$ .

Draw the cam profile.

**20**

- Q.6 a) Describe chebychev spacing method to determine precision points in synthesis of mechanism.

**6**

- b) Design a slider crank mechanism (graphical method) to coordinate three positions of the input of the slider for following data.

$$\theta_{12} = 30^\circ, S_{12} = 40 \text{ mm}$$

$$\theta_{13} = 60^\circ, S_{13} = 96 \text{ mm}$$

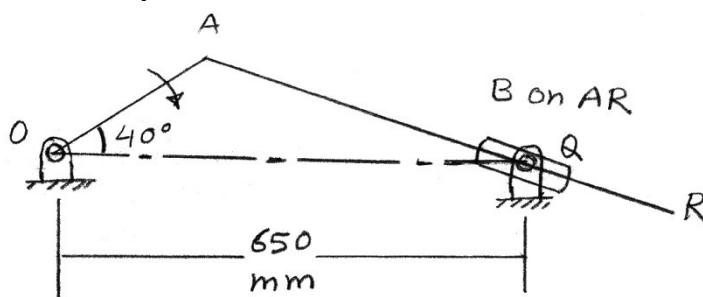
$$\text{Eccentricity} = 20 \text{ mm}$$

**14**

- Q.7 a) Describe with appropriate sketches, the method to locate all the instantaneous centres of a four bar mechanism.

**8**

- b) For the position of mechanism shown in Figure 2, calculate the angular velocity of the link AR. OA is 300 mm long and rotates at 20 rad/s in the clockwise direction. OQ = 650 mm and  $\angle QOA = 40^\circ$ .



**12**

**B. Tech. – Fifth Semester**  
**INDUSTRIAL ENGINEERING (M-501A)**

Time: 3 hrs  
**100**

Max Marks:

No. of pages: 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 total and partial productivity measures.  
 b) Distinguish between fixed and variable costs.  
 c) Differentiate between sampling inspection and 100% inspection.  
 d) Describe master production schedule.  
 e) What is meant by 'kaizen'?

**4x5**

**PART-A**

- Q.2 a) What is motion economy? Write down the various principles involved.

**10**

- b) Describe the process of 'method study' and time study in detail.

**10**

- Q.3 Derive economic batch quantity. A company requires 50,000/- units of a product per year. Ordering cost is Rs. 3/- per order and inspection cost is Rs. 12/- per order. Interest cost is Rs. 0.06/- per unit per year. Obsolescence cost is Rs. 0.004/- per unit per year. Storage cost is Rs. 1000/- per year for 50,000 units.

Calculate: a) EOQ b) No of orders per year and c) Reorder point.

**20**

- Q.4 a) What do you understand by the term cost? Classify different types of costs.

**10**

- b) Explain break even quantity graphically and algebraically.

**10**

**PART-B**

- Q.5 a) Describe the various functions of PPC.

**10**

- b) There are seven jobs which are to be processed on machine  $M_1$  and machine  $M_2$ . Processing time in hours are given below:

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  $M_2$

**10**

- Q.6 a) What is meant by process variation? Classify process variation. How to monitor and analyze process variation?

**10**

- b) What is meant by process control charts? Classify process control charts and draw a comparison between control charts for variables and control charts for attributes. **10**

Q.7 Write short notes on **(any four)**:

  - a) Just In Time (JIT).
  - b) Principles of 5's.
  - c) Total Quality Management (TQM).
  - d) ISO 9001:2015.

**5x4**

**End Semester Examination, Dec. 2017**  
**B. Tech. - Fifth / Eighth 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.** Each question carries equal marks.

- Q.1 a) Differentiate between total and partial productivity measures.  
b) Distinguish between direct and indirect costs.  
c) Explain briefly the term 'inventory control'.  
d) What do you understand by term 'dispatching' used in PPC?  
e) What are various types of variations in any process? 4×5

## **PART-A**

- Q.2 a) Explain the procedure of 'method study' and also explain the various recording techniques in detail. **10**

b) How do you arrive at 'standard time' of any process? Explain various types of allowances used. **10**

Q.3 a) Derive Economic Batch Quantity (EBQ). **10**

b) A manufacturer requires bolts at the rate of 3000 kg per year. The cost of bolts is Rs. 40/- per kg. The company purchase manager estimate the carrying cost of 10% per year. Procurement cost is Rs. 200/- per order. Calculate:

a) EOQ **10**

b) The frequency of orders **10**

- Q.4 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 Rs.5/-. The rent of factory is Rs.2000/-. The article selling price is Rs.9/-. Determine quantity required to break even. Also quantity required to earn profit of Rs.400/-. **10**

## **PART-B**

- Q.5 a) What are the functions of production planning and control? Explain loading and scheduling techniques in detail. **10**

- b) There are seven jobs which are to be pressed on machines M1 and M2. Pressing time in hours are given:

JOB	A	B	C	D	E	F	G
M1	6	24	30	12	20	22	18
M2	16	20	20	13	24	2	6

Find the optimal sequence and total elapsed time. Also compute idle time on M2. **10**

- Q.6 a) Explain the concept of quality control with its functions and objectives in detail. **10**  
 b) What are control charts? Distinguish between control charts for attributes and variables. **10**
- Q.7 Write short notes on (**any four**):  
 a) ISO-9001:2008      b) Kaizen      c) Just in time technique      d)  
 Deming award  
 e) Six sigma methodologies **5×4**

### **End Semester Examination, Dec. 2017**

B. Tech. — Fifth 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 Attempt the following:  
 a) Differentiate between “Process control” and “Product control”, giving an example.  
 b) Differentiate between “Break even quality” and “Break-even point”.  
 c) Differentiate between “Method study” and “Time study”.  
 d) Describe the term “Inventory” and “Inventory control”.  
 e) Differentiate between “Fixed cost” and “Variable cost” **4×5**

#### **PART-A**

- Q.2 a) Explain multiple activity chart, flow diagram and string diagram used in method Study Procedure. **10**  
 b) How is standard time calculated? Explain various types of allowance in detail. **10**
- Q.3 a) Describe the relationship between fixed cost, variable cost, profit and selling price with the help of a graph. **10**  
 c) A company is producing certain types of circuit breakers. The fixed cost of land building etc. is `40000/. The variable cost is ₹10/- per unit production if the sales price of product is ₹20 per unit, what should be the minimum production level? If the firm is operating at present so that production is 8000 units, what is the firms profit? **10**

- Q.4 a) A Company produces 4800 parts per day and sells them at approximately half of the rate. The setup cost is ₹1000/- and carrying cost is ₹5 per unit. The annual demand is 4,80,000 units. Find:  
 i) Optimal lot size.  
 ii) Number of product run per year.  
 iii) Length of each production run. **5×3**  
 b) Explain ABC analysis with the help of a neat sketch. **5**

#### **PART-B**

- Q.5 a) What are the objectives of production planning and control? **5**

- b) Processing time (in minutes) of six jobs on two machines is given below. Use Johnson rule to schedule these jobs:

Job	J1	J2	J3	J4	J5	J6
Machine M1	4	6	7	8	9	1
Machine M2	5	8	1	3	6	10

15

- Q.6 The following data is provided for a process. Find out whether the process is in a state of statistical control. Plot the control chart. (X bar and R chart)  
(For subgroup size n=5;  $A_2 = 0.577$ ,  $D_3 = 0.00$ ,  $D_4 = 2.114$ )

Sub group	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM	10:30 AM	11:00 AM
1	10.1	7.0	5.0	9.0	2.0	2.0	5.0
2	1.0	4.0	2.0	3.0	4.0	4.0	6.0
3	4.0	10.0	6.0	7.0	2.0	8.0	4.0
4	9.0	2.0	2.0	3.0	6.0	8.0	10.0
5	8.0	8.0	3.0	1.0	1.0	6.0	3.0

20

- Q.7 Write short notes on the following:

i) Methods of job evaluation.

7

ii) Methods of merit rating.

6

iii) Factors affecting productivity.

7

## **End Semester Examination, Dec. 2017**

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 Briefly explain the following:

- a) D' Alembert's principle.
- b) Kinematic chain.
- c) Static balancing.
- d) Coupled locomotives.
- e) Stability of governor.
- f) Stability of a two wheeler.
- g) Crank effort in an engine.
- h) Primary and secondary unbalanced force.
- i) Equilibrium of a two force member and a torque (external).
- j) Variation of tractive force.

**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 radial 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**

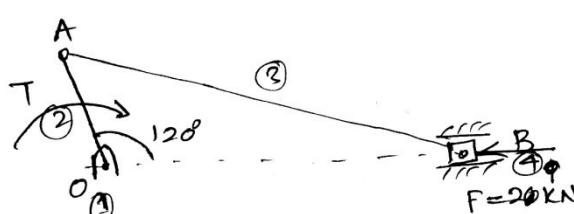
Q.4 a) Derive the expression of gyroscopic couple as  $C_G = IW \cdot W_P$ . **6**

- 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) Deduce the relation between height and rpm of a porter governor. 6  
b) A proell governor has all four arm of length 305 mm. The upper arms are pivoted at axis and lower arms are attached to a sleeve at a distance 38 mm from the axis. The mass of each ball is 4.8 kg and are attached to the extensions of lower arms 102 mm long. Find equilibrium speed at 165 mm and 216 mm if  $M = 54$  kg. 14
- Q.6 a) Explain the equilibrium of a four force member. 6  
b) Determine the input torque 'T' on link OA where  $F = 2$  kN,  $OA = 100$  mm,  $AB = 450$  mm and  $\angle AOB = 120^\circ$  as shown in the figure.



**14**

- Q.7 a) Derive piston effort, thrust along the connecting rod, thrusts on the sides of cylinder and crank effort for a horizontal reciprocating engine. 6  
b) A horizontal engine has following properties  $N = 210$  rpm, bore dia = 220 mm, stroke = 440 mm.  $L = 924$  mm, mass of reciprocating parts = 20 kg. When crank has turned an angle of  $30^\circ$  from inner dead centre the gas pressures on cover and crank sides are  $500$  kN/m<sup>2</sup> and  $60$  kN/m<sup>2</sup> respectively, diameter of piston rod is 40 mm. Find turning moment of the crankshaft. 14

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth / 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 Explain the following:  
a) Dynamic balancing.  
b) Hammer blow.  
c) Angular velocity of precession.  
d) Effect of gyroscopic couple on a ship during rolling.  
e) Stability of a Governor  
f) Fluctuation of energy coefficient.  
g) Gyroscopic couple.  
h) Equilibrium conditions of a two force member.  
i) Static equilibrium.  
j) Piston effort in engine.

**2×10**

### **PART-A**

- Q.2 A circular disc mounted on a shaft carries three attached masses 4 kg, 3 kg and 2.5 kg at radial distances 75 mm, 85mm and 50 mm and at the angular positions of  $45^\circ$ ,  $135^\circ$  and  $240^\circ$  respectively counter clockwise from the reference line along  $x$  axis. Determine the amount of the counter mass at a radial distance of 75 mm required for static balance. **20**
- Q.3 a) Derive an expression for the maximum variation in tractive force in a two cylinder locomotive with cranks set at  $90^\circ$  to each other. **10**

- b) Find out the expressions for primary and secondary forces and couples in an IN-line four cylinder engine in terms of crank angle  $\theta$ . Make usual assumptions. **10**

- Q.4 a) The moment of inertia of an aeroplane air screw is  $20 \text{ kg/m}^2$  and the speed of rotor is 1000 r.p.m. clockwise looking from the front. The speed of the flight is 200 km/hour. Find the gyroscopic couple and its effect when it makes a left turn of radius 150 mm. **15**  
 b) Derive the expression of angle of heel in a two wheeler automobile while turning left. **5**

### **PART-B**

- Q.5 a) Briefly explain the following terms in governors:  
 i) Equilibrium speed.  
 ii) Maximum and minimum equilibrium speed.  
 iii) Sleeve lift. **2x3**  
 b) All the arms of a porter governor are 178 mm long and are hinged at a distance of 38 mm from the axis of rotation. The mass of each ball is 1.15 kg and mass of the sleeve is 20 kg. The governor sleeve begins to rise at 280 rpm, when the links are at an angle of  $30^\circ$  to the vertical. Assuming friction force to be constant, determine the minimum and maximum speed of rotation when the inclination of the arms to the vertical is  $45^\circ$ . **14**

- Q.6 a) Explain the equilibrium of four force members. **5**  
 b) Find the torque required on the input link  $AB$  for static equilibrium by principle of virtual work for figure shown below:

$$AB = 500 \text{ mm}$$

$$BC = 660 \text{ mm}$$

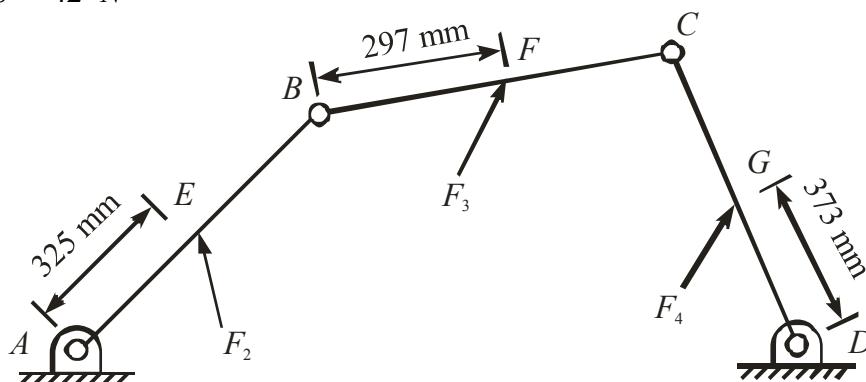
$$CD = 560 \text{ mm}$$

$$AD = 1000 \text{ mm}$$

$$F_2 = 80 \angle 73.5^\circ N$$

$$F_3 = 144 \angle 58^\circ N$$

$$F_4 = 60 \angle 42^\circ N$$



**15**

- Q.7 a) Explain the concept of Equivalent offset inertia force in dynamic force analysis. **5**  
 b) In a vertical steam engine, the connecting rod is 4.5 times the crank. Mass of the reciprocating part is 120 kg and the stroke of the piston is 440 mm. The engine runs at 250 rpm. Net load on the piston due to steam pressure is 25 KN when the crank has turned  $120^\circ$  from TDC. Determine:  
 i) Thrust in the connecting rod.  
 ii) Pressure on side bars.  
 iii) Tangential force on the crank pin.  
 iv) Trust in the bearings.

- v) Turning moment on the crankshaft.

3×5

## **End Semester Examination, Dec. 2017**

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 a) What is stress concentration?  
b) What is fatigue failure?  
c) What is function of transmission shafts?  
d) What do you understand by torsional rigidity?  
e) What are the functions of springs?  
f) What are the functions of bearings?  
g) Why are ball and roller bearing called antifriction bearings?  
h) What is hydrodynamic lubrication?  
i) What are advantages of helical gear over spur gear?  
j) What do you mean by ergonomic consideration in design?

**2x10**

### **PART-A**

- Q.2 a) Explain the modified Goodman diagram for bending stresses.  
**10**

- b) A rotating bar made of steel 45C8 ( $S_{ut} = 630 \text{ N/mm}^2$ ) is subjected to a completely reversed bending stress. The corrected endurance limit of the bar is  $315 \text{ N/mm}^2$ . Calculate fatigue strength of the bar for a life of 90,000 cycles.  
**10**

Q.3 a) Describe the permissible shear stress as per the ASME code.

**5**

b) A rotating shaft, 40 mm in diameter is made of steel FeE 580 ( $S_{yt}=580 \text{ N/mm}^2$ ). It is subjected to a steady torsional moment of 250 N-m and bending moment of 1250 N-m. Calculate the factor of safety based on:  
i) Max<sup>m</sup> principal stress theory.  
ii) Max<sup>m</sup> shear stress theory.

**15**

Q.4 a) What are the applications of multi-leaf springs?

**5**

b) It is required to design a helical compression spring subjected to a force  $500 \text{ N}$ . Deflection of spring corresponding to this force is  $20 \text{ mm}$ . The spring index is  $6$ . The spring is made of cold drawn steel wire with ultimate tensile strength of  $1000 \text{ N/mm}^2$ . The permissible shear stress for spring wire can be taken as 50% of 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 spring vi) Pitch of the coils.
- Assume a gap of  $1 \text{ mm}$  between adjacent coils under maximum load conditions. The spring has square and ground ends.

**15**

### **PART-B**

Q.5 a) A ball bearing is subjected to a radial force of 2500 N and axial force of 1000 N. The dynamic load carrying capacity of bearing is 7350 N. The value of X and Y are 0.56 and 1.6 respectively. The shaft is rotating at 720 rpm. Calculate the life of bearing.

**14**

b) Why is hydrostatic bearing called 'externally pressurized' bearing?

**6**

Q.6 a) What is law of gearing? With a neat sketch of a spur gear, show its various parts and define terminology.

**10**

b) A pair of spur gears consists of a 20 teeth pinion meshing with a 120 teeth gear. The module is  $4 \text{ mm}$ . Calculate:

- i) Centre distance.
- ii) Pitch circle diameters of pinion and gear.
- iii) Addendum and dedendum.
- iv) Tooth thickness.

**2x5**

Q.7 a) Define 'ergonomics'. Explain ergonomics and value engineering in design.

**10**

b) What is standardization? Explain various design considerations in casting.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. — Fifth Semester

**PRODUCTION ENGINEERING (M-504B)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **2**

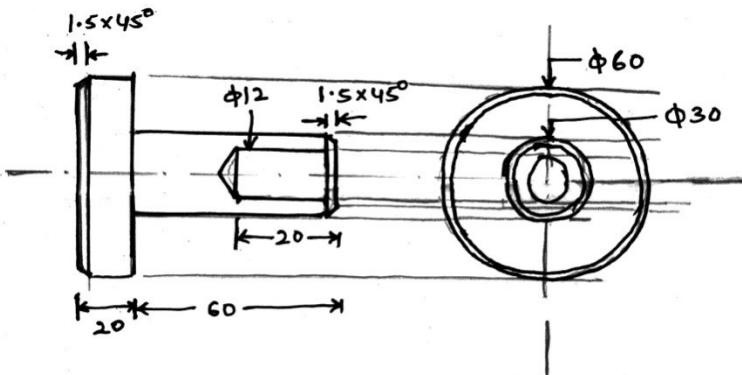
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B.** Marks are indicated against each question.

- Q.1 a) Define “Process planning”.  
b) State the function of a fixture with an example.  
c) Comment on the drill bush materials.  
d) State the function of a stripper used in press operations.  
e) How piercing differs from blanking?  
f) List the materials for gear manufacturing and write the names of gear manufacturing methods.  
g) What is loading and glazing?

- h) State the differences between Honing and Lapping.  
 i) State the significance of cost estimation of machining processes in production methods.  
 j) Differentiate between Cutting speed and Feed. **2x10**

### **PART-A**

- Q.2 A batch of 1000 components as shown in figure-1 of mild steel are to be produced from a blank  $\phi 82 \times 72\text{mm}$  long. Generate a process sheet for the components as shown in figure below:



**20**

- Q.3 a) What is 3-2-1 location principle? Explain. **5**  
 b) Explain the following with neat sketches.  
 i) Jack pins.  
 ii) Diamond pin locators.  
 iii) Cylindrical locators.  
 iv) V-locators.  
 v) Conical locators. **3x5**

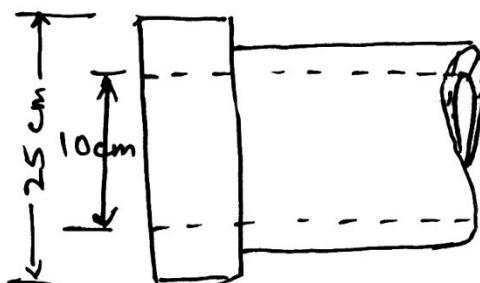
- Q.4 The symmetrical-cup work piece shown in question-2 above, is to be made cold rolled steel 0.8 mm thick. Make the necessary calculations:  
 a) Size of the blank.  
 b) Percentage reduction.  
 c) Number of draws.  
 d) Radius on punch and die.  
 e) Die clearance.  
 f) Drawing pressure.  
 g) Blank holding pressure.  
 h) Press capacity. **20**

### **PART-B**

- Q.5 a) Differentiate between 'thread cutting' and 'thread forming'. **5**  
 b) Explain how gear finishing is done and what are its significances. **5**  
 c) Draw a labeled diagram of a solid tap. **5**  
 d) Explain the principle mechanism of rolling of external screw threads by flat dies and circular dies. **5**

- Q.6 a) Explain the factors that need consideration for selection of grinding wheel:  
 i) Abrasives.  
 ii) Bonds types.  
 iii) Wheels structure.  
 iv) Wheel grades. **3x4**  
 b) Explain the procedure of wheel balancing. **4**

- c) State the causes of unbalancing of grinding wheel and its occurrence. **4**
- Q.7 a) Calculate the machining time to face on a lathe a cast-iron flange as shown in figure.



**10**

- b) How long will it take a 12.7 mm driller to drill a hole 50 mm deep in the brass? **10**

*Note: Assume the cutting speed and feed for the cutting tool selected for question 7(a) and 7(b).*

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.*

- Q.1 a) What is the significance of metrology?  
 b) Name the instruments used for angular measurement.  
 c) What do you mean by flow measurement?  
 d) Define the term 'sensor'.  
 e) What is static characteristics of instrument?  
 f) What is the role of transfer function in control system?  
 g) Draw bridge circuit diagram and label it.  
 h) What is multi-loop control system?  
 i) Write Routh and Hurwitz criteria of stability.

j) What is systematic and random error?

**2×10**

**PART-A**

- Q.2 a) Make a neat sketch of vernier caliper and discuss the guidelines to be followed for the proper use of a vernier caliper. **15**  
b) Write a short note on Micrometer. **5**
- Q.3 a) Explain the construction and working of an optical pyrometer with the help of a schematic diagram. **15**  
b) Briefly describe about thermocouple. **5**
- Q.4 a) Describe variable resistance, inductance and capacitance in brief. **10**  
b) Briefly explain the working of electric transducer. **10**

**PART-B**

- Q.5 a) What are the various kinds of errors which may originate in an instrument? Also, give reasons? What are the precautions to be taken to eliminate these error? **15**  
b) What do you mean by statistical analysis of a test data? **5**
- Q.6 a) What do you understand from open and closed loop system? Explain the servo-mechanism process in detail. **15**  
b) Briefly describe the process control and regulator. **5**
- Q.7 Write short notes on **(any four)**:  
a) Amplifier.  
b) ADC converter.  
c) Voltage indicating device.  
d) Data acquisition.  
e) McLeod gauge.  
f) Hydraulic load cells. **5×4**

**End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

Q.1 Answer the following:

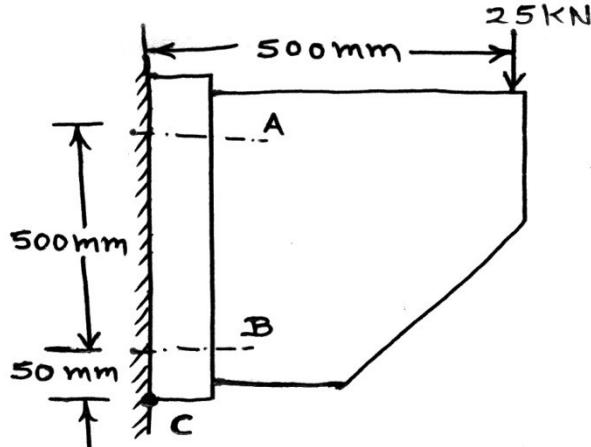
- a) Define “Engineering Design”.
- b) What is allowable stress?
- c) What do you mean by bolt of uniform strength?
- d) Write the condition for self-locking of power screw.
- e) Name the three methods of riveting.
- f) Why are riveted joints replaced by welded joints?
- g) What are the advantages of v-belts?
- h) Write application of chain drive.

- i) Write the use of clutch assembly.  
 j) How the functions of brake differ from that of a clutch?

**2×10**

### **PART-A**

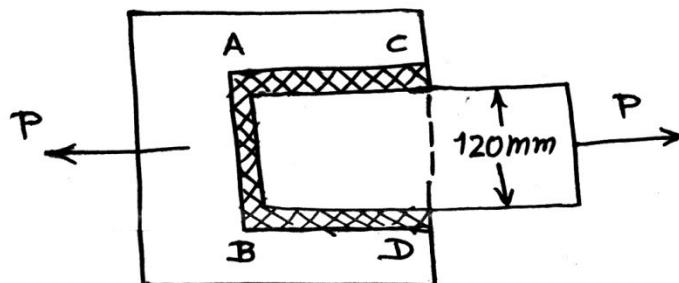
- Q.2 a) Explain different types of feasibility study in design philosophy. **10**  
 b) Describe various factors influencing the value of factor of safety. **10**
- Q.3 a) Explain with neat sketch, the terminology used in screw threads. **8**  
 b) A wall bracket is attached to the wall by means of four identical bolts, two at 'A' and two at 'B' as shown in the figure. Assuming that the bracket is held against the wall and prevented from tipping about the point 'C' by all four bolts. Using an allowable tensile stress in the bolts as  $35 \text{ N/mm}^2$ , determine the size of bolts on the basis of maximum principal stress theory.



**12**

- Q.4 a) Find the efficiency of single riveted lap joint of 6mm plates with 20mm diameter rivets having a pitch of 50mm.  
 Assume: Permissible tensile stress in plate = 120 MPa;  
 Permissible shearing stress in rivets = 90 MPa;  
 Permissible crushing stress in rivets = 180 MPa. **8**  
 b) Determine the length of the weld run for a plate size 120mm wide and 15mm thick to be welded to another plate by means of:

- i) A single transverse weld.  
 ii) Double parallel fillet welds when the joint is subjected to variable loads.



**12**

### **PART-B**

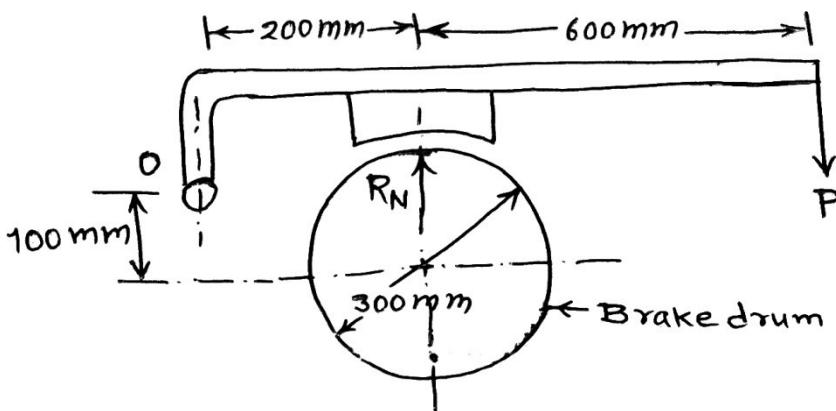
- Q.5 a) Derive an expression for length of open belt drive with a suitable diagram. **8**  
 b) A V-belt drive is required for a 15 kW, 1440 rpm electric motor, which drives a centrifugal pump running at 360 rpm for a service of 24 hours per day. From space considerations, the centre distance should be approximately 1 m. Determine:  
 i) Belt specifications;

- ii) Number of belts;
- iii) Correct centre distance.
- iv) Pulley diameters.

**12**

- Q.6 a) Explain the design and working of single plate clutch. **8**
- b) A multiple disc clutch, steel on bronze, is to transmit 4.5 kW at 750 rpm. The inner radius of the contact is 40 mm and the outer radius of the contact is 70 mm. The clutch operates in oil with an expected coefficient of 0.1, the average allowable pressure is 0.35 N/mm<sup>2</sup>. Find:
- i) The total number of steel and bronze discs;
  - ii) The actual axial force required;
  - iii) The actual axial pressure;
  - iv) The maximum pressure. **12**

- Q.7 a) What is a self-energizing brake and when does a brake become self-locking? **6**
- b) The block brake, as shown in figure below, provides a braking torque of 360 N-m. The diameter of the brake drum is 300 mm. The coefficient of friction is 0.3. Find:
- i) The force (P) to be applied at the end of the lever for the clockwise and counter clockwise rotation of the brake drum; and
  - ii) The location of the pivot or fulcrum to make the brake self-locking for the clockwise rotation of the brake drum.



**14**

## End Semester Examination, Dec. 2017

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**. Each question carries equal marks.

- Q.1 a) What do you mean by feasibility study in design philosophy?  
 b) What are the advantages of threaded joints?  
 c) Define caulking and fullering.  
 d) What are advantage and limitation of power screw?  
 e) What are various mode of failure in case of riveted joints?  
 f) Why are belt drive called flexible drives?

- g) Distinguish between open and cross belt drives.
- h) Why are clutches usually designed on the basis of uniform wear?
- i) Where do you use clutch?
- j) What is function of brake?

**2x10**

### **PART-A**

- Q.2 a) Explain the concept of brain storming in detail.

**10**

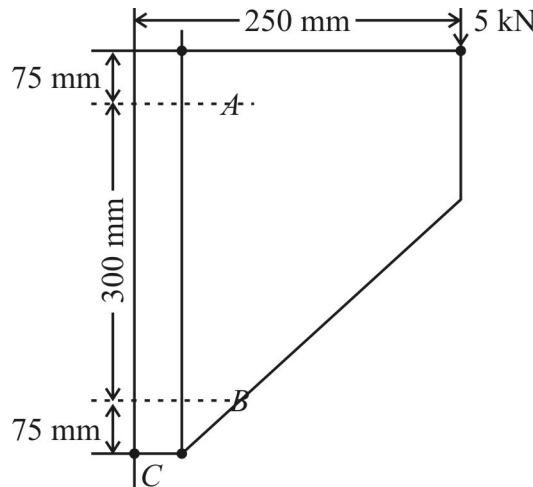
- b) Describe the following:

- i) Factor of safety
- ii) Detailed design

**10**

- Q.3 a) A bracket for supporting the travelling crane is fixed to the steel column by means of four identical bolts, two at A and two at B as shown in the figure. The maximum load acting vertically downward is at a distance of 250 mm from the face of the column. Bolts are made of steel ( $Syt = 380 N/mm^2$ ) and factor of safety is 5. Determine the major diameter of the bolts on the basis of maximum principal stress theory.

**14**



- b) What is a power screw? What types of threads are used in power screw? What are advantages of square threads over trapezoidal threads?

**6**

- Q.4 a) Write short notes on:

- i) What is an eccentric riveted joint?
- ii) Explain different types of fastenings.

**8**

- b) Two plates of  $10\text{mm}$  thickness each are to be joined by means of a single riveted double strap butt joint. Determine the rivet diameter; rivet pitch, strap thickness and efficiency of the joint. Take the working stresses in the tension and shearing as  $80\text{ MPa}$  and  $60\text{ MPa}$  respectively.

**12**

### **PART-B**

- Q.5 a) What is coupling? Classify different couplings and explain any one in brief.

**6**

b) A V-belt drive is required for a  $15kW$ ,  $1440\text{ rpm}$  electric motor, which drives a centrifugal pump running at  $360\text{ rpm}$  for a service of 24 hrs per day. From space considerations, the centre distance should be approximately  $1\text{ m}$ . Determine:

- i) Belt specifications.
- ii) Number of belts.
- iii) Correct centre distance.
- iv) Pulley diameter.

**14**

Q.6 a) Derive the expression for torque transmitting capacity for a single plate friction clutch based on uniform pressure and uniform wear theory.

**15**

b) Differentiate between brake and clutch.

**5**

Q.7 a) State different types of brakes and give at least one practical application of each.

**6**

b) A solid cast iron disk  $1\text{ m}$  in diameter and  $0.2\text{ m}$  thick is used as a flywheel. It is rotating at  $350\text{ rpm}$ . It is brought to rest in  $1.5\text{ sec}$  by means of a brake. Calculate:

- i) The energy absorbed by brake.
- ii) Torque capacity of the brake.

**14**

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** a) Name different environments in which decisions are made.  
 b) Write the steps in conducting the operations research study.  
 c) What do you understand by unboundedness in LPP?  
 d) How do you identify the presence of multiple optima in simplex method?  
 e) Name the methods of optimality check of transportation.  
 f) State the common and distinguishing features of assignment and transportation models.  
 g) Write the basic elements of waiting line situations.  
 h) What are different types of floats?  
 i) What is need of simulation?  
 j) Describe a method for generating random numbers. **2×10**

**PART-A**

- Q.2** a) What is decision-making? Write the difference between decision-making under risk and uncertainty. **8**  
 b) A training programme is to be met with a batch size of  $A_1, A_2, A_3$  and  $A_4$  which meets the expenses.  $S_1, S_2, S_3$  and  $S_4$ . Indicate the levels of attendance:

	$S_1$	$S_2$	$S_3$	$S_4$
$A_1$	6	11	19	26
$A_2$	7	6	11	22
$A_3$	20	17	11	20
$A_4$	29	21	18	14

The table indicates additional cost due to level of attendance in different batches. Find optimum batch size using i) Laplace ii) minimax iii) maxmin criteria **12**

- Q.3** a) How will you solve LPP graphically? Write limitation of graphical method. **6**  
 b) Convert the given primal LPP in dual and solve using simplex".

$$Z \min = 20x_1 + 40x_2$$

Subject to,

$$2x_1 + 20x_2 \geq 40$$

$$20x_1 + 3x_2 \geq 20$$

$$4x_1 + 15x_2 \geq 30$$

$$x_1, x_2 \geq 0$$

**14**

- Q.4** a) Find the optimal solution of following transportation problem:

Destination	1	2	3	4	Supply
-------------	---	---	---	---	--------

**602/5**

→				
Origin	A	7	2	5
	B	4	4	6
	C	5	3	3
	D	4	1	2
Demand →		20	25	15
				15

**10**

- b) Suggest optimum assignment of four workers A, B, C, D to four jobs I, II, III, IV. The time taken by different workers in completing the different jobs is given below

Worker		Job			
		S			
		I	II	III	IV
	A	8	10	12	16
	B	11	11	5	8
	C	9	6	5	14
	D	15	14	9	7

Also find the total time taken in completing the jobs.

**10**

### **PART-B**

- Q.5 a) Discuss the arrival and service processes of waiting line models. **8**  
 b) A repair shop attended by a single mechanic has an average of four customers per hour who bring small appliances for repair. Repairman takes six minutes on the average. Assuming arrival poission and service tine exponential, calculate i) Ls ii) Lq iii) Ws iv) Wq v) probability of finding atleast customer in the shop. **12**

- Q.6 a) Compare and contrast CPM and PERT models. **4**  
 b) Utility data for a network are given below. Construct the network and identify critical path. Also determine total, independent and free floats:

Activity:	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration:	2	8	10	6	3	3	7	5	2	8

**16**

- Q.7 a) Explain Monte Carlo method and give situations where it is used. **8**  
 b) A company manufactures around 200 mopeds. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 196 mopeds to 204, whose probability distribution is as given below:

Production/day :	196	197	198	199	200	201	202	203	204
Probability:	0.05	0.09	0.12	0.14	0.2	0.15	0.11	0.08	0.06

Using following 15 random numbers 82, 89, 78 24, 53, 61, 18, 45, 04, 23, 50, 77, 27, 54, 10.

Simulate the process and find out:

- i) Average number of mopeds waiting in factory.  
 ii) Number of empty spaces in lorry.

Finished mopeds are transported in a lorry that can accommodate only 200 mopeds.

**12**

# **End Semester Examination, Dec. 2017**

B. Tech. — Fifth / Sixth 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.** Each question carries equal marks.

- Q.1 a) What are CAD/CAM tools?  
b) What do you understand by CAD?  
c) Define Bezier curve.  
d) What is an interpolation spline?  
e) How is automation Implemented?  
f) What is an NC control system?  
g) Explain the function of CIM?  
h) Define Analytic curves.  
i) What is group technology?  
j) Define transformation with an example.

**2x10**

## **PART-A**

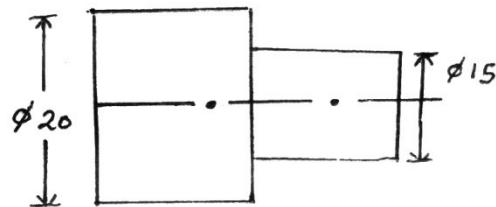
- Q.2 a) Find the reflection matrix when axis of reflection is  $y = 3x + 2$ .  
**12**  
b) A line having end points (3,3) and (5,5) is scaled by 3 units in a  $x$  direction and 4 units in  $y$  direction . Find the transformation matrix and final coordinates of the line.  
**8**
- Q.3 a) Write a Parametric 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.  
**5x2**

## **PART-B**

- Q.5 a) Explain the difference between point-to-point cut, straight cut and contouring NC.  
**10**  
b) Write a note on 'coordinate system used in NC'.  
**10**

Q.6 a) From a shaft 25 mm diameter, make a stepped shaft with dimensions as show in figure below. Take speed = 3000 rpm and feed = 30 mm/min.



12

b) Describe fixed, programmable and flexible automation with examples. Discuss its application in industries in detail.

8

Q.7 a) What is CAPP? What are the benefits of CAPP?

8

b) Write notes on:

- i) MRP II
- ii) BOM
- iii) MRP

4x3

## **End Semester Examination, Dec. 2017**

B. Tech. - Fourth / 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 a) What do you understand by natural convection? **2×10**  
b) What is thermal diffusivity?  
c) State the assumptions of lumped system.  
d) Briefly explain Fourier's law of heat conduction.  
e) State the characteristics of a Black body.  
f) Define overall heat transfer coefficient.  
g) What is Nusselt number?  
h) State the signification of fins with reference to heat transfer.  
i) Define effectiveness of fin.  
j) Briefly explain the types of heat exchangers.

### **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:  
 $K = 0.78W / m^{\circ}C$ ,  $\rho = 2700kg / m^3$ ,  $G = 0.84KJ / Kg^{\circ}C$ .  
What is the heat flow through the wall at steady state condition? **10**
- Q.3 a) Explain the following: **4**  
i) Fin efficiency. **4**  
ii) Fin effectiveness. **4**  
iii) Fin parameter (m). **2**  
b) A steel rod ( $K = 50W / m^{\circ}C$ ) 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  $90W / m^2 C$ . Calculate the heat dissipated by the rod. **10**
- Q.4 a) State the assumptions of lumped system analysis. Also, derive the expression:

$$\frac{T_i - T_\infty}{T - T_\infty} = e^{\left(\frac{hA}{\rho C_p}\right)^{\frac{1}{2}} \tau}$$

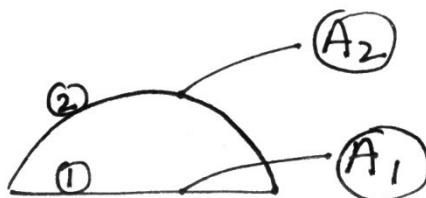
**10**

- b) A steel ball  $[C_p = 0.46 \text{ KJ} / \text{Kg}^\circ\text{C}, K = 35 \text{ W} / \text{m}^\circ\text{C}]$  5 cm, in diameter and initially at a uniform temperature of  $450^\circ\text{C}$  is suddenly placed in a controlled environment in which the temperature is maintained at  $100^\circ\text{C}$ . The convection heat transfer coefficient is  $10 \text{ W/m}^2\text{ }^\circ\text{C}$ . Calculate the time required for the ball to attain a temperature of  $150^\circ\text{C}$  in hours. **10**

### **PART-B**

Q.5 Explain the following:

- i) Wein's displacement law. **4**
- ii) Kirchoff's law of thermal radiation. **4**
- iii) Absorptivity ( $\alpha$ ), Reflectivity ( $f$ ) and transmissivity ( $\tau$ ). **2**
- b) For a very long semicircular duct, having surface areas  $A_1$  and  $A_2$  as shown below:



Determine the shape factors  $F_{12}$ ,  $F_{21}$ , and  $F_{22}$ . **10**

Q.6 a) Explain the following in brief:

- i) Prandtl number.
- ii) Bulk mean temperature.
- iii) Thermal boundary layer.
- iv) Thermal entrance length. **2½×4**
- b) Explain Colburn analogy between fluid friction and heat transfer. **10**

Q.7 a) Differentiate between parallel flow heat exchanger and cross flow heat exchanger. Also, explain the term "effectiveness of a heat exchanger" and state the reason why counter flow heat exchanger is better than parallel flow heat exchanger? **10**

- b) Light lubricating oil ( $C_p=2090 \text{ J/Kg K}$ ) is cooled by allowing it to exchange heat with water in a small heat exchanger, the oil enters and leaves the heat exchanger at  $375\text{K}$  and  $350\text{K}$  respectively and flows at a rate of  $0.5 \text{ Kg/s}$ . Water ( $C_p=4177 \text{ J/Kg K}$ ) is available at  $280 \text{ K}$  in sufficient quantity to allow  $0.201 \text{ Kg/s}$ . to be used for cooling purpose. Determine the required heat transfer area for counter flow operation. The overall heat transfer coefficient is  $250 \text{ W/m}^2\text{k}$ . **10**

# End Semester Examination, Dec. 2017

B. Tech. – Sixth Semester  
**MACHINE DESIGN-II (M-607)**

Time: 3 hrs  
**100**

Max Marks:

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.

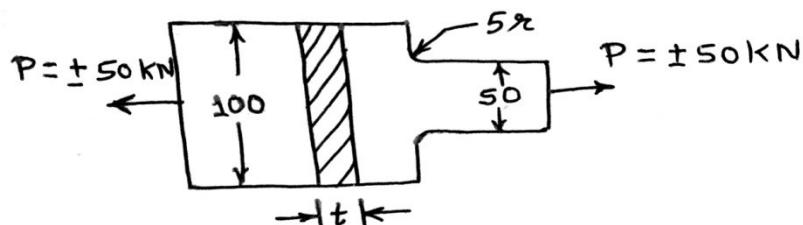
**Q.1** Attempt the following:

- What is S-N curve?
- What is Miner's equation?
- What do you understand by torsional rigidity?
- What are the functions of key?
- What are active coils of spring?
- What type of stress is induced in helical compression spring?
- What are the functions of bearing?
- What is hydrodynamic lubrication?
- What are the advantages of helical gears over spur gears?
- What is standardization?

**2x10**

## **PART-A**

**Q.2** a) A component machined from a plate made of steel 45C<sub>8</sub> ( $S_{ut}=630 \text{ N/mm}^2$ ) is shown in figure below. It is subjected to a completely reversed axial force of 50 kN. The expected reliability is 90% and the factor of safety is 2. The size factor is 0.85. Determine the plate thickness 't' for infinite life, if the notch sensitivity factor is 0.8.



**14**

b) Write a note on 'cumulative damage in fatigue'.

**6**

- Q.3 a) A hollow transmission shaft, having inside diameter 0.6 times the outside diameter, is made of plain carbon steel 40 C8 ( $S_{ut}=380 \text{ N/mm}^2$ ) and the factor of safety is 3. A belt pulley, 1000 mm in diameter, is mounted on the shaft, which overhangs the left hand bearing by 250 mm. The belts are vertical and transmit power to the machine shaft below the pulley. The tension on the tight and slack side of the belt are 3 kN and 1 kN respectively, while the weight of the pulley is 500 N. The angle of wrap of the belt on the pulley is  $180^\circ$ . Calculate the outside and inside diameters of the shaft.

**10**

- b) A steel spindle transmits 4 kW at 800 r.p.m. The angular deflection should not exceed  $0.25^\circ$  per metre of the spindle. If the modulus of rigidity for the material of the spindle is 84 GPa, find the diameter of the spindle and the shear stress induced in the spindle.

**10**

- Q.4 a) A direct reading spring balance consists of a helical tension spring, which is attached to a rigid support at one end and carries weights at the other free end. The pointer attached to the free end moves on a scale and indicates the weight. The length of the scale is 75 mm. The maximum capacity of the balance is to measure the weight of 500 N. The spring index is 6. The spring is made of oil-hardened and tempered steel wire with ultimate tensile strength of  $1400 \text{ N/mm}^2$ . The permissible shear stress for spring wire can be taken as 50% of the ultimate tensile strength ( $G = 81370 \text{ N/mm}^2$ ). Design the spring and calculate:

- Wire diameter.
- Mean coil diameter.
- Number of active coils
- Required spring rate, and,
- Actual spring rate.

**15**

- b) What is Wahl factor? Why is it used?

**2**

- c) What is the objective of nipping of leaf spring?

**3**

## **PART-B**

- Q.5 a) A ball bearing is subjected to a radial force of 2500 N and an axial force of 1000 N. The dynamic load carrying capacity of the bearing is 7350 N. The values of X and Y factors are 0.56 and 1.6 respectively. The shaft is rotating at 720 rpm. Calculate the life of the bearing in hrs.

**5**

- b) The following data is given for  $360^\circ$  hydrodynamic bearing:

Journal diameter = 50 mm

Bearing length = 50 mm

Radial load = 3.2 KN

Journal speed = 1490 rpm

Radial clearance = 0.05 mm

Viscosity of lubricant = 25 cp

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate:

- Minimum oil film thickness.

- ii) Coefficient of friction.
- iii) Power lost in friction.
- iv) Flow requirement in litres/min.
- v) Temperature rise.

**15**

Q.6 A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 100 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is  $20^\circ$ , while the helix angle is  $25^\circ$ . The face width is 40 mm and the normal module is 4 mm. The pinion as well as the gear is made of steel 40C8 ( $S_{ut}=600 \text{ N/mm}^2$ ) and heat treated to a surface hardness of 300 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the dynamic load, calculate the power transmitting capacity of gears. **20**

Q.7 a) Write a note on 'value engineering'. **5**

b) Explain the design considerations of forgings. **10**

c) Enumerate the functions of fasteners, oil seals and gaskets. **5**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth / Sixth Semester

### **IC ENGINE AND GAS TURBINE (M-621)**

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 displacement volume and stroke?  
 b) What do you mean by volumetric efficiency?  
 c) Explain two factors that affects the process of carburation.  
 d) What do you mean by term ignition? How is it related with combustion?  
 e) Define ignition lag in S.I. engine.  
 f) What do you mean by cetane rating of fuel?  
 g) Define cloud point and pour point.  
 h) Define indicated thermal efficiency.  
 i) List the various methods available for finding indicated power.  
 j) Write down application of gas turbine.

**2x10**

### **PART-A**

Q.2 a) For an engine working on the ideal dual cycle, the compression ratio is 10 and maximum pressure is limited to 70 bar. If the heat addition is

**610/5**

$1680 \text{ kJ/kg}$ , find the pressure and temperature at the 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  $100^\circ \text{ C}$  respectively. Assume  $C_p = 1.004 \text{ kJ/kgk}$  for air.

**15**

- b) Compare the efficiency of Otto, Diesel and Dual Cycle for the 'same compression ratio and heat rejection' with P - V and T - S diagram.

**5**

- Q.3 a) What are the functional requirements of Injection System?

**6**

- b) Describe a battery ignition system with the help of a neat sketch

**14**

- Q.4 a) What are the various types of combustion chambers used in S.I. engines? Explain them briefly.

**10**

- b) What is delay period and what are the factors that affect it.

**10**

### **PART-B**

- Q.5 a) What are the desirable properties of a good lubricating oil?

**10**

- b) Explain the following:

- Thermosyphon cooling system.
- Evaporative cooling system.

**2x5**

- Q.6 An eight-cylinder, four 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 54 cm arm. During a 10 minutes test the dynamometer scale beam reading was 42 kg and engine consumed 4.4 kg of gasoline having a calorific value of 44000 kJ/kg. Air at  $27^\circ \text{ C}$  and 1 bar was supplied to the carburetor at the rate of 6 kg/min. Find:

- Brake power delivered.
- Brake mean effective pressure.
- Brake specific fuel consumption.
- Brake specific air consumption.
- Brake thermal efficiency.
- Volumetric efficiency.
- Air-fuel ratio.

**20**

- Q.7 a) Describe the working of constant pressure open cycle gas turbine with neat sketches.

**8**

- b) Discuss briefly the methods employed for improvement of thermal efficiency of open cycle gas turbine plant with neat sketches with T-S diagram.

**12**

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth 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 Answer briefly:

- a) Explain Rankine cycle.
- b) Define reserve factor.

- c) Explain types of power plants.
- d) Explain hydraulic turbines and their classifications.
- e) What is an electrostatic precipitator?
- f) What is a PFBC system?
- g) What is CANDU-type reactor?
- h) What is the significance of a moderator in nuclear power plant?
- i) Define incremental rate theory.
- j) What is economics load sharing?

**2x10**

### **PART-A**

- Q.2 a) The efficiency of a power plant depends on the site location. Discuss the factors on which site selection is being influenced. **10**
- b) Explain with a neat sketch "Hydro Electric Power Plant". What are various elements and components of it?

**10**

- Q.3 a) Explain in detail the ASH handling system in steam power plants.

**10**

- b) What is circulation? What is the difference between natural and forced circulation? **10**

- Q.4 a) Explain ideal regenerative cycle. What is stirling cycle?

