AR18

CODE: 18BST204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

COMPLEX VARIABLES AND STATISTICAL METHODS

(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) Find the value of k such that $f(x,y)=x^3+3kxy^2$ may be harmonic and find its conjugate harmonic function. 6M

   b) Find the imaginary part of the function whose real part is $e^x(x\cos y - y\sin y)$ 6M

(OR)

2. If $u(x,y)=\frac{x}{(x^2+y^2)}$ is real part of an analytic function. Find the analytic function by using Milen-Thomson method. 12M

UNIT-II

3. Using Cauchy's integral formula, Evaluate $\int_c \frac{z+4}{z^2+2z+5}dz$, where Cis the circle given by $|z|=1$, (ii)$|z+1+i|=2$ 12M

(OR)

4. a) Evaluate $\int_c \frac{\log z}{(z-1)^3}dz$, with $c:|z-1|=1/2$ using Cauchy's integral formula. 6M

   b) Evaluate $\int_c \frac{ze^z}{(z+2)^3}dz$, with c is the circle, $c:|z|=3$ using Cauchy's integral formula. 6M

UNIT-III

5. The marks obtained in marks by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine 12M

   (i) How many students got marks above 90%

   (ii) What was the height mark obtained by the lowest 10% of the students

   (iii) Within what limits did the middle of 90% of the students lie.

(OR)

6. Prove that in a Normal Distribution, Mean = Median = Mode 12M

UNIT-IV

7. According to the norms established for a mechanical aptitude test, persons who are 18 years old have an average height of 73.2 with a standard deviation of 8.6. If 4 randomly selected persons of that age averaged 76.7, test whether the average height has increased at the 0.01 level of significance. 12M

(OR)

8. On the basis of information given below about the treatment of 200 patients suffering from a disease. State whether the new treatment is comparatively superior to the conventional treatment by using χ^2 – test 12M

	Favorable	Not Favorable
New	60	30
Conventional	40	70

UNIT-V

9. a) Fit a straight line to the following data 6M

x	1	2	3	4	5
y	14	27	40	55	68

By the method of least squares.

b) Fit a curve of the form $y = ae^{bx}$ to the data 6M

x	0	1	2	3
y	1.05	2.10	3.85	8.30

By the method of least squares.

(OR)

10. Calculate Karl Pearson's coefficient of correlation from the following data 12M

X	100	101	102	102	100	99	97	98	96	95
Y	98	99	99	97	95	92	95	94	90	91

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AR18

CODE: 18EST103 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

ENGINEERING MECHANICS

(Electrical & 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) Write the equations of equilibrium. 2M
   b) Determine the *x* and *y* components of each of the forces as shown in Figure.1 10M

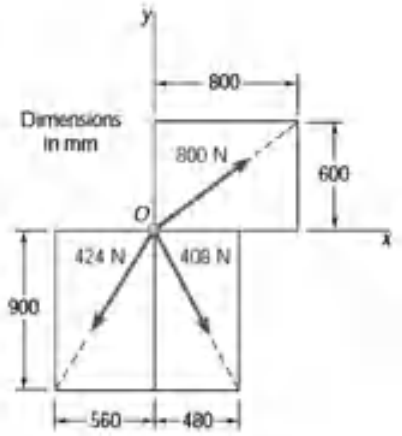


Figure-1

(OR)

2. a) Write difference between moment and couple. 4M
   b) Four coplanar forces are acting at a point as shown in the figure 2. Three forces have magnitude of 20, 50 and 20N at angles of 45°, 200° and 270° respectively. Fourth force is unknown. Resultant force has magnitude of 50N and acts along *x*-axis. Determine the unknown force and its direction from *x*-axis. 8M

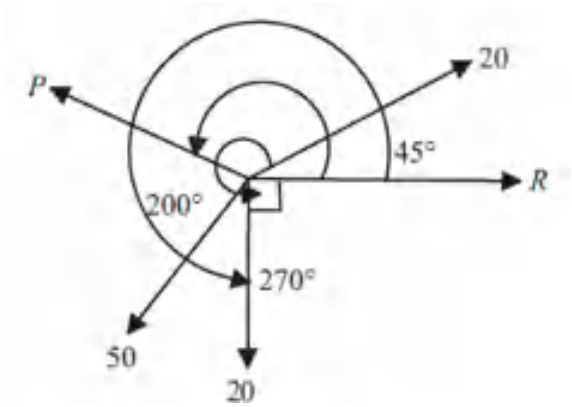


Figure 2

UNIT-II

3. a) State the equilibrium law and what does equilibrant means? 4M
   b) Determine the resultant of the system and an equivalent system through of a two vertical forces and a couple of moment 2000 Nm acting on a horizontal rod, which is fixed at end A as shown in figure 3. 8M

