AR18

CODE: 18CET202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, October, 2019

FLUID MECHANICS-I

(Civil Engineering)

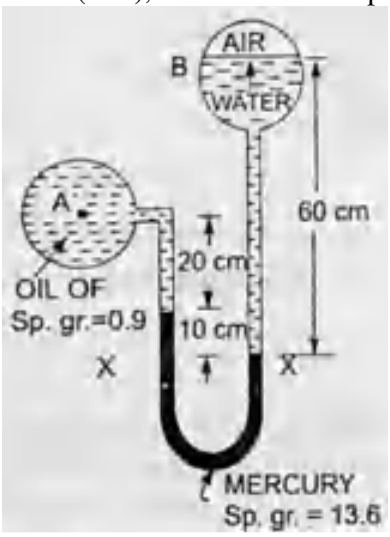
Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Two coaxial glass tube forming an annulus with small gap are immersed in water in a trough. The inner and outer radii of the annulus are r_i and r_o respectively. What is the capillary rise of water in the aannulus if σ is the surface tension of water in contact with air?

   b) A differential manometer connected at the two points A and B as shown in figure. At B air pressure is 9.81 N/cm^2 (Abs), find the absolute pressure at A.



(OR)

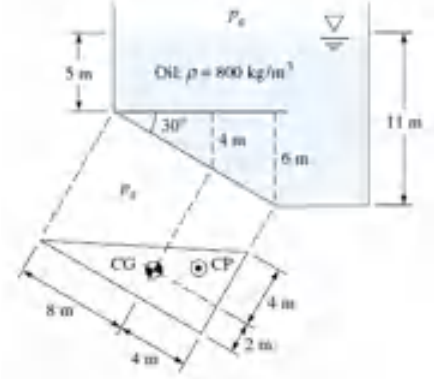
2. a) A plate having size 100 × 100 mm is pulled with velocity of 0.05 m/s over a fixed plate at distance of 0.25 mm. Find (i) force and (ii) power to maintain velocity if fluid has μ = 1 poise.

   b) Can you explain what is meant by surface tension and capillarity effect?

UNIT-II

3. a) How would you determine the horizontal and vertical components of the resultant pressure on submerged curved surface?

   b) A tank of oil has a right-triangular panel near the bottom, as in Fig. Omitting p_a, find the (*a*) hydrostatic force and (*b*) CP on the panel.



(OR)

4. a) Will you state pascal's law in your own words? What is the pressure, in meters of oil (Sp.gr. 0.8), equivalent to 80 m of water?
   b) A rectangular tank 4m long, 1.5m wide contains water up to a height of 2m. Calculate force due to water pressure on the base of the tank. Find also the depth of centre of pressure from free surface.

UNIT-III

5. a) The stream function for a two-dimensional flow is given by $\psi = 3xy$, calculate the velocity at the point P (2, 3). Find the velocity potential function Φ.
   b) The velocity potential function for a flow is given by $\Phi = X^2 - Y^2$ Verify that the flow is incompressible and then determine the stream function for the flow.

(OR)

6. a) Two velocity components in a given flow field are given by $u = 4x^2 + 3xy$, and $w = z^2 - 4xy - 2yz$, then find the third component so that the flow field exists.
   b) Check if $\Phi = X^2 - Y^2 + Y$ represents the velocity potential for 2D irrotational flow. If it does, then determine the stream function

UNIT-IV

7. a) Develop the Euler's equation of motion and then derive Bernoulli's equation. List all some practical applications
   b) Explain Reynold's experiment with the help of diagram?

(OR)

8. a) Describe characteristics of Laminar and Turbulent flows?
   b) Derive the continuity equation for a 3-D Incompressible fluid flow?

UNIT-V

9. a) Water flows through a pipe line whose diameter various from 25 cm to 15 cm in a length of 10 m. If the Darcy-Weisbach friction factor is assumed constant at 0.02 for the whole pipe, estimate the head loss in friction when the pipe is flowing full with a discharge of $0.06 m^3$/sec.
   b) How do you measure velocity of flow using pitot tube?

(OR)

10. a) A compound piping system consists of 1800 m of 0.50 m, 1200 m of 0.40 m and 600 m of 0.30 m new cast iron pipes connected in series. Convert the system to (a) an equivalent length of 0.40 m pipe, and (a) equivalent size pipe 3600 m long.
    b) A venturimeter is used for measuring the flow of petrol in a pipe line inclined at 35^0 to horizontal. The specific gravity of the petrol is 0.81 and the area of inlet to throat ratio is 4. If the difference in mercury levels in the gauge is 50 mm, calculate the flow in liters per hour if the pipe diameter is 0.3 m. Take coefficient of discharge of the venturi meter as 0.975.

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AR18

CODE: 18EET203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, October, 2019

ELECTRO MAGNETIC FIELD THEORY

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Three equal point charges of 2 μC are in free space at (0, 0, 0), (2, 0, 0) and (0, 2, 0). Determine the net vector force on 5 μC at (2, 2, 0). 6 M
   b) Evaluate the electric field $\vec{E}$ at the general point P due to charge distributed uniformly along an infinite straight line with charge density ρ_l. 6 M

(OR)

2. a) A point charge of 6μC is located at the origin, a uniform line charge density of 180nC/m lies along the x-axis. Determine D at A(0,0,4). 5 M
   b) State and explain Gauss's law. Derive an expression for $\vec{E}$ due to sheet of charge. 7 M

UNIT-II

3. a) Derive Laplace's and Poisson's equation from Maxwell's first equation. 4 M
   b) Show that the tangential components are equal at the dielectric-dielectric interface. Also explore the analysis to derive relation between tangential components for dielectric conductor. 8 M

(OR)

4. a) Derive the expression for electric field and potential for the dipole. 6 M
   b) Apply solution of Laplace's equation to derive the expression for capacitance of a coaxial cable. 6 M

UNIT-III

5. a) State Biot-Savart's law and deduce an expression for $\vec{H}$ at a point located at a distance of ***r*** metres from an infinitely long straight conductor carrying ***I*** amperes — 8 M
   b) State and explain Amperes circular law with applications. — 4 M

(OR)

6. a) For a coaxial cable, apply Amperes law to derive expressions for **H** and plot **H** with respect to distance. — 7 M
   b) Derive an expression for **H** due to a circular loop lying on the XY plane. — 5 M

UNIT-IV

7. a) Derive the expression for force and Torque on a closed loop carrying current in the magnetic field. — 6 M
   b) Derive the expressions for statically induced & dynamically induced EMF in case of electromagnetic fields — 6 M

(OR)

8. a) Evaluate the forces per unit length on two long, straight, parallel conductors if each carries a current of 10.0A in the same direction and the separation distance is 0.20m. — 5 M
   b) Derive an expression for self inductance of a solenoid. — 7 M

UNIT-V

9. a) Derive an expression Displacement current density J_d. — 6M
   b) A parallel plate capacitor with plate area of $5cm^2$ and plate separation of 3mm as voltage 50 sin 10^3t volts applied to its plates. Calculate the displacement current assuming $\varepsilon=2\varepsilon_0$ — 6M