**8**

- b) Explain in detail the set up and working principle of a modern thermal power plants.

**12**

### **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 in detail basic nuclear reactor with a neat sketch, principles of nuclear energy and working of a nuclear power plant.

**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, Dec. 2017**  
B. Tech. – Sixth Semester  
**AUTOMOBILE ENGINEERING (M-624)**

Time: 3 hrs  
**100**

Max Marks:

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) Explain the basic requirements of power transmission in an automobile vehicle.  
 b) Write any three advantages of front wheel drive vehicle over rear wheel drive vehicle.  
 c) Explain the vehicle lighting system in an automobile vehicle.  
 d) Explain the Hotchkiss drive with neat sketch.  
 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) Explain the working of mechanical brake in an automobile vehicle.  
 i) Write down the importance of emission control system.  
 j) Write down the various factors affecting the braking performance.

**2x10**

### **PART-A**

- Q.2 a) Explain the various future trends in automobiles.  
**10**  
 b) Discuss the classification of automobiles in detail.  
**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) Explain the working principle of differential in an automobile with neat sketch. **10**  
 b) Explain the various types of rear axle with neat sketches.  
**10**

### **PART-B**

- Q.5 Write short notes on following with neat sketches:  
 a) Caster.  
 b) Camber.  
 c) Power steering.  
 d) Leaf spring.  
**5x4**

- Q.6 a) Explain the disc brake working with neat sketch.  
**10**  
 b) Differentiate between hydraulic and mechanical braking systems.  
**5**  
 c) Write down the various factors affecting the braking performance in an automobile. **5**
- 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, Dec. 2017**

B. Tech. – Sixth Semester

### **ENERGY MANAGEMENT (M-625)**

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 commercial and non-commercial energy.  
 b) What are the objectives of energy management?  
 c) Define the term 'preliminary energy audit'.  
 d) What is the difference between portable instrument and online instruments?  
 e) Name two functions of a steam trap.  
 f) Define contact demand and billing demand.  
 g) Define illuminance and lux level.  
 h) What is the 'root blower'?  
 i) Define the five tube boiler and boiler capacity.  
 j) Define the refrigeration system and air conditioning system. **2x10**

#### **PART-A**

- Q.2 a) Following data were obtained during a boiler trial:  
 Feed water used per hour = 650 kg.  
 Coal consumed per hour = 95 kg  
 Feed water temperature = 25° C  
 Steam leaving super heater = 250° C  
 Steam pressure = 9.8 bar  
 Calorific value of coal = 33500 kJ/kg.  
 Ash and unburnt coal collected in ash pit per hour = 9.0 kg  
 Calorific value of ash and unburnt coal collected = 2500 kJ/kg  
 Quantity of air used per kg of coal burnt = 19 kg  
 Discharge gas temperature = 350° C  
 Boiler room/ambient temperature = 30° C  
 Mean specific heat of flue gases = 1.005 kJ/kgK  
 Determine:  
 i) Equivalent evaporation  
 ii) Actual evaporation per kg of coal.  
 iii) Boiler efficiency.  
 iv) Percentage of heat loss in flue gases. **10**
- b) Define in detail the energy saving through the condensate recovery in steam system. Explain the principle of modulating control in a boiler. **10**

- Q.3 a) What are the methods available for assessing the boiler efficiency? Explain them technically. **10**

- b) Why the energy conservation/management is important in prevailing energy scenario? **10**
- Q.4 a) Derive an expression for the boiler efficiency by direct method and indirect method. **10**  
b) Define technical and economic feasibility. Name four instruments used for thermal/electrical energy audit. Define the high grade and low grade thermal energy. **10**

### **PART-B**

- Q.5 a) Describe the steps involved in ship-floor method for compressed air leakage quantification. **10**  
b) Explain the different losses occurring in meteors in industry. **10**
- Q.6 a) Describe the energy saving opportunities in lighting system. **12**  
b) Describe the factors influencing energy use in farms. **8**
- Q.7 a) Name four insulating material used for hot pipes and cold pipes (2 for each). Discuss their advantages. **8**  
b) Why the water treatment is required in industry? Why the safety valve is used in boilers in industry? Define cogeneration and topping cycle. Draw a line diagram. **12**

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth 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) Explain scattered radiation.  
b) What is zenith angle?  
c) What is solar constant?  
d) Define average flux.  
e) Write the significance of Reynold's number.  
f) What is differential thermal expansion?  
g) What is diurnal temperature?  
h) What is biological energy storage?  
i) Define thermal inertia.  
j) Name applications of solar energy. **2×10**

### **PART-A**

- Q.2 a) What is spectrum? Explain difference between terrestrial and extra-terrestrial spectrum. **10**  
b) Discuss the working of pyranometer with a neat sketch. **10**
- Q.3 a) Explain various types of fixed flat plate collector. **10**  
b) Discuss the variation of Flux curves with latitude and geometry. **10**
- Q.4 a) Explain in detail heat losses in distributed collection system. **10**  
b) Write in detail the process of heat transfer in solar collector. **10**

### **PART-B**

- Q.5 a) What is flat plate collectors? Discuss the basic collector configuration with a neat sketch. **10**  
b) What are different types of collector? **5**  
c) Discuss double window collector. **5**
- Q.6 Write short notes on:  
a) Sensible heat storage. **10**  
b) Heat management with and without phase change. **10**
- Q.7 a) Explain the working of solar refrigeration system. **8**  
b) What is solar water pumping? **7**  
c) What do you mean by community heating and cooling system. **5**

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth 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) Explain scattered radiation.  
b) What is zenith angle?  
c) What is solar constant?  
d) What is average flux?  
e) What is Reynold's number?  
f) What is differential thermal expansion?  
g) What is diurnal temperature?  
h) What is biological energy storage?  
i) What is thermal inertia?  
j) Name applications of solar energy.

**2×10**

### **PART-A**

- Q.2 a) What is spectrum? Explain difference between terrestrial and extra-terrestrial spectrum. **10**  
b) Compare pyranometer and phyrheliometer. **10**
- Q.3 a) Explain various fixed flat plate collector. **15**  
b) Compare peak flux and average flux. **5**
- Q.4 a) Explain in detail heat losses in distributed collection system. **15**  
b) What is the ratio of power generated to power expanded in a solar collector? **5**

### **PART-B**

- Q.5 a) Explain the convection in a flat plate collector. **10**  
b) Briefly explain solar flux. **5**  
c) Briefly explain radioactive cooling. **5**
- Q.6 a) Write short note on thermal storage. **10**  
b) Briefly explain latent heat storage. **10**
- Q.7 a) Briefly explain solar refrigeration. **8**  
b) Explain solar water pumping. **7**  
c) Briefly explain community heating and cooling system. **5**

# **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester  
**MECHATRONICS (M-634)**

Time: 3 hrs  
**100**

Max Marks:

No. of pages: 2

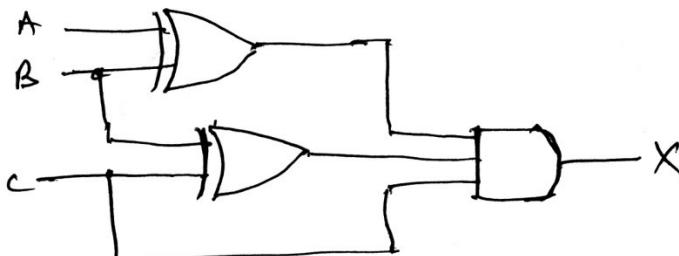
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory**. Attempt any **TWO** questions from **Part-A** and **TWO** questions from **Part-B**. Each question carries equal marks.

- 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.

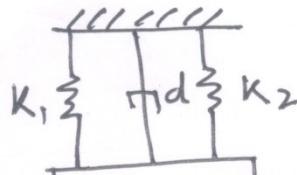
**10**

b) Discuss architecture of 8051 microcontroller.

**10**

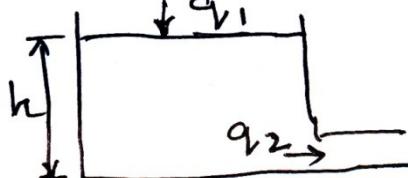
### **PART-B**

- 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.



**10**

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, Dec.2017**

## **B. Tech. – Sixth Semester**

## **TOOL ENGINEERING (M-635)**

Time: 3 hrs  
**100**

**Max Marks:**

**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 the straight carbide cutting tool materials and how does it differ from composite carbide?

b) Arrange the following tool materials in ascending order of hardness: Carbide, Ceramic, HSS, PCD, CBN.

c) Draw neat sketches of various types of chip breaker.

d) What is chisel effect in the drill?

e) State the helix angles of the following:

  - i) Slow Spiral.
  - ii) Regular Spiral.

f) Define broaching allowance.

g) How do you classify a broaching operations?

h) Draw neat sketch of a flat form tool.

i) State the advantages of helical flutes in a milling cutter.

j) Distinguish between up milling and down milling.

2x10

## **PART-A**

- Q.2 a) state the composition of the following HSS tools:  
T-1, T-4, T-6, M-2, M-4, M-16.  
**8**

b) State some important characteristics of the following tool materials;  
i) HSS  
ii) Cemented Carbide

- iii) Ceramics
- iv) CBN.

**12**

Q.3 Design a single point cutting tool based on checking for tool strength and tool rigidity.

**20**

Q.4 a) Explain the various parts of twist drill with a neat sketch. How do angles vary while drilling hard alloy steel and drilling soft materials?

**10**

b) Briefly explain the effect of regrinding of twist drill.

**5**

c) With neat sketches, draw the different types of web/core.

**5**

### **PART-B**

Q.5 A grove of  $90^{\circ}$  angle, having a depth of 10 mm is to be turned on a shaft of 50 mm diameter with the help of a form tool having a rake angle of  $15^{\circ}$  and end clearance of  $10^{\circ}$ . Determine the angle ground on the tool in a plane perpendicular to the end flank edge.

**20**

Q.6 Discuss the following design features of a broach:

- i) Pitch of c teeth.
- ii) Relief angle.
- iii) Rake angle.
- iv) Width of land.
- v) Depth of cutting teeth.
- vi) Tool fillet radius.
- vii) Total length of broach.

**20**

Q.7 Discuss the following design features of milling cutter:

- i) Size of the cutter.
- ii) Tool angles.
- iii) Width of land.
- iv) No. of teeth.

**20**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

#### **Q.1 Fill in the blanks:**

- a) A vibratory system consists of a spring, clamper and \_\_\_\_\_.
- b) The centre of \_\_\_\_\_ can be used advantageously in a baseball bat.
- c) The magnification factor is also known as \_\_\_\_\_ factor.
- d) The vibration of a system under external forces is called \_\_\_\_\_ vibration. **1x4**

#### **Whether the following statements are TRUE or FALSE:**

- e) The normal modes can also be called as principal modes.
- f) The response of a vibratory system will be harmonic, if excitation is harmonic.
- g) The logarithmic decrement can be used to find the clamping ratio.
- h) Any periodic function can be expanded into a Fourier series.

**1x4**

#### **Match the following:**

- |  |         |                                    |
|--|---------|------------------------------------|
| i) Vibration in machine tools during metal cutting | is non- | i) Only stiffness matrix diagonal. |
|--|---------|------------------------------------|

- j) The mechanical clock represents
- k) Damped frequency
- l) Static coupling

- ii)  $W_n \sqrt{1 - \zeta^2}$
- iii) Simple Pendulum
- iv) Can give rise to chatter.

**1x4**

**Select the appropriate answers:**

- m) When parts of a vibrating system slide on a dry surface, the damping is;
  - i) Viscous
  - ii) Coulomb
  - iii) Solid
  - iv) All of these.
- n) For a critically damping system, the motion will be;
  - i) Periodic
  - ii) Aperiodic
  - iii) Harmonic
  - iv) None of these.
- o) The fundamental natural frequency of a system is;
  - i) the largest value
  - ii) the smallest value
  - iii) Both i) and ii)
  - iv) None of these.
- p) The damping caused by bearing support of a rotating shaft is;
  - i) Stationary damping
  - ii) Internal damping
  - iii) Rotary damping
  - iv) None of these.

**1x4**

**Give brief answer to the following:**

- q) Why does dynamic balancing imply static balancing?
- r) What is the use of Routh-Hurwitz criterion?

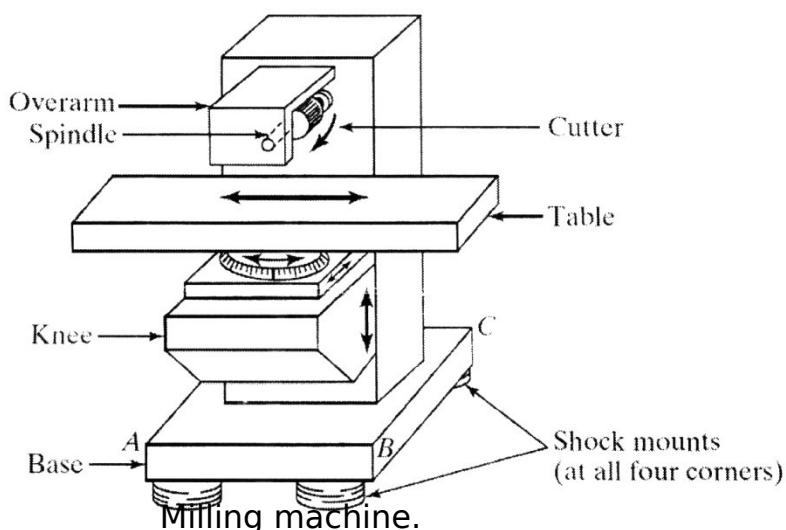
**2x2**

**PART-A**

- Q.2 a) What is vibration? Define degree of freedom of a vibrating system. Discuss good and bad effects of vibration with suitable examples.

**10**

- b) A precision milling machine is supported on four mounts as shown in the figure. If elasticity and damping of each shock mount can be modeled as spring and damper, find the equivalent spring constant ( $k_{eq}$ ) and equivalent damping constant ( $C_{eq}$ ) of the mount if spring constant of each is 100 N/m and damping constant of each is 200 N-sec/m.



**10**

- Q.3 a) Find equation of motion for undamped single degree of freedom system and derive its solution. Also, show the motion of harmonic oscillator, graphically. **12**  
b) A simple pendulum is found to vibrate at a frequency of 0.5 Hz in a vacuum and 0.45 Hz in a viscous fluid medium. Find the damping constant, assuming the mass of the bob of pendulum is 1 Kg. **8**

- Q.4 a) Write the equation of motion of damped system under harmonic force and also discuss the response of the system.

**15**

- b) Consider a spring-mass system with  $K = 4000 \text{ N/m}$  and  $m = 10 \text{ Kg}$ , subject to a harmonic force  $F(t) = 400 \cos 10t \text{ N}$ . Find and plot the total response of the system when  $x_0 = 0.1 \text{ m}$  and  $\dot{x}_0 = 0$  at initial conditions.

**5**

### **PART-B**

- Q.5 a) Briefly describe the mass coupling, velocity coupling and elastic coupling.

**10**

- b) What are principal coordinates? What is their use?

**10**

- Q.6 a) Define flexibility and stiffness influence coefficients. What is the relation between them?

**10**

- b) State Lagrange's equation. Explain the modal analysis procedure.

**10**

- Q.7 A steel shaft of diameter 2.5 cm and length 1 m is supported at the two ends in bearing. It carries a turbine disc, of mass 20 kg and eccentricity 0.005 m, at the middle and operates at 6000 rpm. The damping in the system is equivalent to viscous damping with  $\zeta = 0.01$ . Determine the whirl amplitude of the disc at:

- a) Operating speed.  
b) Critical speed.  
c) 1.5 times the critical speed.

**20**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth / Sixth Seventh Semester

**REFRIGERATION AND AIR-CONDITIONING (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:

- Write down the chemical formula for the following refrigerants.  
*R-134, R729 R22 R11*
- What are the advantages of compound compression with intercooler over single stage compression?
- Draw the neat diagram of practical vapor absorption refrigeration system.
- What do you mean by dew point temperature and ADP of cooling coil?
- List the types of refrigerating compressor.

**4×5**

### **PART-A**

**Q.2** The cock-pit of a jet plane flying at a speed of 1200 km/h is to be cooled by a simple air cooling system. The cock-pit is to be maintained at 25°C and the pressure in the cock-pit is 1 bar. The ambient air pressure and temperature are 0.85 bar and 30°C respectively. The other data is as follows:

Cock-pit cooling load = 9 ton; main compressor pressure ratio = 4; Ram efficiency = 90%; Temperature of air leaving the heat exchanger and entering the cooling turbine = 60°C; pressure drop in heat exchanger = 0.5 bar; pressure loss between the cooler turbine and cock-pit = 0.2 bar.

Assuming the isentropic efficiencies of main compressor and cooler turbine as 80% find the quality of air passed through the cooling turbine and C.O.P. of the system. Take

$\gamma = 1.4$  and  $C_p = 1 \text{ kJ/kg K}$ .

**20**

**Q.3** a) Draw a neat diagram of 'Electrolux refrigerator' and explain its working principle.

**10**

b) Describe the working of a steam jet refrigeration system with neat sketch and also draw the T-s and h-s diagram.

**10**

**Q.4** In a simple v-c cycle following are the properties of refrigerant at various points. Compressor inlet enthalpy  $h_1 = 183.2 \text{ kJ/kg}$ , specific volume at inlet  $v_1 = 0.0767 \text{ m}^3/\text{kg}$  compressor discharge enthalpy  $h_2 = 222.6 \text{ kJ/kg}$  and specific volume at discharge  $v_2 = 0.0614 \text{ m}^3/\text{kg}$ , condenser exit enthalpy and specific volume are 84.9 kJ/kg and

0.00083 m<sup>3</sup>/kg respectively, the piston displacement volume of the compressor is 1.5 litre and its volumetric efficiency 80%, speed is 600 r.p.m.

Find:

- Power input to compressor.
- Refrigeration capacity.

**20**

### **PART-B**

**Q.5** a) Write short notes on:

- Cooling and dehumidification.
- Heating and humidification.

**10**

b) Derive the following relation.

$$\mu = \frac{P_v}{P_s} \left[ \frac{\left( 1 - \frac{P_{vs}}{P_t} \right)}{\left( 1 - \frac{P_v}{P_t} \right)} \right]$$

Degree of saturation

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 — 15m<sup>3</sup>/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, Dec. 2017**

B. Tech.-Seventh Semester

**ALTERNATIVE FUELS AND ADVANCE IN IC ENGINES (M-824)**

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 State whether the following statements are TRUE or FALSE:**

- a) Sterling Engine is a type of Internal Combustion Engine.
- b) Gudgeon pin links the big end of the connection rod and crankshaft.
- c) Thermal efficiency of CI engine is higher than that of the SI engine due to constant pressure heat addition.
- d) For a given value of  $r$ , the efficiency of Otto Cycle decreases with increase in  $r$ .  $\frac{1}{2} \times 4$

**Fill in the blanks:**

- e) Compression Ignition engine was invented by \_\_\_\_\_ in \_\_\_\_\_.
- f) The compression ratio of a Spark Ignition Engine lies in the range of \_\_\_\_\_.
- g) The fuel jet velocity  $V_f$  at the exit of the orifice of nozzle is of the order of \_\_\_\_\_.
- h) The full form of CFR is \_\_\_\_\_.  $\frac{1}{2} \times 4$

**Multiple Choice Questions:**

- i) Leaner air fuel mixture is required during:
  - i) Idling
  - ii) Starting
  - iii) Accelerating
  - iv) Cruising.
- j) In SI engines flame speed increases:
  - i) With turbulence
  - ii) With fuel-air ratio
  - iii) Both i) and ii)
  - iv) None of the above
- k) Decrease in air-fuel ratio in SI engines results in:
  - i) Increase of  $NO_x$
  - ii) Decrease of CO and UBHC
  - iii) Increase of CO and UBHC
  - iv) None of the above
- l) Blue smoke in Diesel engines indicate:
  - i)  $NO_x$
  - ii) HC
  - iii) CO
  - iv) Unburnt oil.  $\frac{1}{2} \times 4$

**Answer the following question:**

- m) What are the differences between an adiabatic heat engine and a conventional engine?
- n) What do you mean by combustion stoichiometry?
- o) What are the problems associated with using CNG as a fuel?
- p) What is a stratified charged engine?
- q) What does  $\Phi$  and  $\lambda$  represents in terms of IC engines?
- r) What do you mean by Swirl in reference to Combustion Chamber Designing?
- s) Which of the two is a safe fuel in terms of handling CNG, Petrol and Diesel? Give reason.

**2x7**

**PART-A**

- Q.2 a) Discuss Fuel spray characteristics along with neat sketches.

- b) Name the various factors affecting flame velocity. **2**  
c) Explain the comparison of air standard cycle and actual cycle along with the assumptions involved in each. **12**

Q.3 Explain the following with neat sketches:

- a) MAN combustion Chamber.  
b) LHR engines.

**10x2**

Q.4 a) What do you mean by Engine Simulation? Write short notes on basic concepts of engine simulation.

**6**

b) What are flow models in combustion modeling?

**4**

c) What do you mean by CI Engine modeling? Draw a neat sketch to show the various processes involved in combustion modeling.

**10**

### **PART-B**

Q.5 Describe briefly about the properties of CNG, LPG and Biogas along with their chemical formulas. Also discuss the modification required to use CNG as a fuel. **20**

Q.6 a) Write the important properties of a SI and CI Engines fuels.

**14**

b) What do mean by transesterification and pyrolysis. Describe briefly.

**6**

Q.7 a) Discuss clearly the layout of an electric vehicle, its advantages and limitations. **10**

b) Write short notes on high energy and power density batteries.

**10**

## **End Semester Examination, Dec. 2017**

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 Attempt **(any four)** of the following:

- a) List the application of RP technology in manufacturing industry.
- b) List different-material which may be used in manufacturing of product in SLA technique.
- c) What is Concept Modeling?
- d) Differentiate between soft tolling and hard tooling.
- e) List the file exchange errors while transferring CAD data.

**4x5**

### **PART-A**

Q.2 Explain historical development of rapid prototyping technology with an example. **20**

Q.3 Explain principle of operation of selective laser sintering process with a neat sketch. **20**

Q.4 Explain any two indirect tooling techniques in detail.  
**20**

### **PART-B**

Q.5 With a neat sketch, explain the following concept modeling techniques:  
a) Sander's Model Maker.

**10**

- b) 3D Printer.

**10**

Q.6 Explain the procedure of Modeling, STL files creation and layering steps before printing 3D Model in RP machine.

**20**

Q.7 How surface generation is done from point cloud data?

**20**

## **End Semester Examination, Dec. 2017**

B. Tech. — Seventh Semester

### **MODERN MACHINING METHODS (M-835A)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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 characteristics of modern machining methods?
- b) Why is abrasive jet machining not recommended to machine ductile materials?
- c) Define the functions of transducers in USM.
- d) What are etchants in chemical machining process?
- e) Elaborate the functions of electrolyte in ECM.
- f) Name some of the tool materials used in EDM.
- g) What is the function of electron beam gun?
- h) Can your machine electrically non-conductive materials by PAM? Justify your answer.
- i) Give the applications of electro chemical grinding.
- j) State the advantages of electro chemical honing.

**2×10**

#### **PART-A**

Q.2 a) What are the various types of modern machining methods? Briefly explain the modern machining methods on the basis of physical parameters, applicability to material and economics of processes.

**20**

- Q.3 a) Discuss in detail about the methods of generating the ultrasonic, characteristics of the various types of tool holder and tool feed mechanisms in USM. **10**
- b) Describe the apparatus, metal removal rate, process principles and applications of water jet machining. **10**
- Q.4 a) Describe the working principle and elements of chemical machining. What are the factors on which the selection of a resist for use in chemical machining. **12**
- b) In an ECM process, for machining of iron, a metal removal rate of  $1 \text{ cm}^3/\text{min}$ . is desired. Determine the current necessary. Assume atomic weight of iron to be 56 gm., its valency 2 and density  $7.2 \text{ gm/cm}^3$ . Faraday constant may be taken as 96,540 coulombs. **8**

### **PART-B**

- Q.5 a) Explain in detail about process principle, construction and working of EDM. **10**
- b) Discuss in detail about the types of pulse generators used in EDM. **10**
- Q.6 a) Discuss in detail about the thermal features of LBM and explain the construction and working of LBM. Also, give scope of laser beam machining applications. **12**
- b) Discuss the factors that influence the quality of the cut in PAM. **8**
- Q.7 a) Explain with a neat sketch, the principle of wire EDM process and also list the advantages of wire EDM process. **10**
- b) Write a short note on Rotary Ultrasonic Machining. **10**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Answer the following questions:
- What is meant by divergence of a velocity vector?
  - What is conservation form?
  - What is no slip condition?
  - Differentiate between integral form and differential form.
  - What is the condition for a partial differential equation to be hyperbolic?
  - What is upwind and downwind scheme?
  - What is a structured grid?
  - What do you mean by multi-phase modeling?
  - What are geometric transformations?
  - What is Dirichlet boundary condition?
- 2×10**

### **PART-A**

- Q.2 a) State and prove Reynold's transport theorem for a fixed control volume in fluid flow. **10**  
 b) Derive the Navier stokes equations of momentum equation for a differential fluid element fixed in space in fluid flow. **10**

Q.3 a) Show that the second order wave equation  $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$  is hyperbolic **10**

b) Convert the partial differential equation  $\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = 0$  to a finite difference **10**

- Q.4 a) Discuss about explicit and implicit methods and their advantages and disadvantages. **10**  
 b) What is Eulerian – Lagrangian approach in multi-phase modeling? Discuss. **10**

### **PART-B**

- Q.5 a) Discuss the applications of multi-phase flow model. **10**  
 b) Discuss and explain about trajectory model theory and two fluid model theory. **10**
- Q.6 a) Explain about Reynolds stress model. **10**  
 b) Discuss one equation models in detail. **10**
- Q.7 a) Discuss any two geometric transformation of a point in detail. **10**  
 b) Discuss parametric representation of curves and surfaces. **10**

## **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) Examine the convergence of  $\sum_{n=1}^{\infty} \left[ \frac{1}{n} \sin\left(\frac{1}{n}\right) \right]$ .  
 b) Find  $n^{\text{th}}$  differential coefficient of  $\sin(2x+3)$ .  
 c) Expand  $e^{x+h}$  in powers of h.  
 d) If  $u = \sin^{-1} \left[ \frac{x+2y+3z}{\sqrt{x^8+y^8+z^8}} \right]$ , prove that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = -3 \tan u$$

e) Evaluate  $B(2 \times 5, 1)$

f) Show that  $\hat{A} = (x^2 + xy^2)\hat{i} + (y^2 + x^2y)\hat{j}$ , is irrotational vector.

g) If  $x = r \cos \theta, y = r \sin \theta$  then, evaluate Jacobian of  $x, y$  w.r.t  $r, \theta$ .

h) Change the order of integration is  $\int_0^1 \int_{2y}^2 e^{-x^2} dy dx$

i) Find  $\nabla \phi$ , if  $\phi = \log(x^2 + y^2 + z^2)$

j) State (T/F): Addition or removal of finite number of terms will not effect the convergence or divergence of an infinite series. **2x10**

### **PART-A**

Q.2 a) Test the following series for convergence and absolute convergence:

$$\frac{1}{1.3} - \frac{1}{2.4} + \frac{1}{3.5} - \frac{1}{4.6} + \dots = \sum (-1)^{n-1} \frac{1}{n(n+2)}$$

**10**

b) Discuss the convergence of the series:

$$\frac{1}{2} + \frac{1.3}{2.4} + \frac{1.3.5}{2.4.6} + \dots = \sum \frac{1 \times 3 \times \dots \times (2n-1)}{2 \times 4 \times \dots \times 2n}$$

**10**

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

b) By forming a differential equation, expand

$$y = e^{m \sin^{-1} x}$$
 in powers of  $x$ .

**10**

$$\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$$

Q.4 a) If  $\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$ , prove that

$$\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial u}{\partial z}\right)^2 = \left(\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}\right)^2$$

**10**

b) Find the dimensions of the rectangular box, open at the top, of maximum capacity whose surface is 432 sq.cm. **10**

### **PART-B**

Q.5 a) Prove that  $\sqrt{\frac{1}{2}} = \sqrt{\pi}$

**10**

b) By changing the order of integration, evaluate

$$\int_0^1 \int_{x^2}^{2-x} xy \, dy \, dx$$

**10**

Q.6 a) If  $\vec{r} = xi + yi + zk$ , show that

$$\text{grad } \vec{r} = \frac{\vec{r}}{r};$$

$$\text{ii) grad } \left(\frac{1}{\vec{r}}\right) = \frac{-\vec{r}}{r^3}$$

**10**

b) State and prove the physical interpretation of curl. **10**

- Q.7 a) Solve  $(D-2)^2 y = 8(e^{2x} + \sin 2x)$  10  
 b) Solve the following simultaneous equations:  

$$\frac{d^2y}{dt^2} + \frac{dy}{dt} - 2y = \sin t$$

$$\frac{dx}{dt} + x - 3y = 0$$
 10

### **End Semester Examination, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) Test the convergence of the following series:

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} \dots \dots \infty$$

- b) State the necessary condition for a series to be convergent.  
 c) If  $y = (ax + b)^{n-2}$ , find  $y_{n-1}$ .  
 d) Expand  $f(x) = \log(1-x)$  in the powers of  $x$ .

e) If  $z = \log(y) \cdot \tan^{-1}(x^2 - y^2)$ , find  $\frac{\partial z}{\partial x}$  and  $\frac{\partial z}{\partial y}$ .

$$f) \text{ If } u = \operatorname{cosec}^{-1} \left[ \frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}} \right]^{\frac{1}{2}}, \text{ find } x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$$

g) Using double integral, find the area of the curve  $x + y \leq a$ .

h) If  $F = xyz\hat{i} + 3x^2y\hat{j} + (xz^2 + y^2z)\hat{k}$ , find  $\nabla \times F$ .

i) If  $\phi = (x^2 + y^2 + z^2 - 3xyz)$  find grad  $\phi$ .

j) Solve:  $x^2 dy + y^2 dx = 0$ .

**2x10**

### **PART-A**

Q.2 a) Discuss the convergence of the series:

$$\frac{1}{2}x + x^2 + \frac{9}{8}x^3 + x^4 + \frac{25}{32}x^5 + \dots$$

**10**

b) Test the convergence and absolute convergence of the series:

$$\sum_{n=1}^{\infty} C - D^n \frac{n}{n^2 + 1}$$

**10**

Q.3 a) By forming a differential equation, prove that

$$\cos(m \sin^{-1} x) = 1 - \frac{m^2}{2!} x^2 - \frac{m^2(2^2 - m^2)}{4!} x^4 + \dots$$

**10**

b) Expand  $f(x) = \cos x$  in the powers of  $\left(x - \frac{\pi}{6}\right)$ . Hence find  $\cos 32^\circ$  correct to three decimal places.

**10**

Q.4 a) If  $u = r^m$  and  $r^2 = x^2 + y^2 + z^2$ ; prove that  $u_{xx} + u_{yy} + u_{zz} = m(m+1)r^{m-2}$ .

**10**

b) Find the minimum distance of the point (3, 4, 12) from the sphere  $x^2 + y^2 + z^2 = 1$ .

**10**

### **PART-B**

$$\int_0^a \int_{x^2/a}^{2a-x} xy dy dx$$

Q.5 a) Evaluate: by changing the order of integration.

**6**

$$b) \text{ Prove that } \Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$$

**4**

c) Find the volume of sphere  $x^2 + y^2 + z^2 = a^2$  by using triple integral.

**10**

Q.6 a) If  $R = \hat{i}x + \hat{j}y + \hat{k}z$  and  $r^2 = x^2 + y^2 + z^2$

Prove that i)  $\nabla \left( \frac{1}{r^2} \right) = -\frac{2\dot{R}}{r^4}$   
 ii)  $\operatorname{div} \left( r^n \dot{R} \right) = (3+n) r^n$   
 iii)  $\nabla \left( \frac{\nabla \times \dot{R}}{r} \right) = -\frac{3}{r^3} \ddot{R}$

**10**

- b) The velocity vector is  $\dot{F} = y\hat{i} + 2\hat{j} + xz\hat{k}$ , show that the flux of water through the parabolic cylinder  $y = x^2, 0 \leq x \leq 3, 0 \leq z \leq 2$ , is  $69m^3/\text{sec}$ .

**10**

Q.7 a) Solve:  $\frac{d^2y}{dx^2} + 4y = e^x + \sin 2x$

**10**

b) Solve:  $\frac{dx}{dt} + y = \sin t ; \frac{dy}{dt} + x = \cos t$ , given that, when  $t = 0; x = 2$  and  $y = 0$ .

**10**

**End Semester Examination, Dec. 2017**  
 B. Tech. - First Semester  
**APPLIED MATHEMATICS-I (MA-101B)**

Time: 3 hrs.

Max Marks: **100**

638/5

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) If A and B are two matrices such that  $\rho(A)=m$  and  $\rho(B)=n$ . Find  $\rho(A+B)$ .

b) Find the sum and product of the Eigen values of  $\begin{bmatrix} 3 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ .

c) If  $y=(3x-1)^{11}$ , find  $y_{11}$  and  $y_{12}$ .

d) Find the Limit of the function  $\lim_{(x,y)\rightarrow(\infty,2)} \frac{(xy+4)}{(x^2+2y^2)}$

e) The focal length of a mirror is found from the formula  $\frac{2}{f}=\frac{1}{v}-\frac{1}{u}$ . Find the percentage error in  $f$  if  $u$  and  $v$  are both in error by 2% each.

f) Evaluate  $\Gamma(7/2)$  and  $\int_0^{\frac{\pi}{2}} \sin^3 x \cos^2 x dx$ .

$$\int_0^a \int_{\frac{x^2}{a}}^{2a-x} f(x, y) dx dy$$

g) Change the order of integration in

h) Find the angle between the tangents to the curve  $r=t^2\hat{i}+2t\hat{j}-t^3\hat{k}$  at the points  $t=\pm 1$ .

i) Examine the convergence of the series  $\sum_{n=1}^{\infty} \sin^3 \frac{1}{n}$

j) Prove that the series is convergent:  $\frac{1}{3} + \left(\frac{2}{3}\right)^2 + \left(\frac{1}{3}\right)^3 + \left(\frac{2}{3}\right)^4 + \left(\frac{1}{3}\right)^5 + \left(\frac{2}{3}\right)^6 + \dots$

**2x10**

### **PART-A**

Q.2 a) Find the rank of the Matrix  $\begin{bmatrix} 1^2 & 2^2 & 3^2 & 4^2 \\ 2^2 & 3^2 & 4^2 & 5^2 \\ 3^2 & 4^2 & 5^2 & 6^2 \\ 4^2 & 5^2 & 6^2 & 7^2 \end{bmatrix}$  **10**

b) Let . Find matrix  $B$  such that  $B^{-1}AB$  is a diagonal matrix. **10**

Q.3 a) Compute the value of  $\cos(32^\circ)$  upto 4 decimal places. **10**

$$\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$$

b) If  $a^2+u = b^2+u = c^2+u$ , prove that

$$\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial u}{\partial z}\right)^2 = 2 \left( x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} \right)$$

**10**

Q.4 a) Show that the functions  $u=x+y+z$ ,  $v=xy+yz+zx$  and  $w=x^3+y^3+z^3-3xyz$  are not independent. Also find the relation between them. **10**

b) Discuss the maxima and minima of  $x^3y^2(1-x-y)$  .

**10**

**PART-B**

Q.5 a) Using the transformation  $u = x + y$  and  $v = x - 2y$ , evaluate  $\iint_R (x+y)^2 dx dy$ , where R is the parallelogram in the xy-plane with vertices  $(1, 0), (3, 1), (2, 2)$  and  $(0, 1)$ . **10**

b) Using triple integral, find the volume of the sphere  $x^2 + y^2 + z^2 = a^2$  **10**

Q.6 a) Verify Gauss Divergence theorem for the vector  $\vec{F} = xy\hat{i} + z^2\hat{j} + 2yz\hat{k}$  over the region defined in a tetrahedron bounded by the planes  $x=0, y=0, z=0$  and  $2x+2y+z=4$  **10**

b) Find the value of  $n$  for which the vector  $r^n \vec{r}$  is Solenoidal, where,  $\vec{r} = xi + yj + zk$ . Also show that  $r^n \vec{r}$  is Irrotational. **10**

Q.7 a) Examine the convergence of the series  $\frac{1}{2}x + x^2 + \frac{9}{8}x^3 + x^4 + \frac{25}{32}x^5 \dots \dots \dots$  **10**

b) Test the Convergence and Absolute Convergence of the series  $\sum_{n=2}^{\infty} (-1)^{n-1} \frac{n+2}{2^n + 5}$  **10**

# End Semester Examination, Dec. 2017

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**. Each question carries equal marks.

$$A = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 9 \end{bmatrix}$$

Q.1 a) What is the  $\rho(A)$ ? If

$$\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

- b) If product of 2 Eigen values of \_\_\_\_\_ value is \_\_\_\_\_.  
c) Give the example of monotonic decreasing sequence which is  
i) Convergent  
ii) Divergent  
d) Test the nature of series: -1, -8, -27, -64,.....

e) If  $y = x^n \log x$  prove that  $y_{n+1} = \frac{n!}{x}$ .

f) Find  $n^{\text{th}}$  differential coefficient of  $e^x \cos^3 x$ .

g) Show that  $\operatorname{div}\left(\frac{\vec{r}}{r^3}\right) = 0$

h) Prove that  $JJ' = 1$ ,  $x = uv$ ,  $y = \frac{u}{v}$ .

i) Change the order of integration

$$\int_0^{a/\sqrt{2}} \int_y^{\sqrt{a^2-y^2}} x dx dy$$

j) Find  $\beta\left(\frac{9}{2}, \frac{9}{2}\right)$ .

**2×10**

## **PART-A**

Q.2 a) Are the vectors are linearly dependent? If so find the relation between them

$$x_1 = (2, -1, 4), x_2 = (0, 1, 2), x_3 = (6, -1, 16)$$

**6**

b) Find the values of  $a$  and  $b$  for which the equations:

$$x + ay + z = 3; x + 2y + 2z = b;$$

$$x + 5y + 3z = 9$$
 are consistent.

Determine the solution in each case.

**7**

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

c) Find the eigen value of the matrix

**7**

Q.3 a) Expand  $\cos(m \sin^{-1} x)$  upto  $x^6$ . 10

b) If  $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$ , prove that  $x^2 u_{xx} + y^2 u_{yy} + 2xy u_{xy} = 2 \cos 3u \sin u$ . 10

Q.4 a) Expand  $f(x, y) = xy^2 + \cos xy$  in powers of  $(x-1)$  and  $\left(y - \frac{\pi}{2}\right)$  upto 2<sup>nd</sup> degree term. 10

b) Find the maximum value / minimum value of the function  $f(x, y) = x^3 + y^3 - 3axy$  10

### **PART-B**

Q.5 a) Find the volume of tetrahedron bounded by the coordinates plane and the plane  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$  8

$$\int_0^1 \frac{dx}{\sqrt{1-x^2}} = \frac{\sqrt{\pi}}{4} \begin{Bmatrix} \frac{1}{4} \\ \frac{3}{4} \end{Bmatrix}$$

b) Prove that 4

c) Evaluate  $\iint \left( \sqrt{a^2 - x^2 - y^2} \right) dx dy$  over the semicircle  $x^2 + y^2 = ax$  in the positive quadrant. 8

Q.6 a) Find the geometrical interpretation of divergence. 8

b) Verify divergence theorem for

$\vec{F} = 4x\hat{i} + 2y^2\hat{j} + z^2\hat{k}$  taken over the region bounded by the cylinder

$$x^2 + y^2 = 4, z = 0, z = 3$$

12

Q.7 a) Test the Nature

$$\frac{1}{1.2.3} + \frac{x}{4.5.6} + \frac{x^2}{7.8.9} \text{ L L} \quad \text{12}$$

b) Check the series for absolute convergence  $\sum \frac{(-1)^{n-1} n}{5^n}$ . 8

# End Semester Examination, Dec. 2017

B. Tech. – First Semester  
**MATHEMATICS FOR BIOTECHNOLOGY-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**. Each question carries equal marks.

Q.1 a) Find the determinant of the matrix  $A = \begin{bmatrix} 11 & -25 \\ 4 & -9 \end{bmatrix}$ .

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 1 & 0 & -3 \end{bmatrix}$$

b) Find rank of  $i^{19} + \left(\frac{1}{i}\right)^{25}$ .

c) Find the value of  $\sin x = \frac{1}{2}$ .

d) Solve  $\sin x = \frac{1}{2}$ .

e) State Raabe's test for infinite series convergence.

f) Find derivative of  $x^2 \sin x$ .

g) Find the  $n^{\text{th}}$  nth derivative of  $y = a^x$ .

h) Find the degree of the homogenous function  $u = \frac{x+2y+3z}{\sqrt{x^8+y^8+z^8}}$ .

i) Prove that  $\frac{\partial(x, y)}{\partial(r, \theta)} = r$ ; if  $x = r \cos \theta$ ,  $y = r \sin \theta$ .

j) Evaluate  $\iint (x^2 + y^2) dy dx$ ; over  $0 \leq x \leq 1$   $x \leq y \leq \sqrt{x}$ .

**2×10**

## PART-A

Q.2 a) Find the inverse of matrix  $A$  using elementary row operations, where

$$A = \begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$$

**10**

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & +1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

**10**

b) Find Eigen values and Eigen vectors of the matrix

Q.3 a) Express  $z$  in the form of  $a+ib$ ; where

$$z = \left( \frac{1}{1-2i} + \frac{3+i}{1+i} \right) \frac{3+4i}{2-4i}$$

**10**

b) Express  $z = -2-2i$  in polar form.

**5**

c) Find the value of  $\cos 135^\circ$  and  $\sin 105^\circ$ .

5

Q.4 a) Test the convergence of the series

$$\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!} x^{2n}$$

10

b) Test  $\sum_{n=1}^{\infty} (-1)^{n-1} \left[ \frac{1}{n^2} + \frac{1}{(n+1)^2} \right]$  for convergence and absolute convergence.

10

**PART-B**

Q.5 a) Calculate the value of  $\cos 32^\circ$  upto four decimal places, using Taylor's series.

8

b) Expand  $\cos(m \sin^{-1} x)$  by Maclaurin's theorem, as far as  $x^9$ .

12

Q.6 a) If  $u = x^y$ ; show that

$$\frac{\partial^3 u}{\partial x^2 \partial y} = \frac{\partial^3 u}{\partial x \partial y \partial x}$$

5

b) If  $u = xyz$ ,  $v = x^2 + y^2 + z^2$ ,  $w = x + y + z$ , find the Jacobian  $\frac{\partial(x, y, z)}{\partial(u, v, w)}$ .

5

c) Locate the stationary points of the function:

$$x^4 + y^4 - 2x^2 + 4xy - 2y^2$$
 and determine their nature.

10

Q.7 a) Evaluate  $\int x \log(1+x) dx$ .

5

b) Evaluate  $\iint_R y dx dy$  over  $R$  where,

$$R \text{ is the region bounded by } y^2 = 4x \text{ and } x^2 = 4y.$$

5

c) Evaluate  $\int_1^{e^{\log y}} \int_1^x \int_1^z \log z dz dy dx$ .

10

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

$$A = \begin{bmatrix} 1 & \lambda & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$$

Q.1 a) For what value of  $\lambda$ , given matrix A has rank 2, where

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

b) Find sum and product of eigen values of the matrix

c) Find fourier cosine series of  $f(x) = x^2, 0 < x < \pi$

d) Form the partial differential equation of the following relation:

$$f(xy+z^2, x+y+z)=0.$$

e) Find Laplace transform of  $f(t) = 3^t + t \cos t$ .

f) Find inverse Laplace transform of  $F(s) = \frac{e^{-s} \cdot s}{s^2 + 9} + \frac{1}{s}$

$$f(z) = \begin{cases} \frac{\operatorname{Re}(z^2)}{|z|^2}, & z \neq 0 \\ 0, & z = 0 \end{cases}$$

g) Test the continuity of

h) State the convolution theorem for Fourier transform.

$$f(z) = \exp\left(\frac{1}{z-a}\right)$$

i) Find the residue of  $f(z) = \frac{1}{z-a}$  about  $z=a$ .

j) Find the fourier sine transform of  $f(t) = e^{-at}, a > 0$

**2x10**

### **PART-A**

Q.2 a) Find the value of  $\lambda$  for which the equations:

$$(\lambda-1)x + (3\lambda+1)y + 2\lambda z = 0$$

$$(\lambda-1)x + (4\lambda-2)y + (\lambda+3)z = 0$$

$$2x + (3\lambda+1)y + 3(\lambda-1)z = 0$$

have non trivial solution.

**10**

b) Find the eigen values and eigen vectors of the matrix:

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

**10**

Q.3 a) Find a half range sine 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**

$$x \sin x = 1 - \frac{1}{2} \cos x - \frac{2}{1 \times 3} \cos 2x + \frac{2}{2 \times 4} \cos 3x + \dots$$

b) Prove that  $x \sin x = 1 - \frac{1}{2} \cos x - \frac{2}{1 \times 3} \cos 2x + \frac{2}{2 \times 4} \cos 3x + \dots$  for  $-\pi < x < \pi$ .

**10**

Q.4 a) Solve the following differential equation:

$$\left( \frac{1}{z} - \frac{1}{y} \right) p + \left( \frac{1}{x} - \frac{1}{z} \right) q = \left( \frac{1}{y} - \frac{1}{x} \right)$$

**6**

b) Solve the following equation by Charpit's method:

$$px + qy = pq$$

**7**

c) Solve the following differential equation by the method of separation of variables:

$$3 \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} = 0, \text{ given } u(x, 0) = 4e^{-x}$$

**7**

### **PART-B**

Q.5 a) Determine the analytic function  $f(z) = u + iv$ , gives that  $u = e^{2x}(x \cos 2y - y \sin 2y)$

**7**

b) Using Cauchy's integral formula; evaluate  $\int \frac{e^{2z}}{(z+1)^3} dz$ ; where C is  $|z|=2$ .

**7**

c) Expand  $f(z) = \frac{1}{(z+2)(z+3)}$  about  $2 < |z| < 3$ .

**6**

Q.6 a) Find fourier transform of  $f(x) = e^{\frac{-x^2}{2}}$ ,  $-\infty < x < \infty$ .

**10**

b) Prove convolution theorem for fourier transform.

**10**

Q.7 a) Find Laplace transform of  $\int_0^t \frac{e^t \sin t}{t} dt$

**7**

b) Evaluate  $L^{-1} \left[ \frac{1}{s(s^2 + a^2)} \right]$  by convolution theorem.

**6**

c) Solve the equation  $y'' + 4y' + 3y = e^{-t}$ ;  $y(0) = y'(0) = 1$ , using transform method.

**7**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

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

Time: 2 hrs.

Max Marks: **50**

No. of pages: **5**

Note: The paper consists of **FIFTY** multiple choice questions. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking. Fill the right option in the answer table given below. Options field in the answer table given below will only be considered.

01. ( )	02. ( )	03. ( )	04. ( )	05. ( )	06. ( )	07. ( )	08. ( )	09. ( )	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 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. In which direction is the horse facing now?
- a) East      b) South  
c) South-East      d) South-West
- 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) 40 m      b) 50 m  
c) 60 m      d) 70 m
- 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-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 If X is the brother of the son of Y's son, how is X related to Y?

- a) Son      b) Brother
- c) Father      d) Grandson

Direction for the questions 12-15:-There is a cuboid whose dimensions are  $4 \times 3 \times 3$  cm. The opposite faces of dimensions  $4 \times 3$  are coloured yellow. The opposite faces of other dimensions  $4 \times 3$  are coloured red. The opposite faces of dimensions  $3 \times 3$  are coloured green. Now the cuboid is cut into small cubes of side 1 cm.

Q.12 How many small cubes will have only two faces coloured?

- a) 12      b) 24
- c) 16      d) 32

Q.13 How many small cubes have three faces coloured?

- a) 24      b) 20

- c) 16      d) 8

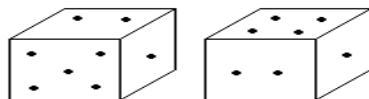
Q.14 How many small cubes will have no face coloured?

- a) 1      b) 2  
c) 4      d) 8

Q.15 How many small cubes will have only one face coloured?

- a) 10      b) 12  
c) 14      d) 18

Q.16 Two positions of dice are shown below. How many points will appear on the opposite to the face containing 5 points?

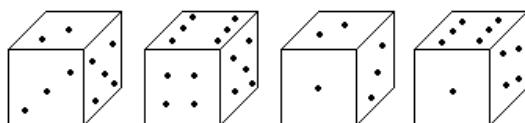


- a) 3      b) 1  
c) 2      d) 4

Q.17 All the faces of cubes are painted with red colour. The cube is cut into 64 equal small cubes. How many small cubes have only one face coloured?