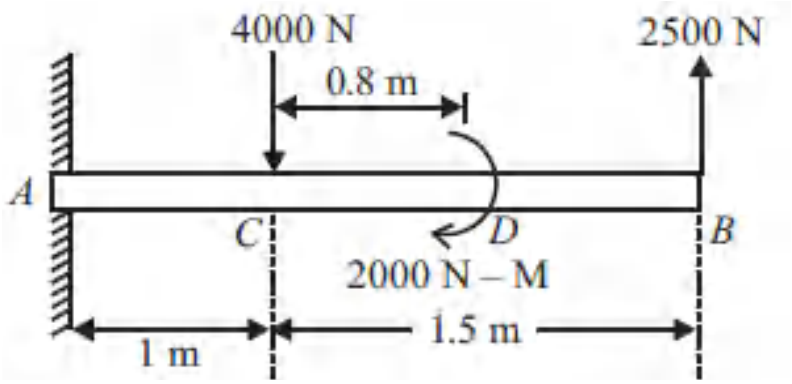


Figure-3

(OR)

4. a) Explain the concept of Free Body Diagram with example 2M
   b) A ball of weight Q=53.4 N rests in a right-angled trough, as shown in figure 1. Determine the forces exerted on the sides of the trough at D and E if all surfaces are perfectly smooth. 10M

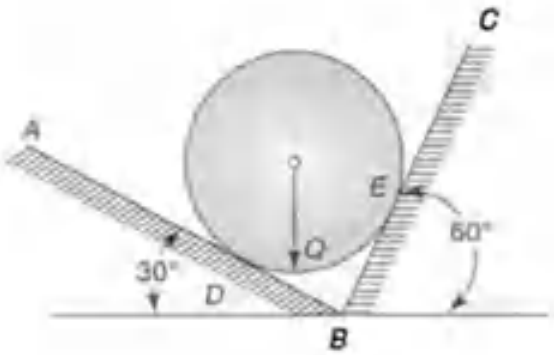


Figure 4

UNIT-III

5. a) State the Laws of Friction 2M
   b) What is the least value of P in the system shown in Figure 5, to cause the motion to impend? Assume the pulley is smooth and coefficient of friction between the other contact surfaces is 0.3. 10M

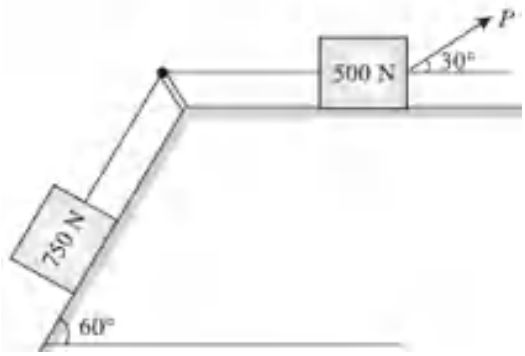


Figure 5

(OR)

6. a) State the assumptions involved in the analysis of a perfect truss 2M
   b) Determine the axial force in each bar of the plane truss loaded as shown in Figure 6. 10M

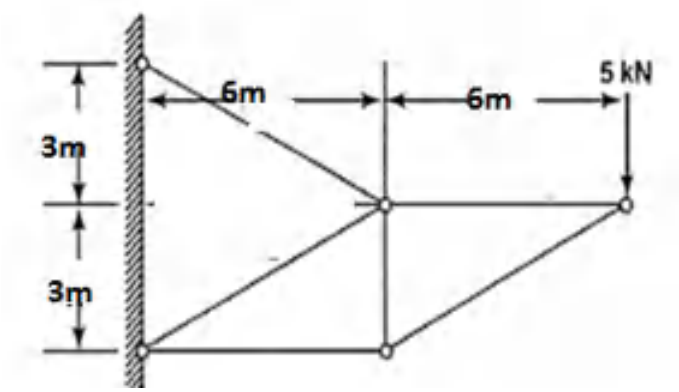


Figure 6

UNIT-IV

7. a) Write the Numerical formula of Polar Moment of Inertia 2M
   b) Locate the centroid of the L – section shown in figure 7. 10M