(OR)

10. a) Write Maxwell's equations for time varying EM fields in both differential & integral form. — 8 M
    b) An a c. voltage source $V = V_o \sin\omega t$ is connected across a parallel plate capacitor C. Verify that displacement current in the capacitor is same as the conduction current in the wires. — 4 M

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AR18

CODE: 18EST203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, October, 2019

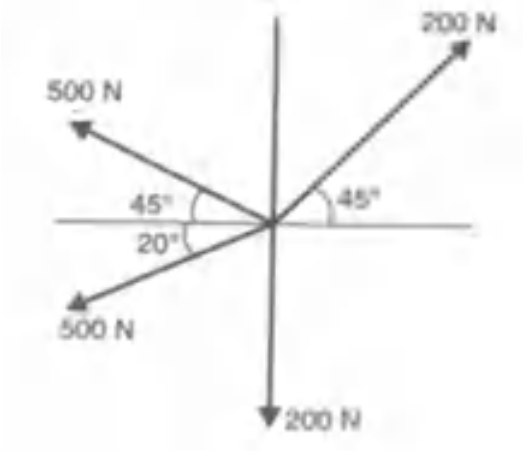
Engineering Mechanics
(Common to ME & ECE)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

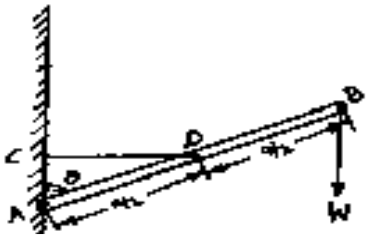
UNIT-I

1. a) State and prove Parallelogram Law 4M
   b) The four coplanar forces are acting at a point as shown in the figure. Determine the magnitude and direction of the resultant force. 8M



(OR)

2. a) A rigid bar AB is supported in a vertical plane by a hinge at the end A and by a horizontal string attached to the bar as shown in fig. above. The end B of the bar carries a load W. Neglecting the weight of the bar determine the tensile force in the string. 6M



   b) A roller of radius r=12cm and weight Q=500N is to be pulled over a curb of height h=6cm by a horizontal force 'p' applied to the end of a string wound around the circumference of the roller. Find the magnitude of 'P' required to start the roller over the curb. 6M

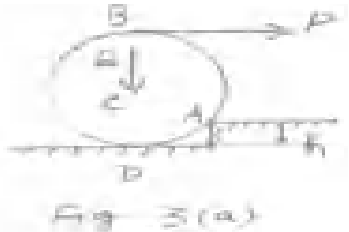
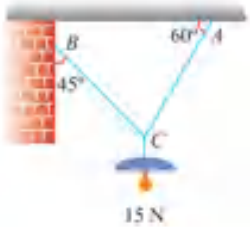


Fig 3(a)

UNIT-II

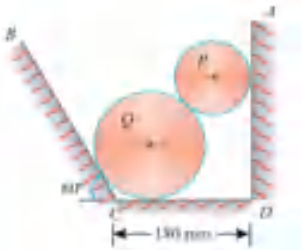
3. a) State and prove varignons theorem 4M

   b) An electric light fixture weighting 15 N hangs from a point C, by two strings AC and BC. The string AC is inclined at 60° to the horizontal and BC at 45° to the horizontal as shown in Fig. determine the forces in the strings AC and BC 8M



(OR)

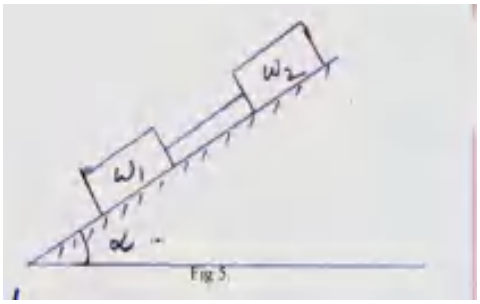
4. Two cylinders P and Q rest in a channel as shown in Fig. The cylinder P has diameter of 100 mm and weighs 200 N, whereas the cylinder Q has diameter of 180 mm and weighs 500 N. If the bottom width of the box is 180 mm, with one side vertical and the other inclined at 60°, determine the pressures at all the four points of contact. 12M



UNIT-III

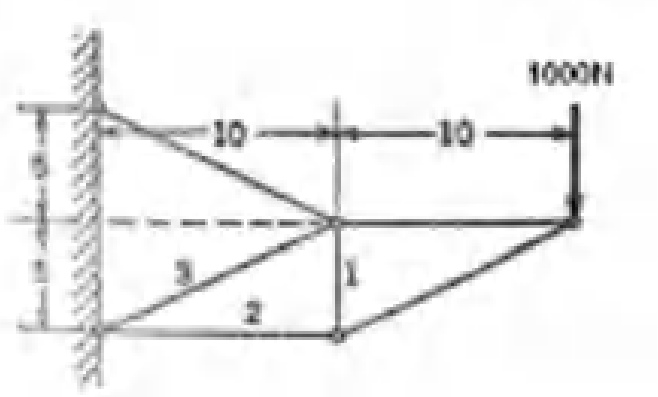
5. a) Explain the concept of cone of friction 4M

   b) Two blocks if weight W1=50N and W2=50N rest on a rough inclined plane and connected by a string as shown in fig . The coefficients of friction between the inclined plane and W1 and W2 are 1=0.3 and 2=0.2 respectively. Find the inclination of the plane for which slipping will impend 8M



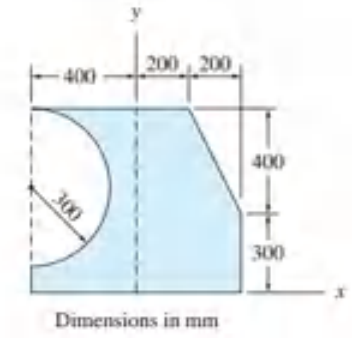
(OR)

6. Find the forces in members 1,2 and 3 of the truss shown in figure. 12M



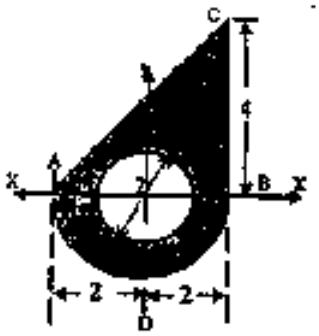
UNIT-IV

7. Using the method of composite areas, determine the location of the centroid of the shaded area shown in Fig 12M



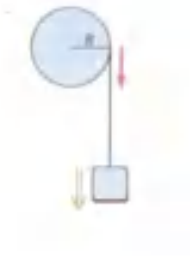
(OR)

8. a) State and explain parallel axis theorem 4M
   b) Determine the MI of shaded area as shown in Figure-8 about cetroidal X-axis 8M



UNIT-V

9. A disk-shaped pulley has mass M=4 kg and radius R=0.5 m. It rotates freely on a horizontal axis, as in Fig. A block of mass m=2 kg hangs by a string that is tightly wrapped around the pulley. 12M
   (a) What is the angular velocity of the pulley 3 s after the block is released?
   (b) Find the speed of the block after it has fallen 1.6 m. Assume the system starts at rest.