- a) 4      b) 8  
c) 16      d) 24

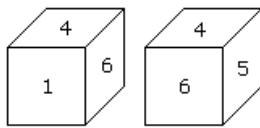
Q.18 How many points will be on the face opposite to the face which contains 2 points?



- a) 1      b) 4  
c) 5      d) 6

Q.19 Two positions of a dice are shown below. When number '1' is on the top. What

number will be at the bottom?



- a) 3
- b) 5
- c) 2
- d) 6

Q.20 Identify the next word in the series:  $B_2CD$ , \_\_\_,  $BCD_4$ ,  $B_5CD$ ,  $BC_6D$ .

- a)  $B_2C_2D$
- b)  $BC_3D$
- c)  $B_2C_3D$
- d)  $BCD_7$

Q.21 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
- d) babbb

Q.22 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.23 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.24 If people is coded as PLPOEE, how is trend coded?

- a) TNERD
- b) DNERT
- c) NDETR
- d) TRDNE

Q.25 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
- d) 10
- d) 18

Q.26 If  $\times$  stands for 'subtraction',  $\div$  stands for 'addition',  $+$  stands for 'division' and  $-$  stands for 'multiplication', then  $20 \times 8 \div 8 - 4 + 2 = ?$

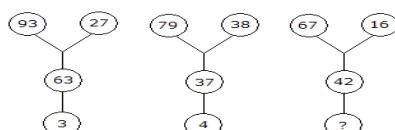
- a) 18
- b) -12
- c) 40
- D) -4

Q.27 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 28 to 32:

Q.28 Which one will replace the question mark in the following figures?



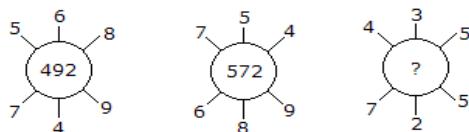
- a) 5
- b) 6
- d) 7
- d) 9

Q.29

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

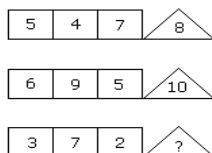
- a) 73      b) 173  
 c) 70      d) 130

Q.30



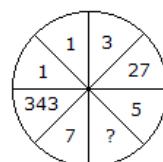
- a) 115      b) 130  
 c) 135      d) 140

Q.31



- a) 1      b) 4  
 c) 3      d) 6

Q.32



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

Q.33 At the end of a business conference, the 14 people present all shake hands with each other once. How many handshakes will there be altogether?

- a) 91                  b) 90
- d) 45                  d) 28

Directions for questions 34 & 35:-

- a) Only conclusion I follow.
- b) If only conclusion II follows.
- c) If either conclusion I or conclusion II follows.
- d) If neither conclusion I nor conclusion II follows.
- e) If both conclusions I and II follow.

Q.34 Statements:  $J \leq K = M$ ,  $N \geq P > K$ ,  $Q > N = R$

Conclusions: I.  $R > J$       II.  $Q \geq M$

Q.35 Statements:  $A \geq C > B > D$ ;  $P < F \geq C > E$

Conclusions: I.  $A \geq E$       II.  $F > D$

Directions for questions 36 to 40:-

In the following questions, select the set of conclusions which logically follows from the given statements.

Q.36 Statements: All that is blue is red. Foil is blue.

Conclusions: I. Foil is red.

II. Foil is not red.

III. All that is red is blue.

- a) Only conclusions I and II follow
- b) Only conclusions II and III follow
- c) Only conclusions I followed
- d) All conclusions are followed

Q.37 Statements: All toasters are squeezers. Some squeezers are grinders.

Conclusions: I. All toasters are grinders.

II. Some grinders are toasters.

III. Some grinders are squeezers.

IV. All squeezers are toasters.

- a) Only I follow
- b) Only I, II and III follow
- c) Only III follows
- d) Only II and III follow

Q.38 Statements: Some balls are paws. No paw is a pad.

Conclusions: I. No ball is a pad.

II. Some balls are not pads.

III. Some paws are balls.

IV. No paw is a ball.

- a) Only either I or IV follows
- b) Only II and III follow
- c) Only I and III follow
- d) All follows.

Q.39 Statements: Some trains are jeeps. Some jeeps are boats.

Conclusions: I. No trains are bosses

II. All jeeps are boats

III. Some boats are trains

IV. No jeeps are trains

- a) Either conclusion I or IV follows
- b) Either conclusion I or II follow
- c) Either conclusion I or III follow
- d) No conclusion is correct

**Q.40** Statements: No force is torque. All torques are stages.

Conclusions: I. No stage is force.

II. No torque is force.

III. Some stage are torque.

IV. Some stages are force.

- a) Only II and III follow
- b) Only either I or IV and II and III follows
- c) Only either I or III follow
- d) Only I or III follows

**Q.41** A, B, C, D and E play a game of cards. A says to B, "If you give me three cards, you will have as many as E has and if I give you three cards, you will have as many as D has." A and B together have 10 cards more than what D and E together have. If B has two cards more than what C has and the total number of cards be 133, how many cards does B have?

- a) 25
- b) 23
- c) 22
- d) 35

Directions to solve questions 42 to 46:-

A ,B, C, D and E are five men sitting in a line facing to south - while M, N, O, P and Q are five ladies sitting in a second line parallel to the first line and are facing to North. B who is just next to the left of D, is opposite to Q. C and N are diagonally opposite to each other. E is opposite to O who is just next right of M. P who is just to the left of Q, is opposite to D. M is at one end of the line.

**Q.42** Who is sitting third to the right of O? a) Q b) N  
c) M d) Insufficient Data

**Q.43** If B shifts to the place of E, E shifts to the place of Q, and Q shifts to the place of B, then who will be the second to the left of the person opposite to O?

- a) Q
- b) P
- c) E
- d) D

Q.44 Which of the following pair is diagonally opposite to each other?

- a) EQ
- b) BO
- c) AN
- d) AM

Q.45 If O and P, A and E and B and Q interchange their positions, then who will be the second person to the right of the person who is opposite to the person second of the right of P?      a)D    b) A

- c) E
- d) O

Q.46 In the original arrangement who is sitting just opposite to N?

- a) B
- b) A
- c) C
- d) D

Directions to solve questions 47 to 49:-

Guest lectures on five subjects viz., Economics, History, Statistics, English and Mathematics have to be arranged in a week from Monday to Friday. Only one lecture can be arranged on each day. Economics cannot be scheduled on Tuesday. Guest faculty for History is available only on Tuesday. Mathematics lecture has to be scheduled immediately after the day of Economics lecture. English lecture has to be scheduled immediately before the day of Economics lecture.

Q.47 Which lecture is scheduled on Monday?

- a) History
- b) Statistics
- c) Economics
- d) Mathematics

Q.48 Which lecture is the last one in the week?

- a) History
- b) English
- c) Mathematics
- d) Economics

Q.49 Which lecture is scheduled on Wednesday?

- a) Statistics
- b) Economics
- c) English
- d) History

Q.50 David gets on the elevator at the 11th floor of a building and rides up at the rate of 57 floors per minute. At the same time, Albert gets on an elevator at the 51st floor of the same building and rides down at the rate of 63 floors per minute. If they continue travelling at these rates, then at which floor will their paths cross?

- a) 19
- b) 28
- c) 30
- d) 37

# End Semester Examination, Dec. 2017

B. Tech. – Third Semester

## QUANTITATIVE APTITUDE (MA-301A)

Time: 2 hrs

**50**

Max Marks:

No. of

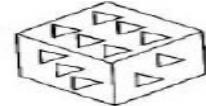
pages: 4

Note: The paper consists of **FIFTY** multiple choice questions; Each question has **FOUR** options with **ONE** correct answer. Tick (**✓**) the correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking.

- |     |   |                    |  |  |                        |   |
|-----|---|--------------------|--|--|------------------------|---|
| Q.1 | Pointing to Sagar in a photograph, Manjula said, "His brother's father is the only son of my grandfather. "How is Sagar related to Manjula?   |                    |  |  | c) West                | d) East   |
|     | a) Aunt   | b) Sister          |  |  |                        |   |
|     | c) Mother   | d) None of these   |  |  |                        |   |
| Q.2 | Introducing a woman, Shashank said, "She is the mother of the only daughter of my son." How that woman is related to Shashank?  |                    |  |  | Q.5                    | Sia introduced Raghav as the son of the only daughter of the father of her uncle. How is Raghav related to Sia?   |
|     | a) Daughter   | b) Sister-in-law   |  |  | a) Brother             |   |
|     | c) Wife   | d) Daughter-in-law |  |  | b) Cousin              |   |
|     |   |                    |  |  | c) Nephew              |   |
|     |   |                    |  |  | d) Can't be determined |   |
| Q.3 | If South-East becomes North, North-East becomes west and so on. What will West become?  |                    |  |  | Q.6                    | Rasik walked 20 m towards north. Then he turned right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Finally he turns left and walks 15 m. In which direction and how many metres is he from the starting position? |
|     | a) North-East   | b) North-West      |  |  | a) 15 m West           | b) 30 m East  |
|     | c) South-East   | d) South-West      |  |  | c) 30 m West           | d) 45 m East  |
| Q.4 | Vimal 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? |                    |  |  |                        | Directions for questions 7 to 11: 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.   |
|     | a) North  | b) South           |  |  |                        |   |

Q.7 How many cubes are there which have no face painted?

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



- a) 4
- b) 3
- c) 2
- d) 5

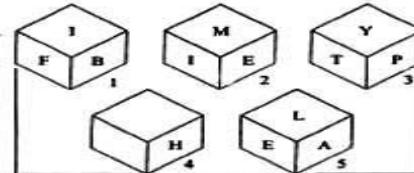
Q.8 How many cubes have only one face painted?

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

Q.9 How many cubes have less than three faces painted?

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

Q.14 What letters are missing from cube 4?



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

Q.10 How many cubes are there with three faces painted?

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

Q.15 Which number is on the face opposite to 6?



- a) 1
- b) 2
- c) 3
- d) 4

Q.11 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.16 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative. bc \_ b \_ c \_ b \_ ccb

- a) cbcb
- b) bbcb
- c) cbbc
- d) bcbc

Q.12 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) Cannot be determined

Q.13 Two positions of a cubical block are given below, each face having small triangles. If there is triangle at the bottom how many triangles will be there on the top face?

Q.17 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 \_\_\_ b\_ bbaa \_

- a) abaab
- b) abbab
- c) baaab
- d) babba

Q.18 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

c \_ baa \_ aca \_  
cacab \_ acac \_ bca

- a) acbaa
- b) bbcaa
- c) bccab
- d) cbaac

Q.19 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) 140
- d) 440

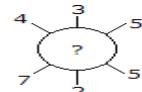
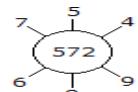
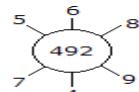
Q.20 **Statements:** All kings are warriors. All soldiers are warriors. All sentries are warriors. Some sentries are soldiers.

Conclusions:

- I. Some sentries are kings.
- II. All warriors are soldiers.
- III. Some warriors are sentries.
- IV. Some soldiers are kings.

- a) Only I follow
- b) Only II follows
- c) Only II and III follow
- d) None of these

Q.21 Which one will replace the question mark in the following figures?



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

**Directions for questions 22 to 27:-** Study the following information and answer the questions given below: M, N, P, R, T, W, F and H are sitting around a circle facing at the centre. P is third to the left of M and second to the right of T. N is second to the right of P. R is second to the right of W who is second to the right of M. F is not an immediate neighbor of P.

Q.22 Who is to the immediate right of P?

- a) H
- b) F
- c) R
- d) Data inadequate

Q.23 Who is to the immediate right of H?

- a) R
- b) F
- c) M
- d) N

Q.24 Who is to the immediate left of R?

- a) P
- b) H
- c) W
- d) T

Q.25 Who is third to the right of H?

- a) T
- b) W
- c) R
- d) F

Q.26 Who is second to the right of F?

- a) M
- b) R
- c) T
- d) Data inadequate

- Q.27 In which of the following is the first person sitting in between the second and the third person?
- a) NHM              b) PHN
  - c) TRP              d) TWF

Directions for questions 28 and 29: Study the given information carefully and answers the questions that follows: Nine blocks shown below are to be filled by letters A to I. It is given that

- A is just above B
- B is just right to C
- D is just left to E
- F is just below I
- G is just right to H

- Q.28 Which letter is in the centre?

- a) A              b) B
- c) C              d) cannot be determined

- Q.29 Which letter is in the bottom left hand corner?

- a) F              b) D
- c) H              d) cannot be determined

**Directions for questions 30 to 32:-**

On the basis of the information provided below, answer these.

Six people A, B, C, D, E and F are sitting on the ground in a hexagonal shape. All the sides of the hexagon so formed are of same length. A is not adjacent to B or C; D is not adjacent to C or E; B and C are adjacent; F is in the middle of D and C.

- Q.30 Which of the following is not correct neighbor pair?

- a) A and F              b) D and F
- c) B and E              d) C and F

- Q.31 Which of the following is in the right sequence?

- a) A, F, B              b) F, A, E
- c) B, C, F              d) D, A, B

- Q.32 Who is placed opposite to E?

- a) B              b) C
- c) D              d) F

- Q.33 **Statements:** All kings are warriors. All soldiers are warriors. All sentries are warriors. Some sentries are soldiers.

**Conclusions:**

- I. Some sentries are kings.
  - II. All warriors are soldiers.
  - III. Some warriors are sentries.
  - IV. Some soldiers are kings.
- a) Only I follow
  - b) Only II follows
  - c) Only II and III follow
  - d) None of these

Directions for questions 34 to 38: A cuboid is painted with black color on opposite faces, red on other set of opposite faces and green on the remaining faces. This cuboid has been cut into 72 cubes in such a manner that 64 cubes all of equal size are smaller in size as compared to 8 equal sized large cubes. The black paint is on the smaller faces of cuboid.

- Q.34** How many cubes will have only 1 face painted?
- a) 16      b) 20  
c) 24      d) 28
- Q.35** How many cubes will have only 2 faces painted?
- a) 8      b) 16  
c) 20      d) 24
- Q.36** How many cubes will have atleast two faces painted?
- a) 16      b) 28  
c) 32      d) 4
- Q.37** How many cubes will have only 3 faces painted?
- a) 0      b) 4  
c) 8      d) 24
- Q.38** How many cubes will have no face painted?
- a) 4      b) 8  
c) 12      d) 32
- Q.39** Veena who is the sister-in-law of Ashok is the daughter-in-law of Kalyani. Dheeraj is the father of Sudeep who is the only brother of Ashok. How Kalyani is related to Ashok?
- a) Mother-in-law      b) Aunt  
c) Wife      d) Mother
- Q.40** The time on Rita's watch is a quarter to three. If the minute hand points to north-east, in which direction does the hour hand point?
- a) South-West      b) North-West  
c) North-East      d) South-East
- Q.41** From the original position, S starts crossing the field diagonally. After walking half the distance he turns right; walks some distance and turns left. Which direction is S facing now?
- a) South-East      b) North-West  
c) South-West      d) North
- Q.42** In a certain code 786 means "bring me apple", 958 means "peel green apple" and 645 means "bring green fruit". Then code for "me" is?
- a) 8      b) 6  
c) 7  
d) None of these
- Q.43** Pointing to Gopi, Nalni Says, "I am the daughter of the only son of his grandfather." How Nalni is related to Gopi?
- a) Niece      b) Daughter  
c) Sister      d) Indeterminable
- Q.44** There are 20,000 people living in Defence Colony Gurgaon. Out of them 9000 subscribe to Star TV Network and 12,000 to Zee TV Network. If 4000 subscribe to both, how many do not subscribe to any of the two?
- a) 3000      b) 2000  
c) 1000      d) 4000
- Q.45**
- 
- a) 45      b) 37  
c) 41      d) 47

**Directions for questions 46 and 47:**  
Answer the questions on basis of the

information given. Four sisters Suvarna, Tara, Viobha and Uma are playing a game such that the looser doubles the money of each of the other players from her share. They played four games and each sister lost one game in alphabetical order. At the end of the fourth game, each sister had Rs. 32.

- Q.46 What was the amount with Uma at the end of the second round?  
 a) 36      b) 72  
 c) 16      d) None of these

- Q.47 How much money did Suvarna start with?  
 a) 60      b) 34  
 c) 66      d) 28

- Q.48 **Statements:** Some receipts are challans. Some challans are papers. Some papers are books. All books are files.

### Conclusions:

- I. Some papers are files.
- II. Some books are receipts.
- III. No book is receipt.
- a) Only I follow
- b) Only I and II follow
- c) Only I & either II or III follow
- d) Only I and III follow

- Q.49 B is the brother of A, S is the sister of B, E is the brother of D, D is the daughter of A, and F is the father of S. Then, the uncle of E is?  
 a) A      b) F  
 c) B      d) D

- 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, Dec. 2017

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**. Each question carries equal marks.

- Q.1 a) If  $y = 4x^3 + \sin 2x$ , find  $\frac{dy}{dx}$ .  
 b)  $y = x^x$ , find  $\frac{dy}{dx}$ .  
 c) Evaluate  $\int \sin^2 x \times dx$ .  
 d) Evaluate  $\int \log x \, dx$ .  
 e) If  $u = \tan^{-1} \left( \frac{y}{x} \right)$ , find  $\frac{\partial u}{\partial x}$ .  
 f) If  $x = r \cos \theta ; y = r \sin \theta$ , find  $\frac{\partial r}{\partial x}$  and  $\frac{\partial \theta}{\partial x}$ .  
 g) Expand  $e^x$  in powers of  $(x-1)$ .  
 h) Evaluate  $\int_{-\infty}^{\infty} \left( \frac{1}{1+x^2} \right) dx$ .  
 i) If  $\phi = x^2 + y^2 + z^2$ , find grad  $\phi$ .  
 j) Change the order of integration

$$\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} f(x, y) \, dy \, dx$$

2×10

**PART-A**

Q.2 a) If  $y = \sin(\cos x^2)$ , find  $\frac{dy}{dx}$  . 5

b) If  $y = \frac{e^x}{1+\cos x}$ , find  $\frac{dy}{dx}$  . 5

c) If  $y = e^{ax} \sin bx$ , show that  $\frac{d^2y}{dx^2} - 2a \frac{dy}{dx} + (a^2 + b^2)y = 0$  . 10

Q.3 a) Evaluate  $\int \frac{x^4}{x^2+1} dx$  . 5

b) Evaluate  $\int \frac{dx}{12-5x+x^2}$  . 8

c) Evaluate  $\int 18x^2 \sqrt[4]{6x^3+5} dx$  . 7

Q.4 a) If  $x^x y^y z^z = c$ , prove that for  $x = y = z$ ,  $\frac{\partial^2 z}{\partial y \partial x} = -(x \log ex)^{-1}$  . 10

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

**PART-B**

Q.5 a) Expand  $\log(1-x)$  by Maclaurin's series. 10

b) Show that the rectangular solid of maximum volume that can be inscribed in a given sphere in a cube. 10

Q.6 a) Find the area of the Cardoid  $r = a(1+\cos \theta)$  above the initial line. 10

b) Derive a relation between beta and gamma function. 10

Q.7 a) Find the directional derivative of the function  $f(x, y, z) = xy^2 + yz^3$  at the point (2, -1, 1) in the direction of the vector  $\hat{i} + 2\hat{j} + 2\hat{k}$  . 10

b) Evaluate the line integral  $\int_C (x^2 + xy) dx + (x^2 + y^2) dy$  , where C is a square formed by the lines  $x = \pm 1$  and  $y = \pm 1$  . 10

## **End Semester Examination, Dec. 2017**

B. Tech. (Biotechnology) — 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.** Each question carries equal marks.

Q.1 Answer briefly the following:

- a) How is a pie chart represented in percentages and angles?
- b) Calculate the geometrical mean for 9, 4 and 3.
- c) How do you compute margin of error? Give the equations.
- d) What are parametric tests? Name three of them.
- e) What should be the value of 'r' and what does it indicate?

**4×5**

### **PART-A**

Q.2 a) Draw a scatter plot for:

- i) Linear, positive slope
- ii) Linear zero slope.
- iii) Linear, negative slope with outlier
- iv) Non-linear, positive slope
- v) Non-linear, negative slope.

**10**

b) Draw a histogram and frequency polygon for the given data:

$x$	1	2	3	4	5
Frequency	2	5	4	2	1

**10**

- Q.3 a) Write short notes on: i) Quartiles ii) Range. 4  
 b) Find the mean, median and mode for the following data:  
 5, 9, 8, 1, 7, 10, 4, 8, 11, 6, 5 6  
 c) Calculate the mean deviation about the mean for the following:

X	10	30	50	70	90	20	15
f	4	24	28	16	8	3	5

**10**

- Q.4 a) What are the different types of probability distributions? Explain. 10  
 b) There are 10 females and 8 males prepared to work on a committee of five. What is the probability that there are exactly three females on the committee? 10

### **PART-B**

- Q.5 a) What is sampling? Explain different types of non-probability sampling methods. 10  
 b) Explain the following:  
 i) Degrees of freedom.  
 ii) T score.  
 iii) P value of 0.05  
 iv) Confidence interval.  
 v) Margin of error. 2x5

- Q.6 a) Carry out one way ANOVA to calculate F statistics for the following: 15

Group 1	Group 2	Group 3
3	4	9
1	3	7
3	5	8
2	5	11
4	4	9
3	-	-

- b) What is a sign test? Explain. 5

- Q.7 a) What does regression of  $x$  and  $y$  mean and vice-versa? Give the equations for both. 5  
 b) What are Karl Pearson's correlation coefficient and Spearman's rank coefficient? Explain. 5  
 c) Calculate the spearman's correlation coefficient for the following data:

9	8	7	6	5	4	3
1	5	4	3	2.	8	1

**10**

## **End Semester Examination, Dec. 2017**

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 a) Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$$

**2**

b) Find the Fourier sine series for unity in  $0 < x < \pi$  and hence show that:

$$1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots = \frac{\pi^2}{8}$$

**4**

c) Solve  $zpq=p+q.$

**3**

$$d) \text{ Evaluate: } L^{-1} \left[ \frac{1}{s^2 - 6s + 9} \right]$$

**2**

e) Write convolution theorem for Fourier transform.

**3**

f) Find complete solution of  $y'''(t) + y(t) = 0$

**4**

$$g) \text{ Show that } L(1) = \frac{1}{s}, \text{ where L is the Laplace transform.}$$

**2**

### **PART-A**

Q.2 a) Solve the ordinary differential equation:  $\frac{d^4y}{dx^4} - y = e^x \cos x$

**10**

b) Solve  $\frac{dx}{dt} + y = \sin t, \frac{dy}{dt} + x = \cos t$ , given that  $x=2, y=0$  when  $t=0$

**10**

Q.3 a) Find Laplace transform of the following:

i)  $f(t) = t^2 \cos at$

ii)  $f(t) = \frac{1-\cos t}{t}$

**5x2**

b) Solve the equation:

$$y'' + 4y' + 3y = e^{-t}; y(0) = y'(0) = 1$$

Using Laplace Transform.

**10**

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

Q.4 a) Find the Eigen values and Eigen vectors of the matrix

**12**

b) Are the following vectors linearly dependent? If so, find the relation between them:

$$x_1 = (1, 1, 2, 3), x_2 = (1, 2, 3, 4), x_3 = (2, 3, 4, 9)$$

**8**

### **PART-B**

Q.5 a) Expand  $f(x) = e^{-x}$  as a Fourier series in the interval  $(-1, 1)$

**10**

$$x^2 = \frac{\pi^2}{3} + 4 \sum_{n=1}^{\infty} (-1)^n \frac{\cos nx}{n^2}; -\pi < x < \pi$$

b) Prove that:

**10**

Q.6 a) Solve:

i)  $(z-y)p + (x-z)q = y-x$

ii)  $p^2 + q^2 = x+y$

where  $p = \frac{\partial z}{\partial x}$  and  $q = \frac{\partial z}{\partial y}$

**5x2**

b) Using the method of separation of variables, solve:

$$\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u, \text{ where } u(x, 0) = 6e^{-3x}$$

**10**

Q.7 a) Find the Fourier cosine integral of  $e^{-ax}$ , hence show that:

$$\int_0^{\infty} \frac{\cos \pi x}{1+\pi^2} d\pi = \frac{\pi}{2} e^{-x}, x \geq 0$$

**10**

- b) Find the Fourier sine transform of  $\frac{e^{-ax}}{x}$   
**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth / Sixth 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**. Each question carries equal marks.

**Q.1** Answer the following:

a) Find the product of the numbers 3.7 and 52.378 both of which are correct to given (3) significant figures. **3**

b) Write Newton Cotes Quadrature Formula. **2**

c) Write Newton's Iterative formula to find the value of  $\sqrt{N}$ . **3**

d) State modified Euler's method for solving  $y' = f(x, y)$  with  $y(x_0) = y_0$ . **3**

e) Write normal equations to fit a parabola  $y = ax^2 + bx + c$  to  $n$  observations. **3**

f) Define the terms – convex region, basic feasible solution and feasible solution. **3**

g) State Intermediate value theorem. **3**

#### **PART-A**

**Q.2** a) Using Lagrange's interpolation formula, find  $f(x)$  as a polynomial in  $x$  from the following data:

$x :$	- 1	0	2	3
$f(x) :$	- 8	3	1	2

**10**

b) Fit a parabola  $y = a + bx + cx^2$  to the following data:

$X$	2	4	6	8	10
$y(x)$	3.07	12.8	31.4	57.3	91.2

Q.3 a) Find the root of the equation  $x \log_{10} x = 1.2$  by Newton-Raphson method correct to 4 decimal places. **10**

b) Find the real root of  $x^3 - 3x - 5 = 0$  by the method of false position correct to 3 decimal places. **10**

Q.4 a) Solve the following equations by Gauss elimination method:

$$x_1 + x_2 + x_3 = 9$$

$$2x_1 - 3x_2 + 4x_3 = 13$$

$$3x_1 + 4x_2 + 5x_3 = 40$$

**10**

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

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

**10**

### **PART-B**

Q.5 a) From the table below, for what value of  $x, y$  is minimum? Also find this value of  $y$ .

$x :$	3	4	5	6	7	8
$y :$	0.20	0.24	0.25	0.26	0.25	0.22

**10**

b) Evaluate the integral  $\int_0^1 \frac{x^2}{1+x^3} dx$  using Simpson's  $\frac{3}{8}$  th rule. Compute the error with the exact value. **10**

Q.6 a) Find by Taylor's series method, the values of  $y$  at  $x=0.1$  and  $x=0.2$  to five

$$\frac{dy}{dx} = x^2 y - 1, y(0) = 1$$

**10**

b) Using Runge-Kutta method, solve  $y'' = xy'^2 - y^2$  for  $x=0.2$  correct to 4 decimal places. Initial conditions are  $x=0, y=1, y'=0$ . **10**

Q.7 Maximize  $Z = 10x_1 + x_2 + 2x_3$

Subject to the conditions

$$x_1 + x_2 - 2x_3 \leq 10$$

$$4x_1 + x_2 + x_3 \leq 20$$

$$x_1, x_2, x_3 \geq 0$$

**20**

## **End Semester Examination, Dec. 2017**

B.Tech. (Integrated) – Third Semester

### **MATHEMATICS-III (MA-I-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.** Each question carries equal marks.

- Q.1 a) Evaluate  $\int_0^1 (x+1)^2 dx$  **2**
- b) State fundamental theorems of Calculus. **2**
- c) Find the area bounded by the curve  $y = x^3$ , x-axis and the lines  $x = 2, x = 3$ . **3**
- d) Define differential equation, find degree and order of  $\frac{dy}{dx} = x^2 - 1$ . **3**
- e) Define dispersion. **2**
- f) From a group of 2 boys and 3 girls, two children are selected. Find the sample space associated to this random experiment. **4**
- g) If D is the midpoint of the side BC of a triangle ABC, prove that:  
$$\overrightarrow{AB} + \overrightarrow{BC} = 2\overrightarrow{AD}$$
 **4**

#### **PART-A**

- Q.2 a) Find:  $\int_0^4 \frac{1}{x+\sqrt{x}} dx$ . **7**
- b) Solve:  $\int \frac{dx}{e^x + 1}$  **6**

c) Solve:  $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt{\cot x}} dx$

7

Q.3 a) Solve the differential equation:  $x \frac{dy}{dx} = x + y$ .

**10**

b) Find the particular solution of the differential equation:

$$\log\left(\frac{dy}{dx}\right) = 3x + 4y, \text{ given } y = 0 \text{ when } x = 0.$$

**10**

Q.4 a) Form the differential equation corresponding to  $y^2 = a(b-x)(b+x)$  by eliminating parameters a and b.

**4**

b) Solve  $(x+2y^2) \frac{dy}{dx} = y$ ; given that  $y = 1$  when  $x = 2$ .

**8**

c) Solve  $x^2 dy + y(x+y)dx = 0$ ; given that  $y = 1$  when  $x = 1$ .

**8**

### **PART-B**

Q.5 a) Find the variance and standard deviation of the following frequency distribution:

Variab le:	2	4	6	8	10	12	14	16
<i>f</i> :	4	4	5	15	8	5	4	5

**10**

b) In an examination, 25 students secured the following marks:

23, 28, 30, 35, 35, 36, 40, 41, 43, 44, 45, 45, 48, 49, 52, 53, 54, 56, 56, 58, 61, 62, 65, 68.

Arrange the data with 'less than' and 'more than' cumulative frequency distribution.

**10**

Q.6 a) In a lottery of 50 tickets numbered 1 to 50, two tickets are drawn simultaneously. Find the probability when:

- i) Both the tickets drawn have prime numbers.
- ii) None of the tickets drawn has prime numbers.

**10**

b) In a group there are 3 women and 3 men. 4 persons are selected at random from the group. Find the probability that 3 women and 1 man or 1 woman and 3 men are selected.

**10**

Q.7 a) If  $\hat{i} + \hat{j} + \hat{k}$ ,  $2\hat{i} + 5\hat{j}$ ,  $3\hat{i} + 2\hat{j} - 3\hat{k}$  and  $\hat{i} + 6\hat{j} - \hat{k}$  are the position vectors of points A, B, C and D. Find the angle between the straight lines AB and CD. Deduce that the lines AB and CD are parallel.

**10**

b) Show that the distance of the point  $c$  from the line joining  $a$  and  $b$  is:

$$\frac{|b \times c + c \times a + a \times b|}{|b - a|}$$

**10**

## **End Semester Examination, Dec. 2017**

M. Tech. – First Semester

### **ADVANCED MATHEMATICAL TECHNIQUES (MAM-101)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- Q.1 Examine whether the vectors  $\{(2, 3, 6, -3, 4); (4, 2, 12, -3, 6); (4, 10, 12, -9, 10)\}$  is linearly independent. Find the dimension and basis of the given set of vectors. **15**

- Q.2 Find the Eigen values and the corresponding Eigen vectors of the matrix:

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$$

**15**

- Q.3 a) In an bombing action there is 50% chance that any bomb will strike the target. Two direct hits are needed to destroy the completely. How many bombs are required to be dropped to give a 99% chance or better of completely destroying the target? **5**

- b) Fit a normal curve to the following distribution:

$x$	2	4	6	8	10
$f(x)$	1	4	6	4	1

**10**

- Q.4 Find the moment generating function of the exponential distribution:

$$f(x) = \frac{1}{c} x e^{\frac{-x}{c}}, 0 \leq x \leq \infty, c > 0$$

15

Q.5 Determine the value of  $u_1, u_2$  and  $u_3$  so as to

Max.  $Z = u_1 + u_2 + u_3$  subject to the constraint

$$u_1 + u_2 + u_3 = 0 \text{ and } u_1, u_2, u_3 \geq 0$$

15

Q.6 Use simplex method of solve the LP problem:

Max.  $Z = 3x_1 + 5x_2 + 4x_3$  subject to the constraint

$$2x_1 + 3x_2 \leq 8; 2x_2 + 5x_3 \leq 10; 3x_1 + 2x_2 + 4x_3 \leq 15$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

15

Q.7 A lightly stretched fixed string has its ends fixed at  $x=0$  and  $x=l$ . At time  $t=0$ , the string is given a shape defined by  $F(x) = \mu x(l-x)$ ,  $\mu$  is constant, and then released, Find the displacement at any point  $x$  of the string at any time  $t > 0$ . **15**

$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$$

Q.8 Determine the solution of one dimensional heat equation  $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ , subject to the boundary condition  $u(0, t) = 0, u(l, t) = 0, (t > 0)$ , and the initial condition  $u(x, 0) = x, l$  being the length of the bar. **15**

## **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) – Second / Fourth Semester

**APPLIED MECHANICS (M-I-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 Describe (**any ten**) of the following:

- a) Free Body diagram.
- b) Difference between a point and a body.
- c) Triangle law of forces.
- d) Component of forces.
- e) Concurrent forces.
- f) Centroid.
- g) Self-locking machine.
- h) Law of machine.
- i) Static friction law.
- j) Mechanical advantage.
- k) Law of machines.
- l) Angle of repose.

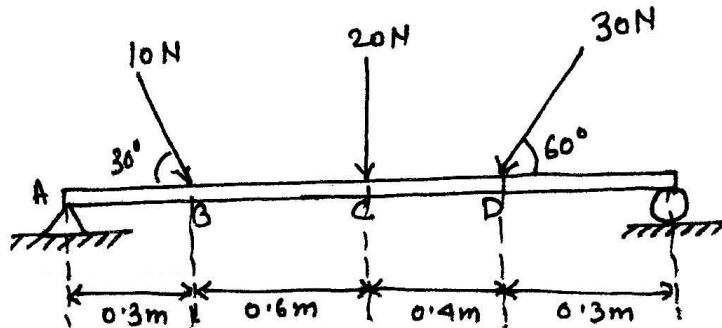
**2x10**

### **PART-A**

Q.2 Define basic principles of mechanics.

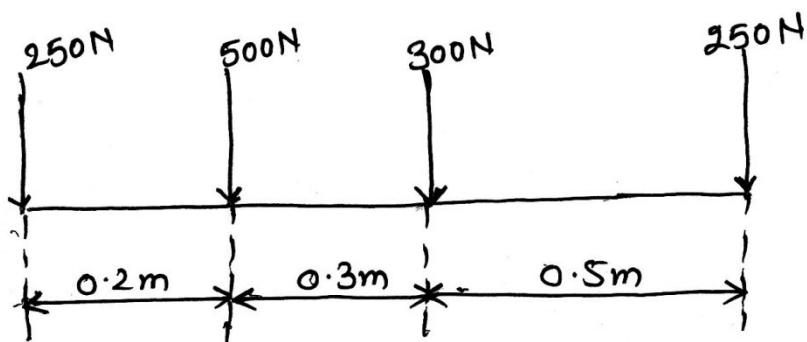
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Q.3 Determine the reaction developed in the simple supporting beam as shown in the figure. Neglecting the self weight of the beam.



20

Q.4 Calculate the resultant of the system of forces shown in the figure. Also find its position and direction.



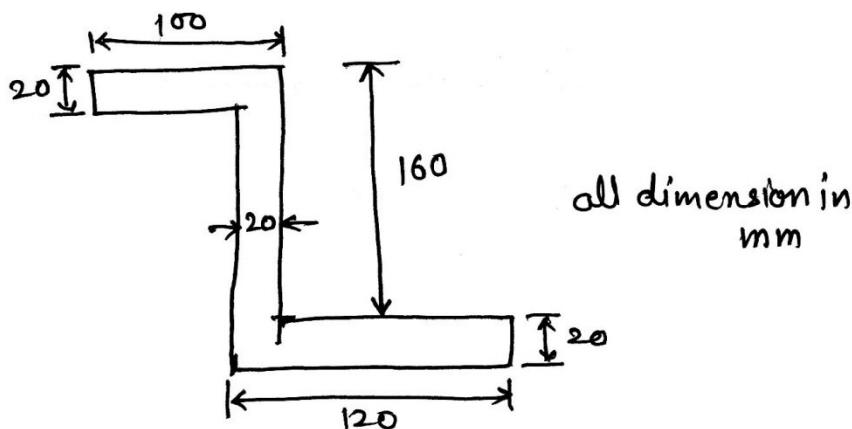
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### **PART-B**

Q.5 An effort of 200 N is required just to move a certain body up an inclined plane of an angle  $15^\circ$  the force acting parallel to the plane. If the angle of inclination of the plane is made  $20^\circ$ , the effort required again applied parallel to plane is found to be 230 N. Find the weight of the body and the coefficient of friction.

20

Q.6 Determine the centroid of z-section as shown in the figure.



20

Q.7 Determine the effort required to lift a load of 150 N if the lifting machine has a velocity ratio 15 and an efficiency 60%. Also set up an equation prescribing the law of machine if the frictional resistance of the machine is

constant. Proceed to find the effort to run this machine at i) no load, ii) A load of 100 N.

**20**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **THEORY OF MACHINES (M-I-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 a) Distinguish between kinematics and dynamics.  
b) What is a resistant body?  
c) What is a linkage?  
d) What are turning moment diagrams?  
e) What is co-efficient of fluctuation of energy of a flywheel?  
f) What is law of belting?  
g) Define velocity ratio for gears.  
h) State the law of gearing.  
i) Explain free and damped vibrations.  
j) What do you mean by balancing?

**2x10**

#### **PART-A**

- Q.2 a) Classify the kinematic pairs with examples. **10**  
b) Explain the withworth quick-return mechanism with the help of a neat sketch. **10**
- Q.3 a) Find a relation for the co-efficient of fluctuation of speed in terms of maximum fluctuation of energy and kinetic energy of the flywheel at mean speed. **10**  
b) Each arm of a Porter governor is 200 mm long and pivoted on the axis of governor. The radii of rotation of the balls at the minimum and maximum speed are 120 mm and 160 mm, respectively. The mass of sleeve is 24 kg and each ball is 4 kg. Find the range the governor. **10**
- Q.4 Draw the profile of a cam operating a knife edge follower from the following data:  
a) It lifts the follower through 3.75 cm during its  $60^\circ$  rotation with S.H.M.

- b) The follower remains at rest for next  $40^\circ$  rotation of cam.
- c) The follower then descends to its original position during  $90^\circ$  rotation of the cam with S.H.M.
- d) The follower remains at rest for the rest of revolution.  
The least radius of cam is 5 cm. If the cam rotate at 300 rpm. Find max velocity and acceleration of the follower during ascent and descent.

**20**

### **PART-B**

$$\frac{T_1}{T_2} = e^{\mu\theta}$$

Q.5 a) Derive relation,  $\frac{T_1}{T_2}$  for flat belt drive with usual notation.

**10**

- b) What are the different modes of transmitting power from one shaft to another? Compare them.

**10**

Q.6 a) What is the difference between the double helical and Herringbone gears?

**10**

- b) Explain the procedure to analyse an compound gear train.

**10**

Q.7 a) Find the natural frequency of longitudinal vibration by the equilibrium method. **10**

- b) Three masses of 8 kg, 12 kg, and 15 kg attached at a radial distance of 80 mm, 100 mm and 60 mm, respectively to a disc on a shaft are in complete balance. Determine the angular positions of the masses of 12 kg and 15 kg relative to the 8 kg mass.

**10**

## **End Semester Examination, Dec. 2017**

M. Tech. (Mech. Industrial Engg). - First Semester

### **INDUSTRIAL STATISTICS AND FORECASTING (M-IE-102 / M-IE-102A)**

Time: 3 hrs

**100**

Max Marks:

No. of pages: 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) Why do we use chi-square test?  
b) State the application of analysis of variance.  
c) Briefly explain central limit theorem.  
For the following cases describe which probability distribution is to be used for hypothesis testing.  
d)  $H_0 : \mu = 15, H_1 : \mu \neq 15, \bar{x} = 14.8, \hat{\sigma} = 3.0, n = 35$   
e)  $H_0 : \mu = 57, H_1 : \mu > 57, \bar{x} = 65, \hat{\sigma} = 12, n = 42$

**3x5**

#### **PART-A**

- Q.2 From 1980 until 1985, the mean price/earnings ratio of the approximately 1800 stocks listed in New York Stock Exchange was 14.35 and standard deviation was 9.73. In the sample of 30 randomly chosen NYSE stocks, the mean price/earnings ratio was 11.77. Does this sample present sufficient evidence to conclude (at the level of 0.05 significance) that in 1986, the mean price/ earning ratio for NYSE stocks had changed from its earlier value? **15**
- Q.3 From a total of 10,200 loans made by a state employees' credit union in the most recent 5-year period, 350 were sampled to determine that proportion was made to women. This sample showed that 39 percent of the loans were made to women employees. A complete census of loans 5 years ago showed that 41 percent of the borrowers then were women. At a significance level of 0.02, can you conclude that the proportion of loans made to women has changed significantly in the past 5 years? **15**

- Q.4 For the following set of data, develop the regression equation that best describe the data. Also predict  $\gamma$  when  $x = 15$ .

x	13	16	14	11	17	9	13	17	18	12
y	6.2	8.6	7.2	4.5	9.0	3.5	6.5	9.3	9.5	5.7

**15**

### **PART-B**

- Q.5 a) Describe the term 'Forecasting'. Explain various type of forecasting in detail.

**8**

- b) Describe various commonly observed demand pattern. Explain various quantitative methods of forecasting.

**7**

- Q.6 a) Describe components of a time series with helps of neat sketch.

**7**

- b) Describe the method of semi averages and moving averages in determining the trends of a time series.

**8**

- Q.7 Write short notes on:

- a) Prisomony principle and shrinkage principal.

- b) T-test and F-test.

- c) Chain rule of forecasting.

**5x3**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester

### **OPERATION PLANNING AND CONTROL (M-IE-103 / M-IE-103A)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **ANY FIVE** questions in all. Each question carries equal marks.

- Q.1 What is the importance of operation planning and control in today's industrial scenario and what are its future challenges? **15**
- Q.2 Explain the type of cost involved in any inventory system. How do you control the inventory? **15**
- Q.3 What are the sources of demand in an MRP system? Are these dependent or independent, and how are they used as inputs to the system? **15**
- Q.4 What is aggregate planning? Explain various strategies involved in it. **15**
- Q.5 What do you understand by routing? Explain information combined in a routing sheet.  
**15**
- Q.6 Explain dispatching and its types. Why it is called the action phase? **15**
- Q.7 Write short notes on (**any two**) of the following:  
i) ABC and VED analysis.  
ii) Bill of material.  
iii) Level scheduling. **7½×2**

## **End Semester Examination, Dec. 2017**

M. Tech. — First Semester

### **MANAGEMENT CONCEPT AND ORGANIZATIONAL BEHAVIOUR (MIE-104/MIE-104A)**

Time: 3 hrs.

Max Marks: **75**

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.** Each question carries equal marks.

- Q.1 a) What is personality? How do we typically measure it? What factors determine the personality? **10**  
b) Describe organizational behavior. **5**

#### **PART-A**

- Q.2 Explain Maslow's need hierarchy theory and XY theory in detail with help of neat sketches. **15**
- Q.3 a) Explain various approaches which can be used for bringing cultural change. **8**  
b) Comment on "culture is symbolic, culture is unifying and culture is holistic." **7**
- Q.4 Write short notes on the following:  
a) Conflict management.  
b) Importance of team building.  
c) Group dynamics. **5×3**

#### **PART-B**

- Q.5 a) Describe in detail Mckinsey's 7-S approach. **10**  
b) Explain the difference between American and Japanese management. **5**
- Q.6 a) Describe the concept and process of business process re-engineering in detail. **8**  
b) Explain BPR experiences in Indian industry. **7**
- Q.7 Write short notes on the following:  
a) Six sigma approach.  
b) Driving force and impact of E-Commerce.  
c) Global management. **5×3**

## **End Semester Examination, Dec. 2017**

M. Tech. – First Semester

### **WORK STUDY AND ERGONOMICS (MIE-105)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt **FIVE** questions in all. Each question carries equal marks.

- |     |  |                        |
|-----|--|------------------------|
| Q.1 | Explain in detail the process of method study.   | <b>15</b>              |
| Q.2 | Define and explain therbligs. List out various therbligs and their usage. Also, explain types of incentives given to workers.  | <b>15</b>              |
| Q.3 | Explain the following in brief:<br>a) Time study.<br>b) Work study.<br>c) Process flow chart.<br>d) SIMO chart.<br>e) PMTS.  | <b>3×5</b>             |
| Q.4 | a) What do you understand by micro motion study? Also, state its applications in detail.<br>b) What do you understand by wage payment plan? What are various wage payment plans used in industry?                      | <b>9</b><br><b>6</b>   |
| Q.5 | a) What is the effect of environmental conditions on the productivity of a worker? How worker performance can be improved?<br>b) Discuss the following in brief:<br>i) Operation process chart.<br>ii) Operator chart. | <b>9</b><br><b>3×2</b> |
| Q.6 | a) Explain different elements of time which are considered for estimating standard time for an operation.<br>b) Discuss string diagram and chronocycle graph.  | <b>9</b><br><b>6</b>   |
| Q.7 | a) Explain the time study procedure in detail.<br>b) Discuss the following in brief:<br>i) Two handed process chart.<br>ii) Multiple activity chart.<br>iii) Travel chart.   | <b>9</b><br><b>2×3</b> |

## **End Semester Examination, Dec. 2017**

M. Tech. (Industrial Engineering) – First Semester

### **PROJECT MANAGEMENT (M-IE-204A)**

Time: 3 hrs.

Max Marks: **75**

No. of pages: **1**

Note: Attempt any **FIVE** questions in all. Each question carries equal marks.

Q.1 Answer the following questions:

- a) How will you identify and select a project?
- b) What are the management principles applied to a project?
- c) Briefly describe the project monitoring process.
- d) What do you mean by prevention planning for the projects?
- e) Write the causes of project termination. What are the implications of project termination? **3x5**

Q.2 a) Compare and contrast the project evaluation and review technique (PERT) with the critical path method (CPM). **5**

- b) Using the information in table given below:
  - i) Determine the critical path of the project.
  - ii) Calculate the planned duration of the project.
  - iii) Identify any non-critical task and the float on each.

Task	Description	Duration (days)	Predecessor
A	Requirement analysis	5	—
B	Systems design	15	A
C	Programming	25	B
D	Telecoms	15	B
E	Hardware installation	30	B
F	Integration	10	C, D
G	System testing	10	E, F
H	Training/Support	5	G
I	Handover and go-live	5	H

**10**

Q.3 a) Describe risk management process and how it applies to project. **8**  
b) Describe the process of project approval. **7**

Q.4 a) What are the financing options in a project? Write the role of various financial institutes in project financing. **8**  
b) What is normal time and crash time in a project? Discuss the crashing of project costs. **7**

- Q.5 Explain the types of project contracts. How will you prepare specification for project activities? **15**
- Q.6 What do you mean by project management? Describe the role and responsibilities of project manager. **15**
- Q.7 What is project? What do you mean by taxonomy of a project? Describe the various project development techniques. **15**

# **End Semester Examination, Dec. 2017**

M. Tech. – Second Semester

## **QUALITY CONTROL TECHNIQUES (M-IE-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 Briefly describe the following:

- a) Opportunity cost.
- b) Serviceability.
- c) Variables and attributes.
- d) Control limits and specification limits.
- e) Robust design.
- f) On-line and off-line quality control.
- g) Quality planning.
- h) Pareto diagram.
- i) Control chart.
- j) Differentiate between inspection and quality control.

**1½×10**

### **PART-A**

- Q.2 a) Describe quality of design and quality of conformance and factors affecting them. **8**
- b) Describe EFQM excellence model for quality improvement. **7**
- Q.3 a) Compare control charts for variables and control charts for attributes including their advantages and disadvantages. **10**
- b) Explain, with suitable sketches, type-I and type-II errors in control charts. **5**
- Q.4 a) Explain full factorial and fractional factorial experiments with suitable examples. **5**
- b) Describe regression model representation of response surfaces. **5**
- c) Describe, with a neat sketch, Taguchi's loss function. **5**

### **PART-B**

- Q.5 a) Enumerate Juran's ten steps to quality improvement. **10**
- b) What is six sigma? Explain its objectives and advantages. **5**
- Q.6 a) Explain Ishikawa diagram with an example. **7**
- b) Describe ten steps to be followed to conduct FMEA with a suitable example. **8**
- Q.7 Describe basic principle and methodology of implementing ISO14001 standard. Mention its benefits. **15**

# **End Semester Examination, Dec. 2017**

M. Tech. — Third Semester  
**SIMULATION AND MODELING (MIE-303)**

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 the terms simulation and modeling. Also explain their principles. **8**  
b) Explain the concept of system and environment used in simulation and modeling? **7**
- Q.2 a) Describe the Monte-Carlo method. **8**  
b) What are the different numerical computation techniques used in simulation and modeling? **7**
- Q.3 a) Define logistic curve and ladder logic. **7**  
b) Briefly explain the growth model. **8**
- Q.4 a) Explain stochastic variables? **6**  
b) Briefly explain variance reduction techniques with suitable example. **9**
- Q.5 a) Explain the flexible manufacturing system. **8**  
b) Explain simulation process of hydraulic system. **7**
- Q.6 Psychological test of intelligence and of engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ratio (I.R) and engineering ratio (E.R). Calculate the co-efficient of correlation:

Student	A	B	C	D	E	F	G	H	I	J
I.R.	105	104	102	101	100	99	98	96	93	92
E.R.	101	103	100	98	95	96	104	92	97	94

**15**

**End Semester Examination, Dec. 2017**  
M. Tech. (Mech. Industrial Engg.) — 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. Each question carries equal marks.