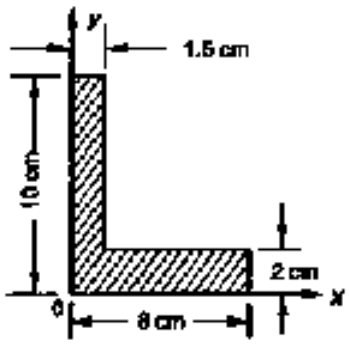


Figure 7

(OR)

8. a) Define the terms centroid and centre of gravity 2M
   b) Determine the centroid of the following figure 8. All dimensions are in cm. 10M

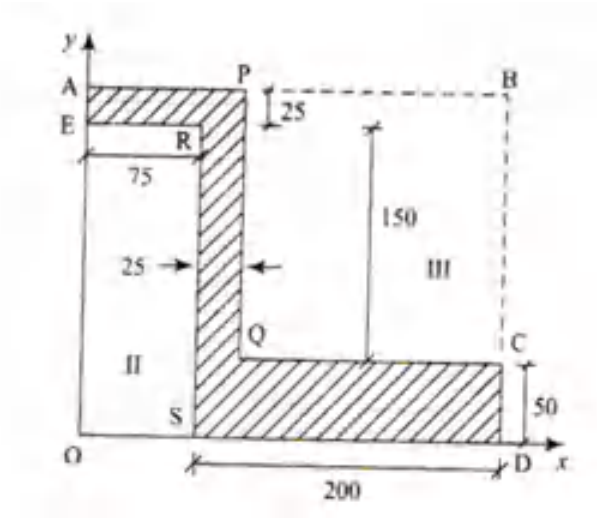


Figure 8

UNIT-V

9. a) Define the term coefficient of friction. 2M

b) A small block of weight W rests on an adjustable inclined plane as shown in Figure 9. Friction is such that sliding of the block impends when $\alpha=30^{o}$.What acceleration will the block have when $\alpha=45^{o}$. Neglect any difference between static and kinetic friction. 10M

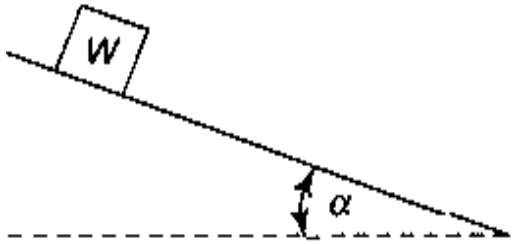


Figure 9

(OR)

10. a) A stone is dropped from the top of a tower 50m high. At the same time, another stone is thrown up from the foot of the tower with a velocity of 25m/s. At what distance from the top and after how much time the two stones cross each other? 6M

b) The x and y components of the displacement in meters of a point are given by the equation $x = 4t^2 - 3t$, $y = t^3 - 10$. Determine the velocity and acceleration of the point when t = 2 sec. 6M

AR18

CODE: 18MET204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

STRENGTH OF MATERIALS

(Mechanical 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) Classify types of stresses and strains 4M

   b) An axial pull of 40000 N is acting on a bar consisting of three sections of length 30 cm, 25 cm and 20 cm and of diameters 2 cm, 4 cm and 5 cm respectively. If the Young's modules = 2 x 10^5 N/mm^2, determine stress in each section and total extension of the bar. 8M

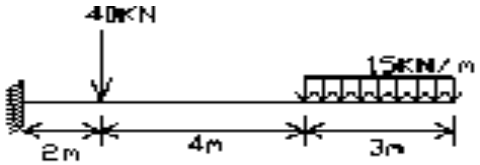
(OR)

2. a) Describe stress-strain diagram for mild steel. 4M

   b) A reinforced concrete column 500 mm X 500 mm in section is reinforced with 4 steel bars of 25 mm diameter, one in each corner. The column is carrying a load of 1000 kN. Find the stresses in the concrete and steel bars. Take E for steel = 210 GPa and E for conctrete = 14 GPa 8M