(OR)

10. a) Explain the concept of D'Alemberts principle? 4M
    b) A train covers a distance of 1.6 km between two stations A and B in 2 minutes starting from rest. In the first minute of its motion, it accelerates uniformly and in the last 30 seconds it retards uniformly and comes to rest. It moves with uniform velocity during the rest of the period find : 8M
    (a) its acceleration in the first minute;
    (b) its retardation in the last 30 seconds and
    (c) constant velocity reached by the train

AR18

CODE: 18CST202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular Examinations, October, 2019

DISCRETE MATHEMATICS
(Common to CSE & IT)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Prove the following implication by using truth table 6M
$(p \rightarrow (q \rightarrow r)) \Rightarrow (p \rightarrow q) \rightarrow (p \rightarrow r)$

b) Obtain the principal disjunctive normal form of 6M
$p \rightarrow ((p \rightarrow q) \wedge (\sim q \vee \sim p))$

(OR)

2. a) Write in detail about the quantifiers used in propositional logic 6M

b) Show that the following premises are inconsistent. 6M
"If Jack misses many classes through illness, then he fails high school. If Jack fails high school, then he is uneducated. If Jack reads a lot of books, then he is not uneducated. Jack misses many classes through illness and reads a lot of books."

UNIT-II

3. a) Let Z={-----3,-2,-1,0,1,2,3-------} and relation R is defined as R = {(x,y)/ x-y is divisible by 3}. Find whether the relation R on Z is equivalence relation or not 6M

b) For fixed integer n >1prove that the relation "congruent modulo n" is equivalence relation on set of all the integers. 6M

(OR)

4. a) Determine whether the function f: NXN→N defined by f(m,n) = 2m+3n is onto or not 6M

b) Let f:N→N and g: N→N defined by f(x) = x^2 , g(x) = 2^n find (i) (fof)(n) (ii) (gog)(n) (iii) (fog)(n) (iv) (gof)(n) 6M

UNIT-III

5. a) Prove that the sum of degrees of all vertices of an undirected graph is twice the number of edges of the graph 6M

   b) State necessary conditions for the graph to be Isomorphic and justify that it is not sufficient with suitable example. 6M

(OR)

6. a) Show that the given pair of graphs are isomorphic 6M

G1:

G2:

   b) Define Euler graph and Hamiltonian graph. Given an example of a graph which is Hamiltonianbut not Eulerian 6M

UNIT-IV

7. a) Prove that every simple planar graph is 5-colourable 6M

   b) Show that the complete bipartite graph of k_{33} is non-planar 6M

(OR)

8. a) Find the chromatic number of 6M

   (i) Petersen graph(p) (ii) k_n , $n \geq 1$ (iii) $k_{m,n}$, $m,n \geq 1$

   (iv) p_n , $n \geq 1$

   b) Explain with an example to find the minimal spanning tree using kruskal's algorithm 6M

UNIT-V

9. a) Find the coefficient of x^{10} in $(1 + x + x^2 + - - - - -)^2$ 6M

   b) Find a particular solution to $a_n - 7a_{n-1} + 10\ a_{n-2} = 7.3^n$ for $n \geq 2$ 6M

(OR)

10. Solve recurrence relation $a_n - 9a_{n-1} + 20\ a_{n-2} = 0$ for $n \geq 2$ and $a_0 = -3$, $a_1 = -10$ Using generating functions 12M

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AR16

CODE: 16CE2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, January-2020

FLUID MECHANICS

(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a The dynamic viscosity of oil used for lubrication between a shaft and sleeve is 10 poises. The shaft is of diameter 0.5 m and rotates at 200 rpm. Calculate the power lost in the bearing for a sleeve length of 100 mm. The thickness of the oil film is 2 mm. 7M

   b Derive the expression for the excessive pressure developed in a soap bubble due to surface tension. 7M

(OR)

2. a What is capillarity? Derive the expression for capillary rise in a glass tube of diameter'd', when it is dipped in a liquid of surface tension 'σ', specific weight 'γ' and contact angle 'θ'. 7M

   b Explain Newton's law of Viscosity and differentiate Dynamic Viscosity from Kinematic Viscosity. 7M

UNIT-II

3. a A rectangular plane surface 2m wide and 3m deep lies in water in such a way that its plane makes an angle of 30^0 with the free surface of water. Determine the total pressure and position of centre of pressure when the upper edge is 1.5m below the free surface. 7M

   b Find the volume of water displaced and position of centre of buoyancy for a wooden block of width 2.5m and depth 1.5m, when it floats horizontally in water. The density of wooden block is 650 kg/m^3 and its length is 6.0m. 7M

(OR)

4. a A cubical tank has sides of 1.5m. It contains water for the lower 0.6m depth. The upper remaining part is filled with oil of specific gravity 0.9. Calculate total pressure and centre of pressure for one vertical side of the tank. 7M

   b Find the Meta centric height for a wooden block of width 2.5m and depth 1.5m, when it floats horizontally in water. The density of wooden block is 750 kg/m^3 and its length is 6.0m. 7M

UNIT-III

5. a The velocity potential function is given by an expression $\emptyset = x^2 - y^2$. Find the velocity components in x and y direction and show that $\emptyset$ represents a possible case of flow. 7M

   b Derive the continuity equation for a three dimensional flow. 7M

(OR)

6. a A pipe line carrying oil of specific gravity 0.87, changes in diameter from 100mm diameter at a position A to 200mm diameter at position B which is 3m at a higher level. If the pressures at A and B are 5.81N/cm^2 and 4.886 N/cm^2 respectively and the discharge is 200ltrs/sec. determine the loss of head 7M

   b Classify different types of flows. 7M

UNIT-IV

7. a Derive Bernoulli's equation. 7M

   b A pipe line carrying oil of specific gravity 0.9, changes in diameter from 200mm diameter at a position A to 400mm diameter at position B which is 5m at a higher level. If the pressures at A and B are 9.81N/cm^2 and 4.9 N/cm^2 respectively and the discharge is 300 ltrs/sec. Determine the loss of head and direction of flow. 7M

(OR)

8. a Explain Navier – Stokes equation and its application. 7M

   b A 400 mm diameter pipe carries water under a head of 25 m with a velocity of 4 m/s. If the axis of the pipe turns through 25^0, find the magnitude and direction of resultant force at the bend. 7M

UNIT-V

9. a A horizontal pipe line 40 m long is connected to a water tank at one end and discharges freely into atmosphere at the other end. For the first 25 m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of the pipe. Considering all losses of head which occur, determine the rate of flow. Take coefficient of friction 0.01 for both sections of the pipe 7M

   b Determine the height of a rectangular weir of length 6 m to be built across a rectangular channel. The minimum depth of water on the u/s side of the weir is 1.8 m and discharge is 2000 ltrs/sec. Take $C_d = 0.7$. And neglect end contractions. 7M

(OR)