- Q.1 What is the role of facilities in supply chain and competitive strategy? What are the facilities related metrics?

**15**

- Q.2 Discuss the design options for a distribution network.

**15**

- Q.3 Discuss risk management in forecasting.

**15**

- Q.4 Describe supply chain coordination and bill whip effect and their impact on supply chain performance.

**15**

- Q.5 What is the impact of trade promotions on lot size and cycle inventory?

**15**

- Q.6 In 1980s, the paint was sold by color and size in paint stores. Today, the paint is mixed at paint store according to color required. Discuss what is the impact this change has on safety inventories in supply chain?

**15**

- Q.7 What are the relative strengths and weaknesses of various transportation network design options?

**15**

## **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**. Each question carries equal marks.

- Q.1 a) What is the definition of reliability in product design?  
b) How is the reliability improved?  
c) What is meant by process planning?  
d) What is the formula for the weight of a part?  
e) What is the maximum size of hole that can be made by stamping in sheet metal of thickness =  $T$ ?  
f) How far should the hole be from the bend edge in sheet metal part?  
g) How can you reduce the weight of a casting part?  
h) How much should be the maximum rib height in forging?  
i) What is meant by hardness?  
j) What is meant by P-Kanban? **2×10**

### **PART-A**

- Q.2 Describe the purpose and importance of new product design. What are the various steps in product design? **20**
- Q.3 a) What are the ways of improving the product design reliability? **10**  
b) What is cost sensitivity? Why is it important? When is it not important? **10**
- Q.4 What are fixed costs and variable costs? Describe the different stages of calculating fixed cost and variable cost. **20**

### **PART-B**

- Q.5 What are the design considerations for designing sheet metal parts? **20**
- Q.6 What are the ergonomic considerations for designing a machine? **20**
- Q.7 What is a Kanban system? What are its advantages? Describe in detail. **20**

## **End Semester Examination, Dec. 2017**

B. Tech. (ME Industry Integrated) – Fifth Semester

## **MEASURING TECHNIQUE 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**. Each question carries equal marks.

Q.1 Answer the following questions:

- a) How do you differentiate between accuracy and precision?
- b) What is the use of taper scale?
- c) Discuss the principle of sine bar and its uses.
- d) Define lays and waviness.
- e) What are the advantages of using laser in measurement?
- f) What are GO and NO-Go gauges used for?
- g) Define shaft base system.
- h) What is a solar cell?
- i) What do you understand by LED?
- j) What do you mean by sensitivity and deviation of a sensor?

**2×10**

### **PART-A**

- Q.2 a) Discuss slip gauges and their uses. **5**  
b) Explain the construction and working of height and depth gauge with neat sketch. **15**
- Q.3 a) Differentiate between straightness and flatness. **5**  
b) Describe various methods for measurement of effective diameter of screw thread with neat sketch. **15**
- Q.4 a) Discuss the equipments used for machine tool testing. **5**  
b) Discuss surface roughness measurement. **15**

### **PART-B**

- Q.5 a) Define profile projector, its components and applications. **10**  
b) Explain tool wear. How can we estimate tool life? **10**
- Q.6 Discuss CMM and its components. What are the advantages and applications of CMM? **20**
- Q.7 a) Explain bar code system and its applications. **5**  
b) Explain photo detector and its working principle. What are the advantages and applications of photo detector? **15**

## **End Semester Examination, Dec. 2017**

B. Tech. (Industry Integrated) – Fifth Semester

**FACILITY PLANNING AND PLANT LAYOUT (MII-503)**

Time: 3 hrs.

Max Marks: **100**

690/5

Note: Attempt **FIVE** questions in all; **Q.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 nature of facility planning?  
 b) Define 'cost contours'.  
 c) Define 'fixed position layout'.  
 d) Define 'travel Chart'.  
 e) Define 'chain type structure' for part coding.  
 f) Define 'production Line'.  
 g) Define 'screw feeders'.  
 h) What are the advantages of a unit load?  
 i) Define 'hoppers and feeders'.  
 j) What are the functions of a warehouse?

**2×10**

### **PART-A**

- Q.2 a) Discuss the scope of facility planning in brief. **5**  
 b) Define 'location analysis'. What are the various techniques used for analysis of a location? **15**
- Q.3 a) Define 'process layout'. Discuss its advantages in brief. **5**  
 b) Describe facility layout'. Discuss its significance and objectives in detail. **15**
- Q.4 a) Describe production flow analysis in brief. **5**  
 b) Explain in detail the grouping techniques. **15**

### **PART-B**

- Q.5 a) Describe unit load concept. **5**  
 b) Classify the various material handling equipments and explain them in detail. **15**
- Q.6 Describe the principles and functions of material handling in detail. **20**
- Q.7 Explain the following with their applications:  
 a) Pneumatic conveyors.  
 b) Bucket Elevators.  
 c) Vibratory conveyors.  
 d) Bins. **5×4**

## **End Semester Examination, Dec. 2017**

B. Tech. (Mechanical Engg. Industry Integrated) – Fifth Semester  
**COMPUTER AIDED DESIGN (MII-504)**

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 meant by .IGS format?
- b) What is zoom and pan function?
- c) What is meant by CAD?
- d) What is meant by trimming function?
- e) What is meant by symmetry creation?
- f) What is meant by over constrained geometry?
- g) How can you change the colour of a part?
- h) What is a sectional view?
- i) What is the difference between draft and shell commands?
- j) What is meant by edge chamfer?

**2×10**

### **PART-A**

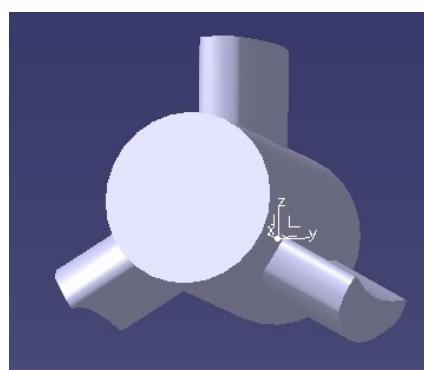
- Q.2** a) Define the complete cycle of Computer Aided Design. What are the advantages of CAD? **10**  
 b) What are the differences between Sketcher, solid modeler and surface modeler? **10**
- Q.3** a) What are transformation features in sketcher module? **10**  
 b) What is meant by Boolean commands? Give examples. **10**
- Q.4** Give method of making the following model:



**20**

### **PART-B**

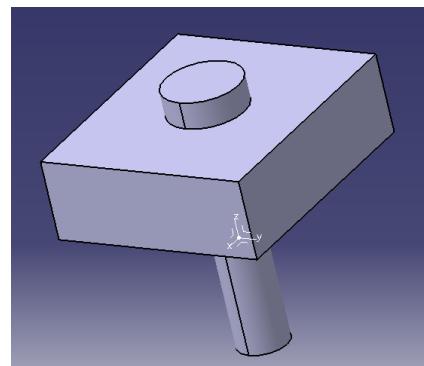
- Q.5** a) Define the method of making a Bottom up assembly. How do you find interference between two parts? **10**  
 b) How will you make the model of the following part?



**10**

- Q.6** How do you make 2D drawings of a 3D model? How do you make the dimensions of the drawing? **20**

Q.7 Write the procedure to make the Top down assembly for the following assembly.



**20**

**End Semester Examination, Dec. 2017**  
B. Tech. (ME Industry Integrated) — Fifth Semester  
**JIGS AND FIXTURE DESIGN (MII-505)**

Time: 3 hrs.

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

**693/5**

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

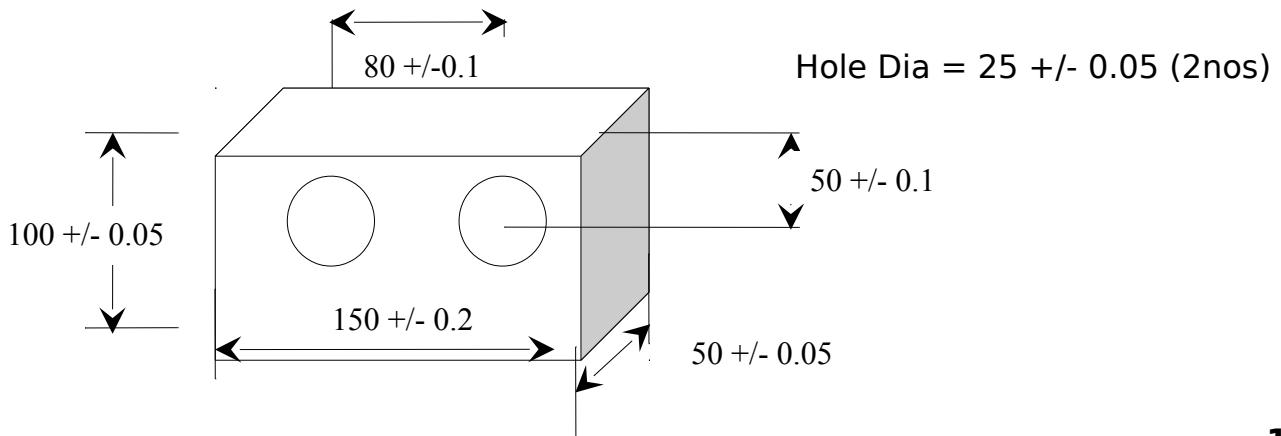
Q.1 Answer the following questions:

- What is meant by transition fit?
- What is a reference surface?
- What is meant by slide fit?
- What is meant by redundant location?
- What is meant by 3-2-1 principle?
- Two plates are joined together with two Allen Bolts. Draw the diagram.
- How is a turning fixture mounted on Lathe?
- What is a tenon in a milling fixture?
- What is the material of a drill bush?
- What is the material of a locating pin in welding fixtures?

**2×10**

### **PART-A**

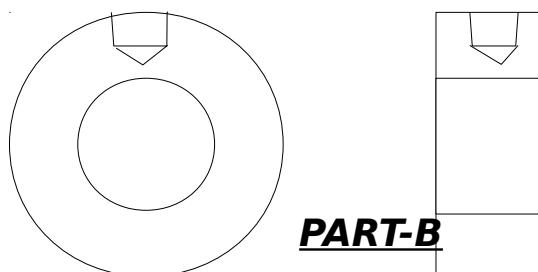
Q.2 a) What is the definition and role of a Process planning? What are the critical factors in making a process plan? **10**  
 b) Make the process plan for the following part. **10**



**10**

Q.3 a) What is a Jig/Fixture? What are the advantages of a jig or a fixture? **10**  
 b) What is takt time? Calculate the takt time for a part. Data is as follows:  
 Yearly production - 2,00,000.  
 No of working days - 289.  
 No of shifts - 2.  
 Assume 20% surge in demand in peak time and 85% efficiency. **10**

Q.4 Design a drill jig for the following part:

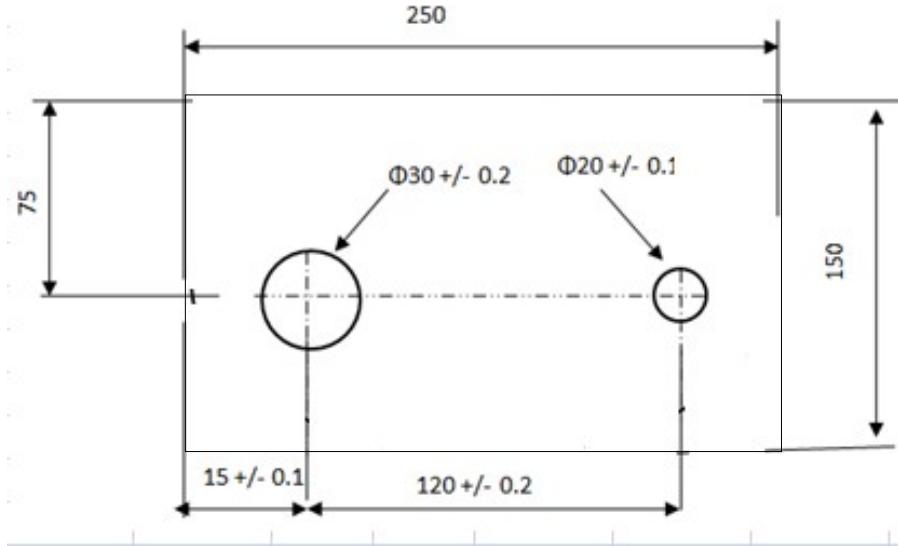


**20**

### **PART-B**

Q.5 Design locating system for the following part:

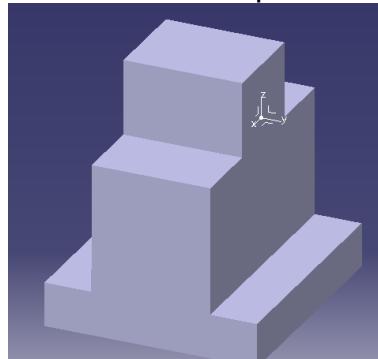
FRONT VIEW SIDE VIEW



**20**

Q.6 What are the steps in designing a welding fixture? Describe the various steps in designing and manufacturing a welding fixture. **20**

Q.7 Design a milling fixture for the following part:  
Purpose: To machine the slots on the top.



**20**

## **End Semester Examination, Dec. 2017**

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) What is instantaneous centre of rotation?
  - c) What is riding height?
  - d) What is function of Panhard rod?
  - e) What are universal joints?
  - f) What are the desired properties of brake fluids?
  - g) Write the functions of ABS.
  - h) Distinguish between sprung and unsprung weight of an automobile.
  - i) What is the use of torsion bar?
  - j) Define leaf spring.

**2×10**

### **PART-A**

- Q.2 a) Discuss three quarter floating axle. **5**  
b) Explain the steering linkages in independent suspension system with neat sketch. **15**
- Q.3 a) Describe Ackermann's steering system. **5**  
b) Describe various types of steering gear box. **15**
- Q.4 a) Discuss the effect of driving thrust & torque on drive line. **5**  
b) Explain the working & construction of a differential. **15**

### **PART-B**

- Q.5 a) What is the function of brakes? How they are classified? **5**  
b) Explain the working & construction of disc brakes. **15**
- Q.6 a) Define suspension system. What are the various functions of suspension system? **5**  
b) Explain McPherson strut suspension system. **15**
- Q.7 a) Describe exhaust system and its components. **5**  
b) Explain exhaust gas re-circulation system with neat sketch. **15**

## **End Semester Examination, Dec. 2017**

B. Tech. (Industry Integrated) — Sixth Semester  
**PRESS TOOLS-I (MII-601)**

Time: 3 hrs.

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

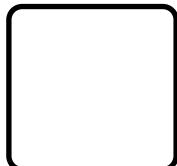
Note: Attempt **FIVE** questions in all; **Q.1 is compulsory.** Attempt **ANY TWO** questions from **PART-A** and **TWO** questions from **PART-B**. Each question carries equal marks.

- Q.1 a) What is meant by tonnage of press?  
 b) What is meant by shut height of press?  
 c) What is the material of cutting dies?  
 d) What is the hardness of cutting dies?  
 e) What is the role of punch backup plates?  
 f) How are the small dies lifted?  
 g) How do you prevent the jamming of parts in dies?  
 h) What is the burr direction after cutting operation?  
 i) What is meant by percentage utilization in strip layout?  
 j) What is meant by neutral axis in bending?

**2×10**

### **PART-A**

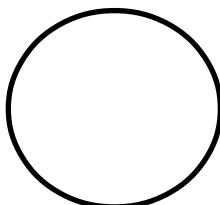
- Q.2 Explain the parts and functioning of a mechanical press. **20**
- Q.3 a) Explain the various stages of sheet metal cutting.  
 b) Calculate the stripping force required for the following part:



Dimensions = 120 mm. × 80 mm.  
 Thickness = 1.2 mm.  
 Material = SPCE  
 Shear Strength = 35 kg/mm<sup>2</sup>

**10×2**

- Q.4 a) Calculate the strip width, advance and cutting force in the strip layout for the following part:

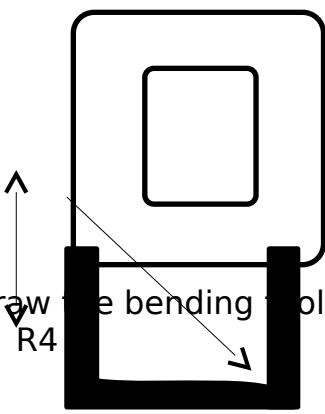


Dia = 40 mm.  
 Thickness = 2 mm.  
 Material Steel.

- b) Design the die block for the above part. **10×2**

### **PART-B**

- Q.5 a) Explain the function of the following parts in progressive dies:  
 i) Pitch punch. **1½**  
 ii) Front gauge and back gauge. **2**  
 iii) Pilots. **1½**
- b) Draw the diagram of a progressive tool. **15**
- Q.6 a) What are the differences between a compound tool and a progressive tool? **8**  
 b) Draw a Compound tool for the following part:

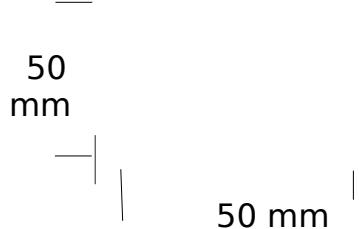


Outside Dimension = 150 mm × 200 mm  
 Inside Dimension = 80 mm × 80 mm  
 Thickness = 2.0 mm  
 Material = MS (SPCE).

**12**

- Q.7 Draw the bending tool for the following part and explain the construction:

**697/5**



**End Semester Examination, Dec. 2017**  
B.Tech. (Mech. Engg.) - Sixth Semester  
**OPERATIONS RESEARCH I (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 a) Name different environments in which decisions are made.  
 b) Write the steps in conducting the operations research study.  
 c) What do you understand by unboundedness in LPP?  
 d) How do you identify the presence of multiple optima in simplex method?  
 e) Name the methods of optimality check of transportation.  
 f) State the common and distinguishing features of assignment and transportation models.  
 g) Write the basic elements of waiting line situations.  
 h) What are different types of floats?  
 i) What is need of simulation?  
 j) Describe a method for generating random numbers.

**2x10**

### **PART-A**

- Q.2 a) What is decision-making? Write the difference between decision-making under risk and uncertainty.

**8**

- b) A training programme is to be met with a batch size of  $A_1, A_2, A_3$  and  $A_4$  which meets the expenses  $S_1, S_2, S_3$  and  $S_4$ . Indicate the levels of attendance:

	<b>S1</b>	<b>S2</b>	<b>S3</b>	<b>S4</b>
<b>A<sub>1</sub></b>	6	11	19	26
<b>A<sub>2</sub></b>	7	6	11	22
<b>A<sub>3</sub></b>	20	17	11	20
<b>A<sub>4</sub></b>	29	21	18	14

The table indicates additional cost due to level of attendance in different batches. Find optimum batch size using (i) Laplace (ii) minimax (iii) maxmin criteria. **12**

- Q.3 a) How will you solve LPP graphically? Write limitation of graphical method.

**5**

- b) Convert the given primal LPP in dual and solve using simplex method:

$$\begin{aligned}
 Z_{\min} &= 20x_1 + 40x_2 \\
 \text{subject to, } & 2x_1 + 20x_2 = 40 \\
 & 20x_1 + 3x_2 = 20 \\
 & 4x_1 + 15x_2 = 30 \\
 & X_1, X_2 = 0
 \end{aligned}$$

**15**

- Q.4 a) Find the optimal solution of following transportation problem.

**10**

	<b>Definitio n</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Suppl y</b>
<b>Origin</b>	<b>A</b>	7	2	5	5	30
	<b>B</b>	4	4	6	5	15
	<b>C</b>	5	3	3	2	10
	<b>D</b>	4	1	4	2	20

- b) Suggest optimum assignment of four workers A, B, C, D to four jobs I, II, III, IV. The time taken by different workers in completing the different jobs is given below:

<b>Worker</b>	<b>Jobs</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>
	<b>A</b>	8	10	12	16
<b>B</b>	11	11	5	8	
<b>C</b>	9	6	5	14	
<b>D</b>	15	14	9	7	

Also find the total time taken in completing the jobs.

**10**

### **PART-B**

- Q.5 a) Discuss the arrival and service processes of waiting line models.

**6**

- b) A repair shop attended by a single mechanic has an average of four customers per hour who bring small appliances for repair. Repairman takes six minutes on the average. Assuming arrival poission and service time exponential, calculate (i)  $L_s$  (ii)  $L_q$  (iii)  $W_s$  (iv),  $W_q$ . (v) probability of finding at least one customer in the shop. **14**

- Q.6 a) Compare and contrast CPM and PERT models.

**4**

- b) Utility data for a network are given below. Construct the network and identify critical path. Also determine total, independent and free floats:

<b>Activity:</b>	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-
7	5-7	6-7						
<b>Duration:</b>	2	8	10	6	3	3	7	5

**16**

- Q.7 a) Explain Monte Carlo method and give situations where it is used.

**8**

- b) A company manufactures around 200 mopeds. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 196 mopeds to 204, whose probability distribution is as given below:

**Production/day:** 196    197    198    199    200    201    202    203    204

**Probability:**            0.05    0.06    0.12    0.14    0.2    0.15    0.11    0.08  
0.06

Using following 15 random numbers 82, 89, 78, 24, 53, 61, 18, 45, 04, 23, 50, 77, 27, 54, 10.

Simulate the process and find out:

- (i) Average number of mopeds waiting in factory.
- (ii) Number of empty spaces in lorry.

Finished mopeds are transported in a lorry that can accommodate only 200 mopeds.

**12**

## **End Semester Examination, Dec. 2017**

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 C<sup>1</sup> 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, Dec. 2017**

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.** Each question carries equal marks.

- Q.1 a) What is formability?  
b) What is fabrication process?  
c) What is roll bending?  
d) What is the function of flux used in welding process?  
e) What are the different types of oxyacetylene flame?  
f) What is weld spatter?  
g) State the principle of resistance welding.  
h) State the limitation of TIG welding.  
i) What is HAZ?  
j) What is soldering?

**2×10**

### **PART-A**

- Q.2 Write short notes on the following: **5×4**
- a) Deep drawing.
  - b) Stretch forming.
  - c) Spanning.
  - d) Tube manufacturing.
- Q.3 Write short notes on the following: **10×2**
- a) Plasma arc cutting.
  - b) Material handling equipment's.
- Q.4 a) Explain carbon arc welding process with a neat sketch. **10**
- b) Explain submerged arc welding with its applications. **10**

### **PART-B**

- Q.5 a) Explain MIG welding with its application. **10**
- b) Explain electro slag welding with its applications. **10**
- Q.6 Write short notes on the following: **10×2**
- a) Welding distortion and ways to prevent it.
  - b) Inspection and testing of welds.
- Q.7 a) Explain laser beam welding and its applications. **10**
- b) Explain electrons beam welding. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. (Industry Integrated) — 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.** Each question carries equal marks.

- Q.1 a) What is fixed cost in production facility?  
 b) What do you understand by WIP?  
 c) Define unit cost of production?  
 d) What are the objectives of automated flow lines?  
 e) What do you understand by automated assembly?  
 f) What is the function of part feeding devices?  
 g) What is acceptance sampling method?  
 h) State the various points at which inspection can be done.  
 i) Define CMM probe?  
 j) What is automated manufacturing system? **2×10**

### **PART-A**

- Q.2 a) What do you understand by margin of safety? **5**

	b) Explain break even analysis and how it is estimated.	<b>15</b>
Q.3	Explain various methods of workpart transport.	<b>20</b>
Q.4	a) Explain the analysis of a single station assembly system. b) Discuss selector and orienter in part feeding devices.	<b>15</b> <b>5</b>
	<b><u>PART-B</u></b>	
Q.5	a) Define online inspection process. b) Explain the major areas for statistical methods for quality control and improvements in detail.	<b>5</b> <b>15</b>
Q.6	a) What are the components of a CMM machine? b) Explain the working of a CMM machine. What are the different types of CMM machines and their applications?	<b>5</b> <b>15</b>
Q.7	Explain the various types of material handling equipments in detail.	<b>20</b>

### **End Semester Examination, Dec. 2017**

B. Tech. (Industry Integrated) — 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.** Each question carries equal marks.

Q.1	a) Define passive safety features in a car. b) What is the effect of panoramic windshield? c) What is cut-off & parting operation? d) Define drag. e) What is a split level bus? f) What is yawing? g) Define commercial vehicle. h) Define integral type bus body. i) Define tractor. j) Write down various components of a tractor.	<b>2×10</b>
Q.2	a) Write short notes on the following: i) Centre pillar.	

### **PART-A**

	ii) Centre console. iii) Firewall.	<b>3×3</b> <b>11</b>
b)	Explain drag in derail and its types, with neat sketches.	
Q.3	a) Briefly describe evaporating suspensions in flow visualization techniques. <b>5</b>	
	b) Explain body optimization techniques for minimum drag.	<b>15</b>
Q.4	a) Discuss the various types of metals sections used in bus manufacturing. <b>5</b>	
	b) Briefly describe the following: i) Mini bus. ii) Town bus. iii) Suburban bus. iv) Long distance coaches. v) Touring coaches.	<b>3×5</b>

### **PART-B**

Q.5	a) Discuss in detail about conventional and integral type frame manufacturing.	<b>20</b>
Q.6	a) What are the design considerations taken into account while designing a driver's seat? b) Explain construction of commercial vehicle body.	<b>10×2</b>
Q.7	a) Write down various factors which govern the selection of a tractor. b) Write down various special features of a tractor.	<b>10×2</b>

## **End Semester Examination, Dec. 2017**

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	a) What is mould? Name its parts. b) What is the significance of mould venting on mould? c) How does mould design depend on machine specification? d) What is forging? e) What is diecasting? f) What is swaging tool? g) How is compression mould classified? h) What are the safety precautions to be taken while operating injection mould? i) What do you mean by tolerance and allowance for closed die forging? j) What is closed die forging?	<b>2×10</b>
-----	---	-------------

### **PART-A**

Q.2	a) What is compression moulding? Name its parts.
-----	--

- b) Explain with neat sketch injection moulding cycle.  
c) Why is core fixed in the moving half of the mould?  
d) What is feed system in injection moulding? Sketch and describe a typical feed system to feed four cavities.
- 5×4**

- Q.3 a) What is forging? Describe various types of forging dies.  
b) What are the advantages of open die forging over closed die forging?  
c) Discuss the advantages and limitations of forging process.  
d) Explain with neat sketch various types of forging equipments.
- 5×4**

- Q.4 a) Explain the following with a neat sketch:  
i) Closed die forging.  
ii) Preparation of material for forging.  
b) Explain the term: "allowances and tolerances for closed die forging".
- 10**

### **PART-B**

- Q.5 a) Explain cold chamber die casting process with neat sketch.  
b) What are the selection criteria of materials in die casting dies?  
c) Explain the following:  
i) Combination and unit dies.  
ii) Alignment of dies with sprue.  
d) How die casting dies depends on machine specification?
- 5×4**

- Q.6 a) Explain with neat sketch of swaging tool and coining dies.  
b) Write short notes on:  
i) Horizontal forging machines.  
ii) Die casting alloys.
- 10**
- 5×2**

- Q.7 a) What is the concept of upsetting dies?  
b) What are the calculations required for upsetting dies?  
c) What are the safety precautions to be taken while operating dies.  
d) Explain roll forming process.
- 5×4**

**End Semester Examination, Dec. 2017**  
B. Tech. (Industry Integrated) - 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.** Each question carries equal marks.

- Q.1 a) Define robot.  
b) What is meant by pitch, yaw and roll?  
c) What is meant by a work envelope?  
d) What is end effector?  
e) What is the difference between internal grippers and external grippers?  
f) What is image analysis?  
g) What are safety sensors?  
h) Define pneumatic sensors.  
i) Define path and trajectory.  
j) Define 'joint space trajectory planning'.  
**2×10**

**PART-A**

- Q.2 a) Explain fixed and flexible automation? **5**  
b) Discuss the evolution of robots and robotics? **15**
- Q.3 a) What do you understand about the sensor and vision related to robotics. **5**  
b) Discuss application of robots in material handling. **15**
- Q.4 a) Discuss use of robots in palletizing application of material handling? **5**

b) Explain industrial applications of robots.

**15**

**PART-B**

- |     |  |    |
|-----|--|----|
| Q.5 | a) Describe force sensors in brief.  | 5  |
|     | b) Explain various functions of sensors in robots in detail.                       | 15 |
| Q.6 | a) Define charged couple device (CCD).   | 5  |
|     | b) Discuss industrial application of vision controlled robotics systems in detail. | 15 |
| Q.7 | a) Discuss joint space versus cartesian space trajectory planning.                 | 5  |
|     | b) Explain linear control scheme in detail.  | 15 |

**End Semester Examination, Dec. 2017**

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) Write the functions of balancer blocks in draw tools?
- b) What is the function of a bottoming mark in draw tools?
- c) What is function of gauges in tools?
- d) What is the purpose of giving wear plates in draw tools?
- e) Why is an air vent used in draw tool?
- f) What is meant by drawing ratio?
- g) What is meant by thinning?
- h) What is the function of ejectors in restriking tools?
- i) What is meant by a cam driver?
- j) What is meant by side thrust?

**2×10**

**PART-A**

- |     |  |           |
|-----|--|-----------|
| Q.2 | What is the function of draw tools? Describe the construction of a single action draw tool with diagram. | <b>20</b> |
| Q.3 | What are the different stages of stamping simulation? Describe in detail.                                | <b>20</b> |
| Q.4 | What are the different quality problems in draw operation? How do you                                    | 708/5     |

overcome them?

**20**

**PART-B**

- |     |   |           |
|-----|---|-----------|
| Q.5 | a) What is the advantage and role of restriking operation?              | <b>5</b>  |
|     | b) Describe the construction of an upward restriking tool with diagram? | <b>15</b> |
| Q.6 | What are the design standards of a restriking tool?                     | <b>20</b> |
| Q.7 | Draw the construction of trim pierce tool with diagram.                 | <b>20</b> |

**End Semester Examination, Dec. 2017**

B. Tech. (Mechanical 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 | a) Define Galvanizing.<br>b) What do you understand by vitreous enameling?<br>c) Define hexagonal close packed crystal structure.<br>d) Define Carbonitriding.<br>e) What do you understand by vitreous enameling?<br>f) Name various thermal spraying processes.<br>g) Define HVOF spraying.<br>h) Define Thin Coatings.<br>i) Define Sputtering,<br>j) What is pickling process? | <b>2×10</b> |
|-----|--|-------------|

**PART-A**

- |     |  |                       |
|-----|--|-----------------------|
| Q.2 | a) Discuss surface texture properties of a material machined on shaper.<br>b) Explain induction hardening process in detail. | <b>5</b><br><b>15</b> |
| Q.3 | a) Discuss carburizing process in brief.<br>b) Explain case hardening methods and applications in detail.                    | <b>5</b><br><b>15</b> |
| Q.4 | a) Describe electroplating process with a neat sketch.<br>b) Explain hot dip coating process in detail.                      | <b>5</b><br><b>15</b> |

**PART-B**

- |     |  |          |
|-----|--|----------|
| Q.5 | a) Describe plasma spray coating in brief. | <b>5</b> |
|-----|--|----------|

- b) Explain various types of conversion coating selection criteria for coatings in detail. **15**
- Q.6** a) Discuss chemical vapour deposition in brief. **5**  
 b) Explain with a neat sketch, electron beam hardening technique and its advantages in detail? **15**
- Q.7** a) What are the applications of thin coatings? **5**  
 b) Explain diamond coating and its advantages in detail. **15**

## **End Semester Examination, Dec. 2017**

### B. Tech. (Industry Integrated) — 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:
- Define the term 'Quality'. Describe the relationship between quality and variability.
  - What are random variation and assignable variation?
  - Describe bath tub curve.
  - What is meant by acceptance sampling?
  - Differentiate between MTTF and MTBF. **4×5**

#### **PART-A**

- Q.2** a) Describe the various dimensions of quality in detail with examples. **10**  
 b) Describe the concept of reliability in detail. **10**
- Q.3** a) Describe the independent and dependent events in detail with help of an example. **10**  
 b) Discuss statistical quality control and methods adopted for implementing statistical quality control. **10**
- Q.4** Plot X and R chart for data given below and comment on the result:

Subgmp No.	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM	10:30 AM	11:20 AM
1.0	10.1	7.0	5.0	9.0	2.0	2.0	5.0
2.0	1.0	4.0	2.0	3.0	4.0	4.0	6.0
3.0	4.0	10.0	6.0	7.0	2.0	8.0	4.0
4.0	9.0	2.0	2.0	3.0	6.0	8.0	10.0
5.0	8.0	8.0	3.0	1.0	1.0	6.0	3.0

**PART-B**

- Q.5 Describe the Seven Quality Tools in detail with help of examples and neat sketches. **20**
- Q.6 a) Discuss steps in promoting and implementing TQM in manufacturing industry. **10**  
 b) Discuss quality circle and its role in meeting individual needs. **10**
- Q.7 Write short notes on the following:  
 a) Types of acceptance sampling. **6**  
 b) ISO 9000 quality system standards. **7**  
 c) Value and quality assurance. **7**

**End Semester Examination, Dec. 2017**

B. Tech. - First Semester

**INTRODUCTION TO PROGRAMMING IN C (MOOC-UGC-002)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: 2

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
 Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 Step-by-step instructions written to solve any problem is called:  
 a) Psedocode.  
 b) Algorithm.  
 c) Assembler  
 d) Class **1**
- Q.2 Diagrammatic or symbolic representation of an algorithm is called:  
 a) Data flow diagram.  
 b) E-R diagram.  
 c) Flow chart.  
 d) None of the above. **1**
- Q.3 Int A [3] [2] [2]={1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 }. What will be the value of A [2] [1] [0]?  
 a) 5  
 b) 7  
 c) 9  
 d) 11 **1**
- Q.4 What is the output of following code?  
 void main ()

```

{
    int A [4]={1, 5},
    printf("%d", A[3]);
}

```

a) 0  
b) Syntax Error.  
c) 5  
d) None of the above.

**1**

Q.5 What is the following program snippet determining?

```

int fn(int a, int b)
{
    if (b==0) return 0;
    if (b==1) return a;
    return a+fn (a, b-1);
}

```

- a)  $a+b$  when  $a, b$  are integers.  
b)  $a+b$  when  $a$  and  $b$  are non-negative integers.  
c)  $a*b$  when  $a$  and  $b$  are integers.  
d)  $a*b$  when  $a$  and  $b$  are non-negative integers.

**1**

Q.6 Given float \*pf;

int \*pi; which of the following is true.

- a) Size of (pf) > size of (pi)  
b) Size of (pi) > size of (pf)  
c) Size of (pi) = size of (pf)  
d) None of the above.

**1**

Q.7 Size of following union is?

Union ABC

```

{
    int a;    float b;    char c; };

```

a) 2  
b) 4  
c) 1  
**d) 7**  
**1**

Q.8 What will be the output of following code?

```

Struct abc {int a; int b; } v[3], *P;
Void main ()
{
    p=v;
    p→a=3;  p→b=p→a;
    printf ("in%d Lt %d", v[0].a, v[0].b);
}

```

- a) 3 4  
b) 4 3  
c) 3 3  
d) any garbage value.

**1**

Q.9 How is a variable accessed from another file?

- a) via the extern specifier.

- b) via the auto specifier.
- c) via the global specifier.
- d) via the pointer specifier.

**1**

**Q.10** The statement

`#include "filename.h"`

Is replaced by the contents of "filename.h"

- a) before compilation.
- b) after compilation.
- c) during execution.
- d) during typing the program.

**1**

**Q.11** Write 10 differences between Windows and Linux operating system.

**10**

**Q.12** WAP to check whether the given number is ARMSTRONG or not.

**10**

**Q.13** WAP to swap two numbers using call-by-reference.

**10**

**Q.14** WAP to generate PRIME numbers till 1000.

**10**

**Q.15** WAP to concatenate the contents of two files in third file. (File1+File2 →File 3.) **10**

## **End Semester Examination, Dec. 2017**

B. Tech. - First Semester

### **COMPUTER FUNDAMENTALS (MOOC-UGC-008)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated  
against each question.

#### **Multiple choice questions:**

- |     |   |          |
|-----|---|----------|
| Q.1 | Which device is required for the internet connection?                                     |          |
|     | a) Joystick   |          |
|     | b) Modem  |          |
|     | c) CD drive   |          |
|     | d) NIC card   | <b>1</b> |
| Q.2 | VGA is:   |          |
|     | a) Video graphics array   |          |
|     | b) Volatile graphics array.   |          |
|     | c) Visual graphics array.   |          |
|     | d) Video graphics adapter.  | <b>1</b> |
| Q.3 | IBM 1401 is:  |          |
|     | a) First generation computer.   |          |
|     | b) Second generation computer.  |          |
|     | c) Third generation computer.   |          |
|     | d) Fourth generation computer.  | <b>1</b> |
| Q.4 | The capacity of 3.5 inch floppy disk is:  |          |
|     | a) 1.40 MB  |          |
|     | b) 1.40 GB  |          |
|     | c) 1.44 MB  |          |
|     | d) 1.44 GB  | <b>1</b> |
| Q.5 | What types of computer are client computers (most of the time) in a client-server system? |          |
|     | a) Main frame.  |          |
|     | b) Microcomputer.   |          |

- c) Mini computer
- d) PDA

**1**

Q.6 A computer cannot ‘boot’ if it does not have the:

- a) Compiler
- b) Operating system.
- c) Loader
- d) Assembler

**1**

Q.7 Where the programme and data are stored, when the processor uses them?

- e) Main memory
- f) Disk memory
- g) Secondary memory
- h) Programme memory**

**1**

Q.8 Which programming language is classified as low level language?

- a) BASIC COBOL, FORTRAN
- b) Prolog
- c) C, C++
- d) Assembly language.

**1**

Q.9 \_\_\_\_\_ is the ability of a device to “jump” directly to the requested data:

- a) Sequential access
- b) Quick access
- c) Random access
- d) All of the above

**1**

Q.10 In latest generation computers, the instructions are executed:

- a) Parallel only
- b) Both sequential and parallel
- c) Sequential only
- d) All of the above.

**1**

Q.11 Explain the hierarchy of memory in detail. **10**

Q.12 Explain the difference between actual and formal parameters with an example. **10**

Q.13 Differentiate between an algorithm and a flow-chart. Write an algorithm for a problem in which N numbers are read and it is desired to pick the largest of them. **10**

Q.14 Define ‘operating system’. Give different functions of operating system. **10**

Q.15 Explain error handling during file operations, in detail. Also, write down a program to explain unformatted and formatted file input/output operations.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **TOTAL QUALITY MANAGEMENT (MOOC-UGC-010)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated  
against each question.

#### **Multiple choice questions:**

- |     |  |          |
|-----|--|----------|
| Q.1 | Total Quality Management focuses on:                             |          |
|     | a) Employee  |          |
|     | b) Customer  |          |
|     | c) Both a) and b)  |          |
|     | d) None of the above   | <b>1</b> |
| Q.2 | According to Deming, quality problems are:                       |          |
|     | a) Due to management.  |          |
|     | b) Due to method.  |          |
|     | c) due to machine.   |          |
|     | d) Due to material.  | <b>1</b> |
| Q.3 | CMM stands for:  |          |
|     | a) Capability maturity model.                                    |          |
|     | b) Capability monitoring model.                                  |          |
|     | c) Capability measuring model.                                   |          |
|     | d) Capability matching model.                                    | <b>1</b> |
| Q.4 | What is meant by Kaizen?   |          |
|     | a) Card signal.  |          |
|     | b) To avoid inadvertent errors.                                  |          |
|     | c) Change for better quality.                                    |          |
|     | d) None of the above.  | <b>1</b> |
| Q.5 | The aim of just-in-time manufacturing principle is to eliminate. |          |
|     | a) Time wastage.   |          |
|     | b) Labour wastage.   |          |
|     | c) Cost of excessive inventory.                                  |          |

- d) All of the above. 1
- Q.6 Which of the following is for Environment Management?  
a) ISO-9000  
b) ISO-14000  
c) ISO-26000  
d) ISO-31000 1
- Q.7 While setting quality objective, \_\_\_\_\_ to be considered.  
**i) Customer need**  
**j) Organizational need**  
k) Supplier need  
**l) Worker need** 1
- Q.8 \_\_\_\_\_ helps organization reduce employee turnover and absenteeism.  
a) Job design  
b) Training & Development.  
c) Wage revision  
d) All of the above 1
- Q.9 TQM promotes:  
a) Small change.  
b) Continous improvement.  
c) Employee participation.  
d) Employee. 1
- Q.10 Quality circle benefit to  
a) Small change.  
b) Continous improvement.  
c) Employee participation.  
d) Employee. 1
- Q.11 Define TQM. Discuss the barriers to TQM implementation. 10
- Q.12 Discuss any four customer retention strategies. 10
- Q.13 What is six sigma? Discuss its DMAIC methodology. 10
- Q.14 What is benchmarking? Discuss the process of benchmarking? 10
- Q.15 Discuss the roles of the following in enhancing the quality of the organization.  
a) Leadership.  
b) Cross functional teams. 5x2

## **End Semester Examination, Dec. 2017**

B. Com (Hons) and B. Com (H) – Industry Integrated. – First Semester  
**DOCUMENT PROCESSING AND ORGANISATION (MOOC-UGC-013)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated  
against each question.

### **Multiple choice questions:**

- Q.1 The \_\_\_\_\_ is a general practical classification tool to classify all kinds of documents on any subjects in all types of libraries.  
a) DDC  
b) MCs  
c) FM  
d) DD **1**
- Q.2 Standard Subdivisions (SS) always begin with a \_\_\_\_\_:  
a) 1  
b) 0  
c) 2  
d) 10 **1**
- Q.3 All the class members in the DDC are composed of decimal numerals and have minimum of \_\_\_\_\_ digits.  
a) Two  
b) Four  
c) Six  
d) Three **1**
- Q.4 There are \_\_\_\_\_ tables in the 19<sup>th</sup> edition of DDC:  
a) Seven  
b) Fourteen  
c) Ten  
d) None of the above. **1**
- Q.5 \_\_\_\_\_ is a library catalogue which is computerized from having searching and browsing facilities.

- a) OPAC
- b) Dictionary
- c) Classified
- d) None of the above.

**1**

Q.6 \_\_\_\_\_ entry is generally prepared basing the author, corporate author and sometimes by the title if the author is not given.

- a) Subject
- b) Title
- c) Name
- d) Main

**1**

Q.7 Designated vertical margins or spaces from the left margin of the catalogue card is called:

- m) Indentations
- n) Document
- o) Collaborator
- p) None of the above.

**1**

Q.8 The full form of AACR is \_\_\_\_\_.

- a) Anglo-American Cataloging Rules.
- b) American-Anglo Cataloging Rules.
- c) Austria-American Cataloging Rules.
- d) Anglo-African Cataloging Rules.

**1**

Q.9 In \_\_\_\_\_ all the information about the collaborators, editions, imprint, etc continues from the second indentation only.

- a) Hanging indentation
- b) First indentation.
- c) Third indentation.
- d) None of the above.

**1**

Q.10 The full form of GMD is:

- a) Global Market Description.
- b) General Material Description.
- c) Gigantic Material Description.
- d) None of the above.

**1**

Q.11 What do you mean by "library classification"? Discuss the different kinds of library classification. **10**

Q.12 Discuss, in detail, the DDC classification scheme. Name the auxiliary tables of the 19<sup>th</sup> edition of DDC. **10**

Q.13 Discuss, in detail, the cataloging process. **10**

Q.14 Discuss, in detail, the structure of AACR2 with examples. **10**

Q.15 Discuss, in detail, the various filing rules applicable in Library management.

**10**

**End Semester Examination, Dec. 2017**  
B. Tech. – Fifth Semester  
**ENVIRONMENTAL BIOLOGY, GENETICS AND EVOLUTION**  
**(MOOC-UGC-017)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated  
against each question.

**Multiple choice questions:**

- |     |   |          |
|-----|---|----------|
| Q.1 | The tendency of population to remain in genetic equilibrium may be disturbed by |          |
|     | a) Random Mating  |          |
|     | b) Lack of migration  |          |
|     | c) Lack of Mutations  |          |
|     | d) Lack of Random Mating  | <b>1</b> |
| Q.2 | A baby has been born with a small tail. It is the case exhibiting               |          |
|     | a) Atavism  |          |
|     | b) Mutation   |          |
|     | c) Retrogressive Evolution  |          |
|     | d) Metamorphosis  | <b>1</b> |
| Q.3 | Homologous organs indicate the  |          |
|     | a) Convergent Evolution   |          |
|     | b) Parallel Evolution   |          |
|     | c) Common Descendent  |          |
|     | d) Natural Selection  | <b>1</b> |
| Q.4 | Layer of atmosphere in which Ozone layer lies is                                |          |
|     | a) exosphere  |          |
|     | b) mesosphere   |          |
|     | c) troposphere  |          |
|     | d) stratosphere   | <b>1</b> |
| Q.5 | Greenhouse gas which is present in very high quantity is                        |          |
|     | a) propane  |          |
|     | b) ethane   |          |
|     | c) carbon dioxide   |          |
|     | d) methane  | <b>1</b> |
| Q.6 | During Photosynthesis, the liberated gas is                                     |          |
|     | a) Hydrogen   |          |

- b) Nitrogen  
c) Oxygen  
d) Carbon Dioxide 1
- Q.7 In DNA adenine normally pairs with  
**q)** Cytosine  
**r)** Guanine  
**s)** Thymine  
**t)** Uracil 1
- Q.8 A nonsense mutation involves  
a) A regulatory sequence  
b) An AG splice acceptor site  
c) The creation of a different amino acid  
d) The creation of a stop codon 1
- Q.9 Exon skipping is associated with  
a) Nonsense mutations  
b) Regulatory mutations  
c) RNA processing mutations  
d) Silent mutations 1
- Q.10 Which of the following conditions is caused by a trinucleotide (triplet) repeat expansion?  
a) Cystic Fibrosis  
b) Duchenne muscular dystrophy  
c) Huntington Disease  
d) Osteogenesis imperfecta 1
- Q.11 What is Bioremediation? Why is bioremediation preferred over physical and chemical methods of environmental cleanup? Differentiate between in-situ and ex-situ technologies of bioremediation. 10
- Q.12 How is polluted water responsible to disturb ecological balance? Discuss about its sources and effect on the environment. 10
- Q.13 Differentiate between Chromosomal and Gene Mutations. Explain with Examples 10
- Q.14 Is the phenomenon of natural selection part of evolution? Why or Why Not? 10
- Q.15 Explain the role of genetics in the process of evolution? Cite Examples in the explanation. 10

## End Semester Examination, Dec. 2017

B. Tech. (ECE) – Fifth Semester

### **ANALOG COMMUNICATION (MOOC-UGC-018)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: 2

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

#### **Multiple choice questions:**

- Q.1 The AM spectrum consists of:  
a) Carrier frequency.  
b) Upper side band frequency.  
c) Lower side band frequency.  
d) All of the above. **1**
- Q.2 The modulation technique that uses the minimum channel bandwidth and transmitted power is:  
a) FM  
b) DSB-SC  
c) VSB  
d) SSB **1**
- Q.3 A 100 MHz carrier is modulated with a sinusoidal signal of 1 KHz, the maximum frequency deviation being 50 KHz. The transmission bandwidth of FM signal will be:  
a) 1 KHz  
b) 50 KHz  
c) 102 KHz  
d) 150 KHz **1**
- Q.4 Consider an angle modulated signal  $x(t) = 6\cos[2\pi \times 10^3 t + 2\sin(8000\pi t) + 4\cos(800\pi t)]$ . The average power of  $x(t)$  is:  
a) 10 W  
b) 20 W  
c) 18 W  
d) 28 W **1**
- Q.5 Noise is added to a signal in a communication system:  
a) At the receiving end  
b) At transmitting-antenna  
c) In the channel.  
d) During regeneration of the information. **1**
- Q.6 The noise due to random behavior of charge carriers is:  
a) Shot noise.