UNIT-II

3 Draw the shear force and bending moment diagram for the cantilever beam loaded as shown in the Figure 12M

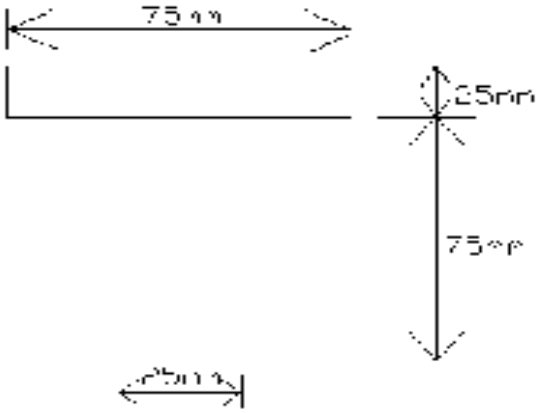


(OR)

4. A thin cylindrical vessel 3 m long is of 1 m diameter with 20 mm thick plates is subjected to an internal pressure of 20 MPa. Calculate the changes in length and diameter of the vessel. Take E = 200 GPa and Poisson's ratio = 0.28 for the vessel material. 12M

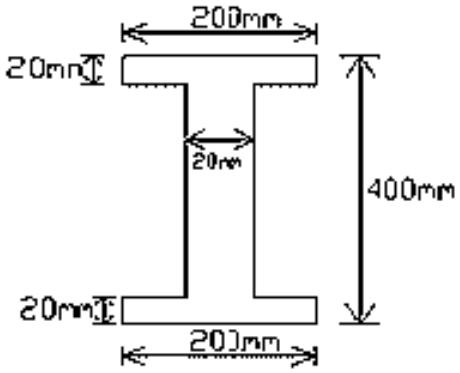
UNIT-III

5 Determine the maximum shear stress in a simply supported beam subjected to a shear force of 20 kN. The cross section of the beam is as shown in the Fig. 12M



(OR)

6. a) Determine the maximum tensile and compressive bending stresses in a cantilever beam subjected to a bending moment of 20kN-m. The cross section of the beam is as shown in the Fig. 12M



UNIT-IV

7. a) Derive Torsion equation. 4M
   b) A shaft is transmitting 97.5 kW at 180 r.p.m. If the allowable shear stress in the material is 60 MPa, find the suitable diameter for the shaft. The shaft is not to twist more that 1° in a length of 3 metres. Take C = 80 GPa. 8M

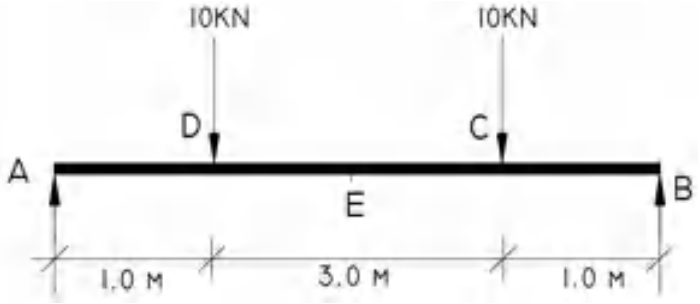
(OR)

8. a) A solid steel shaft in a rolling mill transmits 20 kW of power at 2 Hz. Determine the smallest safe diameterof the shaft if the shear stress τwis not to exceed 40 MPa and the angle of twist θis limited to 6°in a length of 3 m. Use G = 83 GPa 6M

b) A CI column with 120 mm external diameter and 90 mm internal diameter is 3m long. Calculate crippling load if the end conditions are fixed – fixed. Take E = 95 GPa and Factor of safety = 5. 6M

UNIT-V

9. a) A simply supported beam 5m long carries concentrated loads of 10KN each at points 1 m from the ends. Calculate: i) maximum slope and deflection of the beam and ii) Slope and deflection under each load. Take: EI = 1.2 x 10^4 KN-m^2 6M

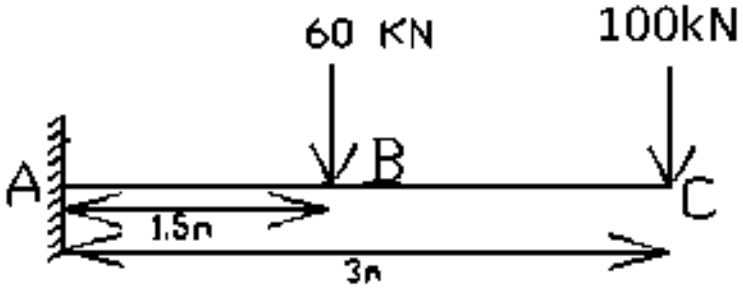


b) Derive the equations for slope and deflection of a simply supported beam subjected to udl over its entire span. 6M