10. a An oil of specific gravity 0.8 is flowing through a Venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal Venturimeter take $C_d = 0.98$. 7M

    b A main pipe line divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000m and 1 m respectively, while the length and diameter for second parallel pipe are 2000m and 0.8 m respectively. Find the rate of flow in each parallel line, if total flow in the main is 3 m^3/s. The coefficient of friction for each pipe is same and equal to 0.005. 7M

AR16

CODE: 16EE2009 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, October, 2017

POWER SYSTEMS-I

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1.	a	Explain the working of a hydro power station with a neat schematic diagram.	8
	b	Describe the functions of economizer and super heater in a thermal power plant .	6
		(OR)	
2.	a	Describe the functions of electrostatic precipitator and condenser in a thermal power plant .	8
	b	Discuss the advantages and disadvantages of a hydro power station	6

UNIT-II

3.	a	Explain the working of a Fast Breeder type nuclear reactor with a neat diagram	8
	b	Explain the working of solar power plant with a neat schematic diagram	6
		(OR)	
4.	a	Describe the working of a Gas power station with a neat diagram	8
	b	Explain the factors considered for location of a nuclear power plant	6

UNIT-III

5.	a	A 500 m long single phase AC distributor has a total impedance of (0.02+j0.04) ohms And is fed from one end at 230V. It is loaded as follows: 50A at UPF, 200 m from feeding point. 100A at 0.8 p.f lag. 300 m from feeding point, 50A at 0.7 p.f lag at the Far end. Calculate the total voltage drop and voltage at the far end.	8
	b	Give the classification of distribution systems and compare AC and DC distribution systems	6
		(OR)	
6.	a	A single phase a.c. distributor AB 300 metres long is fed from end A and is loaded as below i) 100 A at 0·707 p.f. lagging 200 m from point A (ii) 200 A at 0·8 p.f. lagging 300 m from point A .The load resistance and reactance of the distributor is 0·2 Ω and 0·1 Ω per kilometre. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end.	8
	b	Explain stepped distributor and ring main distributor in a distribution system	6

UNIT-IV

7.	a	What are the various types of tariffs? Explain the power factor tariff in detail	8
	b	A generating station has a connected load of 43MW and a maximum demand of 20MW, the units generated being 61.5×10^6 per annum. Calculate (i) the demand factor (ii) load factor	6
		(OR)	
8.	a	Define the following terms Maximum demand, Load factor, Load curve, Plant use factor	8
	b	Discuss the objectives and desirable characteristics of tariff methods	6

UNIT-V

9.	a	A single core cable has a conductor diameter of 2.5 cm and a sheath of inside diameter 6cm. Calculate the maximum stress. It is desired to reduce the maximum stress by using two intersheaths. Determine their best position, the maximum stress and the voltage on Each. Consider the system voltage as 3- phase 66 kV.	8
	b	Explain the construction of a single core low tension cable with a neat schematic diagram.	6
		(OR)	
10.	a	A 3- phase, single core 132 KV cable has a conductor diameter of 3.2 cm and a sheath of inside diameter 9 cm. If two inter sheaths are introduced in such a way that the stress varies between the same maximum and minimum in the three layers. Find i) positions of inter sheaths ii) voltage on the inter sheaths	8
	b	Derive an expression for the insulation resistance of an underground cable.	6

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AR16

CODE: 16ME2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, October, 2019

MECHANICS OF SOLIDS

(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

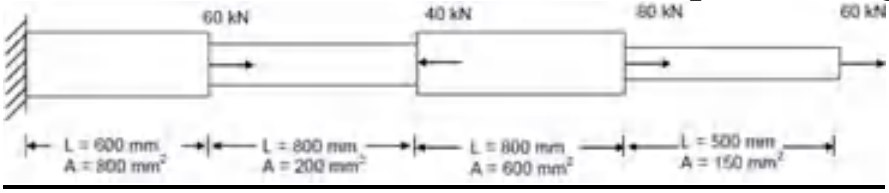
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

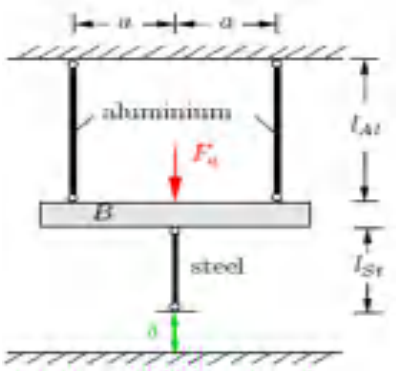
1	a)	Build up the differences between Elasticity and Plasticity	4 M
		State and Explain Hooke's law of elasticity.	3 M
	b)	Enumerate the types of stresses.	2 M
		Draw the stress strain diagram for mild steel.	5 M

(OR)

2	a)	Establish the total deformation developed in the given bar.	7 M



	b)	In the depicted support construction for the *rigid* body *B* the lower support bar is too short by the length δ. In order to assemble the structure a force *Fa* is applied, such that the end of the bar just touches the ground. After assembly the force *Fa* is removed. The diameters of all bars *di* are identical. a) Compute the required assembly force *Fa*. b) Determine the displacement *vB* of the body and the forces in the bars after assembly. Given: l_{Al} 1 m, d_{Al} 2 mm, E_{Al} $0.7 \cdot 10^5$ MPa, l_{St} 1.5 m, d_{St} 2 mm, $E_{St} = 2.1 \cdot 10^5$ MPa, $\delta = 5$ mm.	7 M

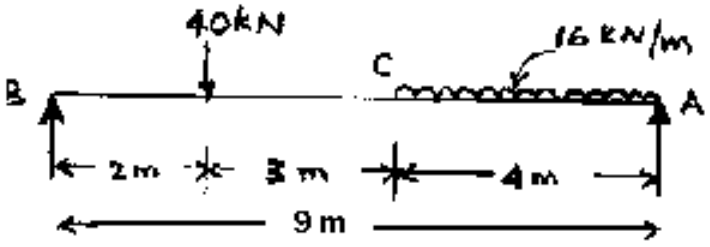


UNIT-II

3. The stresses on two mutually perpendicular planes through a point in a body are 120 MPa and 130 MPa both tensile along with a shear stress of 60 MPa. Determine 14 M
(i) The magnitude and direction of principal stresses stating whether the stress condition as uniaxial or biaxial.
(ii) The planes of maximum shear stresses.
(iii) The normal and shear stress on the planes of maximum shear stress.