- b) Partition noise.  
 c) Industrial noise.  
 d) Flicker noise. 1
- Q.7 For a bandwidth of B KHz, the thermal noise voltage generated by resistor R at absolute temperature T is:  
**u)**  $\sqrt{4kTBR}$   
**v)**  $1/\sqrt{4kTBR}$   
**w)**  $\sqrt{4kTB} / R$   
**x)**  $\sqrt{4kTBG}$  1
- Q.8 Demodulation is:  
 a) Detection.  
 b) Recovering information from modulated signal.  
 c) Both a) and b)  
 d) None of the above. 1
- Q.9 The standard value for intermediate frequency (IF) in AM receivers is:  
 a) 455 KHz  
 b) 508 KHz  
 c) 10.7 MHz  
 d) 50 MHz 1
- Q.10 Function of frequency mixer in super heterodyne receiver is:  
 a) Amplification.  
 b) Filtering.  
 c) Multiplication of incoming signal and locally generated carrier.  
 d) None of the above. 1
- Q.11 a) Discuss the need of modulation in a communication system. 5  
 b) Describe various elements of a communication system in detail. 5
- Q.12 A FM signal is given by  $v(t) = 10\cos(2\pi 10^8 t + 20\cos 2\pi 10^3 t)$ .  
 Find: a) Carrier frequency b) Message frequency c) Modulation index d)  
 Average power e) Frequency deviation f) Bandwidth 10
- Q.13 Two resistors of 50 KΩ and 100 KΩ at room temperature 290 K are connected together. For the bandwidth of 50 KΩ, calculate thermal noise voltage when:  
 a) Resistors are connected in series.  
 b) Resistors are connected in parallel. 10
- Q.14 Draw the block diagram of AM super heterodyne receiver and briefly explain the function of each stage. 10
- Q.15 a) Compare different types of amplitude modulation techniques i.e. DSB (Doble side band), DSB-SC (Double side band suppressed carrier), SSB (Single side band) and VSB (Vestigial side band). 6  
 b) A 400 Watts carrier is modulated to a depth of 75 percent. Find the total power in the amplitude modulated wave. Assume the modulating signal to be a sinusoidal one. 4

## **End Semester Examination, Dec 2017**

B. Tech. – Third Semester / M.Sc.-BT – First Semester

### **BIOCHEMISTRY AND CELL BIOLOGY (MOOC-UGC-019)**

Time: 3 hrs.

Max Marks: **50**

No. of pages: 2

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

#### **Multiple choice questions:**

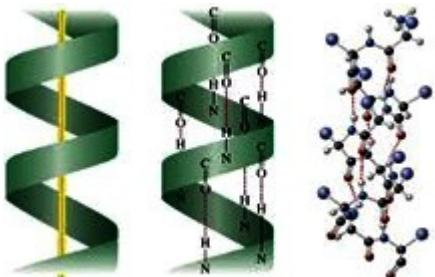
- Q.1 Entropy is highest in which of the following systems?  
a) Water vapor  
b) Liquid water at pH 7.0, at room temperature  
c) Water with sufficient acid added to lower the pH to 2.0  
d) Supercooled water (< 0°C)  
e) Ice 1
- Q.2 Which of the following is NOT an anabolic product of nitrogen assimilation?  
a) Methionine  
b) Glutamine  
c) Asparagine  
d) Aspartate  
e) Urea 1
- Q.3 The glyoxylate cycle is not found in animals. This is due to the inability of animals to:  
a) Synthesize oxaloacetate from isocitrate  
b) Synthesize glutamate from malate  
c) Perform gluconeogenesis from amino acids  
d) Perform gluconeogenesis from fatty acids  
e) Perform CO<sub>2</sub> fixation via the reverse citric acid cycle 1
- Q.4 The first common metabolic intermediate in metabolism of glucose and fatty acids under aerobic condition is:  
a) Acetyl CoA  
b) Beta-hydroxybutyrate  
c) Pyruvate  
d) Citrate  
e) Glyceraldehyde 3-phosphate 1
- Q.5 Which of the following statements about glycolysis is correct?  
a) Glycolysis does not require oxygen.  
b) The end products of glycolysis are always Pyruvate and ATP.  
c) The end products of glycolysis is always lactate and ATP.  
d) Glycolysis is oxidation of glucose. It can occur both aerobically and non-aerobically. 1

Q.6 Sucrose is composed of which two sugars?

- a) Glucose + glucose
- b) Glucose+ fructose
- c) Glucose + galactose
- d) Fructose + Galactose
- e) Glucose + ribose

**1**

Q.7 Identify the structure:



- a) RNA
- b) DNA Alpha-helix
- c) Long chain fatty acid
- d) None of the above

**1**

Q.8 Acy carrier protein requires which vitamin:

- a) Vit B1
- b) Vit B12
- c) Vit B5
- d) Vit K
- e) Vit D

**1**

Q.9 Ribosome are synthesized in part of cell called:

- a) Golgi complex
- b) Mitochondria
- c) Nucleolus
- d) Nucleus

**1**

Q.10 Phagocytosed food is digested with help of enzymes which are present in:

- a) Ribosome
- b) Lyosomes
- c) Mitochondria
- d) Golgi complex

**1**

Q.11 a) Draw the structures of glucose and fructose.

b) Explain the structure of glycogen. State the significance of this molecule.

**5x2**

Q.12 a) What is glutathione? Mention the important functions of glutathione in detail.

b) Which disease is caused by the increased concentrations of phenylalanine in blood? Explain the biochemical reaction that causes PKU.

**5x2**

Q.13 a) Describe purine salvage pathway in brief.

b) Where does the krebs cycle occur in the cell? Draw the pathway.

**5x2**

Q.14 Write short notes on (i) Fluid mosaic model (ii) Active and Passive Transport.

**10**

Q.15 What is cell signaling? Describe the different pathways of intracellular cell signal transduction with the help of flow charts and diagrams.

**10**

B. Tech. - Seventh Semester  
**CLOUD COMPUTING (MOOC-UGC-020)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 What is the number one concern about cloud computing?  
a) Too expensive.  
b) Security concern.  
c) Too many platforms.  
d) Accessibility. **1**
- Q.2 Which is not a major cloud computing platform?  
a) Google 101  
b) IBM Deepblue  
c) Micorosoft Azure  
d) Amazon EC<sub>2</sub> **1**
- Q.3 What “Cloud” in cloud computing represents?  
a) Wireless  
b) Hard drive  
c) People  
d) Internet **1**
- Q.4 In which category of SaaS services depend on Customer Relation Management Software.  
a) Consumer services.  
b) Communication services.  
c) Business services.  
d) Infrastructure services. **1**
- Q.5 A company interested in cloud computing is looking for a provider who offers a set of basic services, such as, virtual server provisioning and on demand storage that can be combined into a platform for deploying and running customized applications. What type of cloud computing model fits these?  
a) Platform as a service  
b) Software as a service.  
c) Application as a service  
d) Infrastructure as a service. **1**
- Q.6 Which statement is true about a bare metal hypervisor?  
a) It can only be hosted on an existing system.  
b) It has minimum functionality to support only one type of operating system.  
c) It requires a separate licence for native operating system.  
d) It runs directly on server hardware to provide virtual machine with time sharing resources. **1**

- Q.7 Which computing feature is related to utility computing?  
y) Security  
z) Virtualization  
aa) Metering  
**ab) Multilatency** 1
- Q.8 In which cloud computing layer software as a service is considered to be included?  
a) Data  
b) Infrastructure.  
c) Application  
d) Client 1
- Q.9 Which cloud deployment model is operated solely for a single organization and its authorized users?  
a) Private cloud  
b) Public cloud  
c) Community cloud  
d) Hybrid cloud 1
- Q.10 Which model of cloud computing service providers the servers, storage devices and networks for a subscriber?  
a) IaaS  
b) SaaS  
c) PaaS  
d) CaaS 1
- Q.11 Discuss the various opportunities and challenges associated with cloud computing. 10
- Q.12 Explain all cloud services model with diagram. 10
- Q.13 What are the various security issues and problems associated with cloud computing? 10
- Q.14 Discuss various open source and commercial cloud. 10
- Q.15 What are various latest research trends in cloud computing? 10

Time: 2 hrs.

Max Marks: **50**

No. of pages: 2

Note: Attempt **FOUTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 The file once created cannot be changed is called:  
a) Immutable file  
b) Mutex file  
c) Mutable file  
d) None of the mentioned **1**
- Q.2 \_\_\_\_\_ of the distributed file system are dispersed among various machines of distributed system.  
a) Clients  
b) Servers  
c) Storage devices  
d) All of the mentioned **1**
- Q.3 What is not true about distributed system?  
a) It is a collection of processor  
b) All processors are synchronized  
c) They do not share memory  
d) None of the mentioned **1**
- Q.4 What are characteristics of processor in distributed system?  
a) They vary in size and function  
b) They are same in size and function  
c) They are manufactured with single purpose  
d) They are real-time devices **1**
- Q.5 What are characteristics of distributed file system?  
a) Its users, servers and storage devices are dispersed  
b) Service activity is not carried out across the network  
c) They have single centralized data repository  
d) There are multiple dependent storage devices **1**
- Q.6 What is not a major reason for building distributed systems?  
a) Resource sharing  
b) Computation speedup  
c) Reliability  
d) Simplicity **1**
- Q.7 What are types of distributed operating system?  
**ac)** Network Operating system  
**ad)** Zone based Operating system  
**ae)** Level based Operating system  
**af)** All of the mentioned **1**
- Q.8 What are characteristics of Network Operating Systems?  
a) Users are aware of multiplicity of machines  
b) They are transparent  
c) They are simple to use

- d) All of the mentioned 1
- Q.9** How is access to resources of various machines done?  
 a) Remote logging using ssh or telnet  
 b) Zone are configured for automatic access  
 c) FTP is not used  
 d) All of the mentioned 1
- Q.10** What are characteristics of Distributed Operating system?  
 a) Users are aware of multiplicity of machines  
 b) Access is done like local resources  
 c) Users are aware of multiplicity of machines  
 d) They have multiple zones to access files 1
- Q.11** a) Discuss ATM in detail.  
 b) What are the various steps involved in RPC? **5x2**
- Q.12** a) Differentiate between Process and Threads.  
 b) Differentiate between User-level and Kernel level Threads. **5x2**
- Q.13** Discuss Real Time operating System and Explain issues in Distributed operating system. **10**
- Q.14** Discuss Deadlock Detection in Distributed system. **10**
- Q.15** Write short notes on:  
 a) Distributed Shared Memory.  
 b) Communication protocols in distributed system **5x2**

**End Semester Examination, Dec. 2017**  
 B. Tech. – Third Semester  
**ELECTRICAL MACHINE-I (MOOC-UGC-024)**

Time: 2 hrs.

Max Marks: **50**  
 No. of pages: **2**

Note: Attempt **FOUTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 Thin laminations are used in a machine in order to reduce:  
a) Eddy Current Losses  
b) Hysteresis Losses  
c) Both a) & b)  
d) Copper losses 1
- Q.2 The brushes are \_\_\_\_\_ in shape.  
a) Triangular  
b) Rectangular  
c) Cylindrical  
d) Square 1
- Q.3 The following is (are) the part(s) of a field magnet.  
a) Yoke  
b) Pole cores  
c) Pole shoes  
d) All of the above 1
- Q.4 Which of the following generators have two field windings?  
a) Series wound generator.  
b) Shunt wound generator.  
c) Compound wound generator.  
d) All of the above 1
- Q.5 Maximum efficiency will occur, when copper loss is \_\_\_\_\_ to iron loss  
a) Equal  
b) Greater  
c) Less  
d) Both b) & c) losses. 1
- Q.6 Iron losses in a D.C. machine are independent of variations in  
a) speed  
b) load  
c) voltage  
d) speed and voltage 1
- Q.7 Brushes of D.C. machines are made of  
**ag)** carbon  
**ah)** soft copper  
**ai)** hard copper  
**aj)** All of the above 1
- Q.8 How can eddy current loss be minimized?  
a) Laminating the core  
b) controlling armature current  
c) supply voltage  
d) changing frequency 1
- Q.9 The path of magnetic flux in a transformer is

- a) high resistance
- b) high reactance
- c) low resistance
- d) low reactance

**1**

**Q.10** Scott connection is used to convert

- a) single phase to two phase
- b) two phase to three phase
- c) single to six phase
- d) three to six phase

**1**

**Q.11** Derive EMF equation of transformer. What are typical applications for transformers?

**10**

**Q.12** Explain parallel operation of three phase transformers.

**10**

**Q.13** A 4 pole lap wound DC shunt motor rotates at the speed of 1500 rpm, has a flux of 0.4 mwb and the total number of conductors are 1000. Calculate the value of emf.

**10**

**Q.14** Explain speed control methods used in DC machines.

**10**

**Q.15** a) What is the difference between KW and KVA? Why transformer is rated in KVA? **5**  
b) What do you mean by armature reaction? Explain in case of DC motors. **5**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

**ENGINEERING THERMODYNAMICS (MOOC-UGC-025)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.** Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 Which of the following is an extensive property?  
 a) Pressure  
 b) Temperature  
 c) Volume  
 d) Density 1
- Q.2 The volume of one bar (SI Units) is equal to:  
 a)  $100 \text{ N/m}^2$   
 b)  $1000 \text{ N/m}^2$   
 c)  $1 \times 10^4 \text{ N/m}^2$   
 d)  $1 \times 10^5 \text{ N/m}^2$  1
- Q.3 The latent heat of vapourization at critical point is:  
 a) Less than zero  
 b) Greater than zero  
 c) Equal to zero  
 d) None of the above. 1
- Q.4 The equation of state per kg of a perfect gas is given by:  
 a)  $p^2v = RT$   
 b)  $pv = RT$   
 c)  $pv^2 = RT$   
 d)  $p^2v^2 = RT$   
 Where P, V, T and R are pressure, volume, temperature and characters gas constant respectively. 1
- Q.5 Work done in a free expansion process is:  
 a) Zero  
 b) Minimum  
 c) Maximum  
 d) Positive 1
- Q.6 The most important solid fuel is:  
 a) Wood  
 b) Charcoal  
 c) Coal  
 d) All of the above. 1
- Q.7 For a reversible adiabatic process, the entropy change is:  
**ak)** Zero  
**al)** Unity  
 am) Negative  
**an)** Positive 1
- Q.8 The specific heat at constant pressures ( $C_p$ ) is given by:  
 a)  $C_p = T \left( \frac{\partial S}{\partial T} \right)_P$   
 b)  $C_p = T \left( \frac{\partial T}{\partial S} \right)_P$

$$c) C_p = T \left( \frac{\partial V}{\partial T} \right)_P$$

$$d) C_p = T \left( \frac{\partial T}{\partial V} \right)_P$$

1

Q.9 Helmholtz function is expressed as:

- a)  $(u - Ts)$
- b)  $(h - Ts)$
- c)  $(u + pv)$
- d)  $(-sdT + vdp)$

1

Q.10 Rankine cycle efficiency may be in the range of

- a) 15 to 20%
- b) 35 to 45%
- c) 70 to 80%
- d) 90 to 95%

1

Q.11 The properties of a closed system change following the relation between pressure and volume as  $(PV=3.0)$  where p is in bar and v is in m<sup>3</sup>. Calculate the work done when pressure increases from 1.5 bar to 7.5 bar. **10**

Q.12 Describe the process of formation of steam and give its graphical representation also. **10**

Q.13 Derive an expression for decrease in available energy. **10**

Q.14 Write short notes on:

- a) Steady flow energy equation.
- b) Entropy. **10**

Q.15 Explain the following:

- a) Equation of state.
- b) Isothermal compressibility. **5x2**

## End Semester Examination, Dec. 2017

B. Tech. – Fifth Semester

## FLUID DYNAMICS AND TURBOMACHINES (MOOC-UGC-026)

Time: 2 hrs.

Max Marks: **50**

No. of pages: 2

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.** Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 Newton's law of viscosity states that:  
 a) Shear stress is directly proportional to the velocity.  
 b) Shear stress is directly proportional to velocity gradient.  
 c) Shear stress is directly proportional to shear strain.  
 d) Shear stress is directly proportional to the viscosity. 1
- Q.2 Poise is a unit of:  
 a) mass density.  
 b) dynamic viscosity.  
 c) kinematic viscosity.  
 d) Velocity gradient. 1
- Q.3 The resultant hydrostatic force acts through a point known as:  
 a) Centre of gravity.  
 b) Centre of buoyancy.  
 c) Centre of pressure.  
 d) Centre of mass. 1
- Q.4 Continuity equation deals with the law of conservation of:  
 a) Mass  
 b) Energy  
 c) Momentum.  
 d) Force. 1
- Q.5 The boundary layer separation takes place if  
 a) Pressure gradient is zero.  
 b) Pressure gradient is positive.  
 c) Pressure gradient is negative.  
 d) Independent of pressure gradient. 1
- Q.6 Von-Karman integral equation is given as:  
 a)  $\frac{\tau_0}{\frac{1}{2} \int u^2} = \frac{\partial \theta}{\partial x}$   
 b)  $\frac{\tau_0}{\int u^2} = \frac{\partial \theta}{\partial x}$   
 c)  $\frac{\tau_0}{2 \int u^2} = \frac{\partial \theta}{\partial x}$   
 d)  $\frac{\tau_0}{4 \int u^2} = \frac{\partial \theta}{\partial x}$  1
- Q.7 A turbine is a device which converts:  
 ao) Hydraulic energy into mechanical energy.  
 ap) Hydraulic energy into electrical energy.  
 aq) Mechanical energy into hydraulic energy.  
 ar) Electrical energy into hydraulic energy. 1
- Q.8 Kaplan turbine is:  
 a) an impulse turbine.  
 b) a radial flow impulse turbine.  
 c) an axial flow reaction turbine.  
 d) an radial flow reaction turbine. 1

- Q.9 To produce high head by multistage centrifugal pumps, the impellers are connected:  
 a) in parallel.  
 b) in series.  
 c) in parallel and in series.  
 d) None of the above. 1

- Q.10 The specific speed of a pump is given by the expression:

a)  $N_s = \frac{N\sqrt{Q}}{(H_m)^{5/4}}$

b)  $N_s = \frac{N\sqrt{P}}{(H_m)^{3/4}}$

c)  $N_s = \frac{N\sqrt{Q}}{(H_m)^{3/4}}$

d)  $N_s = \frac{N\sqrt{P}}{(H_m)^{5/4}}$  1

- Q.11 Briefly explain:

- a) Newtonian and non-Newtonian fluid  
 b) Steady and unsteady flow.  
 c) Uniform and non-uniform flow.  
 d) Rotational and irrotational flow.

**2x5**

- Q.12 A 30 cm diameter pipe, conveying water, branches into two pipes of diameter 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in the pipe. Also, determine the velocity in 15 cm pipe if the velocity in 20 cm diameter pipe is 2 m/s. 10

- Q.13 a) What is Bernoulli's equation for both ideal and real fluid? Also, mention the assumptions. 5  
 b) The stream function for a two dimensional flow is given by  $\psi = 2xy$ . Calculate the velocity at point P (2, 3). 5

- Q.14 a) Define the terms: Boundary layer; Boundary layer thickness; Drag; Lift and Momentum thickness. 5  
 b) What do you mean by boundary layer separation? Also, mention the methods of preventing the separation of? 5

- Q.15 a) Write the differences between impulse and Reaction turbine. 5  
 b) Explain with sketch the construction details and working principle of centrifugal pump. 5

**End Semester Examination, Dec. 2017**  
B. Tech. – Fifth Semester  
**FUNDAMENTAL OF GAS DYNAMICS (MOOC-UGC-027)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated  
against each question.

**Multiple choice questions:**

- Q.1 A normal shock propagated into still air travels with a speed:  
a) equal to the speed of sound in the still air  
b) larger than the speed of sound in the still air  
c) smaller than the speed of sound in the still air

- d) all of the above are possible, depending on the air temperature 1
- Q.2 A perfect gas enters a frictionless, insulated passage with a supersonic speed. It is desired to increase the static pressure of the gas as it flows through the passage. The passage area should:  
 a) decrease  
 b) remain constant  
 c) increase  
 d) be converging-diverging 1
- Q.3 Which of the following is true for a Fanno flow?  
 a) the Mach number always increases as one moves downstream  
 b) the static pressure always decreases as one moves downstream  
 c) the maximum length of the duct is the sonic length  
 d) none of the above 1
- Q.4 A characteristic curve is a curve.  
 a) across which a variable, e.g. the velocity, is continuous, but the derivatives of that variable are indeterminate.  
 b) the governing PDE can be reduced to an ordinary differential equation  
 c) along which disturbances in the flow propagate  
 d) all of the above 1
- Q.5 For flow of a compressible fluid from a storage tank through a converging-diverging channel operating under choked conditions.  
 a) the pressure at the exit will be equal to the sonic pressure  
 b) the flow in the diverging section must be supersonic  
 c) the mass flow rate through the channel cannot be increased by changing the storage tank conditions  
 d) none of the above 1
- Q.6 The conditions across a normal shock  
 a) lie at the intersection of the Fanno and Rayleigh lines for the flow  
 b) have the same stagnation temperature  
 c) both (a) and (b) are true  
 d) both a) and b) are false 1
- Q.7 When using small perturbation theory, the boundary conditions for a flow?  
**as)** must be satisfied exactly to prevent unstable solutions  
**at)** become trivial (this is the chief advantage of small perturbation analysis)  
**au)** should be modified to be consistent with the small perturbation assumptions  
**av)** must satisfy the no slip condition at a solid wall 1
- Q.8 Kelvin's theorem states that for a flow with the following conditions, the circulation about a closed curve (or the vorticity contained within that curve) will remain constant.  
 a) adiabatic and no body forces  
 b) uniform flow and no body forces  
 c) inviscid and the pressure is a function of the density only  
 d) irrotational and an ideal gas 1

- Q.9 A Mach line  
 a) is a curve which is everywhere perpendicular to the stream lines in a subsonic flow  
 b) is a wave which is perpendicular to the stream lines in a supersonic flow  
 c) is perpendicular to the stream lines when the flow is sonic  
 d) has the same slope as an arbitrary oblique shock wave 1
- Q.10 When heat is added to a compressible flow?  
 a) the flow temperature will always increase  
 b) the Mach number will always increase  
 c) the entropy may decrease  
 d) the flow stagnation temperature will always increase 1
- Q.11 a) What is choked flow? State the necessary conditions for this flow to occur in a nozzle?  
 b) What is impulse function and give its uses? 5x2
- Q.12 a) What is Prandtl-meyer relation? State its significance.  
 b) Explain briefly the chocking in fanno flow. 5x2
- Q.13 a) Define the principle of Ram jet engine.  
 b) Why after burners are used in turbojet engine? 5x2
- Q.14 a) Define Mach number in terms of bulk modulus of elasticity.  
 b) Derive the relationship between stagnation and static temperature in terms of the flow, Mach number for the case of isentropic flow. 5x2
- Q.15 a) Define Characteristic Mach number and give its relation with Mach number.  
 b) How will you illustrate the role of Mach number as a measurement of compressibility? 5x2

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

### **FUNDAMENTALS OF MANUFACTURING PROCESSES (MOOC-UGC-028)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.** Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

#### **Multiple choice questions:**

- Q.1 Casting is a:  
 a) Primary manufacturing process  
 b) Secondary manufacturing process

- c) Tertiary manufacturing process.  
d) None of the above. 1
- Q.2 Secondary manufacturing process includes:  
a) Casting.  
b) Forming.  
c) Fabrication.  
d) Special casting process. 1
- Q.3 Die casting uses:  
a) Single use mould.  
b) Double use mould.  
c) Multiple use mould.  
d) None of the above 1
- Q.4 Hot working process includes:  
a) Forging.  
b) Rolling.  
c) Exhaustion.  
d) All of the above. 1
- Q.5 Brazing is a:  
a) Joining process.  
b) Material removal process  
c) Both of the above.  
d) None of the above. 1
- Q.6 Which of the following is not a forging process?  
a) Drop forging.  
b) Spot forging.  
c) Press forging.  
d) Machine forging. 1
- Q.7 Which of the following are forging defects?  
aw) Cold sheet.  
ax) Unfilled section.  
ay) Scol pit  
**az) All of the above.** 1
- Q.8 Fettling is the process of:  
a) Cleaning.  
b) Removal of core.  
c) Removal of risers.  
d) All of the above. 1
- Q.9 Calipers are used to measure:  
a) Length.  
b) Breadth.  
c) Height.  
d) Diameter. 1
- Q.10 Which of the following are types of joints?  
a) Butt joint.  
b) Lap joint.

c) Tee joint.		
d) All of the above.		1
Q.11 What do you understand by manufacturing process? Give its classification.	<b>10</b>	
Q.12 Explain the process of casting. Give various types of casting defects.	<b>10</b>	
Q.13 What is Forming process? Explain various types of Forming processes.	<b>10</b>	
Q.14 Explain the various material removal processes.	<b>10</b>	
Q.15 Explain various types of joining processes.	<b>10</b>	

## **End Semester Examination, Dec. 2017**

B. Tech. – First Semester

### **INTRODUCTION TO INTERNET OF THINGS (MOOC-UGC-029)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

#### **Multiple choice questions:**

- Q.1 The term internet of things was coined by:  
 a) Steve Jobs.  
 b) Kevin Ashton  
 c) Satya Nadella  
 d) Mark Zuckerburg. 1
- Q.2 M2M stands for:  
 a) Machine to Machine.  
 b) Mobile to Mobile.  
 d) Both of these.

- d) None of these. **1**
- Q.3 Class A of IP address is reserved for:  
a) Large companies.  
b) Medium companies.  
c) Small companies.  
d) None of these. **1**
- Q.4 The most commonly used home automation communication protocol is:  
a) WiFi  
b) Zigbee  
c) TCP  
d) MQTT **1**
- Q.5 How many bits in length the address in IPV6:  
a) 64 bits  
b) 128 bits  
c) 32 bits  
d) 16 bits **1**
- Q.6 The associated protocol with internet layer is:  
a) TCP  
b) IGMP  
c) SMTP  
d) UDP **1**
- Q.7 How many host bits are allocated for class B IP addressing:  
ba) 8 bits  
bb) 16 bits  
bc) 24 bits  
**bd) 32 bits** **1**
- Q.8 MQTT is a protocol of which layer in TCP/IP protocol suite:  
a) Link layer  
b) Application layer  
c) Transport layer  
d) None of these **1**
- Q.9 How many layers are there in the TCP/IP protocol suite?  
a) 4  
b) 2  
c) 6  
d) 7 **1**
- Q.10 What are the key features of IOT?  
a) Connectivity  
b) Sensors  
c) Artificial intelligence  
d) All of these. **1**
- Q.11 Explain in detail the TCP/IP protocol suite. **10**
- Q.12 Explain with a block diagram a simplified global value chain. **10**

Q.13 Explain in detail the schematics of IOT.	<b>10</b>
Q.14 Explain in detail the applications of IOT.	<b>10</b>
Q.15 Write short notes on <b>(any two):</b> a) HTTP. b) Static and Dynamic Addressing. c) Challenges of IOT. d) IOT Hardware.	<b>5x2</b>

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **INTRODUCTION TO WIRELESS AND CELLULAR COMMUNICATION (MOOC-UGC-030)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.** Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

#### **Multiple choice questions:**

- |  |          |
|--|----------|
| Q.1 3G W-CDMA is also known as:<br>a) UMTS<br>b) DECT<br>c) DCS-1800<br>d) ETACS   | <b>1</b> |
| Q.2 Channel assignment (Frequency Reuse).<br>a) Efficient utilization of radio spectrum.<br>b) Increased capacity.<br>c) Minimized interference.<br>d) All of the above. | <b>1</b> |

- Q.3 Each time a call is attempted, the serving base station (BS) request a channel from the \_\_\_\_\_.  
 a) MSC  
 b) MTS  
 c) PSTN  
 d) MTSO 1
- Q.4 Reducing cell size to increase capacity is called as:  
 a) Intelligent cell approach.  
 b) Micro cell approach.  
 c) Top-down approach.  
 d) Bottom-up approach. 1
- Q.5 CDMA uses the idea of tolerating interference by:  
 a) Spread spectrum modulation.  
 b) Intelligent modulation.  
 c) Manchester coding.  
 d) Bipolar non return to zero coding. 1
- Q.6 It can be shown that the no. of hexagonal cells per cluster is given by:  
 a)  $n = i^2 + ij + j^2$   
 b)  $n = i + ij + j$   
 c)  $n = i^2 + j^2$   
 d)  $n = i^2 + ij - j^2$  1
- Q.7 Fading is caused due to  
 i) Multipath propagation  
 ii) Obstacles.  
 iii) Frequency variations at the source.  
 iv) Variation in amplitude and phase at receiver.  
**be)** i) and ii) are correct.  
**bf)** i), ii) and iv) are correct.  
**bg)** ii) and iii) are correct  
**bh)** All are correct. 1
- Q.8 Linear equalizer is also known as:  
 a) Transversal filter.  
 b) Lattice filter.  
 c) Low pass filter.  
 d) None of the above. 1
- Q.9 The diversity schemes are based on:  
 i) Time diversity.  
 ii) Frequency diversity.  
 iii) Space diversity.  
 iv) Polarization diversity.  
 a) i) and ii) are correct.  
 b) i), ii) and iii) are correct.  
 c) ii) and iii) are correct.  
 d) All the four are correct. 1

- Q.10 In handoff \_\_\_\_\_. 1  
a) Process of transferring the call to the new base station.  
b) Transfers the call.  
c) New channel allocation is done.  
d) All of the above.
- Q.11 Explain the architecture of GSM system along with its block diagram. 10
- Q.12 Explain the broad features of TDMA and CDMA. Discuss their relative merits and demerits. 10
- Q.13 Write short notes on **(any two)**:  
a) GPRS.  
b) 4G-LTE.  
c) WCDMA. 5x2
- Q.14 If signal to interference ratio of 15 dB is required for satisfactory performance. What is the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is a) n=4 b) n=3? Assume that there are six co-channel cells in the first tier and are equidistant from the mobile. 10
- Q.15 a) What is the need of diversity techniques? List different types of diversity techniques. 5  
b) List various factors influencing small scale fading. 5

# **End Semester Examination, Dec 2017**

B. Tech. – Fifth Semester

# **MECHANICS OF SOLIDS (MOOC-UGC-031)**

Time: 3 hrs.

Max Marks: 50

No. of pages: 2

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated  
against each question.

### ***Multiple choice questions:***

c) 90 degree

**1**

d) 180 degree

Q.6 Mohr's circle is a graphical method to find:

a) Bending stresses

c) Maximum shear stresses

b) Bucking stresses

d) None of the above

**1**

Q.7 If a material has identical properties in all directions, it is called:

a) Elastic

c) Plastic

b) Isotropic

d) Homogenous

**1**

Q.8 Which of the following is a dimensionless quantity?

a) Shear stress

b) Strain

c) Poisson's ratio

d) Both (b) and (c)

**1**

Q.9 Which of the following assumptions are made in Torsion Theory?

a) Shaft is perfectly straight

b) Material of the shaft is Heterogenous

c) Twist cannot be uniform along the length of the shaft.

d) All of the above

**1**

Q.10 Which of the machine component is designed under bending stress?

a) Shaft

b) Key

c) Arm of a lever

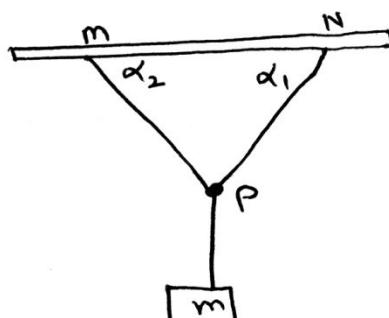
d) Belts and ropes

**1**

Q.11 a) What are Equilibrium conditions in 2D for system?

**5**

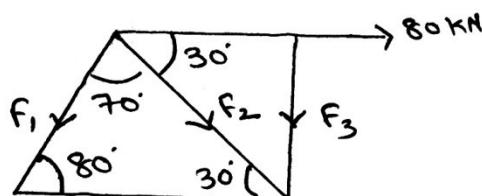
b) Draw Free Body diagram for the given figure:



**5**

Q.12 a) What are methods of solving a truss problem? Briefly describe any one in detail. **5**

b) Find Forces F<sub>1</sub>, F<sub>2</sub> & F<sub>3</sub> in the truss shown in the figure:



**5**

Q.13 a) Describe different types of stresses acting on a body.

5

b) Describe different types of strains acting on a body.

5

Q.14 a) Draw a Mohr's Circle diagram and explain it for the stresses.

5

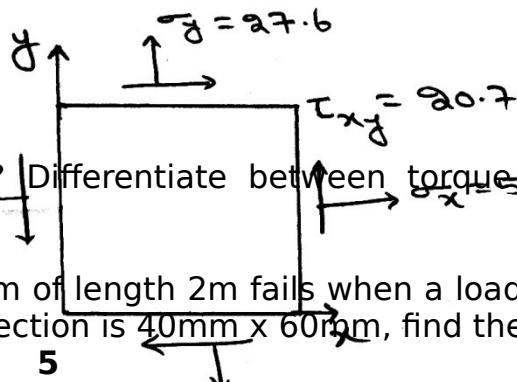
b) At a point in the structural member, the stresses (MPa) are represented.

Calculate:

i) Centre of Mohr's

ii) Magnitude of principle stresses

5



Q.15 a) What is torsion? Differentiate between torque and torsion. Also write Torsion equation.

5

b) A cantilever beam of length 2m fails when a load of 2 kN is applied at the free end. If the section is 40mm x 60mm, find the stress at the failure.

5

## **End Semester Examination, Dec. 2017**

M. Sc. (Biotechnology) – Third Semester

### **MOLECULAR BIOLOGY GENETIC ENGINEERING, PLANT TISSUE CULTURE (MOOC-UGC-032)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.** Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

#### **Multiple choice questions:**

- Q.1 Recombinant DNA is introduced in bacterial cells by:  
a) Transfection.  
b) Electroporation.  
c) Transformation.  
d) Transduction. **1**
- Q.2 DNA sequencing is done by:  
a) Maxam and gilbert method.  
b) Sanger dideoxy method.  
c) Both a) and b)  
d) Watson and Crick. **1**
- Q.3 DNA staining is done by:  
a) Crystal violet.  
b) Giemsa stain  
c) Methylene blue.  
d) Feulgen stain. **1**
- Q.4 Which of the following is not a restriction endonuclease?  
a) ECORI  
b) DNA ligase.  
c) Hind-III  
d) Bam H1 **1**
- Q.5 Nick translation is done by:  
a) DNA polymerase-I  
b) DNA polymerase-III  
c) Ligase  
d) Kinase **1**

- Q.6 Semi conservative replication of DNA was first demonstrated in  
a) Escherichia coli  
b) Streptococcus pneumoniae.  
c) Salmonella typhimurium  
d) Drosophila melanogaster. 1
- Q.7 When DNA replication starts?  
**bi)** The phosphodiester bonds between the adjacent nucleotides break.  
**bj)** The bonds between the nitrogen base and deoxyribose sugar break.  
bk) The leading strand produces Okazaki fragments.  
**bl)** The hydrogen bonds between the nucleotides of two strand break. 1
- Q.8 The process involved in the RNA formation on the DNA template is:  
a) Transcription.  
b) Translation.  
c) Replication.  
d) Transformation. 1
- Q.9 Which of the following is best suited method for production of virus free plants?  
a) Embryo culture.  
b) Meristem culture.  
c) Ovule culture.  
d) Anther culture. 1
- Q.10 Haploid plants are produced in large numbers by:  
a) Anther culture.  
b) Ovary culture.  
c) Both a) and b)  
d) Embryo culture 1
- Q.11 Write notes on:  
a) Reverse transcriptase.  
b) Real time PCR. 5x2
- Q.12 What is the role of the following in DNA replication in bacteria?  
a) Helicases  
b) SSB  
c) Primase 10
- Q.13 What do you mean by micropropagation on? Discuss its applications. 10
- Q.14 What is plant tissue culture? Explain. 10
- Q.15 Explain transcription in prokaryotes with well labeled diagram. 10

## **End Semester Examination, Dec 2017**

B. Tech. – Third / Fifth Semester

### **NATURE AND PROPERTIES OF MATERIALS (MOOC-UGC-033)**

Time: 3 hrs.

Max Marks: **50**

No. of pages: 2

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated  
against each question.

**Q.1** In mortar, building material is:

- a) Cement
- b) Sand
- c) Surkhi
- d) Cinder

**1**

**Q.2** Lacquer paints:

- a) Are applied on structural steel
- b) More durable than enamel paints
- c) Consists of resin but not nitro cellulose
- d) None of the above

**1**

**Q.3** Wrought iron contains carbon up to:

- a) 0.25%
- b) 1.0%
- c) 1.5%
- d) 2.0%

**1**

**Q.4** Polymimetic rock is:

- a) Quartz sand
- b) Pure gypsum
- c) Magnesite
- d) Granite

**1**

**Q.5** Pick correct statement:

- a) For thin structures subjected to wetting and drying, the water cement ratio should be 0.45
- b) For mass concrete structures subjected to wetting and drying, the water ratio should be 0.55
- c) For thin structures which remain continuously under water, the water-cement ratio by weight should be 0.55
- d) All of the above

**1**

**Q.6** Ultimate strength to cement is provided by:

- a) C3S
- b) C2S
- c) C3A
- d) C4AF

**1**

- Q.7 Elastomers can extend up to:
- a) Five times their original dimensions
  - b) Seven times their original dimensions
  - c) Ten times their original dimensions
  - d) Three times their original dimensions

**1**

- Q.8 In the cement the compound quickest to react with water, is:
- a) C3A
  - b) C4AF
  - c) C3S
  - d) C2S

**1**

- Q.9 The clay to be used for manufacturing bricks for a large project, is dugout and allowed to weather throughout:
- a) Monsoon
  - b) Winter
  - c) Summer
  - d) None of the above

**1**

- Q.10 Quartzite is a:
- a) Metamorphic rock
  - b) Argillaceous rock
  - c) Calcareous rock
  - d) Silicious rock

**1**

- Q.11 How do we preserve timber? Explain in detail.

**10**

- Q.12 What is Bessemer process? Explain.

**10**

- Q.13 How do we prepare brick earth?

**10**

- Q.14 Explain process of blasting in detail.

**10**

- Q.15 Explain in detail, the process of refining to achieve mild steel.

**10**

B. Tech. – Third Semester  
**NETWORK AND SYSTEMS (MOOC-UGC-034)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **3**

Note: Attempt **FOURTTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
 Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 What does the value of constant 'K' represent in the factorized form of network equation given below?

$$H(s) = \frac{[k(s - z_1)(s - z_2) \dots (s - z_m)]}{[(s - p_1)(s - p_2) \dots (s - p_n)]}$$

- a) Scale factor.
- b) System gain factor.
- c) Vector factor.
- d) System quality factor.

**1**

- Q.2 A laplace transform exists when

- a) The function is piecewise continuous.
- b) The function is of exponential order and piecewise continuous.
- c) The function is of piecewise discrete.
- d) The function is of differential order.

**1**

- Q.3 Which result is generally obtained by the addition of a step to a ramp function?

- a) Step function shifted by an amount equal to ramp.
- b) Ramp function shifted by an amount equal to step.
- c) Ramp function of zero slope.
- d) Step function of zero slope.

**1**

- Q.4 What do high pass filters generally comprise of?

- a) Capacitive series arm.
- b) Capacitive shunt arm.
- c) Inductive series arm.
- d) Inductive shunt arm.

**1**

- Q.5 In an RC circuit, when the switch is closed, the response \_\_\_\_\_.

- a) Does not vary with time
- b) Decays with time.
- c) Rises with time.
- d) First increases and then decreases.

**1**

- Q.6 Which among the following represents the precise condition of reciprocity for transmission parameters?

- a) AB-CD=1
- b) AD-BC=1
- c) AC-BD=1
- d) None of the above.

**1**

- Q.7 If z-parameters are  $Z_{11}=40$ ,  $Z_{22}=50$  and  $Z_{12}=Z_{21}=20$ , what would be the value of  $y_{22}$  in the matrix form of Y-parameters given below:

$$\begin{bmatrix} \frac{5}{160} & -\frac{2}{160} \\ -\frac{2}{160} & ? \end{bmatrix}$$

**bm)**  $\frac{4}{160}$

**bn)**  $\frac{5}{160}$

bo)  $\frac{10}{160}$

**bp)**  $\frac{15}{150}$

1

Q.8 The time constant of an RC circuit is:

- a)  $RC$
- b)  $R/C$
- c)  $R$
- d)  $C$

1

Q.9 Which among the following belongs to the category of critical frequency?

- a) Poles.
- b) Zeros.
- c) Both a) and b)
- d) None of the above.

1

Q.10 What is an ideal value of network function at poles?

- a) Zero
- b) Unity
- c) Infinity.
- d) Finite and non zero.

1

Q.11 For the given network function, draw pole-zero diagram and obtain time domain response.

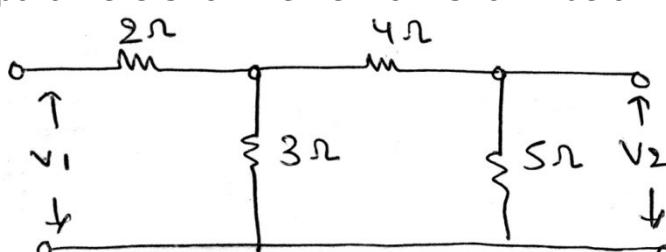
$$I(s) = \frac{5s}{(s+1)(s+4)}$$

10

Q.12 a) Explain the analysis of constant k low pass filter. 5

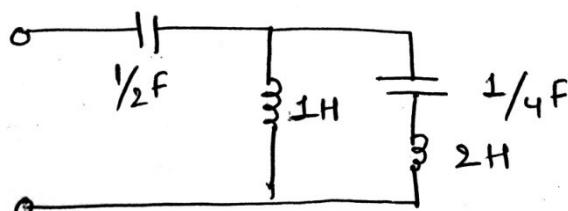
b) Design a constant K-high pass filter with cut-off frequency 2.5 KHz and design resistance of  $700 \Omega$ . 5

Q.13 Determine the Z-parameters for the network shown below:

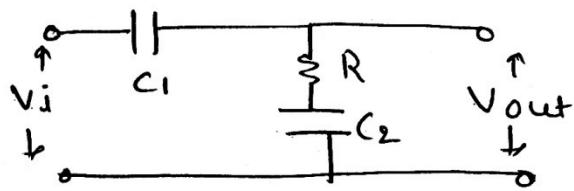


10

Q.14 a) Find the driving point admittance of network.

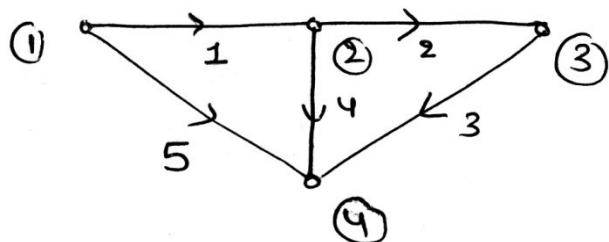


b) Find the transfer function of network.



**10**

Q.15 Obtain the incidence [A], Tieset [B], cutset [Q] matrix for the graph shown below:



**10**

**End Semester Examination, Dec. 2017**  
B. Tech. – Fifth Semester  
**POWER SYSTEM ANALYSIS (MOOC-UGC-035)**

Time: 2 hrs.

Max Marks: **50**

Note: Attempt **FOUTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
 Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 The volume of copper required for an ac transmission line is usually proportional to:  
 a) Voltage  
 b) Current  
 c) Power factor.  
 d) Both b) and c). 1
- Q.2 For load flow analysis, what are the quantities specified at load bus.  
 a) P and V  
 b) P and Q  
 c) V and S  
 d) S and Q 1
- Q.3 For 'n' bus power system size of Y bus matrix is:  
 a)  $(n-1) \times (n-1)$   
 b)  $(n-2) \times (n-2)$   
 c)  $n \times n$   
 d)  $(n-1) \times (n-2)$  1
- Q.4 What percentage of fault occurring in the power system is line-to-line fault?  
 a) 5%  
 b) 30%  
 c) 25%  
 d) 15% 1
- Q.5 What is the value of zero sequence impedance in line to line faults?  
 a)  $z_0 = 1$   
 b)  $z_0 = \infty$   
 c)  $z_0 = 3z_n$   
 d)  $z_0 = 0$  1
- Q.6 In which among the following, phase shift of symmetrical components happens:  
 a) delta-delta  
 b) star-delta  
 c) delta-star  
 d) both b) and c) 1
- Q.7 If the torque angle of alternator increases indefinitely the system will show:  
 bq) Steady state stability limit  
 br) Transient state stability limit.  
 bs) Instability.  
**bt)** None of the above. 1
- Q.8 The use of high speed breaker can:

- a) Increase the transient stability.
- b) Decrease the transient stability.
- c) Increase the steady state stability.
- d) Decrease the steady state stability.

**1**

Q.9 The stability of power system is not affected by:

- a) Generated reactance.
- b) Line reactance.
- c) Excitation of generator.
- d) Line less.

**1**

Q.10 Which of the following power plant has instant starting?

- a) Nuclear power plant.
- b) Hydro power plant.
- c) Diesel power plant.
- d) Both b) and c).

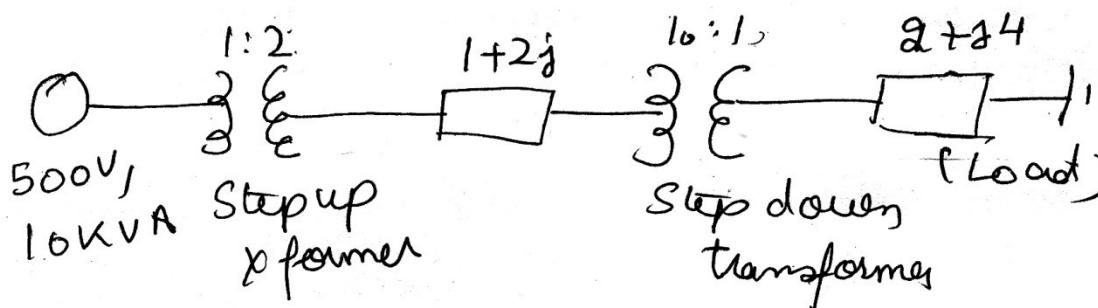
**1**

Q.11 Show how the capacitance of a 3-phase transmission line with unsymmetrical spacing between conductors can be calculated. Assume no transposition. **10**

Q.12 Three resistors of 5, 10 and 20 ohms are connected in delta across the three phases of a balanced 100 volt system. What are the sequence components of currents in the resistors and in the supply lines? **10**

Q.13 Derive expression for sequence currents in case of L-L faults. **10**

Q.14 For given one line diagram for a single phase power system where generator supplies a load through a step up transformer, a transmission line and a step down transformer. Assuming the transformers to be ideal, calculate the per unit current. **10**



**10**

Q.15 With the help of flow chart, explain the Newton-Raphson method of load flow solution when the system contains voltage controlled buses in addition to swing bus and load bus.

**10**

**End Semester Examination, Dec. 2017**

B. Tech. - Seventh Semester

# PRINCIPLES OF CONSTRUCTION MANAGEMENT (MOOC-UGC-036)

Time: 2 hrs.

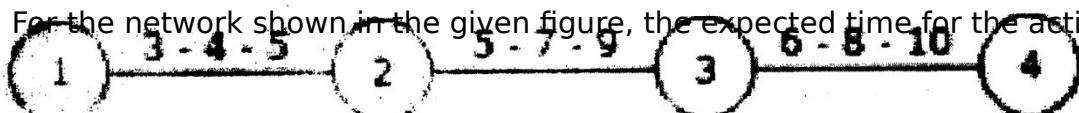
Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTEN** questions in all; **Q.1 to Q.10** are **compulsory**. Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

## **Multiple choice questions:**

- Q.1 In PERT analysis, the time estimates of activities and probability of their occurrence follow:  
a) Normal distribution curve  
b) Poisson's distribution curve  
c) Beta distribution curve  
d) None of the above **1**
- Q.2 Which of the following surfaces will give highest rolling resistance for a rubber tyred vehicle?  
a) Concrete  
b) Loose sand  
c) Asphalt  
d) Firm earth **1**
- Q.3 During the construction period, price variation clause in contracts caters to:  
a) Increase in rates of only important materials  
b) Variation in cost in materials element, labour element and petrol-oil-lubricant element  
c) Variation in total cost of the project on an adhoc basis  
d) Rate of inflation **1**
- Q.4 For a given activity, the optimistic time, pessimistic time and the most probable estimates are 5, 17 and 8 days respectively. The expected time is:  
a) 8 days  
b) 9 days  
c) 10 day  
d) 15 days **1**
- Q.5 Updating may result in:  
a) Change of critical path  
b) Decrease of project completion time  
c) Increase of project completion time  
d) All of the above **1**
- Q.6 The time with which direct cost does not reduce with the increase in time is known as:  
a) Crash time  
b) Normal time  
c) Optimistic time  
d) Standard time **1**
- Q.7 For the network shown in the given figure, the expected time for the activity.