(OR)

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

b) Determine the deflection and slope at the points B and C for a cantilever beam loaded as shown the figure. Take E = 200 GPa and I = 160 x 10^6 mm^4. 6M



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AR18

CODE: 18ECT208 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

ANALOG COMMUNICATIONS

(Electronics and Communication 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)	A 400W carrier is modulated for a depth of 75%. Determine the total power in the modulated wave.	6M
	b)	Explain AM generation using Switching modulator	6M
		(OR)	
2.	a)	Explain demodulation of AM signal using square law detector	6M
	b)	Discuss the spectrum of AM signal and determine the bandwidth.	6M

UNIT-II

3.	a)	Determine the percentage of power saving for a DSBSC signal for the percentage of modulation (i)100% (ii)50%	6M
	b)	Explain DSBSC wave generation using Balanced modulator	6M
		(OR)	
4.	a)	Discuss the spectrum of SSB signal when (i) upper sideband is transmitted (ii) lower sideband is transmitted.	6M
	b)	Explain VSB modulation	6M

UNIT-III

5.	a)	Illustrate the relationship between frequency modulation and phase modulation	6M
	b)	Explain the comparison of narrow-band FM and AM waves	6M
		(OR)	
6.	a)	Compare TDM and FDM	6M
	b)	Explain the working principle of balanced frequency discriminator used for FM detection.	6M

UNIT-IV

7.	a)	Explain the operation of phase modulated type FM transmitter	6M
	b)	Explain AM transmitter with high level modulation scheme.	6M
		(OR)	
8.	a)	Explain the operation of Tuned radio frequency receiver with block diagram	6M
	b)	Explain the operation of FM receiver	6M

UNIT-V

9.	a)	Explain the generation of PWM signals	6M
	b)	Explain Demodulation of PAM signals	6M
		(OR)	
10.	a)	Determine the figure of merit for DSBSC modulation system.	6M
	b)	Explain pre-emphasis and de-emphasis	6M

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AR18

CODE: 18CST205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

COMPUTER ORGANIZATION & ARCHITECTURE

(Common to CSE AND 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)	Illustrate the basic functional units of a computer.	6M
	b)	Design a bus system for connecting 4 registers each of size 4 bits.	6M
		(OR)	
2.		Illustrate various addressing modes in a computer.	12M

UNIT-II

3.	a)	Explain fixed point addition/subtraction operations with the help of a flowchart.	6M
	b)	Apply Booth's multiplication algorithm between 12 x 9.	6M
		(OR)	
4.	a)	Write multiplication algorithm of Signed Magnitude data	6M
	b)	Construct the flowchart for division operation for signed magnitude data.	6M

UNIT-III

5.	a)	Discuss the efficiency of hierarchical organization of memory in terms of speed, size and Cost.	6M
	b)	Illustrate various replacement algorithms	6M
		(OR)	
6.		What is Cache memory? Explain various memory mapping techniques of Cache memory?	12M

UNIT-IV

7.	a)	Describe Asynchronous data transfer using Strobe Control.	6M
	b)	Draw the block diagram of DMA controller. Explain its working	6M
		(OR)	
8.	a)	Differentiate programmed I/O and interrupt driven I/O.	6M
	b)	Why I/O interface is required between I/O devices and CPU?	6M

UNIT-V

9.		Discuss in detail about pipeline hazards and give various solutions to handle hazards	12M
		(OR)	
10.	a)	How to solve cache coherence problem?	6M
	b)	Illustrate four segment Instruction Pipeline?.	6M

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AR16

CODE: 16BS2006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, September-2021

COMPLEX VARIABLES AND STATISTICAL METHODS

(Common for CE & ME)

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 Show that $u = \frac{1}{2}\log(x^2 + y^2)$ is harmonic and find its harmonic conjugate function. 14M

(OR)

2. Prove that the function $f(z)$ is defined by 14M

$$f(z) = \begin{cases} \dfrac{x^3(1+i) - y^3(1-i)}{x^2 + y^2} & if \ z \neq 0 \\ 0 & if \ z = 0 \end{cases}$$ is continuous and C-R equations are satisfied at the origin, yet f '(0) does not exist.