(OR)

4. A simply supported beam of 9m span is loaded as shown in the figure. Draw the shear force and bending moment diagrams indicating principal values. 14M

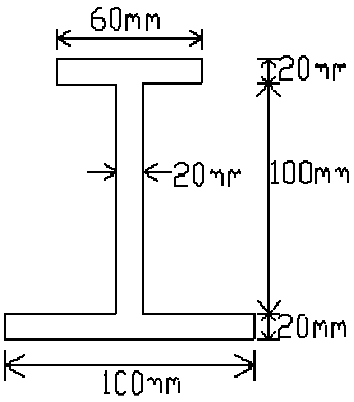


UNIT-III

5. Show the ratio of maximum shear stress to mean shear stress in a rectangular cross section is equal to 1.5 when it is subjected to a transverse shear force F. Plot the variation of shear stress across the section 14M

(OR)

6. Determine the maximum tensile, compressive bending stress caused by a concentrated load of 5.4 kN acting at the free end on a cantilever beam of span 3m. The cross section as shown in the Figure. 14M



UNIT-IV

7. a) Derive the torsion-equation for circular shafts. 7M
   b) A hollow steel shaft transmits 200 kW of power at 150 rpm. The total angle of twist in a length of 5m of the shaft is 3°. Find the inner and outer diameters of the shaft if the permissible shear stress is 60 MPa. Take G = 80 GPa. 7M

(OR)

8. a) Derive the equation for the column with one end fixed and other end free carrying a point load. 7M
   b) A steel wide-flange column of 254 x 254 x 167 kg ue section (Fig. 9-19) with pinned ends is 8 m long. It supports a centrally applied load *PI* = 1400 kN and an eccentrically applied load *P2* = 180 kN; the eccentric load acts on axis 2-2 at a distance of 340 mm from the centroid. Buckling occurs in plane 2-2. (a) Using the secant formula, calculate the maximum compressive stress in the column. (b) If the yield stress for the steel is *(Jy* = 290 MPa, what is the factor of safety with respect to initial yielding of the steel? 7M

UNIT-V

9. a) Derive differential equations for the elastic curve of a beam. 7M
   b) What is the minimum required diameter *d* for a solid circular shaft if it is to transmit 30 kW at 600 rpm without exceeding an allowable shear stress of 28 MPa? 7M

(OR)

10. A simply supported beam has a span of 15m and carries three point loads of 4 kN, 6 kN and 9 kN at 6 m, 8 m and 10 m from left support respectively. Find the deflection and slope at each load, if E = 200GPa, I = 400 x 106 mm4. 14M

AR16

CODE: 16EC2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, November, 2019

PULSE AND DIGITAL CIRCUITS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	A pulse of amplitude 10 V and duration 10 μs is applied to a high-pass RC Sketch the output waveform indicating the voltage levels for (i) $RC = t_p$, (ii) $RC = 0.5t_p$ and (iii) $RC = 2t_p$.	7
	b)	Derive an expression for output of low-pass RC circuit excited by ramp input	7
		(OR)	
2.		Calculate the output voltages and draw the waveforms when (a) C1 = 75 pF,(b) C1 = 100 pF, (c) C1 = 50 pF for the circuit shown in Fig. 3.21(a). The input step voltage is	14

UNIT-II

3.	a)	Draw a circuit to transmit that part of a sine wave, which is below + 6 V	7
	b)	Draw the emitter coupled clipper, explain its operation and discuss its transfer characteristics	7
		(OR)	
4.	a)	Design a types of clampers with suitable diagrams	7
	b)	State and prove the clamping circuit theorem.	7

UNIT-III

5.		Explain in detail about transistor switching times	14
		(OR)	
6.	a)	Explain in detail about the principle of operation of Bi-stable multivibrator?	7
	b)	A fixed bias binary uses transistors with Hfe(min)=20.The circuit parameters are Vcc=12V,Vbb=-3V,Rc=1k,R2=10k,Vce(sat)=0.3V and Vbe(sat)=0.7V.Find (i)Steady state voltages and currents (ii)What is the heaviest load it can drive, still maintaining one transistor in cutoff and the other in saturation. (iii)Find the maximum Icbo tolerated.	7

UNIT-IV

7.	a)	With neat circuit, explain about transistor miller time base generator?	7
	b)	Derive expression for the pulse width of astable multivibrator?	7

(OR)

8.	a)	Explain the working of transistor based Bootstrap time base generator circuit, and draw the necessary waveforms.	7
	b)	Explain all the types of errors in time base generator with formulas and necessary waveforms.	7

UNIT-V

9.	a)	Calculate the pulse width of a monostable blocking oscillator with base timing	7
	b)	How to cancel the pedestal in a sampling gate? Discuss with suitable circuit diagram?	7

(OR)

10.	a)	With the help of neat circuit diagram explain the working of an astable blocking oscillator with R-C control	7
	b)	Give the applications of sampling gates?	7

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AR16

CODE: 16CS2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, October-2019

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Computer Science & Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

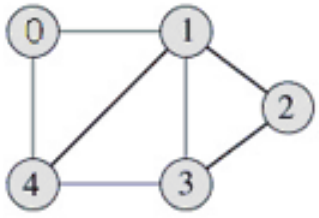
1.	a	Explain about Tautology with example?	5
	b	Explain in detail about the Logical Connectives with Examples?	9
		(OR)	
2.	a	Explain in brief about Principle of Mathematical Induction with examples?	7
	b	Obtain a d.n.f for $P \wedge (P \rightarrow Q)$	7

UNIT-II

3.	a	Explain about properties of Relations	7
	b	Let X= {1,2,3,…..7} and R= { (x,y)| x→ y is divisible by 3 } in X. show that R is an Equivalence Relation	7
		(OR)	
4.	a	Show that the "greater than or equal " relation ($\geq$) is a partial ordering on the set of integers	7
	b	Prove that (S,≤) is a Lattice, where S= {1,2,5,10} and ≤ is for divisibility. Prove that it is also a Distributive Lattice?	7

UNIT-III

5.	a	Prepare incidence and adjacency matrices for given graph.	5



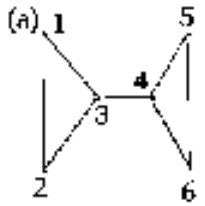
	b	Find the chromatic number of each of the following graph: The tetrahedron, cube, octahedron, icosahedron and dodecahedron (All are platonic graphs)	9

(OR)

6.	a	Discuss about Planar graphs with example	7
	b	State necessary conditions for the graph to be Isomorphic and justify that it is not sufficient with suitable example.	7

UNIT-IV

7.	a	Illustrate with an example to find minimal spanning tree using Kruskal's algorithm	7
	b	Using the below graph obtain a spanning tree by BFS algorithm	7



(OR)

8.	a	Illustrate with an example to find minimal spanning tree using prims's algorithm	7
	b	Explain about DFS Algorithm	7

UNIT-V

9.	a	Solve the Reccurence Relation $a_n-7a_{n-1}+10a_{n-2}=7.3^n$, $n\geq 2$, $a_0=8$, $a_1=36$	7
	b	Discuss about Partial Fractions	7

(OR)

10.	a	Solve the generating functions for the following sequences 1,2,3,4 and 0,1,2,3	7
	b	Solve the co-efficient of x^{12} of $x^3\ (1-2x)^{10}$?	7

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AR13

CODE: 13CE2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, January-2020

FLUID MECHANICS
(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define Density and its unit.
   b) What is Kinematic Viscosity?
   c) What do you mean by Coefficient of Velocity?
   d) What is meant by Uniform flow?
   e) What is the use of Pitot Tube?
   f) List the minor losses occurring when a fluid is flowing in pipe.
   g) What is the relation between atmospheric pressure, gauge pressure and absolute pressure?
   h) What do you mean by Fluid Dynamics?
   i) Define Stream line.
   j) What is meant by Buoyancy?