- bu)** 1-2 is 4  
**bv)** 2-3 is 7  
**bw)** 3-4 is 8  
**bx)** All the above

**1**

- Q.8 In the time-cost optimisation, using CPM method for network analysis, the crashing of the activities along the critical path is done starting with the activity having  
a) Longest duration  
b) Highest cost slope  
c) Least cost slope  
d) Shortest duration **1**
- Q.9 The time by which a particular activity can be delayed without affecting the preceding and succeeding activities is known as  
a) Total float  
b) Free float  
c) Interfering float  
d) Independent float **1**
- Q.10 Pick up the correct statement from the following:  
a) Optimistic time estimate refers to activities.  
b) Pessimistic time estimate refers to activities.  
c) Most likely time estimate refers to activities  
d) All the above **1**
- Q.11 What are the unique features of a construction project? Discuss in detail. **10**
- Q.12 Define a project in civil engineering terms. Explain different phases of construction of a project. **10**
- Q.13 Differentiate between CPM and PERT through suitable example. **10**
- Q.14 What is the purpose of resource allocation? Describe the use of resource leveling in detail. **10**
- Q.15 What do you understand by the term "Work Break Down Structure"? **10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

**REFRIGERATION AND AIR CONDITIONER (MOOC-UGC-037)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **3**

Note: Attempt **FOURTREEN** questions in all; **Q.1 to Q.10 are compulsory.** Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 The heat removing capacity of one ton refrigeration is equal to  
a) 21 kJ / min;  
b) 210 kJ / min;  
c) 420 kJ / min;  
d) 620 kJ / min **1**
- Q.2 C.O.P. of a reversed carnot refrigerator is 4. The ratio of its highest temperature to the lowest temperature will be  
a) 1;  
b) 1.25;  
c) 1.75;  
d) 2 **1**
- Q.3 Solar energy can be directly used in  
a) Vapour compression refrigeration system;  
b) Vapour absorption refrigeration system;  
c) Air refrigeration system;  
d) Jet refrigeration system. **1**
- Q.4 In VCRS plant, the refrigerant leaves the evaporator at 195 kJ/kg and condenser at 65 kJ/kg. For 1 kg/s of refrigerant, what is the refrigeration effect?  
a) 70 kW  
b) 100 kW  
c) 130 kW  
d) 160 kW **1**
- Q.5 The refrigerant used for absorption refrigerator working by taking heat from solar collector, is a mixture of water and \_\_\_\_\_.  
a) Carbon dioxide  
b) Sulphur dioxide  
c) Lithium bromide  
d) Freon 12 **1**
- Q.6 During sensible cooling, wet bulb temperature  
a) Decreases  
b) Increases  
c) Remains constant  
d) None of the above. **1**
- Q.7 The relative humidity, during sensible heating  
a) Can increase or decrease.  
b) Increase  
c) remains constant  
d) Decrease **1**

- Q.8 Which of the following statements are true?
- Infiltration load is a part of the building load
  - Infiltration load is not the part of the building load
  - Infiltration rate increases as the pressure difference across the building decreases
  - Infiltration rate is uncontrollable.
- Q.9 In summer air conditioning, the air is
- Cooled and humidified
  - Cooled and dehumidified
  - Heated and humidified
  - Heated and dehumidified
- Q.10 If the condenser and evaporator temperatures are 312 K and 273 K respectively, then the carnot C.O.P. is
- 5
  - 7
  - 9
  - 10
- Q.11 Describe with a schematic diagram and draw the T-S representation of the processes of boot-strap evaporative type aircraft refrigeration system.
- Q.12 What will be the consequences, if a domestic refrigerator works inside an adiabatic room with its door open?
- Q.13 90 cmm of air at 20°C and 75% RH is heated until its temperature becomes 30°C. Calculate
- RH of heated air.
  - Heat added to air per minute.
- Q.14 Explain the terms 'sub-cooling' and 'superheating'.
- Q.15 Explain the following terms.
- RSHF
  - GSHF



## End Semester Examination, Dec. 2017

B. Tech. – First Semester

**SCIENCE AND TECHNOLOGY (MOOC-UGC-038)**

Time: 2 hrs.

Max Marks: **50**  
No. of pages: **2**

Note: Attempt **FOUTREEN** questions in all; **Q.1 to Q.10 are compulsory.**  
Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 Mr is symbol given for:  
a) relative molecular mass  
b) relative formula mass  
c) relative atomic radius  
d) both a) and b) 1
- Q.2 Sum of protons ( $p^+$ ) and neutrons ( $nO$ ) in an atom is called its.  
a) Atomic number  
b) Lucleon number  
c) Avogadro's number  
d) Protomic identity 1
- Q.3 A macromolecule found in blood is:  
a) Ferritin  
b) Albumin  
c) Haemoglobin  
d) Keratin 1
- Q.4 A molecule is a smallest particle which can exist.  
a) independently  
b) in combination  
c) in space  
d) in gas form 1
- Q.5 Chloride ion has number of protons of  
a) 17  
b) 18  
c) 24  
d) 34 1
- Q.6 Sky looks blue because the sun light is subjected to  
a) Rayleigh scattering  
b) Compton scattering  
c) Both  
d) None 1
- Q.7 The weight of a body is  
**by)** The same everywhere on the surface of the earth  
**bz)** Maximum at the poles  
**ca)** Maximum at the equator  
**cb)** More on the hills than in the plains 1
- Q.8 How many chambers are present in human heart?  
a) 2  
b) 3  
c) 4  
d) 6 1
- Q.9 A sound wave is produced when an object.

a) Accelerates		
b) decelerates		
c) Vibrates		
d) remains stationary	1	
<b>Q.10</b> Which of the following structures is responsible for transportation of water in higher plants?		
a) Sieve tube		
b) Sieve cell		
c) Vessel		
d) Companion cell	1	
<b>Q.11</b> Explain with examples:		<b>10</b>
a) Decomposition		
b) Redox reactions		
<b>Q.12</b> Answer Briefly:		
a) Define pH. Write a brief note on its importance in daily life.		
b) Write the difference between washing soda and baking soda.	10	
<b>Q.13</b> Explain in detail:		
a) State Ohms law with a neat circuit. Explain how this law can be verified and also plot the expected V-I graph.	5	
b) Differentiate between resistance and resistivity.	5	
<b>Q.14</b> Briefly explain:		
a) Give two examples of artificial & man made ecosystems. List the salient features by which they differ from natural ecosystems.	5	
b) State the difference between self-pollination and cross pollination.	5	
<b>Q.15</b> What is Rain water harvesting? What are its various types & the basic component of RWH?		<b>10</b>

**End Semester Examination, Dec 2017**  
**B. Tech. – Fifth Semester**  
**SOFTWARE TESTING (MOOC-UGC-039)**

Time: 3 hrs.

Max Marks: **50**

No. of pages: 2

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.**  
 Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

**Multiple choice questions:**

- Q.1 Increasing the quality of the software, by better development methods, will affect the time needed for testing by:  
a) Reducing test time  
b) Increasing test time  
c) No Change  
d) Can't say.
- Q.2 Alpha testing is:  
a) Post-release testing by end-user at the developer's site.  
b) The first testing that is performed.  
c) Pre-release testing by end-user at their sites.  
d) Pre-release testing by end-user at the developer's site.
- Q.3 What is 'V' Model?  
a) Testing Level  
b) SDLC Model  
c) Testing Type  
d) Test Design Technique.
- Q.4 Which of the following is NOT a black box Testing Technique?  
a) Equivalence Class Partitioning Testing  
b) Boundary Value Analysis Testing  
c) Error-guessing Testing  
d) Mutation Testing.
- Q.5 Which one of the following statements about system testing is not true?  
a) System Tests are often performed by independent teams.  
b) Functional testing is used more than structural testing.  
c) Faults found during system tests can be very expensive to fix.  
d) End-users should be involved in system tests.
- Q.6 What is Integration Testing?  
a) SDLC Model  
b) Testing Type  
c) Test Design Technique  
d) Testing Level
- Q.7 \_\_\_\_\_ is not a 'Test Document'?  
a) Test Plan  
b) Test Case  
c) Project Initiation Note  
d) RTM (Requirement Traceability Matrix)
- Q.8 What is the important criterion in deciding; what testing technique to use?  
a) How well you know a particular technique?  
b) How appropriate the technique is for testing the application?  
c) The objective of the test.  
d) Whether there is a tool to support the technique.
- Q.9 \_\_\_\_\_ is not a Testing Level?  
a) System Testing.  
b) Unit Testing  
c) Functional Testing  
d) Integration Testing
- Q.10 Which of the following would not normally form part of a test plan?  
a) Features to be tested  
b) Risks  
c) Schedule  
d) Reports

**1x10**

Q.11 Give the overview of various levels of testing in detail.

**10**

Q.12 Differentiate between Blackbox testing and Whitebox testing.

**10**

Q.13 Explain the 'Dataflow Testing' with examples.

**10**

Q.14 Write short notes on:

- a) Object-Oriented Testing.
- b) Integration Testing.

**10**

Q.15 Give the overview of various phases of software testing life cycle in detail.

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

### **STRENGTH OF MATERIAL (MOOC-UGC-040)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **2**

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory.** Attempt any **FOUR** questions from **Q.11 to Q.15.** Marks are indicated against each question.

#### **Multiple choice questions:**

Q.1 Strain energy is the

- a) Energy stored in a body when strained within elastic limits.

- b) Energy stored in a body when strained upto the breaking of a specimen  
c) Maximum strain energy which can be stored in a body.  
d) Proof resilience per unit volume of material. 1
- Q.2 The neutral axis of the cross-section beam is that axis at which the bending stress is:  
a) Zero  
b) Minimum  
c) Maximum  
d) Infinity 1
- Q.3 Euler's formula holds good only for  
a) Short columns  
b) Long columns  
c) Both short and long columns  
d) Weak columns 1
- Q.4 The stress induced in a body, when suddenly loaded, is \_\_\_\_\_ the stress induced when the same load is applied gradually.  
a) Equal to  
b) One-half  
c) Twice  
d) Four times. 1
- Q.5 If the slenderness ratio of a column is 100, then it is said to be a \_\_\_\_\_  
column.  
a) Long  
b) Medium  
c) Short  
d) None of these 1
- Q.6 When a body is subjected to two equal and opposite pushes, as a result of which the body tends to reduce its length, the stress and strain induced is compressive.  
a) True  
b) False 1
- Q.7 In the torsion equation  $\frac{T}{J} = \frac{Z}{R} = \frac{G\theta}{l}$ , the term  $J/R$  is called:  
cc) Shear modulus  
cd) Section modulus  
ce) Polar modulus  
**cf)**None of these 1
- Q.8 When shear force at a point is zero, then bending moment is \_\_\_\_\_ at that point?  
a) Zero  
b) Minimum  
c) Maximum  
d) Infinity 1
- Q.9 A concentrated load is one which  
a) acts at a point on a beam.  
b) spreads non-uniformly over the whole length of beam.

- c) spreads uniformly over the whole length of beam.  
d) Varies uniformly over the whole length of beam.

**1**

**Q.10** The longitudinal stress in a thin cylinder of mean radius 'R', wall thickness 'h' under pressure 'p' is given by:

- a)  $\frac{2PR}{h}$   
b)  $\frac{PR}{2h}$   
c)  $\frac{PR}{h}$   
d)  $\frac{4PR}{h}$

**1**

**Q.11** A cylinder is 3 m long, 0.75 m in diameter and 12.5 mm thickness at atmospheric pressure. Calculate the dimensions when subjected to an internal pressure of 1.5 MPa. Assume  $E=210\text{ GPa}$ ,  $\nu=0.25$ .

**10**

**Q.12** Find the maximum stress in a propeller shaft 40 cm external and 20 cm internal diameter, when subjected to twisting moment of 4650 N-m. If the modulus of rigidity  $G=82\text{ GPa}$ .

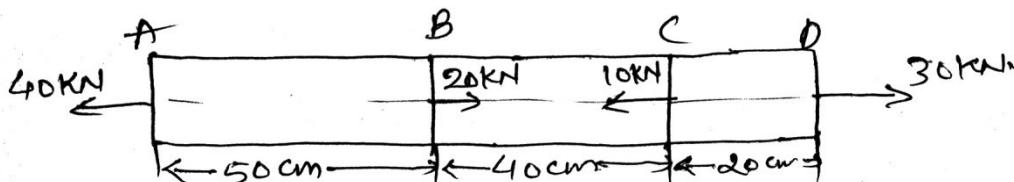
**10**

**Q.13** A rectangular beam 6 cm x 4 cm is 2 m long and is simply supported at the ends. It carries a load 1 kN at mid span. Determine the maximum bending stress induced in the beam.

**10**

**Q.14** A steel bar 25 mm diameter is load. Determine the stresses in each part and total elongation.

$$E=210\text{ GPa.}$$



**10**

**Q.15** A closed coiled helical spring 10 cm mean diameter is made of 20 turns of 1 cm dia steel rod. The spring carries an axial load of 100 N. Find the shearing stress developed in the spring and deflection of the load. Assume modulus of rigidity  $G= 84\text{ GPa}$ .

**10**

## **End Semester Examination, Dec. 2017**

B. Tech. - First Semester

### **TECHNICAL ENGLISH FOR ENGINEERS (MOOC-UGC-041)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **3**

Note: Attempt **FOURTEEN** questions in all; **Q.1 to Q.10 are compulsory**. Attempt any **FOUR** questions from **Q.11 to Q.15**. Marks are indicated against each question.

**Fill in the blanks with the correct options**

- Q.1 They usually spend their holidays in \_\_\_\_\_ Mountains. (**a/an/the**)  
**1**
- Q.2 I've been waiting for \_\_\_\_\_ long time. (**a/an/the**)  
**1**
- Q.3 I've \_\_\_\_\_ my dog since 2002. (**has/had/have**)  
**1**
- Q.4 Marie has been absent \_\_\_\_\_ last week. (**for/since/on**)  
**1**
- Q.5 I need to work hard \_\_\_\_\_ I can pass the exam. (**so that/so/for**)  
**1**
- Q.6 She went to the shops \_\_\_\_\_ couldn't find anything that could fit her needs. (**where/and/but**)  
**1**
- Q.7 Manya \_\_\_\_\_ your novel several times. (**read/has read/has been reading**)  
**1**
- Q.8 I \_\_\_\_\_ to the radio for 5 hours. (**have been listening/was listening/will listen**)  
**1**
- Q.9 He's always in a rush. I don't understand why he walks so \_\_\_\_\_.  
(**quick/quickly/quicker**)  
**1**
- Q.10 I'll arrive sometime \_\_ 8 and 9 am. (**between/in/next to**)  
**1**
- Q.11 **Read the passages and choose the correct options according to the readings.**
- One of my favorite vacation places is Mexico. I really like the weather there because it never gets cold. The people are very nice too. They never laugh at my bad Spanish. The food is really good. Mexico City is a very interesting place to visit. It has some great museums and lots of fascinating old buildings. The hotels are too expensive to stay but there are more affordable options. For example, you can stay at one of the beach resorts like Acapulco. If you are planning to visit Mexico, you should definitely see the Mayan temples near Merida.
- A.
- Sam likes warm weather
  - Sam doesn't like warm weather at all
  - Sam hates warm water
  - Sam likes cold weather
- B.
- His Spanish is very good
  - He speaks Spanish very well
  - He is Spanish
  - He doesn't speak Spanish very well

C.

- There's a lot to see and do in Mexico
- There aren't a lot of beautiful places in Mexico
- Mexico is a dirty place
- Tourists never come to Mexico

D.

- Hotels are very cheap in Mexico
- The hotels aren't comfortable there
- Hotels are all poor in Mexico
- The hotels in Mexico are pretty expensive

E. Give a word from the passage which means the same as "captivating"

---

Last summer, we decided to spend our vacation at the beach because the weather was very hot in the mountains. The travel agent said that traveling by bus was the cheapest way, but we went by plane because it was faster. We wanted to have more time to spend at the beach. The weather was beautiful and we had a great time.

F. We decided to go to the beach because \_\_\_\_\_

- it was cheaper than going to the mountains
- the travel agent said that it was the cheapest
- of the hot weather in the mountains
- we wanted to spend time at the beach

G. The bus was the \_\_\_\_\_ way to travel.

- Best
- Easiest
- Cheapest
- Slowest

H. Traveling by plane was \_\_\_\_\_ than by bus.

- more fun
- cheaper
- expensive
- faster

I. We \_\_\_\_\_ our vacation.

- Hated
- didn't like
- enjoyed
- regretted

J. We had very \_\_\_\_\_ weather during our vacation.

- Good
- Freezing
- Terrible
- Cold

Q.12 Which would you choose: a high-paying job that you didn't enjoy, or a lower-paying job that you did enjoy? Explain your reasoning, using specific reasons and examples. (180-200 words) **10**

Q.13 In many countries, very few young people read newspapers or follow the news on TV. What do you think are the causes of this? What solutions can you suggest? (180-200 words)

**10**

Q.14 The table below gives information about languages with the most native speakers.

Summarize the information by selecting and reporting the main features, and make comparisons where relevant. (at least 150 words)

Language	Number of native speakers	Number of speakers as an additional language	Total number of speakers
Mandarin Chinese	900 million	190 million	1,090 million
Hindi	370 million	120 million	490 million
Spanish	350 million	70 million	420 million
English	339 million	603 million	942 million
Arabic	206 million	24 million	230 million
Portuguese	203 million	10 million	213 million

**10**

**Q.15 Re-order / Rearrange the sentence in such a way that makes sense.**

**(Write the correct order no. in the blank)**

- A. Over the years, I have had the opportunities to observe and understand the thought processes behind the ads that have been flooding both the print and the TV media. (\_\_\_\_)
- B. Although there is a huge shift in the quality of ads that we come across on daily basis- thanks essentially to improvement in technology-I somehow can't help but feel that the quality of communication of the message has become diluted. (\_\_\_\_)
- C. Proportionally, the numbers of ads that lack in quality have gone up exponentially as well!! (\_\_\_\_)
- D. There is an increasing attempt by most companies to be seen as cool and funky. (\_\_\_\_)
- E. Another reason could be the burgeoning number of companies, which means an exponential increase in the number of ads that are being made. (\_\_\_\_)

**Re-order / Rearrange the sentence in such a way that makes sense.**

**(Write the correct order no. in the blank)**

- A. Since then, intelligence tests have been mostly used to separate dull children in school from average or bright children, so that special education can be provided to the dull. (\_\_\_\_)
- B. In other words, intelligence tests give us a norm for each age. (\_\_\_\_)

- C. Intelligence is expressed as intelligence quotient, and tests developed to indicate what an average child of a certain age can do...What a five-year-old can answer, but a four-year-old cannot, for instance. (\_\_\_\_)
- D. Benet developed the first set of such tests in the early 1990s to find out which children in school needed special attention. (\_\_\_\_)
- E. Intelligence can be measured by tests. (\_\_\_\_)**

**10**

### **End Semester Examination, Dec. 2017**

M. Sc. (Energy & Environment) — Third Semester

**ENVIRONMENTAL MODELING AND REMOTE SENSING (MSE-301)**

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.** Each question carries equal marks.

Q.1 Answer the following:

- a) Define a scientific model.
- b) What is the difference between continuous model and discrete model?
- c) Differentiate between active and passive remote sensing.
- d) What is a digital image?
- e) What is spatial resolution in satellite imageries?
- f) Write few names of software used for image processing and GIS. **2×6**

### **UNIT-I**

- Q.2 a) Discuss the different types of models for remote sensing in detail with suitable examples. **6**
- b) Write in detail basic steps in modeling process. **6**
- Q.3 a) What do you understand by this famous saying "All models are wrong but some are useful" **6**
- b) Discuss the need of environment modeling and its scope in understanding and solving different environmental problems. **6**

### **UNIT-II**

- Q.4 a) What is electromagnetic radiation (EMR) energy? Explain how EMR energy from sun is scattered in the atmosphere. **6**
- b) Explain in detail about ideal remote sensing system with a neat sketch. **6**
- Q.5 a) Define spectral reflectance (or Albedo) and discuss the spectral reflect once curve for trees (or vegetation). **6**
- b) Explain different types of resolutions in satellite images. **6**

### **UNIT-III**

- Q.6 a) Differentiate between following:  
i) Raster and vector data in GIS.  
ii) True color composite (T.C.C) and false color composite (F.C.C). **3×2**
- b) Write about various platforms used in remote sensing. **6**
- Q.7 a) Discuss the role of remote sensing in environment monitoring and modeling with suitable examples. **6**
- b) Choose any specific environment problem, which you think can be modeled using remote sensing data and write basic steps to build the model. **6**

## **End Semester Examination, Dec. 2017**

M. Sc. (Energy & Environment) - Third Semester

**ENVIRONMENTAL LEGISLATIONS AND CLEARANCES (MSE-302)**

Time: 3 hrs.

Max Marks: **60**

772/5

No. of pages: 1

Note: Attempt **FIVE** questions in all; Attempt **FOUR** questions from remaining **SIX**, selecting at least **ONE** from each **UNIT**. **Q.1 is compulsory.** All questions carry equal marks.

- Q.1 Answer briefly:  
a) What is CPCB?  
b) Give full form of CRZ. What is the significance of it?  
c) Differentiate between biodegradable and non-biodegradable wastes.  
d) Define sustainable development. **3×4**

### **UNIT-I**

- Q.2 Write short notes on the following (give examples):  
a) National environmental policy.  
b) International laws. **6×2**
- Q.3 a) Explain how sustainable development has been the objective of the environment legislations in India? **6**  
b) What is the future of environmental laws regarding pollution control? **6**

### **UNIT-II**

- Q.4 Write short notes on the following:  
a) Objectives of Environmental Protection Act 1986.  
b) EIA. **6×2**
- Q.5 a) What are rules and guidelines given for disposal of hazardous waste? **6**  
b) What is bio-prospecting? Describe its role in exploration of biodiversity potential. **6**

### **UNIT-III**

- Q.6 a) Explain the importance of Stockholm conference in International Environment Law. **6**  
b) Explain the salient features of Ramsar convention. Elaborate importance in maintaining ecological balance. **6**
- Q.7 a) Define impact indicators. How do they measure the progress towards an integrated environment management and disaster risk reduction? **6**  
b) Differentiate between in situ and ex situ conservation giving examples. **6**

## **End Semester Examination, Dec. 2017**

M. Sc. (Energy and Environment) — Third Semester

### **ENVIRONMENTAL MANAGEMENT AND IMPACT ASSESSMENT**

### **(MSE-303)**

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.** Each question carries equal marks.

Q.1 Answer the following questions:

- a) List any four ozone depleting substances.
- a) Describe the role of project manager of an EIA team.
- b) List any four methods of impact prediction.
- d) What are the benefits of doing EIA?
- e) Give the threshold limit of any two A category projects.
- f) What activities are included in environmental management?

**2×6**

### **UNIT-I**

- Q.2 a) Describe the role of public and facilitators as stakeholder to environmental management. **6**
- b) Discuss the environmental concerns of India. **6**
- Q.3 a) Give an overview of public interest litigation for the protection of Taj Mahal filed by Mr. M.C. Mehta. **6**
- b) Give an overview of environmental laws and regulations that affect the environment. **6**

### **UNIT-II**

- Q.4 a) Explain the following:  
i) Principle of common differentiated responsibilities.  
ii) Polluters pay principle. **3×2**
- b) Describe the purpose of conducting EIA. **6**
- Q.5 a) Discuss the significance of:  
i) Impact prediction in EIA.  
ii) Impact mitigation in EIA. **3×2**
- b) With the help of flow chart, give a summary of EIA process and rough timelines and who is responsible for performing these activities. **6**

### **UNIT-III**

- Q.6 a) How is project scoping helpful in EIA study? **6**
- b) What is the significance of cost benefit analysis in EIA? **6**
- Q.7 a) With the help of flow chart, explain the integrated decision making process. **6**
- b) Explain the procedure of public hearing applicable in India in the context of EIA. **6**

## **End Semester Examination, Dec. 2017**

M. Sc. (Energy & Environment) – Third Semester

**ENVIRONMENTAL CLEARANCE AND AUDIT (MSE-304)**

Time: 3 hrs.

Max Marks: **60**

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 Define the following terms:  
a) What is the main objective of EMS?  
b) Define pre auditing with its stages.  
c) Benefits of waste auditing and air monitoring in EIA.  
d) Define the term LCA with its scope in EIA.  
e) Define on site auditing and post auditing.  
f) What is the application of Environmental Impact Assessment (EIA)? **2×6**

### **UNIT-I**

- Q.2 Explain briefly audit methodology with different audit approaches. **12**
- Q.3 Explain briefly various objectives and scope of environmental auditing. Also, explain the different types of environmental auditing. **12**

### **UNIT-II**

- Q.4 What do you understand by environmental management system standards (EMS)? Explain all the steps involved in it. **12**
- Q.5 Explain various steps involved in an environmental audit process in detail. **12**

### **UNIT-III**

- Q.6 Describe briefly the methodology of Life Cycle assessment. Explain all the stages of LCA. **12**
- Q.7 What do you understand by Indian standard specifications? Explain ISO 14000 in detail with its merits and demerits. **12**

## **End Semester Examination, Dec. 2017**

M. Sc. (Energy & Environment) – Third Semester  
**DISASTER MANAGEMENT (MSE-305C)**

Time: 3 hrs.

Max Marks: **60**

No. of pages: 1

Note: Attempt **FIVE** questions in all. Attempt **FOUR** questions from remaining **SIX**, selecting at least **ONE** from each **Unit**. **Q.1 is compulsory**. All questions carry equal marks.

- Q.1 Explain briefly:
- Define the disaster, risk and vulnerability.
  - Give three examples of recent disaster occurred in India.
  - What is the role of local urban body in reduction of disaster risk?
  - Draw a disaster risk management cycle, taking example of flood.
  - What is disaster risk index? What is the recent position of India in global index?
  - Mention the components of disaster relief.
- 2×6**

### **UNIT-I**

- Q.2 Explain the link between climate change and vulnerability. **12**
- Q.3 Explain the urban disasters. How global trends in disaster can help reducing these disaster risks? **12**

### **UNIT-II**

- Q.4 How critical infrastructure can reduce the risk of natural hazards?  
 OR  
 Illustrate the role and responsibility of community in disaster risk management. **12**
- Q.5 Explain preparedness for disaster management, taking example of flood. **12**

### **UNIT-III**

- Q.6 Discuss the hazard and vulnerability profile of India. **12**
- Q.7 Explain the role of institutional arrangements of waste management in disaster prevention. **12**

## **End Semester Examination, Dec. 2017**

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 question:

- a) What is metastable state?
- b) Explain the principle of propagation of light in optical fibre.
- c) Why is the wave nature of particles not observed in our daily life?
- d) Which statistics is followed by electrons?
- e) What do you understand by inertial frame of reference?
- f) What is the rest mass of a photon?
- g) What are equipotential surfaces?
- h) What is electric susceptibility?
- i) Explain phenomenon of pair production.
- j) What is photo multiplier tube?

**2×10**

### **PART-A**

- Q.2 a) Explain the principle, construction and working of semiconductor laser with neat diagrams. **10**  
 b) Explain different types of optical fibre on the basis of mode of propagation and refractive index. **7**  
 c) A light ray enters from air to fibre the refractive index of core and cladding are 1.5 and 1.48 respectively. Find critical angle and numerical aperture. **3**

- Q.3 a) Explain “Compton Effect”. Show that the change in wavelength of a photon is given by:

$$\lambda' - \lambda = \frac{h}{m_0 c} (1 - \cos\varphi)$$

Where  $\varphi$  is the angle of scattering for photon?

- b) Differentiate between Bose-Einstein statistics and Fermi-Dirac statistics. **4**

- Q.4 a) Give Lorentz transformation equations. With the help of Lorentz transformation equations, explain length contraction and time dilation. **10**  
 b) A moving body of rest mass “ $m_0$ ”, with velocity “v” has mass “m”. Show that:

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

**10**

### **PART-B**

- Q.5 a) What is electric potential? Give expressions for electric potential due to discrete charge distribution and continuous charge distribution. **7**  
 b) What is curl of an electrostatic field? Also, give its physical significance. **6**  
 c) Derive an expression for energy of a discrete charge distribution. **7**
- Q.6 a) What are dielectrics? Explain molecular theory of dielectrics. **4**  
 b) Classify dielectric material with examples. **4**  
 c) Derive expression for energy density of electric field in dielectric medium. **8**  
 d) Write a short note on electronic polarization in dielectrics. **4**

- Q.7 a) Discuss different mechanism through which gamma rays interact with matter. **8**  
 b) Write a short note on construction and working of ionization chamber. **6**  
 c) Discuss external quenching and internal quenching in detail. **6**

### **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 Attempt all questions:

- a) What are metastable states?
- b) What is laser pumping?
- c) What is attenuation in an optical fibre?
- d) Give the difference between inertial and non-inertial frames of reference.
- e) What is the maximum possible velocity of a material particle?
- f) Define electric field intensity and electric potential.
- g) What are the differences between dielectrics and insulations?
- h) Write Clausius-Mossotti relation.
- i) Differentiate between musical sound and noise.
- j) Discuss some important applications of ultrasonic waves.

**2×10**

### **PART-A**

- Q.2 a) Discuss the principle, construction and working of a CO<sub>2</sub> laser with suitable diagrams. **10**
- b) Discuss the construction and reconstruction of image on a hologram. **10**
- Q.2 a) What is an optical fibre? Explain the term acceptance angle and numerical aperture and deduce the expression for numerical aperture. **10**
- b) Discuss different types of losses in an optical fibre. **7**
- c) Consider a fibre with 25μm core radius and numerical aperture 0.24. If λ is 1000nm, then calculate the value of V-number. **3**
- Q.3 a) Derive Lorentz transformation equations for space and time. **11**
- b) Explain and establish mass energy equivalence relation  $E=mc^2$ . **6**
- c) Determine the speed of light of a clock which appears to loss 2 minutes every hour. **3**

### **PART-B**

- Q.5 a) Derive an expression for curl of electrostatic field. **5**
- b) Derive an expression for the potential energy of a discrete charge distribution. Do the same for continuous charge distribution over entire space? **11**
- c) Given a potential of the form  $V = m(x^2 + y^2 + z^2)^{\frac{1}{2}}$ , check whether the potential satisfies the Laplace's equation. **4**
- Q.6 a) Discuss three electric vectors E, P and D in dielectrics. Find the relation among them. **10**
- b) Derive an expression for the Gauss's law in presence of a dielectric. **7**
- c) Discuss in brief piezoelectricity. **3**
- Q.7 a) What is absorption coefficient? Explain how to determine the absorption coefficient. **5**
- b) Discuss the Sabine's formula for reverberation time. **5**
- c) What are ultrasonic waves? Explain how they are produced using magnetotraction method? **10**

**End Semester Examination, Dec. 2017**  
B. Tech. – Second Semester  
**APPLIED PHYSICS-II (PH-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.** Each question carries equal marks.

- Q.1    a) Bragg's Equation is given by  $2d \sin \theta = n\lambda$ ; Give the meaning of 'd' and ' $\lambda$ ' in this equation.  
      b) For a simple cubic lattice calculate  $d_{100} : d_{110} : d_{111}$ .  
      c) With increase in temperature, the resistivity of a semiconductor increases or decreases? Justify your answer.  
      d) What do you understand by hetro-epitaxy? Give an example.

- e) Explain the meaning of trapping centre and recombination centre in a photoconductor.
- f) Is magnetic susceptibility for a paramagnetic material positive or negative? Also define magnetic susceptibility.
- g) Explain ferromagnetic domains in brief.
- h) Cooper pairs is a pair of: (i) electrons (ii) protons (iii) positrons or (iv) neutrons. How Cooper pairs are formed?
- i) Discuss in brief isotopic effect in superconductors.
- j) What do you understand by quantum dot?

**2×10**

### **PART-A**

- Q.2 a) What do you understand by Schottky defects? Show that concentration of Schottky defects is given by  $n = Ne^{-\frac{E}{2kT}}$ , where symbols have their usual meaning. **10**
- b) What are Miller Indices? How they are determined? Draw planes (101) and (321) in a simple cubic unit cell. **7**
- c) A simple cubic crystal has atomic radius of 3.0 Å. Determine the spacing of planes having Miller Indices as (120). **3**
- Q.3 a) Derive an expression for Hall coefficient. Give two important applications of Hall Effect. **7**
- b) Describe any two methods of growing semiconductor crystals. **8**
- c) What are semiconductors? Discuss physical properties of semiconductors. **5**
- Q.4 a) Discuss the simple model of a photoconductor. **10**
- b) Explain briefly principle, construction and working of a photoconductive cell. Also give its two applications. **10**

### **PART-B**

- Q.5 a) Discuss in brief the differences between diamagnetic and ferromagnetic materials. **6**
- b) Show that the magnetic dipole moment of an atom is given by  $M = neh / 4\pi m$ . **6**
- c) Explain how will you plot the hysteresis curve for a magnetic material? Briefly explain the important features of this curve. Write one application each of soft and hard magnetic materials. **8**
- Q.6 a) Discuss in details the types of superconductors. Mention at least four applications of superconductors. **10**
- b) What is critical temperature in superconductivity? Describe Meissner effect in superconductors. **6**
- c) If  $T_c$  represents the critical temperature of the superconductor, determine the temperature at which the critical field reduces to half its value at absolute zero. **4**
- Q.7 a) Describe top down and bottom up approaches that are used in nanotechnology for building nanomaterials. **4**
- b) What are different types of carbon nanotubes? Describe laser evaporation method for the fabrication of carbon nanotubes. **8**
- c) Briefly explain nanoscience and nanotechnology. Discuss applications of nanomaterials in defence and energy. **8**

## **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) - First Semester

**PHYSICS-I (PH-I-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 a) Define CGS system of units.  
 b) Give four examples of vector quantities.  
 c) Define radius of gyration.  
 d) Two forces of magnitude 15 N and 23 N are perpendicular to each other. Find the resultant of these forces.  
 e) Refractive index of the glass with respect to water is 1.125. If the absolute refractive index of glass is 1.5, find the absolute refractive index of water.

- f) How much work is done on a body of mass M in moving once round a horizontal circle of radius 'r'?
- g) How will the momentum of a body change, if its kinetic energy is doubled?
- h) The bags and suitcases are provided with broad handles. Explain why?
- i) A ball is thrown straight up. What is its velocity and acceleration at the top?
- j) Define power of a lens and give its unit.

**2X10**

### **PART-A**

- Q.2 a) What is meant by scalar product and vector product of vectors? Give their geometrical interpretation also. Given two vectors of magnitude 3 and  $2\sqrt{2}$ , respectively, if their dot product is 6 then find the angle between them. What would be the cross product of two vectors?

**10**

- b) The position  $x$  of a particle depends upon time t according to the equation  $x = at + bt^2$ . Determine the dimensions and units of a and b. What are the physical quantities denoted by them?

**6**

- c) The centripetal force F acting on a body of mass m, moving with a velocity v, in a circle of radius r is given by  $F = \frac{mv^2}{r}$ . Check whether the equation is dimensionally correct or not.

**4**

- Q.3 a) State and prove parallelogram law of forces.

**6**

- b) A body of mass 0.25 kg moving with velocity 12 m/s is stopped by applying a force of 0.6 N. Calculate the time taken to stop the body.

**4**

- c) A projectile is fired with a certain velocity u making an angle  $\theta$  with the horizontal. Find the total height attained, total time of flight and horizontal range.

**7**

- d) Explain in brief the linear velocity, angular velocity and angular acceleration.

**3**

- Q.4 a) Derive the expression for the angular momentum of a rigid body. State the law of conservation of angular momentum and give two examples illustrating the same.

**10**

- b) Define moment of inertia and give its physical significance.

**6**

- c) An aircraft executes a horizontal loop at a speed of 20 km/h with its wings banked at 150. What is the radius of the loop?

**4**

### **PART-B**

- Q.5 a) Define kinetic energy. Give its units. Show that mechanical energy of the body is conserved, when it falls freely under the action of gravitational field.

**7**

- b) A body of mass 16 kg slides on a horizontal frictionless table with a speed of 0.5 m/s. It is brought to rest by compressing a spring in its path. By

how much is the spring compressed if the force constant of the spring is 0.25 N/m. **3**

- c) Differentiate between elastic and inelastic collisions. Two bodies of mass  $m_1$  and  $m_2$  moving with velocities  $u_1$  and  $u_2$  respectively, collide elastically in one dimension. Obtain an expression for their final velocities after the collision. **10**

Q.6 a) Draw the stress strain curve for a material and explain the behavior of the material. **6**

- b) Write a short note on (**any one**):  
i) Reynolds number  
ii) Bernoulli's theorem  
iii) Surface tension.

**10**

- c) A steel wire of length 4.7 m and cross section  $3.0 \times 10^{-5} \text{ m}^2$  stretches by the same amount as a copper wire of length 3.5 m and cross section  $4.0 \times 10^{-5} \text{ m}^2$  under a given load. What is the ratio of Young's modulus of steel to that of copper? **4**

Q.7 a) Distinguish between a real and a virtual image. Derive a relation between object distance 'u', image distance 'v' and focal length 'f' for a convex lens. **7**

- b) A 4.5 cm needle is placed 12 cm away from a convex mirror of focal length 15 cm. Find the location and nature of the image formed by the mirror. **3**

- c) What is a compound microscope? Explain its construction and working with the help of a ray diagram. Deduce an expression for its magnifying power. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) - Second Semester

**PHYSICS-II (PH-I-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:

- a) State Coulomb's law.
- b) Define electric field intensity.
- c) Explain Peltier effect.
- d) State Ohm's law.
- e) What is plane polarized light?
- f) What is law of Malus?
- g) What is a coherent source?
- h) Expand the term LASER.
- i) Give two applications of optical fibres.
- j) What is photo multiplication tube?

**2x10**

### **PART-A**

Q.2 a) What is a spherical capacitor? Derive the capacity of a spherical capacitor. **8**

- b) Find the electric field due to non-conducting charged sphere at a point:
  - i) Outside the sphere.
  - ii) On the surface of the sphere.
  - iii) Inside the sphere.

**12**

Q.3 a) Derive a formula for the series and parallel combination of resistances. **10**

- b) Derive the relation between drift velocity and current density. **7**
- c) Briefly explain Seebach effect. **3**

Q.4 a) Derive expressions for the kinetic and potential energy of a particle executing simple harmonic motion. Represent these energy terms graphically. **10**

- b) Write a short note on forced oscillations. **6**

- c) Obtain the equation of simple harmonic motion of a particle whose amplitude is 0.04 m and whose frequency is 50 Hz. The initial phase is  $\frac{\pi}{3}$ . **4**

### **PART-B**

Q.5 a) State and explain Huygens principle. Describe Young's double slit experiment for observing the interference of light. **10**

- b) Write a short note on Nicol prism. **5**
- c) Establish the conditions for constructive and destructive interference in terms of phase difference and path difference. **5**

Q.6 a) Explain principle, construction and working of a He-Ne laser. **10**

b) Explain different types of optical fibres on the basis of mode of propagation and index.

**10**

Q.7 a) Discuss different mechanisms by which gamma rays are absorbed in matter. **10**

b) Describe the construction and working of a scintillation counter.

**10**

B. Tech. - First Semester  
**PROFESSIONAL COMMUNICATION-I (HM-104)**

Time: 3 hrs.

Max Marks: **50**

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 Short answer type questions (Word limit 30-40 words):
- a) What is critical thinking? Give one example to support your answer.
  - b) What is the difference between Extensive and Intensive Listening?
  - c) What are the three parts of paragraph writing?
  - d) What is the meaning of the term "retention"?
  - e) What are the four parameters of communication? Specify with apt percentages.
  - f) What do you mean by *proxemics*?
  - g) How can reading be effectively done?
  - h) What is SQ3R theory?
  - i) What are the three steps involved in Reading?
  - j) What is informal communication? Give one example.
- 1x10**

**PART-A**

- Q.2 Fill in the correct form of tenses:
- a) Rahul \_\_\_\_\_ (**finish**) his homework. (*Simple Past*)
  - b) I \_\_\_\_\_ (**work**) the entire night. (*Present Perfect Continuous*)
  - c) He \_\_\_\_\_ (**dance**) tonight. (*Simple future*)
  - d) Martha and David \_\_\_\_\_ (**play**) twice a week. (*Future Continuous*)
  - e) You always \_\_\_\_\_ (**teach**) me good things. (*Simple present*)
  - f) I \_\_\_\_\_ (**eat**) only vegetarian food. (*Simple present*)
  - g) It's \_\_\_\_\_ (**rain**) since morning. (*Present continuous*)
  - h) She \_\_\_\_\_ (**study**) Chinese in class 10. (*Simple Past*)
  - i) You \_\_\_\_\_ (**do**) nothing for the past 20 minutes. (*Present Perfect Continuous*)
  - j) She always \_\_\_\_\_ (**tell**) funny jokes. (*Past tense*)
- 1x10**

- Q.3 Write a letter to the Sports Director stating your concern regarding lack of facilities in your campus **10**

- Q.4 Given below is the opening line of a story. Continue the story and give it an ending!  
(Word limit 100-120 words)  
"One day while walking in the streets of Delhi ....." **10**

**PART-B**

- Q.5 Bring out the difference in the words given below by using them in sentences:
- a) Except-Accept
  - b) Affect- Effect
  - c) Idol-Idle
  - d) Aloud- Allowed
  - e) Weather- Whether
- 2x5**

Q.6 Read the following passage carefully and answer the questions that follow:  
“She was a maiden of rarest beauty, and not more lovely than full of glee. And evil was the hour when she saw, and loved, and wedded the painter. He, passionate, studious, austere, and having already a bride in his Art; she a maiden of rarest beauty, and not more lovely than full of glee; all light and smiles, and frolicsome as the young fawn; loving and cherishing all things; hating only the Art which was her rival. It was thus a terrible thing for this lady to hear the painter speak of his desire to portray even his young bride. But she was humble and obedient, and sat meekly for many weeks in the dark, high turret-chamber where the light dripped upon the pale canvas only from overhead. But he, the painter, took glory in his work, which went on from hour to hour, and from day to day.

And he was a passionate, and wild, and moody man, who became lost in reveries; so that he would not see that the light which fell so ghastly in that lone turret withered the health and the spirits of his bride, who pined visibly to all but him. Yet she smiled on and still on, uncomplainingly, because she saw that the painter (who had high renown) took a fervid and burning pleasure in his task, and wrought day and night to depict her who so loved him, yet who grew daily more dispirited and weak. But at length, as the labor drew nearer to its conclusion, there were admitted none into the turret; for the painter had grown wild with the ardor of his work, and turned his eyes from canvas merely, even to regard the countenance of his wife. And he would not see that the tints which he spread upon the canvas were drawn from the cheeks of her who sat beside him. And when many weeks had passed, and but little remained to do, save one brush upon the mouth and one tint upon the eye. And then the brush was given, and then the tint was placed; and, for one moment, the painter stood entrenched before the work which he had wrought; but in the next, while he yet gazed, he grew tremulous and very pallid, and aghast, and crying with a loud voice, ‘This is indeed Life itself!’ turned suddenly to regard his beloved:—She was dead!

- a) Why do you think the painter did not notice the wife’s declining death?
- b) What type of a man was the husband?
- c) What is the meaning of the word entrenched?
- d) Describe the meaning of the sentence, “This is indeed life itself”.
- e) What do you think of the tints that were spread on the campus? 2x5

Q.7 Paraphrase the same passage and write it in **100** Words.

**10**

# **End Semester Examination, Dec. 2017**

B. Tech. – Second Semester

## **PROFESSIONAL COMMUNICATION-II (HM-204)**

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**. Each question carries equal marks.

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

- a) Define 'encoding'.
- b) Define audience analysis with respect to presentation skills.
- c) What is netiquette?
- d) Explain with examples the definition of Jargon.
- e) Define low context culture with examples.
- f) What is emphatic stress?

**2×5**

### **PART-A**

**Q.2 Define 'technical writing'. Discuss the essentials for good technical writing in detail. **10****

**Q.3 a) Draw the labeled format for a formal email.  
b) Write down the Dos and Don'ts for an e-mail writing. **5×2****

**Q.4 Define 'inter-cultural communication'. What are the barriers to inter-culture communication? **10****

### **PART-B**

**Q.5 Draft a cover letter addressing to Ravish George, Manager Operations, XYZ Ltd applying for the position of Research associate in their Manesar plant. This position was advertised in [timesjob.com](http://timesjob.com) on April 3, 2017. Assume other details. **10****

**Q.6 Discuss in detail:**

- a) The process of communication.
- b) Communication barriers.

**5x2**

**Q.7 a) Define 'phonetics'. How many different sounds exist in english language? **3**  
b) What is syllable stress? **2**  
c) Define a 'syllable'. Explain mono, di and poly syllabic words with two examples each. **5****

# **End Semester Examination, Dec. 2017**

B. Tech. – Third Semester

## CAREER SKILLS-I (HM-302)

Time: 2 hrs.

Max Marks: **50**

No. of pages: **4**

Note: The paper consists of **FIFTY** multiple choice questions; Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking. Options filled in the answer table given below 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 K is 40 m South-West of L. If M is 40 m South-East of L, then M is in which direction of K?

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

Q.2 One morning after sunrise, Suresh was standing facing a pole. The shadow of the pole fell exactly to his right. To which direction was he facing?

- a) East                            b) South  
c) West                            d) Data  
inadequate

Q.3 One evening before sunset Riya and Himani were talking to each other face to face. If Himani's shadow was exactly to the right of Himani in, which direction was Riya facing?

- a) North                        b) South  
c) West                            d) Data  
inadequate

Q.4 In the AMS club, all the members participate either in the Tambola or the Fete. 420 participated in the Fete, 350 participated in the Tambola and 220 participated in both. How many members does the club have?

- a) 410                            b) 550





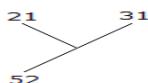
Q.27 In alphabet series, some alphabets are missing which are given in that order as one of the alternatives below it. Choose the correct alternative. \_ babbba \_ a \_

- a) ababb
- b) baaab
- c) bbaba
- d) babbb

Directions for questions 28 to 31:-

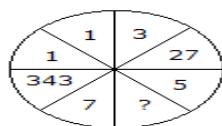
Find the value of the missing figure (?)

Q.28



- a) 115
- b) 99
- c) 89
- d) 140

Q.29



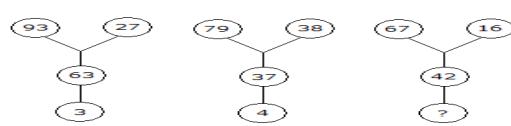
- a) 125
- b) 165
- c) 600
- d) 625

Q.30

A <sub>2</sub>	C <sub>4</sub>	E <sub>6</sub>
G <sub>3</sub>	I <sub>5</sub>	?
M <sub>5</sub>	O <sub>9</sub>	Q <sub>14</sub>

- a) L<sub>10</sub>
- b) K<sub>15</sub>
- c) I<sub>15</sub>
- d) K<sub>8</sub>

Q.31



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

Directions for questions 32 to 36:

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

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

Q.33 How many cubes have only one face painted?

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

Q.34 How many cubes have less than three faces painted?

- a) 44
- b) 24
- c) 48
- d) 56

Q.35 How many cubes are there with three faces painted?

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

Q.36 How many cubes have one face green and one of the adjacent faces black or red?

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

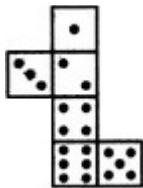
Q.37 If B says that his mother is the only daughter of A's mother, how is A related to B?

- a) Son
- b) Father
- c) Brother
- d) Uncle

Q.38 A dice is numbered from 1 to 6 in different ways. If 1 is adjacent to 2, 4 and 6, then which of the following statements is necessarily true?

- a) 2 is opposite to 6
- b) 1 is adjacent to 3





a) 1      b) 2      c) 3      d)  
4

## End Semester Examination, Dec. 2017

B. Tech. – Fourth Semester  
**CAREER SKILLS-II (HM-402)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **4**

Note: The paper consists of **FIFTY** multiple questions; each question has **FOUR** options with one correct answer. Select the correct answer.

Attempt all questions. All questions are of **ONE** mark each. There is no negative marking. Calculator is not allowed.

Mention the correct option for each question in the blank answer key given herein below. (Answer sheets with empty answer keys despite the correct options being ticked, will not be evaluated)

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

Q.1 The average of five numbers is 12. What will be the new average, if each of the numbers is multiplied by 4?

- a) 60      b) 20  
c) 48      d) 4

Q.2 If 35% of a number is 112. Then what is the number?

- a) 380      b) 300  
c) 320      d) 350

Q.3 If 40, x, x, 40 are in proportion, then find the value of x.

- a) 40      b) 50  
c) 30      d) 25

Q.4 Two numbers are in the ratio 3:4. The difference between their squares is 28. Find the greatest number.

- a) 12      b) 8

- c) 24                  d) 16

Q.5 In a group of persons, 70% of the persons are male and 30% of the persons are married. If two-seventh of the males are married, what fraction of the females is single?

- a)  $\frac{2}{7}$                   b)  $\frac{1}{3}$   
c)  $\frac{3}{7}$                   d)  $\frac{2}{3}$

Q.6 An airplane covers a certain distance at a speed of 240 kmph in 5 hours. To cover the same distance in 1 hours, it must travel at a speed of:

- a) 300 Kmph                  b) 360 kmph  
c) 600 kmph                  d) 720 kmph

Q.7 The CP of an article is  $\frac{5}{6}$  of the SP. What is the percentage profit or loss?

- a) 20% loss                  b) 16.66 profit  
c) 16.66% loss                  d) 20% profit

Q.8 A man sold an umbrella for `1800 and incurs a loss of 20%, then what is the cost price of the umbrella?

- a) 1440                  b) 2160  
c) 2250                  d) 2320

Q.9 The smallest three digits divisible by 3 is:

- a) 103                  b) 100  
c) 102                  d) None of these

Q.10 The side of a square is 20 cm. What is the area of the square?

- a)  $400 \text{ cm}^2$                   b)  $300 \text{ cm}^2$

- c)  $40 \text{ cm}^2$       d)  $480 \text{ cm}^2$

Q.11 What is the LCM of 8, 12, 15?

- a) 150      b) 100  
c) 120      d) 180

Q.12 To complete a piece of work A and B take 8 days, B and C 12 days. A, B and C take 6 days.

A and C will take:

- a) 7 days      b) 7.5 days  
c) 8 days      d) 8.5 days

Q.13 A tank is 25m long, 12m wide and 6m deep. The cost of plastering its walls and bottom at 75 paise per sq.m is?

- a) `456      b) `458  
c) `558      d) `568

Q.14 The ratio between the perimeter and the breadth of a rectangle is 5:1. If the area of the rectangle is 216 sq.cm, what is the length of the rectangle?

- a) 16cm      b) 18cm  
c) 24cm      d) 20cm

Q.15 A mixture of water and milk contains 80% milk. In 50 litres of such a mixture, how many litres of water is required to increase the percentage of water to 50%?

- a) 20      b) 15  
c) 30      d) 45

Q.16 What is the probability of getting an even number in single throw of a dice?

- a)  $2/5$       b)  $1/2$

- c) 1/3                  d) 5/6

Q.17 A shopkeeper has 50kgs of rice, part of which he sells at 8% profit and the rest at 18% profit. On the whole, he gains 14% profit. What quantity of rice is sold at 18% profit ?(in kgs)

- a) 40                  b) 35  
c) 30                  d) 45

Q.18 Amit started a business by investing `30,000. Rahul joined the business after some time and invested `20,000. At the end of the year, profit was divided in the ratio of 2:1. After how many months did Rahul join the business?

- a) 9                  b) 3  
c) 4                  d) 5

Q.19 Three unbiased coins are tossed. What is the probability of getting at most two heads?

- a) 3/4                  b)  $\frac{1}{4}$   
c) 3/8                  d) 7/8

Each of the questions 20-21 given below consists of a statement and / or a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statement(s) is / are sufficient to answer the given question. Read the both statements and

- Give answer (a) if the data in Statement I alone are sufficient to answer the question, while the data in Statement II alone are not sufficient to answer the question.
- Give answer (b) if the data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question.
- Give answer (c) if the data even in both Statements I and II together are not sufficient to answer the question.
- Give answer(d) if the data in both Statements I and II together are necessary to answer the question.

Q.20 What is Sonia's present age?

- I. Sonia's present age is five times Deepak's present age.

II. Five years ago her age was twenty-five times Deepak's age at that time.

Answer \_\_\_\_\_

Q.21 How much time did X take to reach the destination?

- I. The ratio between the speed of X and Y is 3 : 4
- II. Y takes 36 minutes to reach the same destination

Answer \_\_\_\_\_

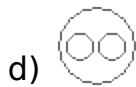
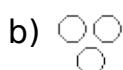
Q.22 16. Look at this series: 2, 4, 8, 16, ... What number should come next?

- a) 64
- b) 48
- c) 45
- d) 32

Q.23 Two pipes can fill the cistern in 10hr and 12 hrs. respectively, while the third empty it in 20hr. If all pipes are opened simultaneously, then the cistern will be filled in

- a) 7.5 hrs.
- b) 8 hrs.
- c) 8.5 hrs.
- d) 10 hrs.

Q.24 Which of the following diagrams indicates the best relation between Earth, Sea and Sun?



Q.25 In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

- a) 120
- b) 720
- c) 4320
- d) 2160

Q.26 In how many different ways can the letters of the word 'GAMER' be arranged?

- a)  $8!$
- b)  $6!$
- c)  $3! \times 2!$
- d)  $5!$

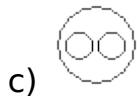
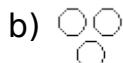
Q.27 Find the remainder when 103 is divided by 3?

- a) 2
- b) 1
- c) 3
- d) 7

Q.28 If a quarter kg of potato costs 60 paise, how many paise will 200 gm cost?

- a) 48 paise
- b) 54 paise
- c) 56 paise
- d) 72 paise

Q.29 Which of the following diagrams indicates the best relation between India, Haryana and World?



Q.30 The length of a rectangle is halved, while its breadth is tripled. What is the percentage change in area?

- a) 25% increase
- b) 50% increase
- c) 50% decrease
- d) 75% decrease

Q.31 To make a presentation impressive and effective you should use:

- a) Jargons
- b) Complex sentences
- c) Passive sentences
- d) A simple and active form of sentences

Q.32 Self-assessment in career planning helps you to know

- a) What your talents & strengths are
- b) The activities you get most satisfaction from
- c) The talents you achieve most with
- d) All of the above

Q.33 Which of these is a characteristic of high performance team where members believe in the integrity, character and ability of each other?

- a) Openness      b) Worthiness
- c) Trust            d) Loyalty

Q.34 Which of these is the fundamental pattern of cultural differences?

- a) Communication styles
- b) Clothing Styles
- c) Decision making style
- d) All of the above

Q.35 I pass others' work as in my own work I am indulging in:

- a) Compassion    b) Altruism
- c) Plagiarism     d) Benevolence

Q.36 Which of the following could be considered as a stress?

- a) Noise
- b) Commuting to work
- c) Crowd
- d) All of the above

Q.37 Effective teams can

- a) Be bought
- b) Be faked
- c) Be created through trust and competency
- d) Exist without having a common goal

Q.38 In a self-awareness process, research can be done by

- a) Shopping
- b) Speaking with people involved in your area of interest
- c) Joining a dance school
- d) Participating in GD

Q.39 Which of these is an unhealthy way of coping with stress?

- a) Listen to music
- b) Physical exercise
- c) Over eating or under eating
- d) Talking it out with family & friends

Q.40 The visual aids used in a presentation needs to be:

- a) Simple

- b) Have an impact
- c) Easy to read
- d) All of the above

Q.41 Creativity is related to \_\_\_\_\_ brain

- a) Left
- b) Posterior
- c) Right
- d) Rear

Q.42 Good presenters will

- a) Keep their hands on the podium
- b) Gesture with their hands
- c) Keep their hands in their pockets
- d) Does not make a difference

Q.43 Urgent and Important activities will find place in your Schedule as

- a) Could
- b) Must
- c) Should
- d) None of these

Q.44 The idea of effective cross cultural communication is to:

- a) Respecting cultural differences and working together.
- b) Stereo typing a culture.
- c) Delegate work to the other person.
- d) Changing oneself as per the other culture.

Q.45 What is the tendency to postpone things called?

- a) Overreaching
- b) Procrastination
- c) Delegation
- d) Remuneration

Q.46 Career Plan is

- a) Life long process
- b) Acquiring skills
- c) Changing Careers
- d) All of the above

Q.47 SWOT analysis helps you

- a) Plan Better
- b) Identify things that go in your favour
- c) Identify pitfalls
- d) All of the above

Q.48 Diversity in teams are caused best by

- a) Religion
- b) Gender
- c) Educational back ground
- d) Competencies

Q.49 I like to break complex tasks in to sequential simpler tasks. This makes me

- a) Process Oriented
- b) Resourceful
- c) Smart
- d) Pragmatic

Q.50 Plagiarism is

- a) Unethical

- b) Passing of others' work as your own
- c) Both
- d) None of the above

## **End Semester Examination, Dec. 2017**

B. Tech. – Fourth Semester

### **QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-I (HM-403A)**

Time: 2hrs

Max

Marks: **50**

No. of

pages: 5

Note: The paper consists of **FIFTY** multiple choice questions; Each question has **FOUR** options with **ONE** correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking. Mention the correct options for each question in the answer key. (Answers marked outside the answer key will not be evaluated.)

<b>51.</b>	<b>52.</b>	<b>53.</b>	<b>54.</b>	<b>55.</b>	<b>56.</b>	<b>57.</b>	<b>58.</b>	<b>59.</b>	<b>60.</b>
<b>61.</b>	<b>62.</b>	<b>63.</b>	<b>64.</b>	<b>65.</b>	<b>66.</b>	<b>67.</b>	<b>68.</b>	<b>69.</b>	<b>70.</b>
<b>71.</b>	<b>72.</b>	<b>73.</b>	<b>74.</b>	<b>75.</b>	<b>76.</b>	<b>77.</b>	<b>78.</b>	<b>79.</b>	<b>80.</b>
<b>81.</b>	<b>82.</b>	<b>83.</b>	<b>84.</b>	<b>85.</b>	<b>86.</b>	<b>87.</b>	<b>88.</b>	<b>89.</b>	<b>90.</b>

<b>91.</b>	<b>92.</b>	<b>93.</b>	<b>94.</b>	<b>95.</b>	<b>96.</b>	<b>97.</b>	<b>98.</b>	<b>99.</b>	<b>100.</b>
Q.1	What is self-awareness?					b) A clear idea of your preferences and work goals			
	a) The awareness of self.					c) An idea of how much money you should be making			
	b) The knowledge of our own strengths and weaknesses					d) None of the above			
	c) The awareness of one's likes and dislikes								
	d) All of the above								
Q.2	The SWOT analysis of a person talks about the:				Q.6	The decision making process involves which of the following steps?			
	a) Smartness, Weaknesses, Opportunities and Threats					a) Comparing various options available to you			
	b) Strengths, Words, Orderliness, and Time management					b) Narrowing down your choices			
	c) Strengths, weaknesses, Opportunities and Threats					c) Thinking what suits you best			
	d) Strong points, welfare, Opportunities and Time management					d) All of the above			
Q.3	How can self-awareness be achieved?				Q.7	The “Research” or the occupational awareness involves which of the following?			
	a) Through introspection.					a) Exploring the occupation which interests you and matches your knowledge, skills and attitude			
	b) By asking our near and dear ones.					b) Finding out who all from your group of friends are having the same interests			
	c) By performing the SWOT analysis					c) What actions are required to achieve the goal			
	d) All of the above					d) None of the above			
Q.4	The knowledge of self includes asking which of the following questions? HM403A.6				Q.8	“Employability” is:			
	a) What do I want to achieve in my life?					a) Getting a job			
	b) What do I want out of my job/career?					b) Having the right K, S, A's to get and maintain a job			
	c) Both the above					c) Being able to draw a respectable salary			
	d) None of the above					d) None of the above			
Q.5	After the self-awareness exercise, you should have:				Q.9	The career planning process involves the following steps in order:			
	a) A Confused mind					a) Self-awareness; Decision making; Research; Taking action			

- b) Self-awareness; Taking action; Research; Decision making
- c) Self-awareness; Research; Decision making; Taking action
- d) Self-awareness; Taking action; Decision making; Research
- Q.10 The career planning process is an ongoing process of:
- Continuously fine tuning your work and learning plans to help you manage your professional life.
  - Getting employment
  - Maintain the employment by functioning successfully
  - None of the above
- Q.11 Which of the skills is gauged through Group Discussion?
- Flexibility
  - Managerial Skills
  - Leadership Skills
  - A & C
- Q.12 The steps for Effective presentation includes:
- Plan
  - Prepare
  - Practice
  - All of the above
- Q.13 "What to change today so that tomorrow is better than yesterday"- is the definition of \_\_\_\_\_.
- Self awareness
  - Decision Making
  - Planning
  - Goal setting
- Q.14 What is the full form of MBTI personality test
- Myers Briggs talent indicator
  - Myers Briggs time indicator
  - Myers Briggs team indicator
  - Myers Briggs type indicator
- Q.15 Choosing an occupation, getting a job, growing in our job, acquiring skills, changing careers and retiring are examples of:
- Self awareness
  - Decision Making
  - Career Planning
  - Goal setting
- Q.16 Which is not the source of job search?
- Campus recruitment
  - Alumni groups
  - Job portals
  - Project reports
- Q.17 The decision making pyramid has:
- Intuition, occupational and self-awareness
  - Strength, weaknesses, opportunities and threats
  - Strengths, occupational awareness and opportunities
  - Intuition, opportunities and threats
- Q.18 Among all which is not the part of career planning process.
- Self-assessment
  - Research
  - Decision making
  - Evaluation
- Q.19 The ability to evaluate oneself, observe the behaviors, find the

areas of improvement and work on them is an example of \_\_\_\_\_ Intelligence

- a) Spacial
- b) Intrapersonal
- c) Interpersonal
- d) Rhythmic

Q.20 The true purpose of an Interview is to:

- a) To get a job
- b) Take the experience of sitting in an interview.
- c) To know the kind of jobs available in the market.
- d) To see if your skills matches with what the employer is looking for.

Q.21 An interview portfolio bag should have:

- a) Master Application
- b) Copies of resume
- c) Certificates and Accomplishments
- d) All of these

Q.22 The answer to the question "Why should we hire you?" should be:

- a) I am the best and would do the job at my best.
- b) I am the best among the people you have just met.
- c) All my teacher and friends like me.
- d) It will give me a platform to showcase my skills.

Q.23 The question "Tell me something about yourself" is to check:

- a) How well you speak about yourself
- b) Whatever you have written in your CV is true or not.

- c) How confident you are about yourself and your skill sets
- d) How well versed you are about talking in English

Q.24 Effective Non Verbal delivery involves.

- a) Eye Contact
- b) Physical Delivery
- c) Facial Expression
- d) All of the above

Q.25 Group Discussion is used for \_\_\_\_\_.

- a) Judgment
- b) Analyzing skills
- c) Mass elimination
- d) Job selection

Q.26 Two pipes can fill the cistern in 10hr and 12 hr respectively, while the third empty it in 20hr. If all pipes are opened simultaneously, then the cistern will be filled in

- a) 7.5 hrs
- b) 8.5 hrs
- c) 8 hrs
- d) 10 hrs

Q.27 How many times will minute hand and hour hand coincide in one day?

- a) 21
- b) 22
- c) 23
- d) 24

Q.28 To complete a piece of work A and B take 8 days, B and C 12days. A, B and C take 6 days. A and C will take:

- a) 7 days
- b) 8 days
- c) 7.5 days
- d) 8.5 days

- Q.29 Fresh fruit contains 68% water and dry fruit contains 20% water. How much dry fruit can be obtained from 100 kg of fresh fruits?
- a) 20                    b) 30  
c) 40                    d) 50
- Q.30 The value of a machine depreciates at the rate of 10% every year. It was purchased 3 years ago. If its present value is Rs. 8748, its purchase price was:
- a) 10000                b) 12000  
c) 14000                d) 16000
- Q.31 If the price of a book is first decreased by 25% and then increased by 20%, then the net change in the price will be
- a) 10                    b) 20  
c) 30                    d) 40
- Q.32 A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are:
- a) 500                    b) 600  
c) 800                    d) 1000
- Q.33 If 75% of a number is added to 75, then the result is the number itself. The number is:
- a) 100                    b) 200  
c) 300                    d) 400
- Q.34 A number is decreased by 10% and then increased by 10%. The number so obtained is 10 less than the original number. What was the original number?
- a) 1000                    b) 2000
- c) 3000                    d) 4000
- Q.35 A housewife saved Rs. 2.50 in buying an item on sale. If she spent Rs. 25 for the item, approximately how much percent she saved in the transaction?
- a) 8                        b) 9  
c) 10                        d) 11
- Q.36 A merchant marks his goods up by 75% above his cost price. What is the maximum % discount that he can offer so that he ends up selling at no profit or loss?
- a) 75%                    b) 46.67%  
c) 300%                    d) 42.85%
- Q.37 If apples are bought at the rate of 30 for a rupee, how many apples must be sold for a Rupee so as to gain 20%?
- a) 28                        b) 25  
c) 20                        d) 22
- Q.38 Rajiv sold an article for Rs.56 which cost him Rs.x. If he had gained x% on his outlay, what was his cost?
- a) 40                        b) 45  
c) 36                        d) 28
- Q.39 How many litres of water should be added to a 30 litre mixture of milk and water containing milk and water in the ratio of 7: 3 such that the resultant mixture has 40% water in it?
- a) 7                            b) 10  
c) 5                            d) None
- of these
- Q.40 A zookeeper counted the heads of the animals in a zoo and found it to be 80. When he

counted the legs of the animals he found it to be 260. If the zoo had either pigeons or horses, how many horses were there in the zoo? In the zoo, each horse had four legs and each pigeon had two legs.

- a) 40                    b) 30  
c) 50                    d) 60

- Q.41 A 20 litres mixture of milk and water comprising 60% pure milk is mixed with "x" litres of pure milk. The new mixture comprises 80% milk. What is the value of "x"?
- a) 40                    b) 20  
c) 8                      d) 16

- Q.42 The average of 5 quantities is 6. The average of 3 of those 5 quantities is 8. What is the average of the remaining two quantities?
- a) 6.5                    b) 4  
c) 3                      d) 2

- Q.43 Average age of boys in a class is 16 years and average age of girls is 15 years, what is the average age of all:
- a) 15                    b) 15.5  
c) 16                    d) Cannot be determined

- Q.44 Average of five numbers is 27. If one number is excluded the average becomes 25. The excluded number  
a) 35                    b) 45  
c) 55                    d) 65
- Q.45 The average of four consecutive odd numbers is 24. Find the largest number.  
a) 25                    b) 27  
c) 29                    d) 31
- Q.46 A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:  
a) 650                    b) 690  
c) 698                    d) 700
- Q.47 How long will it take for a sum of money to grow from Rs.1250 to Rs.10,000, if it is invested at 12.5% p.a simple interest?  
a) 65 years              b) 56 years  
c) 45 years              d) 57 years
- Q.48 At what rate of compound interest per annum will a sum of Rs.1200 becomes Rs.1348.32 in 2 years;  
a) 6%                    b) 6.5%  
c) 7                      d) 7.5%
- Q.49 A work which could be finished in 9 days was finished 3 days earlier after 10 more men joined. The number of men employed was?  
a) 18                    b) 20  
c) 22                    d) 24
- Q.50 Pipe A can fill a tank in 5 hours, pipe B in 10 hours and pipe C in 30 hours. If all the pipes are open, in how many hours will the tank be filled?  
a) 2.5 hrs              b) 2 hrs  
c) 3.5 hrs              d) 3 hrs

**End Semester Examination, Dec. 2017**  
**B. Tech. – Sixth Semester**  
**INDUSTRIAL MANAGEMENT (HM-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 **any four** parts:

- a) Discuss the importance of directing function of management.
- b) Draw and explain product layout.
- c) Draw a flow diagram.
- d) Discuss the need for store management.
- e) What are the objectives of good industrial relations?
- f) Discuss the importance of inspection.

**5×4**

### **PART-A**

Q.2 Define management. Discuss the scope of management with suitable examples. **20**

Q.3 Discuss the steps in finding a plant location with the help of suitable examples. **20**

Q.4 Define method study. Discuss the steps involved in method study with the help of a block diagram. **20**

### **PART-B**

Q.5 Discuss ABC technique of inventory management in detail. **20**

Q.6 a) Discuss the scope of employee welfare in detail. **10**  
b) Discuss the importance of workers participation in management. **10**

Q.7 a) Discuss the concept of total quality management. **10**  
b) Discuss the importance of quality control. **10**

## **End Semester Examination, Dec. 2017**

B. Tech. - Fifth Semester  
**INDUSTRIAL MANAGEMENT (HM-501)**

Time: 3 hrs.

Max Marks: **100**

809/5

No. of pages: 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 four)** questions:

- a) Discuss the importance of controlling function.
- b) Discuss the problems of plant layout.
- c) What are the differences between work sampling and time study?
- d) Draw and explain a BIN card.
- e) Who are the participants in industrial relations?
- f) Define quality control. How is it important?

**5×4**

### **PART-A**

Q.2 Define management. Discuss its scope.

**20**

Q.3 a) Discuss the steps in finding a plant location.  
b) How is the location of a plant important?

**15**  
**5**

Q.4 a) Define method study

**2**

- b) Discuss the procedure of method study with the help of a block diagram.
- 18**

### **PART-B**

Q.5 Explain Always Better Control technique of inventory management.

**20**

Q.6 a) What do you mean by employee welfare? Discuss its scope.

**20**

Q.7 a) Discuss the concept of TQM. Explain its components.  
b) Define inspection. Discuss its importance.

**10**  
**10**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

**CAREER SKILLS-III (HM-503A)**

Time: 2hrs

Max

Marks: **50**

pages: 4

Note: The paper consists of **FIFTY** multiple choice questions; Each question has **FOUR** options with **ONE** correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking. Mention the correct options for each question in the answer key. (Answers marked outside the answer key will not be evaluated.) Calculator is not allowed.

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

- Q.1** A car covers 600 m in 10 minutes. Find the speed in km/hr.
- a) 10 km/hr                          b) 6 km/hr  
 c) 0.36 km/hr                          d) 3.6 km/hr
- Q.2** In the number “4678M0”, what is the smallest number that should replace M if the number is divisible by 3?
- a) 6                                  b) 4  
 c) 2                                  d) 5
- Q.3** The sum of ages of 5 children born at the intervals of 3 years each is 50 years. What is the age of the youngest child?
- a) 4                                  b) 8  
 c) 10                                  d) None of these
- Q.4** What is the probability of getting a sum 9 from two throws of a dice?
- |                  |                   |
|------------------|-------------------|
| a) $\frac{1}{6}$ | b) $\frac{1}{8}$  |
| c) $\frac{1}{9}$ | d) $\frac{1}{12}$ |
- Q.5** Three unbiased coins are tossed. What is the probability of getting at most two heads?
- |                  |                  |
|------------------|------------------|
| a) $\frac{3}{4}$ | b) $\frac{1}{4}$ |
| c) $\frac{3}{8}$ | d) $\frac{7}{8}$ |
- Q.6** Look at this series: 7, 10, 8, 11, 9, 12, ... What number should come next?
- a) 7                                  b) 10  
 c) 12                                  d) 13
- Q.7** If the population of a town is decreased by 10% and then increased by 10%, the net effect on the population of the town is:
- a) Decrease of 99%                          b) No change  
 c) Decrease of 1%                                  d) Increase of 1%
- Q.8** How many times the two hands of a clock meet in a day?
- a) 22                                  b) 11  
 c) 44                                  d) 55
- Q.9** What percentage of numbers from 1 to 70 have 1 or 9 in the unit's digit?
- a) 1                                  b) 14  
 c) 20                                  d) 21
- Q.10** A fruit seller had some apples. He sells 40% apples and still has 420 apples. Originally, he had:
- a) 588                                  b) 672  
 c) 600                                  d) 700
- Q.11** A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is:
- |                   |                   |
|-------------------|-------------------|
| a) $\frac{1}{4}$  | b) $\frac{1}{10}$ |
| c) $\frac{7}{15}$ | d) $\frac{8}{15}$ |
- Q.12** The largest 4 digit number exactly divisible by 88 is:
- a) 9944                                  b) 9988  
 c) 8888                                  d) None of these

Q.13 What is the unit digit in  $(625)^{3^{17}} \times (341)^{4^{91}}$ ?

- a) 5                          b) 2  
c) 3                          d) 0

Q.14  $8597 - ? = 7429 - 4358$

- a) 5430                      b) 5420  
c) 5526                      d) None                of  
these

Q.15 In how many ways can the letters of the word 'LEADER' be arranged?

- a) 72                          b) 36  
c) 360                        d) None                of  
these

Q.16 Two discounts of 60% and 20% equal to a single discount of:

- a) 70                          b) 65  
c) 66                          d) 68

Q.17 In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is red?

- a)  $\frac{1}{3}$                       b)  $\frac{1}{2}$   
c)  $\frac{8}{21}$                       d)  $\frac{3}{13}$

Q.18 Six bells commence tolling together and toll at intervals of 2, 4, 6, 8, 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?

- a) 4                            b) 10  
c) 13                          d) 16

Q.19 A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?

- a) 3.6                        b) 7.2  
c) 8.4                        d) 10

Q.20 The ratio between the speeds of two trains is 7:8. If the second train runs 400 km in 4 hours, then the speed of the first train is:

- a) 67.5 kmph                b) 57.5  
kmph                            c) 77.5 kmph                d) 87.5  
kmph

Q.21 Pipe A can fill the tank in 6 hours and Pipe B in 8 hours. If both are open together, in how many hours can they fill an empty tank?

- a)  $24/7$  hours                b)  $25/7$  hours  
c)  $25/6$  hours                d)  $48/7$  hours

Q.22 Find the remainder when  $75^{80}$  is divided by 5.

- a) 0                            b) 3  
c) 2                            d) 6

Q.23 What number should be subtracted from 3938 if it is to be perfectly divisible by 3?

- a) 41                        b) 39  
c) 13                        d) None                of  
these

Q.24 The product of two numbers is 507 and their H.C.F. is 13. The numbers are:

- a) 13, 49                    b) 13, 39  
c) 39, 15                    d) None                of  
these

Q.25 How many 2-digit distinct nos. can be formed from digits 1, 2, 3, 4, 5, 6?

- a) 36                          b) 25  
c) 24                          d)  $6^5$

Q.26 A thief steals a car and drives it at 15 km/hr. The theft has been discovered after one hour and the owner of the car sets off in another car at 25 km/hr. When will the owner overtake the thief from the starting point?

- a) 1 hr                          b) 1.5 hr  
c) 2 hr                          d) 2.5 hr

Q.27 If a man runs at 3m/s, how many kilometers does he run in 1 h 40 min?

- a) 18 km                          b) 12 km  
c) 20 km                          d) 22 km

Q.28 If the marked price is Rs 1000 and the seller gives 30% discount on it. What is the selling price?

- a) Rs. 650                          b) Rs. 700  
c) Rs. 800                          d) Rs. 750

Q.29 A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What is the selling price of the cycle?

- a) Rs. 1090                          b) Rs. 1160  
c) Rs. 1190                          d) Rs. 1202

Q.30 A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20%?

- a) 3                                  b) 4  
c) 6                                  d) 5

Q.31 Which of the following is the enemy of time management?

- a) Highly organized meetings  
b) Delegation of work  
c) Important telephone calls  
d) Procrastination

Q.32 According to time matrix, things which are urgent as well as important should be:

- a) Done Now  
b) Done quickly  
c) Spent max. time on  
d) Rejected

Q.33 Which of the following processes was developed by Min Basadur?

- a) Time Matrix  
b) Elements of Emotional Intelligence  
c) Sales Process  
d) Simplex Process

Q.34 Which of the following is not an element of emotional intelligence?

- a) Self -awareness                          b) Self-regulation  
c) Sympathy                                  d) Social Skills

Q.35 Which of the following statements is NOT true?

- a) Body language forms 55% of the first impression of a person  
b) Customer delight is the pinnacle of customer satisfaction  
c) Verbal tone is immaterial while verbal content helps us capture the attention of others  
d) The first step to managing an irate customer is to listen patiently.

Q.36 "Posture" in interview would mean:

- a) Lean & Forward  
b) Slouch and Hunch  
c) Straight & upright  
d) Slide & Comfortable.

Q.37 "A good first impression" would mean:  
a) Good-verbals & Non-verbals

- b) Good academic Records  
 c) Good sport records  
 d) Good extra-curricular records
- Q.38 If the name (Samuel Ferguson) is provided, which is the correct salutation?  
 a) Dear Mr. Ferguson  
 b) Dear Mr. Samuel  
 c) Dear Mr. Samuel Ferguson  
 d) Respected Sir
- Q.39 Cover Letter is used for:  
 a) Giving information  
 b) Proposing your candidature  
 c) Seeking salary hike  
 d) None of the above
- Q.40 What does a resume show?  
 a) Candidate's goal orientation  
 b) Candidate's eye for detail  
 c) Candidate's academic & professional history  
 d) All of the above
- Q.41 Which of the following is NOT true w.r.t. resume writing?  
 a) While drafting the resume, keep busy readers in mind  
 b) While editing, do a triple check  
 c) All the headings should be of one font style  
 d) A good qualification, from a good institute is the only thing that recruiters are actually interested in.
- Q.42 Which of the following is a "Do" in a group discussion?  
 a) Argue and Shout  
 b) Mention erratic statistics  
 c) Snatch your chance of speaking  
 d) None of the above
- Q.43 The pre requisite of a Group Discussion includes:  
 a) Being Shy/ Isolated in GD  
 b) Analyzing the topic logically  
 c) Interrupting another participant before his/her argument is over  
 d) Changing Opinions
- Q.44 "Accepting Criticism" in GD means:  
 a) Get upset and react strongly.  
 b) Be polite in telling the other person that the criticism is unconvincing.  
 c) If the criticism is flimsy, criticize the other person who is criticizing you.  
 d) Just ignore and keep talking.
- Q.45 The answer to the question "Why should we hire you?" Should be:  
 a) I am the best and would do the job at my best.  
 b) I am the best among the people you have just met.  
 c) All my teacher and friends like me.  
 d) It will give me a platform to showcase my skills.
- Q.46 The answer to the question "How long would you expect to work for us if hired?" Would be:  
 a) Till 5 o clock  
 b) Till I keep getting foreign assignments  
 c) Till I keep getting good salary.  
 d) Till I feel challenged professionally.
- Q.47 Researching the organization is important:  
 a) To increase your general knowledge  
 b) To know whether my skills match with the company's needs

- c) To match the knowledge that you have with the company profile.
  - d) None of the above
- Q.48 The question "Tell me something about yourself" is to check:
- a) How well you speak about yourself
  - b) How self aware are you
  - c) How confident you are about yourself and your skill sets
  - d) All of the above.
- Q.49 The true purpose of an Interview is to:
- a) To get a job
- b) Take the experience of sitting in an interview.
  - c) To know the kind of jobs available in the market.
  - d) To see if your skills matches with what the employer is looking for.
- Q.50 What should you do if you did not understand the question that the interviewer asked?
- a) Politely request him/her to repeat
  - b) Guess the answer
  - c) Smile and ignore the question
  - d) None of the above

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester

### **INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP (HM-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**. Each question carries equal marks.

- Q.1 Briefly define/explain the following.
- a) Nature of Management.
  - b) Participants in IR.
  - c) Span of control.
  - d) Purchase management.
  - e) Problems of layout.
  - f) Industrial relations.
  - g) Inventory control techniques.
  - h) Directing.
  - i) Inspection.
  - j) Nabard.

**2×10**

#### **PART-A**

- Q.2 What are the functions of management? Explain in brief, each of these functions.

**20**

- Q.3 a) Define plant layout. Discuss the types of layout with the help of a diagram. **10**  
 b) Discuss the factors influencing a layout, with major problems of a layout. **10**

- Q.4 What are the objectives of materials management? Discuss the costs associated with materials management and derive an expression for economic order quantity.

**20**

#### **PART-B**

- Q.5 a) What is the importance of good industrial relations? Explain the concept of worker's participation in management. **10**  
 b) Discuss the concept and scope of employee welfare. **10**

- Q.6 Discuss the following:  
 Entrepreneurial support systems.  
 a) Commercial Banks  
 b) District Industry centres. **10×2**
- Q.7 Write short notes on:  
 a) Objectives of good industrial relations.  
 b) Role of sidbi in supporting entrepreneurs. **10×2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth / Sixth Semester

### **INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP (HM-504 / HM-504A)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: **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) Discuss the nature of management.  
 b) Mention important steps in finding a suitable site for plant location.  
 c) Define the role of NABARD.  
 d) Discuss the importance of industrial relations. **5×4**

#### **PART-A**

- Q.2 What are the functions of management? Explain in brief, each of these functions. **20**
- Q.3 Explain the nature, objectives and importance of plant layout. **20**
- Q.4 Discuss ABC control in inventory management and the role of V.E.D. analysis in improving it further. **20**

#### **PART-B**

- Q.5 What is the concept of worker's participation in management? Discuss the objectives of same in detail. **20**
- Q.6 What is the role of development financial institutions towards entrepreneurship development? **20**

- Q.7 Write short notes on:  
a) Objectives of good industrial relations.  
b) Role of SIDBI in supporting entrepreneurs.

**10×2**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester

### **QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-II (HM-505A)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **4**

Note: The paper consists of **FIFTY** multiple choice questions; each question has **FOUR** options with **ONE** correct answer. Select the correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking.

Mention the correct option for each question in the blank answer key given herein below. (Answer sheets with empty answer keys despite the correct options being ticked will not be evaluated.)

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 Speed of a train is 20 meters per second. It can cross a pole in 10 seconds. What is the length of train?
- a) 150 m      b) 250 m  
c) 200 m      d) 300 m

- Q.2 Ram walks at a speed of 12 km/h. Today the day was very hot so walked at  $\frac{5}{6}$  of his average speed. He arrived his school 10 minutes late. Find the usual time he takes to cover distance between his school and home?
- a) 40 mins      b) 45 mins  
c) 50 mins      d) 60 mins
- Q.3 In a kilometer race, A beats B by 100 meters. B beats C by 100 meters. By how much meters does A beat C in the same race?
- a) 200 meters      b) 180 meters  
c) 190 meters      d) 210 meters
- Q.4 A train overtakes two girls who are walking in the opposite direction in which the train is going at the rate of 3 km/h and 6km/h and passes them completely in 36 seconds and 30 seconds respectively. The length of the train is?
- a) 120 m      b) 150 m  
c) 125 m      d) None of these
- Q.5 A boat takes 90 minutes less to travel 36 miles downstream than to travel the same distance upstream. If the speed of the boat in still water is 10 mph, the speed of the stream is?
- a) 2 mph      b) 2.5 mph  
c) 3 mph      d) 4 mph
- Q.6 Two trains are running in opposite directions in the same speed. The length of each train is 120 meter. If they cross each other in 12 seconds, the speed of each train (in km/hr) is?
- a) 42      b) 36  
c) 28      d) 20
- Q.7 A farmer travelled a distance of 61 km in 9 hours. He travelled partly on foot @ 4 km/hr and partly on bicycle @ 9 km/hr. The distance travelled on foot is?

- a) 14 km
- b) 15 km
- c) 16 km
- d) 17 km

Q.8 What is the angle between the two hands of clock at 3:40 am?

- a) 110 degree
- b) 130 degree
- c) 150 degree
- d) None of these

Q.9 How many times the hands of clock are opposite to each other in a day?

- a) 22 times
- b) 24 times
- c) 44 times
- d) 48 times

Q.10 If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. The actual distance travelled by him is?

- a) 50 km
- b) 56 km
- c) 70 km
- d) 80 km

Q.11 Excluding stoppages, the speed of a bus is 60 km/hr and including stoppages, it is 54 km/hr. For how many minutes does the bus stop per hour?

- a) 9 min.
- b) 10 min.
- c) 6 min.
- d) 20 min.

Q.12 The product of two numbers is 2028 and their H.C.F. is 13. The number of such pairs is?

- a) 1
- b) 2
- c) 3
- d) 4

Q.13 Six bells commence tolling together and toll at intervals of 2, 4, 6, 8, 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?

- a) 4
- b) 10
- c) 15
- d) 16

Q.14 On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder?

- a) 0
- b) 3
- c) 5
- d) 11

Q.15 How many natural numbers are there between 23 and 100 which are exactly divisible by 6?

- a) 8
- b) 11
- c) 12
- d) 13

Q.16 The largest 3 digit number exactly divisible by 24 is?

- a) 994
- b) 902
- c) 998
- d) 996

Q.17 What is the unit digit in  $\{(37)^{179} \times (625)^{31} \times (246^{49})\}$ ?

- a) 0
- b) 2
- c) 3
- d) 5

Q.18 What will be remainder when  $(37^{37} + 37)$  is divided by 38?

- a) 1
- b) 38
- c) 36
- d) 37

Q.19 In a division sum, the divisor is 5 times the quotient and 2 times the remainder. If the remainder is 45, what is the dividend?

- a) 1625
- b) 1665

- c) 1550      d) 1650

Q.20 If the number 3478A7 is exactly divisible by 11, then the value of A(single digit) is?

- a) 2      b) 9  
c) 6      d) 7

Q.21 How many factors of 1500 are even integers?

- a) 4      b) 24  
c) 16      d) 6

Q.22 Find the highest power of 6 in 24!?

- a) 18      b) 11  
c) 22      d) 10

Q.23 Find the sum of factors of 20?

- a) 63      b) 6  
c) 60      d) 28

Q.24 Find the number of trailing zeroes in the expansion of 154!?

- a) 28      b) 37  
c) 30      d) 36

Q.25 The unit digit of  $21^{67} + 14^{66}$  is?

- a) 2      b) 0  
c) 3      d) 7

Q.26 Which of the following is the enemy of time management?

- a) Highly organized meetings.
- b) Delegation of work.
- c) Important telephone calls.
- d) Overreaching.

Q.27 According to time matrix, things which are urgent as well as important should be:

- a) Done Now
- b) Done quickly
- c) Spent max. time on
- d) Rejected

Q.28 Which of the following processes was developed by Min Basadur?

- a) Time Matrix
- b) Elements of Emotional Intelligence
- c) Sales Process
- d) Simplex Process

Q.29 Which of the following is not an element of emotional intelligence?

- a) Self -awareness
- b) Self-regulation
- c) Sympathy
- d) Social Skills

Q.30 Which of the skills is gauged through Group Discussion?

- a) Technical skills
- b) Managerial skills
- c) Writing skills
- d) None of the above

Q.31 "Posture" in interview would mean:

- a) Lean & Forward
- b) Slouch and Hunch
- c) Straight & upright
- d) Slide & Comfortable

Q.32 A "good impression" would mean:

- a) Good Verbals & Non verbals
- b) Good academic Records
- c) Good sport records
- d) Good Extra Curricular records

Q.33 If the name (Samuel Ferguson) is provided, which is the correct salutation?

- a) Dear Mr. Ferguson
- b) Dear Mr. Samuel
- c) Dear Mr. Samuel Ferguson
- d) None of the above

Q.34 Cover Letter is used for:

- a) Giving information

- b) Proposing your candidature
- c) Seeking salary hike
- d) None of the above

Q.35 What does a resume show?

- a) Candidate's aesthetic sense
- b) Candidate's academic & professional history
- c) Candidate's eye for detail
- d) All of the above

Q.36 What should you not do in an interview?

- a) Maintain eye contact with all panelists
- b) Sit smartly
- c) Smile incessantly
- d) Dress neatly

Q.37 The most commonly used format in curriculum vitae is:

- a) Chronological order
- b) Reverse chronological order
- c) Hybrid
- d) Functional

Q.38 The Simplex Process of problem solving was developed by:

- a) Daniel Goleman
- b) Min Basadur

- c) Joseph Luft
  - d) Harrington Inge
39. Which of the following is a “Do” in a group discussion?
- a) Argue and Shout
  - b) Mention erratic statistics
  - c) Snatch your chance
  - d) None of the above
- Q.40 Cover letter should not include:
- a) Past professional background
  - b) Suitability to the job
  - c) Application purpose
  - d) Family backgrounds
- Q.41 The pre requisite of a group Discussion includes:
- a) Being Shy/ Isolated in GD
  - b) Interrupting another participant before his argument is over
  - c) Analyzing the topic logically
  - d) Changing Opinions
- Q.42 “Accepting Criticism” in GD means:
- a) Get upset and react strongly.
  - b) Be polite in telling the other person that the criticism is flimsy
  - c) If the criticism is flimsy, criticize the other person who is criticizing you.
  - d) Just ignore and keep talking

Q.43 The answer to the question “Why should we hire you?” should be:

- a) I am the best and would do the job at my best.
- b) I am the best among the people you have just met.
- c) All my teacher and friends like me.
- d) It will give me a platform to showcase my skills.

Q.44 The answer to the question “How long would you expect to work for us if hired?” Would be:

- a) Till 5 o clock
- b) Till I keep getting foreign assignments
- c) Till I keep getting good salary
- d) Till I feel challenged professionally

Q.45 Researching the organization is important:

- a) To increase your general Knowledge
- b) To know whether my skills match with the company's needs
- c) To match the knowledge that you have with the company profile.
- d) None of the above

Q.46 The question “Tell me something about yourself” is to check:

- a) How well you speak about yourself
- b) Whatever you have written in your CV is true or not.
- c) How confident you are about yourself and your skill sets
- d) How well versed you are about talking in English

Q.47 The true purpose of an Interview is to:

- a) To get a job

- b) Take the experience of sitting in an interview.
- c) To know the kind of jobs available in the market.
- d) To see if your skills matches with what the employer is looking for.

Q.48 What should you do if you did not understand the question that the interviewer asked?

- a) Politely request him to repeat
- b) Guess the answer
- c) Smile and ignore the question
- d) None of the above

Q.49 If the recruiter wants an example of leadership skills displayed by you, you should talk about:

- a) An excellent presentation that you gave to the class
- b) A job experience that you have
- c) A website that you have designed
- d) That you are a class rep. and/or the head of cultural committee.

Q.50 The preparation for a personal interview does NOT include:

- a) Being up to date with your CV
- b) Anticipating questions from the CV and identifying relevant answers/examples
- c) Buying new fancy clothes for the interview
- d) Researching about the organization and the job applied

## **End Semester Examination, Dec. 2017**

**B. Tech. – Fifth Semester  
FRENCH (HM-506)**

Time: 1½ hrs

Max Marks: **50**  
*No. of pages: 2*

Note: **All questions are compulsory. Marks indicated against question.**

Q.1 Complétez avec la conjugaison du verbe  
(Conjugate the verbs in present tense)

- a) Elle \_\_\_\_\_ belle. (**Être**)
- b) Il \_\_\_\_\_ deux stylos. (**Avoir**)
- c) Elle \_\_\_\_\_ au Canada. (**Aller**)
- d) Je \_\_\_\_\_ au gâteau. (**Faire**)
- e) Nous \_\_\_\_\_ une sœur. (**Avoir**)
- f) Elles \_\_\_\_\_ beaucoup. (**Parler**)
- g) Tu \_\_\_\_\_ bien. (**Chanter**)
- h) Les étudiants \_\_\_\_\_ le professeur. (**Écouter**)
- i) Ils \_\_\_\_\_ à Paris. (**Arriver**)
- j) Nous \_\_\_\_\_ français. (**Parler**)

**1x10**

Q.2 Complétez avec les jours de la semaine et les mois de l'année  
(Complete the blanks with days of the week & months of the year)

- a) Il y a \_\_\_\_\_ jours au mois de novembre.
- b) \_\_\_\_\_ est le cinquième mois de l'année.
- c) Il y a \_\_\_\_\_ jours dans une année.
- d) Nous sommes au mois de/d' \_\_\_\_\_.
- e) \_\_\_\_\_ est le dernier mois de l'année..
- f) \_\_\_\_\_ est le premier jour de la semaine.
- g) \_\_\_\_\_ et \_\_\_\_\_ est weekend.
- h) Nous célébrons Diwali au mois d' \_\_\_\_\_.
- i) \_\_\_\_\_ est le septième mois de l'année

**1x10**

Q.3 Traduisez en français

(Translate in French)

- a) It's beautiful \_\_\_\_\_
- b) It' day \_\_\_\_\_
- c) It's night \_\_\_\_\_
- d) It's cold \_\_\_\_\_
- e) It's hot \_\_\_\_\_

**1x5**

Q.4 Écrivez les nombres cardinaux et ordinaux  
(Write these numbers in ordinal & cardinal form)

- a) 11:- \_\_\_\_\_
- b) 25:- \_\_\_\_\_
- c) 32:- \_\_\_\_\_
- d) 01:- \_\_\_\_\_
- e) 100:- \_\_\_\_\_

**2x5**

Q.5 a) Complétez avec l'article défini (Le, La, Les, L')

(Complete with definite articles)

- i) Voilà \_\_\_\_\_ stylos de ma sœur.
- ii) C'est \_\_\_\_\_ professeur d'anglais.
- iii) C'est \_\_\_\_\_ hôtel de Valérie.

**1/2x3**

b) Complétez avec l'article indéfini (Un, Une, Des)

(Complete with indefinite articles)

- i) Tu as \_\_\_\_\_ fille.
- ii) J'ai \_\_\_\_\_ livre bleu.
- iii) Mon frère achète \_\_\_\_\_ voitures.

**1/2x3**

**Q.6** Complétez avec les pronoms sujets

(Complete with subject pronouns)

- a) \_\_\_\_\_ êtes petits.
- b) \_\_\_\_\_ vais au cinéma.
- c) \_\_\_\_\_ aiment les chocolats.
- d) \_\_\_\_\_ parle Italien?
- e) \_\_\_\_\_ habite à Delhi?
- f) \_\_\_\_\_ chantez bien.

**1/2x6**

**Q.7** Quelle heure est-il?

(What time is it?)

- a) 7:05h \_\_\_\_\_
- b) 15: 30h \_\_\_\_\_
- c) 00:00h \_\_\_\_\_
- d) 4: 50h \_\_\_\_\_

**1x4**

**Q.8** Présentez-vous en 5 lignes

(Describe yourself in 5 lines)

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**1x5**

## **End Semester Examination, Dec. 2017**

B. Tech. – Fifth Semester  
**GERMAN-I (HM-507)**

Time: 1½ hrs

Max Marks: **50**

No. of pages: **2**

Note: **All questions are compulsory. Marks indicated against question.**

**Q.1** Hier fehlt der bestimmte Artikel. (Write the missing article):

- 1. \_\_\_\_\_ Kaffee

2. \_\_\_\_\_ Tee  
 3. \_\_\_\_\_ Mineralwasser  
 4. \_\_\_\_\_ Wein  
 5. \_\_\_\_\_ Kuchen  
 6. \_\_\_\_\_ Limonade  
 7. \_\_\_\_\_ Apfelsaft  
 8. \_\_\_\_\_ Cola  
 9. \_\_\_\_\_ Brot  
 10. \_\_\_\_\_ Bier

**5**

Q.2 Bitte ergänzen Sie die Tabelle. (Complete the given table):

S.No.	Deutsch	Englisch
1	Samstag	
2		June
3		Wednesday
4	Fünfhundert	
5		March
6	Kellner	
7		984
8		8243
9		Sunday
10		444
11	Gestern	
12	Übermorgen	
13	Siebenhundertachtzig	
14	Trinken	
15		Waitress

**15**

Q.3 Schreiben Sie die Zahlen:

1. 39 \_\_\_\_\_  
 2. 48 \_\_\_\_\_  
 3. 100 \_\_\_\_\_  
 4. 27 \_\_\_\_\_  
 5. 56 \_\_\_\_\_  
 6. 17 \_\_\_\_\_  
 7. 61 \_\_\_\_\_  
 8. 12 \_\_\_\_\_  
 9. 99 \_\_\_\_\_  
 10. 73 \_\_\_\_\_

**5**

Q.4 Ergänzen Sie die richtigen Form:

1. Sie \_\_\_\_\_ aus London. (Kommen)
2. Wir \_\_\_\_\_ Kaffee. (trinken)
3. Ich \_\_\_\_\_ die Hausaufgabe (machen)
4. Wir \_\_\_\_\_ Brot mit Kartoffellen. (essen)
5. Die Lehrerin \_\_\_\_\_ die Schülerinnen. (Unterrichten)
6. Die Kinder \_\_\_\_\_ fußball in dem Garten. (spielen)
7. Ihr \_\_\_\_\_ an der Manav Rachna Universität. (studieren)

- 8.** Bitte \_\_\_\_\_ Sie den Platz.(nehmen)  
**9.** Er \_\_\_\_\_ immer Orangensaft. ( trinken)  
10 Ich \_\_\_\_\_ um 10:00 uhr. (schlafen)

**10**

**Q.5** Lesen Sie den Text und beantworten Sie die Fragen:

Sie ist meine Mathematik Lehrerin. Meine Mathematik Lehrerin heißt Sandra Boroswaka. Ich bin Marx. Ich studiere in Klasse 10 in der DAV Schule. DAV ist in Faridabad. Meine Schule ist sehr gross. Meine (my) mathematic Lehrerin ist sehr streng aber süß. In mein klass haben wir 48 Studentinen. Ich intressiere mich um Musik zu lernen. Ich spiele Gittare und lerne Hollywood song. Mein musik Lehrer ist sehr nett.