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) The velocity distribution for flow over a flat plate is given by u= $32y-y3/2$, where u is the point velocity in meter per second at a distance y meter above the plate. Determine the shear stress at y = 0, 0.1 and 0.2m. Assume dynamic viscosity 5 poise.
   b) Distinguish the use of pipe connections in series and in parallel.

(OR)

3. a) Derive the expression for Meta centric height.
   b) Calculate the density, specific weight and weight of one litre of Petrol of specific gravity = 0.7.

UNIT-II

4. a) Calculate the capillary effect in millimeters in a glass tube of 5.5 mm diameter, when immersed in (i) water, and (ii) mercury. The values of the surface tension of water and mercury are 0.075 N/m and 0.60 N/m respectively. Take density of as equal to 981 kg/m3.
   b) Derive an expression for capillary rise.

(OR)

5. a) Derive the expression for total pressure and centre of pressure for Inclined plane surface.
   b) Derive Euler's equation of motion.

UNIT-III

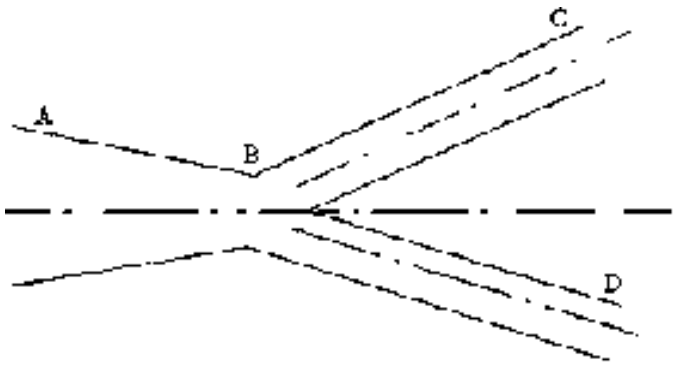
6. Derive the equation of continuity for 2D and 3D.

(OR)

7. Define stream and potential function and write the equation to know whether the fluid flow is rotational or irrotational.

UNIT-IV

8. a) Oil flows through a pipeline which contracts from 45 cm diameter at A to 30 cm diameter at B and then branches into two pipes C and D. The diameter of the pipe C is 15 cm and diameter of the pipe D is 20 cm. If the velocity at A is 1.8 m/sec and that at D is 3.6 m/sec Determine i) Velocity at section B ii) Discharge at C



b) What are the various equations of fluid motion?

(OR)

9. a) The velocity vector in a fluid flow is given: $V = 4x^3 *i - 10x^2y*j + 2t*k$. Find the velocity of a fluid particle at (2,1,3) at time t = 1.

b) Explain how you would find the resultant pressure on a curved surface immersed in a liquid?

UNIT-V

10. a) Derive expression for Discharge through Triangular Notch.

b) Explain different methods of pressure measurement.

(OR)

11. a) Find the Volume of water displaced and position of centre of Buoyancy for a wooden block of width 2.5m and of depth 1.5m, when it floats horizontally in water. The density of wooden block is 650 kg/m^3 and length is 6 m.

b) State and prove the Hydrostatic law.

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AR13

Code: 13EE2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, October-2019

ELECTRO MAGNETIC FIELDS
(Electrical & Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART – A

Answer all questions **[1 x 10 = 10M]**

1. a) Write the relation between potential difference V and electric field **E**.
   b) State Gauss's Law.
   c) Define electric potential.
   d) State the boundary field conditions at the interface between two perfect dielectrics.
   e) State Biot-Savart's law.
   f) Defined dipole.
   g) Write the expression for Poisson's equation.
   h) State Ampere's Circuital law.
   i) Write the expression for energy stored in a magnetic field.
   j) Write the expression for inductance of a toroid.

PART – B

Answer one question from each Unit **[5 x 12 = 60M]**

UNIT - I

2. Derive the expression for electric field intensity due to a finite line charge with charge density ρ_L C/m and extend that line charge to infinity. [12M]

(OR)

3. a) Two point charges -4μC & 5μC are located at (2, -1, 3) and (0, 4, -2) respectively.
   Find the potential at (1, 0, 1) assuming zero potential at infinity. [6M]
   (b) Obtain the force between the point charges Q_1 = 10μC at (0, 1, 3) and Q_2 = -20μC at (1, 0, 0) both in magnitude and direction. [6M]

UNIT – II

4. (a) Derive the expression for capacitance of a coaxial capacitor. [6M]
   (b) Verify whether the potential fields given below satisfy Laplace's equation.
   (i) $V = 4x^2 - 6y^2 + 2z^2$
   (ii) $V = \rho \cos\phi + 4z$ [6M]

(OR)

5. Define electric dipole and derive the expressions for electric potential and electric field intensity due to a dipole [12M]

AR13

Code: 13EE2006 **SET-1**

UNIT – III

6. (a) Show that the expression for magnetic field intensity due to a circular loop located at distance (0, 0, h) is $\overline{H}\ (0,0,h) = \frac{I\rho^2}{2(\rho^2+h^2)^{\frac{3}{2}}}\mathbf{a}_z$ [8M]

   (b) A circular loop located on $x^2 + y^2 = 9$, Z = 0 carries a direct current of 10 A along $\mathbf{a}_\phi$. Detemine $\overline{H}$ at (0, 0, 4). [4M]

(OR)

7. Derive the expression for magnetic field intensity due to an infinite sheet of current. [12M]

UNIT – IV

8. Define magnetic torque and derive the expression for torque in terms of magnetic dipole moment. [12M]

(OR)

9. (a) Derive the expression for force Lorentz force equation [6M]
   (b) Derive the expression for force between two parallel current carrying conductors. [6M]

UNIT – V

10. a) Write Maxwell's equations for time varying EM fields in both differential & integral form. [6M]
    b) Derive an expression Displacement current density J_d. [6M]

.

(OR)

11. State and prove Poynting theorem. [12M]

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AR13

CODE: 13ME2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, October, 2019

MECHANICS OF SOLIDS
(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

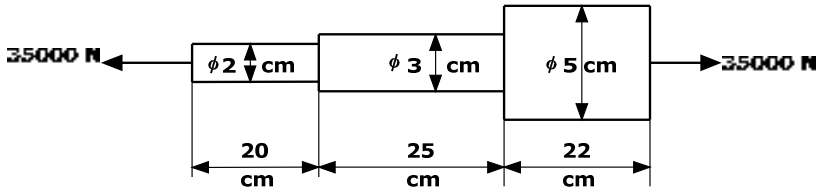
1. a) Define factor of safety
   b) What is the value of shear stress in principal plane?
   c) Differentiate between Point Load and Distributed Load
   d) What do you mean by point of contraflexure.
   e) Define Flexural Rigidity of Beams
   f) What is the maximum deflection for a cantilever beam subjected to uniformly distributed load?
   g) What is the value of bending stress at neutral axis of a beam?
   h) For a simply supported beam of length L subjected to point load P at its midpoint, the value of maximum deflection is_____
   i) Differentiate thin cylinders and thick cylinders
   j) What type stresses will induce in thin sphere with an internal fluid pressure

PART-B

Answer one question from each unit [5x12=60M]

UNIT-I

2. a) Draw the Stress strain curve for mild steel? Explain each term briefly? 6M
   b) An axial pull of 35000 N is acting on a bar consisting of three lengths as shown. If the Young's modulus = 2.1×10^5 N/mm^2, determine the total extension of the bar.