1. Was ist der Name von mathematic Lehrerin?

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2. Wie viele Studentinen studiert in Klasse 10?

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3. In welche Schule studiert Marx?

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4. In welche klasse studiert Marx?

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5. Schreiben Sie 2 verben aus dem Text?

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**5**

**Q.6** Bitte stellen Sie sich vor. (Write 10 sentences about yourself):

1. \_\_\_\_\_.
2. \_\_\_\_\_.
3. \_\_\_\_\_.
4. \_\_\_\_\_.
5. \_\_\_\_\_.
6. \_\_\_\_\_.
7. \_\_\_\_\_.
8. \_\_\_\_\_.
9. \_\_\_\_\_.
10. \_\_\_\_\_.

**10**

**End Semester Examination, Dec. 2017**  
B. Tech. – Fifth Semester  
**GERMAN (HM-507)**

Time: 1½ hrs

Max Marks: **50**

No. of pages: 2

Note: **All questions are compulsory. Marks indicated against question.**

Q.1 Bitte ergänzen Sie die Tabelle. (Complete the given table):

S.N o.	Deutsch	Englisch
1	Sonntag	
2	März	
3		Tuesday
4	Fünfzehnhundert	
5		June
6		Waitress
7		405
8	Februar	
9		Wednesday
10		777
11	Donnerstag	
12	Übermorgen	
13	Vorgestern	

14	Beruf	
15		Monday

15

Q.2 Bitte stellen Sie sich vor. (Write 10 sentences about yourself). 10

Q.3 Ergänzen Sie die Verben in der richtigen Form (Fill in the suitable verb forms):

kommen	studieren	schwimmen	sprechen	essen
kaufen	tanzen	trinken	Wohnen x3	hören

- a) \_\_\_\_\_ ihr gern Popmusik?  
 b) Ich \_\_\_\_\_ aus Italien und \_\_\_\_\_ jetzt (now) in Deutschland.  
 c) Was \_\_\_\_\_ Sie? Auto oder Haus?  
 d) Ich \_\_\_\_\_ das Brot.  
 e) Ich \_\_\_\_\_ Deutsch und Englisch.  
 f) \_\_\_\_\_ Sie einen Kaffee?  
 g) Er \_\_\_\_\_ seit (since) 12 Jahren in Deutschland.  
 h) Vera \_\_\_\_\_ zu (at) Hause.  
 i) Er \_\_\_\_\_ gern in die Disko.  
 j) Sie(she) \_\_\_\_\_ Mathematik.

10

Q.4 Ergänzen Sie die Tabelle.

	Kaufen	heißen	bringen	lieben
<b>Du</b>				liebst
<b>Ihr</b>		heißt		
<b>Sie</b>				

10

Q.5 Hier fehlt der bestimmte Artikel.

- a) \_\_\_\_\_ Kaffee.  
 b) \_\_\_\_\_ Limonade.  
 c) \_\_\_\_\_ Kuchen  
 d) \_\_\_\_\_ Bier  
 e) \_\_\_\_\_ Eistee  
 f) \_\_\_\_\_ Brot  
 g) \_\_\_\_\_ Chips  
 h) \_\_\_\_\_ Cola  
 i) \_\_\_\_\_ Apfel  
 j) \_\_\_\_\_ Saft

5

**End Semester Examination, Dec. 2017**  
B. Tech. – Fifth Semester  
**SPANISH (HM-508)**

Time: 1½ hrs

Max Marks: **50**

No. of pages: 2

Note: **All questions are compulsory. Marks indicated against question.**

- Q.1 Escriba todos los números pares cardinales entre 70-90.  
(Write all the Even Cardinal Numbers between 70-90).

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**10**

- Q.2 Completa las conjugaciones de los verbos y traduce la conjugacion completo de cualquiera de ellos:  
(Complete the conjugations of the verbs and translate the complete conjugation of any 1 of the verbs)

<b>PRONOMBRE PERSONAL</b>	<b>ESTUDIAR</b>	<b>TRABAJAR</b>	<b>HABLAR</b>
YO	Estudio		
TU		Trabajas	
			Habla
NOSOTROS			
	Estudiáis		
ELLOS/AS			Hablan

- Q.3 Escribe el pronombre personal de sujeto al lado de cada forma:  
 (Write the subject's personal pronoun next to each form)

Por ejemplo:

Escuchan: Ellos/Ellas

- Tengo \_\_\_\_\_
- Trabajáis \_\_\_\_\_
- Hablamos \_\_\_\_\_.
- Estas \_\_\_\_\_.
- Habla \_\_\_\_\_.

**1x5**

- Q.4 Escribe en Español (Días Y Meses):  
 (Write in Spanish Days and Months)

- The most lovable day of the Week

b) \_\_\_\_\_ I come after April but before June

c) \_\_\_\_\_ The only Leap Month of the year

d) \_\_\_\_\_ I'm the Fifth and the third last day of the Week

e) \_\_\_\_\_ I'm the last however the most celebrated month of the year

**1x5**

- Q.5 Escribe 3 Usos básicos del Verbo 'TENER' con ejemplos:  
 (Write 3 basic uses of verb 'Tener' with an example to each)

<b>USOS</b>	<b>EJEMPLOS</b>
1.	
2.	
3.	

**2x3**

- Q.6 Completa con la forma adecuada de los verbos:  
 (Complete with the appropriate form of the Verb)
- Mi padre \_\_\_\_\_ (Trabajar) en un compañía
  - Yo \_\_\_\_\_ (Tener) 21 años
  - Mi hermana \_\_\_\_\_ (Estudiar) en Amity
  - Tu \_\_\_\_\_ (Escuchar) la canciones de Enrique
  - Yo y Maria \_\_\_\_\_ (Estar) contento
  - Maria \_\_\_\_\_ (Ser) Ingenier
  - Mi hermano \_\_\_\_\_ (Llamar) Pedro
  - Ana y pedro \_\_\_\_\_ (Ser) amigos de Juan
  - Tu \_\_\_\_\_ (Estar) alegre pero yo \_\_\_\_\_ (Estar) triste
  - Mis padres \_\_\_\_\_ (hablar) 2 lenguas

**1x10**

- Q.7 Completa la tabla usando artículos definidos y indefinidos:  
 (Complete the table using definite and indefinite articles)

<b>OBJETOS</b>	<b>Articulo Definido</b>	<b>Articulo Indefinido</b>
<b>1. Libro</b>	<b>El Libro</b>	<b>Un libro</b>
<b>2. Pizzara</b>		
<b>3. Botellas</b>		
<b>4. Bolso</b>		
<b>5. Manzanas</b>		

**4**

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester  
**CAREER SKILLS-IV (HM-602)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **4**

Note: *The paper consists of **FIFTY** multiple choice questions; Each question has **FOUR** options with **ONE** correct answer. Attempt all questions. All questions are of **ONE** mark each. There is no negative marking. Mention the correct options for each question in the answer key. (Answers marked outside the answer key will not be evaluated.) Calculator is not allowed.*

<b>101.</b>	<b>102.</b>	<b>103.</b>	<b>104.</b>	<b>105.</b>	<b>106.</b>	<b>107.</b>	<b>108.</b>	<b>109.</b>	<b>110.</b>
<b>111.</b>	<b>112.</b>	<b>113.</b>	<b>114.</b>	<b>115.</b>	<b>116.</b>	<b>117.</b>	<b>118.</b>	<b>119.</b>	<b>120.</b>
<b>121.</b>	<b>122.</b>	<b>123.</b>	<b>124.</b>	<b>125.</b>	<b>126.</b>	<b>127.</b>	<b>128.</b>	<b>129.</b>	<b>130.</b>
<b>131.</b>	<b>132.</b>	<b>133.</b>	<b>134.</b>	<b>135.</b>	<b>136.</b>	<b>137.</b>	<b>138.</b>	<b>139.</b>	<b>140.</b>
<b>141.</b>	<b>142.</b>	<b>143.</b>	<b>144.</b>	<b>145.</b>	<b>146.</b>	<b>147.</b>	<b>148.</b>	<b>149.</b>	<b>150.</b>

- Q.1 Naveen purchased two oranges, 3 apples and 5 bananas and paid Rs. 40. Had Naveen purchased 3 oranges, 5 apples and 9 bananas, He would have to pay Rs. 64. Gagan demanded only 1 orange, 1 apple and 1 banana) If Naveen purchased only what was demanded by Gagan, then how much would he have paid (in Rs.)?
- a) 16      b) 28  
 c) 36      d) 24

Q.2 21 pencils and 29 pens cost Rs. 79. But if the number of pencils and pens were interchanged, the cost would have reduced by Rs. 8. Find the cost of each pen.

- a) Rs. 1
- b) Rs. 2
- c) Rs. 3
- d) Rs. 4

Q.3 What percentages of numbers from 1 to 70 have 1 or 9 in the unit's digit?

- a) 1
- b) 14
- c) 20
- d) 21

Q.4 A fruit seller had some apples. He sells 40% apples and still has 420 apples. Originally, he had:

- a) 588
- b) 672
- c) 600
- d) 700

Q.5 Students of a class are made to stand in rows. If 4 students are extra in each row, there would be 2 rows less. If 4 students are less in each row, there would be 4 more rows. The number of students in the class is:

- a) 90
- b) 94
- c) 92
- d) 96

Q.6 If Dennis is  $\frac{1}{3}$ rd the age of his father Keith now, and was  $\frac{1}{4}$ th the age of his father 5 year ago, then how old will his father Keith be 5 year from now?

- a) 45 years
- b) 40 years
- c) 55 years
- d) 50 years

Q.7 Salaries of Ravi and Sumit are in the ratio 2:3. If the salary of each is increased by Rs. 4000, the new ratio becomes 40:57. What is Sumit's salary?

- a) Rs. 17,000
- b) Rs. 20,000
- c) Rs. 34,000
- d) Rs. 38,000

Q.8 The salaries A, B, C are in the ratio 2:3:5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be new ratio of their salaries?

- a) 3:3:10
- b) 10:11:20
- c) 23:33:60
- d) Cannot be determined

Q.9 8 is 4% of a, and 4 is 8% of b) c equals b/a). What is the value of c?

- a) 1/32
- b) 1/4
- c) 1
- d) 4

Q.10 What is the unit digit in  $\{(6374)^{1793} \times (625)^{317} \times (341)^{491}\}$ ?

- a) 0
- b) 2
- c) 3
- d) 5

Q.11 How many 3 digit numbers are divisible by 6 in all?

- a) 149
- b) 150
- c) 151
- d) 166

Q.12 A special lottery is to be held to select a student who will live in the only deluxe room in a hostel. There are 100 Year-III, 150 Year-II and 200 Year-I students who applied) Each Year-III's name is placed in the lottery 3 times; each Year-II's name, 2 times and Year-I's name, 1 time. What is the probability that a Year-III's name will be chosen?

- a) 1/8
- b) 2/9

- c) 2/7                  d) 3/8

Q.13 Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:

- a) 2:5                  b) 3:5  
c) 4:5                  d) 5:4

Q.14 Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was 56% of the sum of their marks. The marks obtained by them are:

- a) 39, 30              b) 41, 32  
c) 42, 33              d) 43, 34

Q.15 A cone and sphere have the same radius of 12 cm. find the height of the cone if the cone and sphere have the same volume.

- a) 18 cm.              b) 24 cm.  
c) 36 cm.              d) 48 cm.

Q.16 A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

- a) 10/21              b) 11/21  
c) 13/21              d) None of these

Q.17 Two discounts of 60% and 20% equal to a single discount of:

- a) 70                  b) 65  
c) 66                  d) 68

Q.18 Sahil earns 10% more than Satish and Satish earns 20% more than Swati. If Swati earns Rs. 17,500 less than Sahil then what are the earnings of each?

a) Swati = Rs. 35,900.0

Sahil = Rs. 53,400.0

Satish = Rs. 58,740.0

b) Swati = Rs. 39,500.0

Sahil = Rs. 57,000.0

Satish = Rs. 62,700.0

c) Swati = Rs. 54,687.5

Sahil = Rs. 72,187.5

Satish = Rs. 65,625.0

d) Swati = Rs. 69125.0

Sahil = Rs. 86,625.0

Satish = Rs. 95,287.5

Q.19 If 35% of a number is 112. Then what is the number?

a) 380                  b) 300

c) 320                  d) 350

Q.20 A car travels first half distance between two places with a speed of 40 km/hr. and rest of the half distance with a speed of 60 km/hr. The average speed of the car is:

a) 48 km/hr            b) 37 km/hr

c) 44 km/hr            d) 45 km/hr

Q.21 The ratio between the speeds of two trains is 7:8. If the second train runs 400 km in 4 hours, then the speed of the first train is:

a) 67.5 kmph        b) 57.5 kmph

- c) 77.5 kmph      d) 87.5 kmph

Q.22 The ages of the two persons differ by 20 years. If 5 year ago, the older one be 5 times as old as the younger one, then their present ages, in year are:

- a) 25, 5                  b) 30, 10  
c) 35, 15                  d) None of these

Q.23 Two numbers are in the ratio 3:4. The difference between their squares is 28. Find the greatest number.

- a) 12                  b) 8  
c) 24                  d) 16

Q.24 A man sold an umbrella for Rs. 1800 and incurs a loss of 20% then what is the cost price of the umbrella?

- a) 1440                  b) 2160  
c) 2250                  d) 2320

Q.25 What is the LCM of 8, 12, and 15?

- a) 150                  b) 100  
c) 120                  d) 180

Q.26 The age of Mr. Chetan in 2002 was  $\frac{1}{90}$  of his birth year. What is his age in 2006?

- a) 30                  b) 28  
c) 26                  d) 22

Q.27 The CP of an article is  $\frac{5}{6}$  of the SP. What is the percentage profit or loss?

- a) 20% loss.      b) 16.66 profit.  
c) 16.66% loss.    d) 20% profit.

Q.28 A man has 1044 candles. After burning, he can make a new candle from 9 stubs left behind) Find the maximum number of candles that can be made.

- a) 116
- b) 120
- c) 130
- d) 140

Q.29 The smallest three digits divisible by 3 are:

- a) 103
- b) 100
- c) 102
- d) None of these

Q.30 Three unbiased coins are tossed. What is the probability of getting at most two heads?

- a)  $3/4$
- b)  $1/4$
- c)  $3/8$
- d)  $7/8$

Q.31 A re-statement of a text or passage is also known as:

- a) Paraphrasing.
- b) Greeting.
- c) Referencing.
- d) Encoding.

Q.32 For an effective communication the subject should be:

- a) Complex.
- b) Unfamiliar.
- c) Simple and familiar.
- d) None of these.

Q.33 “After you”, “May I”, “Please allow me”, “Thank you” are examples of:

- a) Punctuality.
- b) Morality.
- c) Courtesy.
- d) Brutality.

Q.34 Which is the best dress code for boys for an interview?

- a) Casual.
- b) Shirt and Tie.
- c) Designer suit.
- d) Business suit and a tie.

Q.35 Which of the following is a strict NO during an interview?

- a) Making excuses.
- b) Making negative comments.
- c) Taking a cell phone call.
- d) All of the above.

Q.36 A resume is a:

- a) Formality.
- b) Irrelevant employment document.
- c) A very important employment document.
- d) None of these.

Q.37 While sitting for an interview, you should:

- a) Maintain eye contact.
- b) Be composed and poised.
- c) Smile.

d) All of these.

Q.38 Which of the following should be avoided in a resume?

- a) Skills.
- b) Education.
- c) Hobbies.
- d) Your Religion.

Q.39 A personal interview stresses on the following areas:

- a) Your Goal.
- b) Knowledge.
- c) Personality trait.
- d) All of these.

Q.40 Which of the following is an example of body language?

- a) Body Posture.
- b) Pitch of voice.
- c) Rate of speech.
- d) Volume of voice.

Q.41 I am a participant in a GD. I, realizing that the group is losing focus on the topic, bring the group back on the topic. This makes me a:

- a) Moderator.
- b) Channelizer.
- c) Contributor.
- d) Initiator.

Q.42 In order to be an effective listener you should not:

- a) Maintain eye contact.
- b) Resist distractions.

c) Paraphrase.

d) Interrupt.

Q.43 Making eye contact is a way of communicating:

a) Interest.      b) Involvement.

c) Attention.      d) All of these.

Q.44 In order to do well in a GD one should be:

a) Speak clearly and confidently.

b) Speak continuously even if it's irrelevant.

c) Dominating.

d) Keep looking at the Jury/Panel.

Q.45 When you have to speak about a topic without preparation, it is called:

a) Extempore.      b) Debate.

c) Declamation.      d) None.

Q.46 Example of Non-verbal communication:

a) Debate.

b) Group discussion.

c) Extempore.

d) Communication through body language.

Q.47 A good handshake is:

- a) Elbow grasp.
- b) Glove handshake.
- c) The wrist holds
- d) A firm handshake with a smile and eye contact.

Q48 The prime motive of a cover letter is to:

- a) Highlight the items covered in the resume.
- b) Show alignment towards the job description.
- c) State the fact that resume is attached.
- d) All of the above.

Q.49 Tick the correct statement about telephonic interviews:

- a) One may be casual in dress and conduct.
- b) One may select any location for the conduct of interview.
- c) One should select a quiet place for the interview.
- d) Is not as important as a face to face interview.

Q.50 We should pick up our phone ideally in \_\_\_\_\_ or less rings.

- a) 1
- b) 2
- c) 3
- d) 6

## **End Semester Examination, Dec. 2017**

B. Tech. – Sixth Semester

### **QUANTITATIVE APTITUDE AND PERSONALITY DEVELOPMENT-III (HM-603)**

Time: 2 hrs.

Max Marks: **50**

No. of pages: **5**

Note: All questions are compulsory. Each question has **FOUR** options with **ONE** correct answer. Select the correct answer. All questions are of **ONE** mark each. There is no **NEGATIVE** marking. Mention the correct option for each question in the blank answer key given herein below. Calculator is not permitted.

<b>151.</b>	<b>152.</b>	<b>153.</b>	<b>154.</b>	<b>155.</b>	<b>156.</b>	<b>157.</b>	<b>158.</b>	<b>159.</b>	<b>160.</b>
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<b>161.</b>	<b>162.</b>	<b>163.</b>	<b>164.</b>	<b>165.</b>	<b>166.</b>	<b>167.</b>	<b>168.</b>	<b>169.</b>	<b>170.</b>
<b>171.</b>	<b>172.</b>	<b>173.</b>	<b>174.</b>	<b>175.</b>	<b>176.</b>	<b>177.</b>	<b>178.</b>	<b>179.</b>	<b>180.</b>
<b>181.</b>	<b>182.</b>	<b>183.</b>	<b>184.</b>	<b>185.</b>	<b>186.</b>	<b>187.</b>	<b>188.</b>	<b>189.</b>	<b>190.</b>
<b>191.</b>	<b>192.</b>	<b>193.</b>	<b>194.</b>	<b>195.</b>	<b>196.</b>	<b>197.</b>	<b>198.</b>	<b>199.</b>	<b>200.</b>

Q.1 What do you do if you find someone struggling to speak in a GD?

- a) Invite the person to keep his point of view.
- b) Take it as an opportunity and continue talking.
- c) Make fun of the person .
- d) All of the above.

Q.2 Which of the following statements is true about self-introduction?

- a) A good self-introduction lays a strong foundation for the rest of the interview
- b) It helps you to reflect confidence when the ice between you and the interviewer is being broken.
- c) You have about 60 seconds for self-introduction.
- d) All of the above.

Q.3 Certain ground rules while participating in a group discussion are:

- a) Express ideas clearly and concisely.
- b) Listen to what others have to say.
- c) Talk for long periods; others should not be able to speak.
- d) Only a) and b)

Q.4 A resume should be

- a) As lengthy as you want it to be
- b) A carefully crafted document not exceeding one side of an A-4 sheet.
- c) A colorful and visually attractive document.
- d) None of the above.

Q.5 In a Group Discussion, one should

- a) Be aggressive to show dominance
- b) Speak when asked to.
- c) Always summarize the discussion.
- d) Be assertive while being polite.

Q.6 The prime motive of a cover letter is to

- a) Highlight the items covered in the resume.
- b) Show alignment towards the job description.
- c) State the fact that resume is attached.
- d) All of the Above.

Q.7 While sitting for an interview, you should

- a) maintain eye contact.
- b) be composed and poised.
- c) smile.
- d) All of the above.

Q.8 Preparation for a telephonic interview

- a) Should be akin to that of a face to face interview.
- b) May be relaxed since there is no physical presence.
- c) Is not necessary since you don't know what interviewer may ask.
- d) None of the above.

Q.9 Choose the correct statement about Telephonic Interviews

- a) One may be casual in dress and conduct.
- b) One may select any location for the conduct of interview.
- c) One should select a quiet place for the interview.
- d) Is not as important as a face to face interview.

Q.10 Pick the correct statement for a Skype interview

- a) Carries less weightage than face to face interview.
- b) Face to face interviews always succeed skype interviews.
- c) Body language is as important in Skype as in face to face interviews.
- d) Eye contact is not essential in Skype interviews.

Q.11 SWOT analysis is required for

- a) Self-Assessment.
- b) interview preparation.
- c) Clarity of purpose.
- d) All of the above.

Q.12 Which is the best dress code for boys for an interview?

- a) Casual
- b) Shirt and Tie
- c) Designer Suit
- d) Business Suit and a tie

Q.13 The term “Extempore” means

- a) It is another name for debates .
- b) A quick speech on a topic without preparation.
- c) It is the participation in the events external to the college.
- d) A strategy adopted in group discussions.

Q.14 To be good in extempore, which of the following is not required?

- a) Being well read.
- b) Watching and reading a lot of speeches.
- c) Learning a new quotation each day.
- d) Learning a new art.

Q.15 Your ideal resume should be

- a) At least 2 pager.
- b) One-pager.
- c) Can be any size.
- d) None one of the above.

Q.16 SWOT stands for

- a) Support With Online Technology.
- b) Strength Wise Optimal Test.
- c) Strength Weakness Opportunity Threat.
- d) Simple Winning Observation Technique.

Q.17 While introducing yourself, you should

- a) Give full details about your family.
- b) Vividly describe only your academic career.
- c) State information as it comes to your mind.
- d) Align your introduction to the requirements of the job.

Q.18 A self-introduction is

- a) An impromptu speech about yourself.
- b) A well drafted and rehearsed pitch.
- c) Just an ice breaker with not much relevance.
- d) None of the above.

Q.19 In an extempore it is important to

- a) Structure your thoughts well
- b) Hold your nerve.
- c) Maintain eye contact.

d) All of the above.

Q.20 While in an interview, you build your brand by

- a) Dressing smartly, hygienically and professionally.
- b) Exhibiting good etiquette.
- c) Staying poised and answering coherently.
- d) All of the above.

Q.21 The average temperature on Wednesday, Thursday and Friday was  $25^{\circ}\text{C}$ . The average temperature on Thursday, Friday and Saturday was  $24^{\circ}\text{C}$ . If the temperature on Saturday was  $27^{\circ}\text{C}$ , what was the temperature on Wednesday?

- a) 24
- b) 21
- c) 27
- d) 30

Q.22 How many kilograms of sugar costing `9 per kg must be mixed with 27kg of sugar costing `7 per kg so that there may be gain of 10% by selling the mixture at `9.24 per kg?

- a) 63 kg
- b) 60 kg
- c) 50 kg
- d) 77 kg

Directions for questions 23 to 25: Answer the questions based on the passage below.

Out of seven persons, a group of three or four has to be selected. Among the seven are two women: Payal and Jyoti, and five men: Harish, Vikas, David, Peter and Rahim. Harish would not like to be in the group if Vikas is also selected. Vikas and Rahim want to be selected together in the group. Jyoti would like to be in the group only if David is also there. David, if selected, would not like Peter in the group. Harish would like to be in the group only if Peter is also there. David insists that Payal be selected in case he is there in the group.

Q.23 Which of the following is a feasible group of three?

- a) David, Harish and Rahim.

b) Peter, Vikas and Rahim.

c) Jyoti, David and Vikas.

d) Payal, David and Harish.

Q.24 Which of the following is a feasible group in four?

a) Harish, Peter, Payal and Rahim.

b) Vikas, Rahim, Jyoti and David.

c) Vikas, Rahim, Payal and David .

d) Payal, David, Harish and Peter

Q.25 Which of the following statements is true?

a) Jyoti and Harish can be part of a group of four.

b) A group of four can have two women.

c) A group of four can have all four men.

d) None of these

Q.26 `395 is divided among A, B and C in such a manner that B gets 25% more than A and 20% more than C. The share of A is?

a) `198                  b) `120

c) `180                  d) `195

Q.27 Nancy, Priya and Neha are friends, being looked after by a matron Sunita. Nancy weighs 50% more than Priya and Neha weighs 25% less than Nancy. Sunita weighs a third of the combined weight of the three boys. All four together weight 232 kg. The correct arrangement of the person in the ascending order of their weights is

a) Neha, Priya, Sunita, Nancy.

b) Neha, Priya, Nancy, Sunita.

- c) Priya, Neha, Nancy, Sunita .
- d) Priya, Neha, Sunita, Nancy.

Q.28 If A + B means A is the sister of B; A × B means A is the wife of B, A % B means A is the father of B and A - B means A is the brother of B. Which of the following means T is the daughter of P?

- a) P × Q % R + S - T
- b) P × Q % R - T + S
- c) P × Q % R + T - S
- d) P × Q % R + S + T

Q.29 A can build up a structure in 8 days and B can break it is 3 days. A has worked for 4 days and then B joined to work with A for another 2 days only. In how many days will A alone build up the remaining part of the structure?

- a) 10
- b) 9
- c) 12
- d) None of these

Q.30 A trader has some watches in his stock. He marks his watches 20% above the cost price. He sold half the stock at marked price, one quarter at a discount of 20% on the marked price and rest on discount of 40% on the marked price. What is his gain per cent?

- a) 2%
- b) 5%
- c) 3%
- d) 8%

Q.31 An article is listed at `1800 and two successive discounts of 8% and 8% are given on it. How much would the seller gain or loss, if he gives a single discount of 16% instead of two discounts?

- a) `11.52 loss
- b) `11.52 gain
- c) `12.62 loss
- d) `12.52 gain

Q.32 Two pipes can fill a tank in 20 and 24 min., respectively and a waste pipe can

empty 6 gallon per min. All the three pipes working together can fill the tank in 15 min. Find the capacity of the tank (in gallons)?

- a) 210
- b) 50
- c) 150
- d) 240

Q.33 A work is done by three person A, B and C. A alone takes 10 hours to complete a single product but B and C working together takes 4 hours, for the completion of the same product. If all of them worked together and completed 14 products, then how many hours have they worked?

- a) 20
- b) 28
- c) 40
- d) 54

Q.34 A worker makes a basket in  $\frac{2}{3}$  of an hour. If he works for  $7 \frac{1}{2}$  h, then how many baskets can he make

- a)  $10 \frac{3}{4}$
- b)  $11 \frac{1}{4}$
- c)  $12 \frac{1}{2}$
- d) 13

Q.35 If the length, breadth and the height of a cuboid are in the ratio 6:5:4 and if the total surface area is  $33300 \text{ cm}^2$ , then the length, breadth and height in cms, are respectively.

- a) 90,85,60
- b) 85,75,60
- c) 90,75,70
- d) 90,75,60

Q.36 The radius of a cylinder is same as that of a sphere. Their volumes are equal. The radius is how many times of height of the cylinder?

- a) 1
- b)  $\frac{1}{2}$
- c)  $\frac{2}{3}$
- d)  $\frac{3}{4}$

Q.37 If the cost of the 12 pencils is equal to the selling price of 10 pencils, the profit percent in the transaction is

- a)  $16 \frac{2}{3}\%$
- b) 18%

- c) 20%                  d) 25%

Q.38 In a queue of children, Kashish is the fifth from the left and Mona is sixth from the right. When they interchange their places among themselves, Kashish becomes thirteenth from the left. Then, what will be Mona's position from the right?

- a) 4<sup>th</sup>                  b) 14<sup>th</sup>  
c) 8<sup>th</sup>                  d) 15<sup>th</sup>

Q.39 When a plot is sold for `18,700, the owner loses 15%. At what price must that plot be sold in order to gain 15%?

- a) `21,000                  b) `22,500  
c) `25,300                  d) `25,800

Q.40 100 oranges are bought at the rate of `350 and sold at the rate of `48 per dozen. The percentage of profit or loss is:

- a) 14 2/7% Gain    b) 15% Gain  
c) 14 2/7 Loss      d) 15% Loss

Q.41 What is unit digit of  $127 \times 135 \times 239$ ?

- a) 5                  b) 3  
c) 0                  d) 1

Q.42 A number 2368A0 is divisible by 12. How many digits can come at place of "A"?

- a) 2                  b) 3  
c) 0                  d) 4

Q.43 Find the last digit of  $2^{29} \times 3^{36} \times 4^{55} \times 5^{95}$ .

- a) 2
- b) 4
- c) 0
- d) 8

Q.44 What will be the last digit of the multiplication:  $3^{153} \times 7^{162}$ ?

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

Q.45 Find the remainder when  $421^{203}$  is divided by 7

- a) 1
- b) 2
- c) 4
- d) 6

Q.46 Find the remainder when  $80^{80}$  is divided by 7

- a) 4
- b) 3
- c) 2
- d) 6

Q.47 In a meet, persons from five different places have assembled in Bangalore High School. From the five places the persons come to represent are 42, 60, 210, 90 and 84. What is the minimum number of rooms that would be required to accommodate so that each room has the same number of occupants and occupants are all from the same places?

- a) 44
- b) 62
- c) 81
- d) 96

Q.48 A teacher of 10 students takes 3 of his students at a time to a zoo as often as he can, without taking the same pair of children together more than once. How many times does the teacher go to the zoo?

- a) 110
- b) 115
- c) 120
- d) 20

Q.49 In how many ways can 18 people be seated around two round tables with seating capacities of 8 and 10 people?

- a)  $18!/8!$
- b)  $10! \times 8!$
- c)  ${}^{18}C_8 \times 9! \times 7!$
- d)  ${}^{18}C_8 \times 8!$

Q.50 What is the sum of all even integers between 103 and 305?

- a) 40000
- b) 20000
- c) 40400
- d) None of these

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **TOTAL QUALITY MANAGEMENT (HM-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 (**any five**) of the following questions:

- a) Discuss the role of senior management in an organization.
- b) Discuss important steps involved towards better team work.
- c) Discuss the concept of quality circles.
- d) Discuss various reasons to benchmark a process.
- e) What are cross functional teams? What is their importance?
- f) Discuss the benefits of ISO 9001 quality management.
- g) What is the importance of documentation in TQM?

**5×4**

#### **PART-A**

Q.2 Define 'quality'. Discuss the critical dimensions of product quality. **20**

Q.3 What is customer retention? Discuss different strategies for customer retention in detail. **20**

Q.4 What is six-sigma? Discuss DMAIC methodology. **20**

#### **PART-B**

Q.5 What is QFD? Discuss the process of QFD with its potential benefits. **20**

Q.6 What is partnering? Discuss the principles of customer/supplier relations in detail. **20**

Q.7 What is quality management system? Discuss its elements in detail. **20**

**End Semester Examination, Dec. 2017**  
B. Tech. – Seventh Semester  
**HUMAN RESOURCE MANAGEMENT (HM-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 Answer **(any ten)** of the following questions:
- a) Spell out overall importance of HRM.
  - b) Define the role of HR managers.
  - c) Why are training and development important in industry?
  - d) What do you understand by recruitment?
  - e) What is performance management?
  - f) Why is HR important in knowledge industry?
  - g) What is HR audit?
  - h) What is succession planning?
  - i) Define HRP.
  - j) Give advantages of outsourcing of HR functions.
  - k) What do you understand by compensation?
- 2×10**

**PART-A**

- Q.2 a) What are the various functions of HRM? What is its strategic importance? **10**
- b) Discuss the evolution of HRM and what is futuristic HRM going to be. **10**
- Q.3 a) Distinguish between recruitment and selection. **8**
- b) Explain the processes of recruitment and selection in detail. **12**
- Q.4 a) Explain the process of HR planning. What factors affect HRP? **12**
- b) How is forecasting of manpower carried out? **8**

## **PART-B**

- |     |  |                     |
|-----|--|---------------------|
| Q.5 | a) Differentiate between training and development.<br>b) Explain the process of training and development.<br>c) What is orientation and how it is carried out?   | 5<br><b>10</b><br>5 |
| Q.6 | a) What do you understand by performance management and state its importance?<br>b) Distinguish between performance management and performance appraisal.<br>c) What factors affect the performance appraisal? | 8<br>7<br>5         |
| Q.7 | Write short notes on the following:<br>a) HR in virtual organizations.<br>b) Employee leasing.<br>c) HR in mergers and acquisitions.<br>d) HR in multinational companies.                                      | <b>5×4</b>          |

## **End Semester Examination, Dec. 2017**

B. Tech. – Seventh Semester

### **PROJECT MANAGEMENT (HM-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 Answer the following questions:

- a) Define project.
- b) What do you mean by termination of a project?
- c) How will team members be chosen to carry out a project?
- d) What do you mean by project review?
- e) Define project contracts.
- f) What do you mean by global tenders?
- g) Define CPM.
- h) What is problem statement?
- i) Write down the names of various types of projects.
- j) Define project appraisal.

**2×10**

## **PART-A**

- |     |  |                 |
|-----|--|-----------------|
| Q.2 | a) What is the screening process for project ideas?<br>b) What are the qualities of a project manager? | 10<br><b>10</b> |
| Q.3 | a) Explain the approval process for a project.   | <b>10</b>       |

b) What do you mean by technical analysis and feasibility study of a project? **10**

Q.4 a) Write down the various applications of network analysis. **12**  
b) What is critical path method? **8**

### **PART-B**

Q.5 a) What are the various team operating rules in a project organization? **10**  
b) What do you mean by legal aspects of project contracts? **10**

Q.6 a) Explain the review process of a project completion. **10**  
b) What are the various reasons for terminating a project? **10**

Q.7 a) What are the steps in project monitoring? **10**  
b) Why it is necessary to have project inventories? **10**

## **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) - Sixth Semester

## **ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT (HM-I-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:

- a) Discuss the role of DIC in providing support to entrepreneurs.
- b) List the steps involved in starting a small scale industry.
- c) Discuss the importance of Personal Management.
- d) Explain workers' participation in management.

**5x4**

### **PART-A**

Q.2 'Entrepreneurship' is a viable career option for young engineers. Do you agree? Justify your answer with reasons.

**20**

Q.3 What are 'public sector banks'? What is their role in financing entrepreneurs? **20**

Q.4 What is a project report? Explain the key contents of a preliminary project report. **20**

### **PART-B**

Q.5 Why is it important for an entrepreneur to be an efficient manager? What are the key functions of management?

**20**

Q.6 Discuss the Factory Act, 1948 in detail. **20**

Q.7 What do you mean by job satisfaction? Explain the factors important for job satisfaction. **20**

## **End Semester Examination, Dec. 2017**

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**. Each question carries equal marks.

- Q.1 a) Write the differences between temporary and permanent hardness?  
b) Write any two units of hardness.  
c) Define alkalinity.  
d) What is the difference between dry and wet corrosion?  
e) Define viscosity.

- f) What are bio-degradable polymers?
- g) Discuss any two applications of conducting polymers.
- h) What are the nanomaterials? Write their two applications.
- i) Write any four factors that affect corrosion.
- j) Define green chemistry with an example.

**2×10**

### **PART-A**

- Q.2 a) Explain various steps involved in the purification of water for domestic use. **10**
- b) 50 ml of a sample water required 5 ml of N/50 H<sub>2</sub>SO<sub>4</sub> acid using methyl orange as indicator but did not give any colour with phenolphthalein indicator. What type of alkalinity is present? Express in PPM. **5**
- c) Explain zeolite method. **5**
- Q.3 a) Define dry corrosion. Explain rusting of Fe with suitable mechanism and chemical reactions. **10**
- b) Write brief notes on:
- i) Soil corrosion.
  - ii) Galvanic corrosion. **2½×2**
- c) Explain pilling-Bed-worth rule. **5**
- Q.4 a) Define following with examples:
- i) Eutectic point.
  - ii) Congruent melting point.
  - iii) Triple point.
  - iv) Metastable state. **2½×4**
- b) Draw a labelled phase diagram of Pb-Ag system. **5**
- c) Write any four applications of phase-rule. **5**

### **PART-B**

- Q.5 a) What are the composites? Classify them on the basis of matrix. **10**
- b) Explain Boundary lubrication with a suitable diagram and example. **5**
- c) Write definition and significance of the following:
- i) Cloud point
  - ii) Pour point. **2½×2**
- Q.6 a) What are the differences between n-doped and p-doped conducting polymer? **5**
- b) What do you mean by smart batteries and write their applications? **5**
- c) What is liquid crystal polymer? Write their types and applications in detail. **10**
- Q.7 a) What do you mean by the term nano? Discuss the significance of nano science and nano technology in engineering field. **10**
- b) Explain sol-gel process. **5**
- c) Write the differences between AFM and SEM. **5**

**End Semester Examination, Dec. 2017**  
**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**. Each question carries equal marks.

- Q.1 a) If a water sample contains bicarbonate ion only, which indicator will determine its alkalinity?  
b) How are the exhausted zeolites can be regenerated?  
c) What is reduced phase rule?  
d) What is triple point in water system?  
e) Write any three factors affecting corrosion.  
f) Define flash point and fire point.  
g) Write any three applications of liquid crystal polymers.  
h) Write a brief note on carbon based nanomaterials.  
i) What is Green solvent?  
j) Write any three applications of green chemistry in one daily life. **2×10**

### **PART-A**

- Q.2 a) Describe zeolite method. Write their merits and demerits. **10**  
b) 100 ml of water sample require 10 ml of N/50  $\text{H}_2\text{SO}_4$  acid using methyl orange as indicator but did not give any colour with phenolphthalein indicator. What type of alkalinity is present? Express in ppm. **5**  
c) Explain electrodialysis process. **5**
- Q.3 a) Define wet corrosion. Explain rusting of Fe with suitable mechanism and chemical reaction. **10**  
b) How will you prevent corrosion by proper designing? **5**  
c) Write short notes on:  
i) Galvanic corrosion.  
ii) Differential aeration corrosion. **2½×2**
- Q.4 a) Draw and discuss the phase diagram of water system. **10**  
b) Write brief notes on:  
i) Congruent melting point and Eutectic point.  
ii) Component and degree of freedom. **5×2**

### **PART-B**

- Q.5 a) i) What are electrically conducting polymers? How are they classified?  
ii) Write any three applications of conducting polymers. **10**  
b) Explain sol-gel process with a suitable block diagram. **10**
- Q.6 a) Write the principle and applications of scanning electron microscopy and atomic force microscopy. **10**  
b) Write brief notes on (**any two**):  
i) Beer-Lambert's law  
ii) UV-visible spectroscopy.  
iii) Paper chromatography. **5×2**
- Q.7 a) Write any six principles of Green chemistry. **10**  
b) Write brief notes on:  
i) Green synthesis.  
ii) Green Reagent. **2½×2**  
c) What is Green polymer and bio-based plastics? **5**



# **End Semester Examination, Dec. 2017**

B. Tech. - Second Semester

## **ENVIRONMENTAL STUDIES (CH-202A)**

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 renewable and non-renewable resources?  
b) Define 'flood and drought'.  
c) Write a note on uses and exploitation of minerals'.  
d) Write a brief note on undernourishment.  
e) Write the name of two acids, responsible for acid rain.  
f) What do you mean by desertification?  
g) Which chemicals cause ozone layer depletion?  
h) What is population explosion?  
i) Define 'decomposers'.  
j) What are endangered species?

**2×10**

### **PART-A**

- Q.2 a) Why there is a need for public awareness to control the environment degradation? **5**  
b) What do you mean by land degradation and soil erosion? **5**  
c) What do you understand by sustainable development? **5**  
d) Write a brief note on effect of modern agriculture. **5**
- Q.3 a) What are the biotic components of ecosystems? **5**  
b) Explain 10% law of energy. **5**  
c) Write brief note on (explain with diagram)  
i) Pyramids of numbers.  
ii) Pyramids of biomass. **5**  
d) Write the characteristics and functions of aquatic ecosystem. **5**
- Q.4 a) What do you mean by i) Genetic ii) Species iii) Ecosystem diversity. **5**  
b) Write brief notes on:  
i) Habitat loss    ii) Poaching of wild life. **5**  
c) What do you mean by hot spots? How many hot spots of biodiversity in India?  
**5**  
d) What are the conservation methods of biodiversity? **5**

### **PART-B**

- Q.5 a) How are air-pollutants classified? State five common air pollutants and their effects on the man and his environment. **5**  
b) What is photochemical smog? How is it formed in the atmosphere? What are its consequences? **5**  
c) Write a brief note on 'green-house effect'. **5**

- d) Explain soil pollution with its causes, effects and control methods in brief. **5**
- Q.6** a) Discuss the salient features of Wild Life Protection Act. **5**  
b) Explain waste-land-reclamation in brief. **5**  
c) Take the example of any local polluted site and give the suggestions for improvement of same. **5**  
d) Write a brief note on 'consumerism and waste products'. **5**
- Q.7** a) Write a brief note on 'chemical weapons'. **5**  
b) Give a detailed account on the human rights related to health and nutrition. **5**  
c) In what way rural development is facilitated by Information Technology? **5**  
d) Explain the following:  
i) Demographic transition.  
ii) Exponential growth. **5**

# **End Semester Examination, Dec. 2017**

B. Tech. – Second Semester  
**ENVIRONMENTAL STUDIES (CH-202A)**

Time: 3 hrs.

Max Marks: **100**

No. of pages: 2

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## **PART-B**

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# **End Semester Examination, Dec. 2017**

Bachelor of Architecture – First Semester  
**ENVIRONMENTAL STUDIES (CH-202A)**

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 Multiple choice questions:**

- a) The main decomposers in an ecosystem are:
  - i) Fungi.
  - ii) Plants.
  - iii) Insects.
  - iv) Prokaryotes.
- b) Floods can be prevented by:
  - i) Afforestation.
  - ii) Cutting the forests.
  - iii) Tilling the land.
  - iv) Removing the top soil.
- c) Which of the following is a difference between a food chain and a food web?
  - i) Food chains involve only plants, while food webs involve both plants and animals.
  - ii) Food chains involve plants and animals, but food webs involve only animals.
  - iii) Food chains are linear and food webs are complex.
  - iv) Food chains include decomposers, but food webs do not.
- d) Group of individuals of the same species that share common attributes are called:
  - i) Community.
  - ii) Population.
  - iii) Ecotype.
  - iv) Society.
- e) Trophic level refers to the:
  - i) Axis around the earth.
  - ii) Stage in an ecological niche.
  - iii) Stage in a food chain.
  - iv) Stage in a community.

**1x5**

## **Briefly answer the following:**

- f) What is environmental science?
- g) Differentiate between autotrophs and heterotrophs.
- h) What are the major threats to biodiversity?
- i) Define population equation.
- j) What role an individual can play in conservation of natural resources?

**3x5**

## **PART-A**

- Q.2 a) What do you understand by sustainable development? How can you link conservation and preservation of environment with development? **10**
- b) What kind of efforts are required to protect our environment? **10**
- Q.3 a) 'Water resources will soon become non-renewable', justify the statement and give measures to conserve water. **10**
- b) Discuss the consequences of over exploitation of land and mineral resources. **10**
- Q.4 a) Describe the different types of ecological pyramids. State the significance and advantages of each. **10**
- b) Write short note on pattern of ecological succession in a Xerosere. **10**

## **PART-B**

- Q.5 a) What are the laws and policy options to conserve the biodiversity in India? **10**
- b) "India is one of the mega diversity nations", comment. **10**
- Q.6 a) What are the causes, effects and methods to manage solid waste? **10**
- b) Write a short note on disaster management. **10**
- Q.7 a) What is value education? Explain the importance of value education to the field of environment? **10**
- b) How important is the women and child welfare to the field of human health and environment? **10**

## **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) - First Semester  
**CHEMISTRY (CH-I-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 a) Define orbital.  
b) Write electronic configuration of  $Fe^{2+}$  ion.  
c) Give the number of protons, electrons and neutrons in the nitride ion.  
d) What is hybridization of carbon in (i) diamond and (ii) graphite?  
e) How many sigma and pie bonds are present in one molecule of (i) benzene (ii) calcium carbide?  
f) What is basicity of  $H_3PO_3$  and  $H_3BO_3$ .  
g) State how do thermoplastics differ from thermo sets.  
h) State Pauli's exclusion principle.  
i) Distinguish between diffusion and osmosis.  
j) Which type of bond is present in HCl? **2x10**

### **PART-A**

- Q.2 a) What are atomic orbital? Discuss the shapes of three 2 P orbitals. **8**  
b) Explain Aufbau's principle. **4**  
c) Discuss Bohr's model. **8**

- Q.3 a) What do you mean by hybridization? Describe the shapes of  $SP$ ,  $SP^2$  and  $SP^3$  orbitals. **8**  
 b) Distinguish between a sigma bond and a pi bond. **4**  
 c) Write the favourable factors for formation of ionic bond and covalent bond. **8**
- Q.4 a) What will be resultant  $pH$  when 200 ml of an aqueous solution of  $HCl(pH = 2)$  is mixed with 300 ml of an aqueous solution of  $NaOH(pH = 12)$ ? **8**  
 b) Density of water at  $25^0C$  is  $1\text{ g}/ml$ . Calculate the molarity of water at  $25^0C$ . **4**  
 c) Discuss the following in detail:  
   i) Osmosis and osmotic pressure  
   ii) Properties of colloidal solutions **8**

### **PART-B**

- Q.5 a) State Faraday's first law and second law of electrolysis. **8**  
 b) Discuss the types of batteries. **6**  
 c) Discuss the application of an-Ni-Cd battery. **6**
- Q.6 a) Define the term catalysis. Discuss types and characteristic properties of catalysts in detail. **10**  
 b) Define the terms absorption and adsorption. Distinguish between physical and chemical adsorption in detail. **10**
- Q.7 a) How properties of polymer are affected with its structure? Explain with examples. **6**  
 b) Write preparation, properties and technical applications of (i) PF resins (ii) SBR. **8**  
 c) What are silicones? Describe the preparation and technical applications of silicone rubbers. **6**

## **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) - First Semester

### **CHEMISTRY (CH-I-101)**

Time: 3 hrs

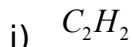
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- d) What is hybridization of carbon in (i) diamond and (ii) graphite?
- e) What is the total number of sigma bonds in the following molecules?



ii)  $C_2H_4$

- f) What is basicity of  $H_3PO_3$  and  $H_3BO_3$ .
- g) State first law of electrolysis.
- h) State how thermoplastics differ from thermosets.
- i) Write any two factors affecting electrolytic conductance.
- j) Distinguish between diffusion and osmosis.

**2x10**

### **PART-A**

- Q.2 a) State the essential postulates of Bohr's theory of hydrogen atom. **6**
- b) What are quantum numbers? Briefly explain the significance of each of them. **8**
- c) State and explain Pauli's exclusion principle. **3**
- d) State and explain Hund's rule of maximum multiplicity by taking an example of nitrogen. **3**
- Q.3 a) What is hybridization? Write down the rules for hybridization of orbitals. **6**
- b) Distinguish between a sigma and a pi bond. **6**
- c) Write the favorable factors for formation of ionic bond and covalent bond. **8**
- Q.4 a) What will be resultant  $pH$  when 200 ml of an aqueous solution of  $HCl(pH = 2)$  is mixed with 300 ml of an aqueous solution of  $NaOH(pH = 12)$ ? **8**
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  - i) Osmosis and osmotic pressure
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### **PART-B**

- Q.5 a) Briefly discuss the types of batteries? Give a brief account of lead acid battery. **7**
- b) Discuss the applications of an Ni-cd battery? **6**
- c) An electric current is passed through three cells in series containing solution of copper sulphate, silver nitrate and potassium iodide, respectively. What weights of silver and iodine will be liberated while 1.25 gram of copper is being deposited. **7**
- Q.6 a) Define the term catalysis. Discuss types and characteristic properties of catalysts in detail. **10**
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- Q.7 a) How properties of polymer are affected with its structure? Explain with examples. **6**
- b) Write preparation, properties and technical applications of (i) PF resins (ii) SBR. **8**

c) What are silicones? Describe the preparation and technical applications of silicone rubbers.

**6**

# **End Semester Examination, Dec. 2017**

B. Tech. (Integrated) - First Semester  
**CHEMISTRY (CH-I-101)**

Time: 3 hrs

Max Marks: **100**

No. of pages: **1**

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