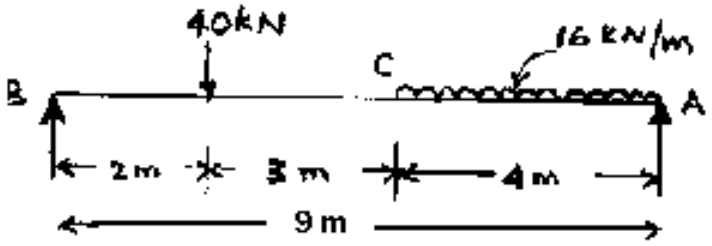
6M

(OR)

3. The stresses on two mutually perpendicular planes through a point in a body are 120 MPa and 130 MPa both tensile along with a shear stress of 60 MPa. Determine 12M
   (i) The magnitude and direction of principal stresses stating whether the stress condition as uniaxial or biaxial.
   (ii) The planes of maximum shear stresses.
   (iii) The normal and shear stress on the planes of maximum shear stress.

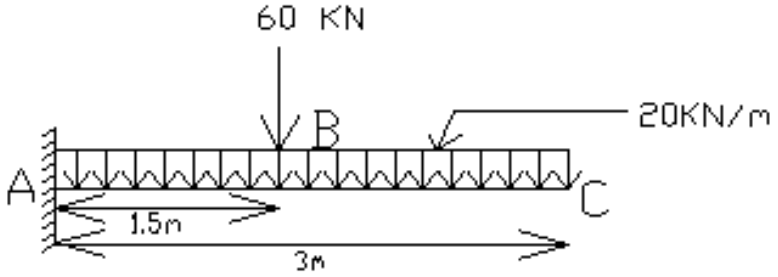
UNIT-II

4. A simply supported beam of 9m span is loaded as shown in the figure. Draw the shear force and bending moment diagrams indicating principal values. 12M



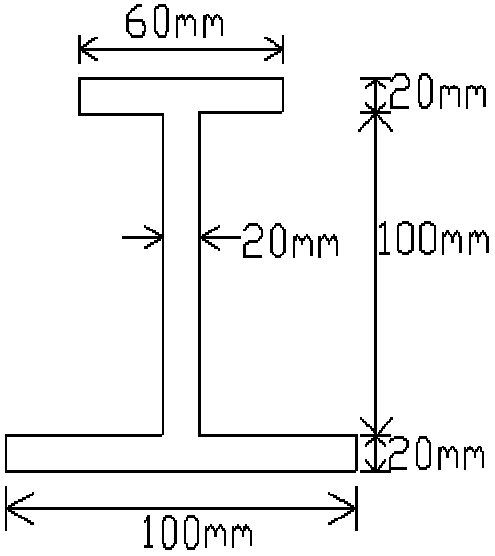
(OR)

5. A cantilever beam 3m long is loaded with uniformly distributed load and a point load as shown in the Figure. Draw the shear force and bending moment diagrams. 12M



UNIT-III

6. Determine the maximum tensile, compressive bending stress caused by a concentrated load of 5.4 kN acting at the free end on a cantilever beam of span 3m. The cross section as shown in the Figure. 12M

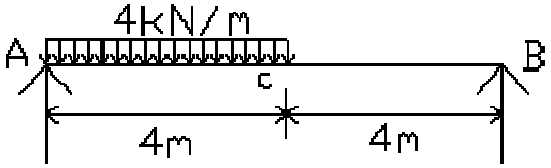


(OR)

7. a) Derive the torsion-equation for circular shafts. 6M
   b) A hollow steel shaft transmits 200 kW of power at 150 rpm. The total angle of twist in a length of 5m of the shaft is 3°. Find the inner and outer diameters of the shaft if the permissible shear stress is 60 MPa. Take G = 80 GPa. 6M

UNIT-IV

8. Determine the deflection at the midpoint and slope at the supports for a simply supported beam loaded as shown the figure. Take E = 200 GPa and I = 160 x 10^6 mm^4. 12M



(OR)

9. A simply supported beam has a span of 15m and carries three point loads of 4 kN, 6 kN and 9 kN at 6 m, 8 m and 10 m from left support respectively. Find the deflection and slope at each load, if E = 200GPa, I = 400 x 106 mm^4. 12M

UNIT-V

10. a) Derive the expression for the longitudinal stress in a thin cylindrical shell 6M
    b) A hollow cylindrical drum of 600 mm diameter and a wall thickness of 10mm. and is subjected to an internal pressure of 3 MPa. E = 2x10^5 MPa, μ=0.3 and length is 3 m. Find (i) Circumferential stress and (ii) Longitudinal stress 6M

(OR)

11. A thick cylinder has inner and outer diameters as 120 mm and 180 mm respectively. It is subjected to an external pressure of 9 MPa. Find the value of the internal pressure which can be applied if the maximum stress is not to exceed 30 MPa. Draw the curve showing the variation of hoop and radial stresses through the material of the cylinder. Take d_i = 120 mm, d_o = 180 mm, P_o = 9 MPa, σ = 30 MPa. 12M

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AR13

CODE: 13EC2005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, October-2019

PROBABILITY THEORY & STOCHASTIC PROCESSES
(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define independent events
   b) Define Probability as a Relative Frequency
   c) Determine the binomial distribution for which the mean is 4 and variance is 3
   d) Define continuous random variable
   e) State Central limit theorem
   f) Define marginal distribution functions
   g) Define stationary random process
   h) Define covariance function a random process
   i) Write the relationship between cross power density spectrum and Cross Correlation Function
   j) Define linear system of inputs

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a If A, B and C are mutually independent events, prove that $A \cup B$ and C are independent **6M**
   b If A_1, A_2, B_1, B_2 are four events of a sample space such that $P(B_1) = 0.6, P(B_2) = 0.4,$ $P(A_1 / B_1) = 0.9,\ P(A_2 / B_1) = 0.1, P(A_1 / B_2) = 0.1$ and $P(A_2 / B_2) = 0.9$, find (i) $P(A_1)$ (ii) $P(B_1 / A_1)$ (iii) $P(B_2 / A_1)$ **6M**

(OR)

3. a If A, B and C are events such that $P(A) = \frac{1}{3}, P(B) = \frac{1}{4}$ and $P(A \cup B) = \frac{1}{2}$, find **6M**
   (i) $P\left(\frac{B}{A}\right)$ (ii) $P\left(\frac{A}{B}\right)$
   b State and prove total probability theorem **6M**

UNIT-II

4. a If the probability density function of a random variable X is given by **6M**

$$f_X(x) = \begin{cases} 0 & 3 > x \geq 13 \\ (x-3)/25 & 3 \leq x < 8 \\ (8.2-x)/25 & 8 \leq x < 13 \end{cases}$$

   Compute the probability that X has values greater than 4.5 but not greater than 6.7
   b Define the Binomial density function and find Mean and Variance **6M**

(OR)

5. a Determine the mean and variance of exponentially distributed density function **6M**

$$f(x)=\begin{cases}\frac{1}{b}e^{-\frac{x-a}{b}}, & x>a\\ 0, & x<a\end{cases}$$

b Assume that the height of clouds above the ground at some location is a Gaussian random variable X having $a_X=1830m$ and $\sigma_X=460m$, find the probability that clouds will be higher than 2750 *m*. **6M**

UNIT-III

6. a Given the function $g(x,y)=\begin{cases}b\,e^{-x}\cos y, & 0\le x\le 2 \text{ and } 0\le y\le\frac{\pi}{2}\\ 0, & \text{elsewhere}\end{cases}$ **6M**

Find the value of the constant b so that $g(x,y)$ is a valid probability density function

b Define joint distribution function and write its properties **6M**

(OR)

7. a The joint probability density function of two random variables X,Y is given by **6M**

$$f_{X,Y}(\mathrm{x},\mathrm{y})=\begin{cases}cxy, 0\le \mathrm{x}\le 2, 0\le \mathrm{y}\le 2\\ 0, \text{otherwise}\end{cases}$$

Compute (i) the value of c (ii) Marginal density functions $f_X(\mathrm{x})$ and $f_Y(\mathrm{y})$

b The joint probability density function of two random variables X,Y is given by **6M**

$f_{X,Y}(x,y)=u(x)u(y)xe^{-x(y+1)}$. Determine $f_X(x/y)$

UNIT-IV

8. a Explain Autocorrelation function of a random process with properties **6M**

b Let two random processes $X(t)$ and $Y(t)$ be defined by $X(t)=A\cos(\omega_0 t)+B\sin(\omega_0 t)$ **6M**

$Y(t)=B\cos(\omega_0 t)-A\sin(\omega_0 t)$, where A and B are random variables and ω_0 is constant. Find the cross-correlation function $R_{XY}(t,t+\tau)$

(OR)

9. a Show that the random process $X(t)=A\cos(\omega_0 t+\theta)$ is wide-sense stationary if it is assumed that A and ω_0 are constants and θ is a uniformly distributed random variable on (0, 2π) **6M**

b A random process is defined by $X(t)=\sqrt{2}\sin(2\pi t+\theta)$ where the random phase θ is uniformly distributed on $[0,2\pi]$. Determine the autocorrelation of $R_{XX}(t_1,t_2)$ **6M**

UNIT-V

10. a Explain Power Density Spectrum with properties **6M**

b Compute the auto correlation function of power spectrum $S_{XX}(\omega)=\frac{157+12\omega^2}{(16+\omega^2)(9+\omega^2)}$ **6M**

(OR)

11. a Show that the power density spectrum of a random process $X(\mathrm{t})$ is an even function **6M**

b A random process $X(t)$ has the power density spectrum $S_{XX}(\omega)=\frac{6\omega^2}{1+\omega^4}$. Determine the average power in the process **6M**

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AR13 **Set 01**

Code: 13CS2003

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, October-2019
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE and IT)

Time: 3 hours **Max. Marks: 70**

PART – A

Answer all Questions [10X1=10M]

1. a) Define tautology and give an example.
   b) Write in symbolic form the statement 'If Jerry takes Maths, then Ken takes English'.
   c) State Fermat's principle.
   d) What is the value of $1^2 + 2^2 + 3^2 + \cdots + n^2$
   e) Write Euler formula for a planar graph.
   f) Define Euler graph and give example.
   g) Write generating function for the sequence 1,1,1,1----
   h) Determine inverse of 4 in the group G={0,4,8,12} with respect to addition modulo16.
   i) Give an example of finite abelian group.
   j) Give an example for distributive lattice.

PART-B

Answer one question from each unit [5X12 =60M]

UNIT-I

2. a) Obtain the PDNF of $P \to [(P \to Q) \wedge \sim (\sim Q \vee \sim P)]$ (where $\sim$ is negation)
   b) Construct the truth table for i) $P \wedge \sim P$ and ii) $(P \vee Q) \vee \sim P$ [6M+6M]

(OR)

3 a) Establish the validity of the following argument
$p \to r$, $r \to s$, $t \vee \neg s$, $\neg t \vee u$, $\neg u \Rightarrow \neg p$
   b) Show that $(P \vee \sim Q) \wedge (\sim P \vee \sim Q) \vee Q$ is a tautology. [6M+6M]

UNIT-II

4 a) By using Fermat's theorem, prove that 8^{th} power of any number is of the form 17n or 17n ± 1, where n is a integer.
   b) Using mathematical induction, show that

$$\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + ---- \frac{1}{2^n} = 1 - \frac{1}{2^n}, \text{ for n} \in \text{N.}$$ [6M+6M]

(OR)

5 a) Determine the number of divisors and sum of divisors of 14553.
   b) Using mathematical induction, determine $1^3 + 2^3 + 3^3 + \cdots + n^3$, *for* $n \geq 1$. [6M+6M]

UNIT-III

6 Illustrate BFS, DFS algorithms with a suitable example. [12M]

(OR)

7 Show that the following graphs are planar [6M+6M]
   i) Graph of order 5 and size 8.
   ii) Graph of order 6 and size 12.

UNIT-IV

8 a) Prove that the set Z of all integers with the binary operation a*b=a+b+1, $\forall a,b \in Z$ is an abelian group.
   b) Show that the set G= {1, 2, 3, 4} is an abelian group w.r.to. multiplication modulo 5. [6M+6M]

(OR)

9 (a) Let (L, ≤) be a lattice in which * and $\oplus$ denotes the operations of meet and join respectively. For any $a,b \in L$, a ≤ b ⇔ a * b = a ⇔ a $\oplus$ b = b
   (b) Let (L, ≤) be a lattice. For any a, b, c in L, show that distributive inequality $a \oplus (b * c) \leq (a \oplus b) * (a * c)$ hold good. [6M+6M]

UNIT-V

10 a) Obtain the generating function for the sequence 1, 4,9,16----

   b) If a_n is a solution of $a_{n+1} = ka_n$, for n≥0 and $a_3 = \frac{153}{49}$ and $a_5 = \frac{1377}{2401}$, find the value of k. [6M+6M]

(OR)

11 a) Let a_n be the number of ways can a person climb up a flight of n steps. If the person can skip at most one or two steps at a time, then form a recurrence relation.
   b) Calculate the coefficient of x^{20} in $(x^3 + x^4 + x^5 + \ldots)^5$. [6M+6M]