UNIT-II

3. Evaluate using Cauchy's integral formula $\oint_C \frac{\log z}{(z-1)^3} dz$ *where C is* $|z-1| = \frac{1}{2}$. 14M

(OR)

4. Evaluate by Residue theorem $\oint_C \frac{3z^2 + z + 1}{(z^2 - 1)(z+3)} dz$ *where C is* $|z| = 2$. 14M

UNIT-III

5. Expand the Laurent's series expansion of the function $f(z) = \frac{7z - 2}{(z+1)z(z-2)}$ 14M in the region $1 < |z+1| < 3$.

(OR)

6. Expand the Laurent's series expansion of the function 14M

$f(z) = \frac{1}{(z^2+1)(z^2+2)}$ *in the region* $(i)\ 0 < |z| < 1$ $(ii)\ |z| > 2$.

UNIT-IV

7. a) A problem is given to three students whose chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$. What is the probability that (i) only one of them solves the problem and (ii) the Problem is solved 7M

b) A Continuous random variable has the probability density function $f(x) = kx^2e^{-x}$, $x \geq 0$
Determine(a) k, (b) Mean, (c)Variance 7M

(OR)

8 In a Normal distribution, 31% of the items are under 45 and 8% are over 64. Determine the mean and standard deviation of the distribution. 14M

UNIT-V

9. a) Compute the coefficient of correlation between X and Y using the following data. 7M

X	65	67	66	71	67	70	68	69
Y	67	68	68	70	64	67	72	70

b) In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible: Variance of X=1. The regression equations are $3x + 2y = 26$ and $6x + y = 31$.What were (i) the mean values of X and Y? and (ii) the correlation between X and Y? 7M

(OR)

10. a) Fit a second degree polynomial to the following data by the Method of least squares 10M

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

b) Write normal equations for fitting of a straight line 4M

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AR16

CODE: 16EC2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, September-2021

ANALOG COMMUNICATIONS

(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)	Derive the equation and power relation of a single tone modulation of AM system.	[7M]
	b)	A Carrier of 750 W,1MHz is amplitude modulated by sinusoidal signal of 2 KHz to a depth of 50%. Calculate Bandwidth, Power in side band and total power transmitted.	[7M]

(OR)

2.	a)	Define a standard form of amplitude modulation and explain the time and frequency domain expression of an AM wave.	[7M]
	b)	Explain with the help of a neat sketch, how a square law modulator is used to generate an AM.	[7M]

UNIT-II

3.	a)	Draw the circuit diagram of Ring modulator. Explain its operation including all the waveforms.	[7M]
	b)	With block diagram and relevant equations explain the coherent detection of a DSB-SC wave	[7M]

(OR)

4.	a)	Explain the phase discrimination method for generating SSB.	[7M]
	b)	Compare AM, D.S.B-SC, S.S.B-SC and V.S.B transmission.	[7M]

UNIT-III

5.	a)	With a neat block diagram explain the Armstrong method of FM generation.	[10M]
	b)	Compare narrow band and wide band FM	[4 M]

(OR)

6.	a)	With a block diagram approach explain the operation of FDM scheme.	[7M]
	b)	Explain clearly about pre-emphasis and de-emphasis in FM wave.	[7M]

UNIT-IV

7.	a)	With the aid of the block diagram explain TRF receiver. Also explain the basic Super heterodyne principle.	[10M]
	b)	List out the advantages and disadvantages of TRF receiver.	[4 M]

(OR)

8.	a)	With neat block diagram, explain the operation of super heterodyne receiver.	[7M]
	b)	Define the terms sensitivity, selectivity and fidelity of a radio receiver.	[7M]

UNIT-V

9.	a)	Explain the process of generation of PWM with neat diagrams.	[10M]
	b)	Write short notes on transmission bandwidth of PAM.	[4 M]

(OR)

10.	a)	Define Pulse Amplitude Modulation (PAM)? Give merits and demerits of PAM.	[7M]
	b)	Compare PAM, PWM and PPM systems.	[7M]

AR16

CODE: 16EE2010 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, September-2021
ELECTRO MAGNETIC FIELD THEORY
(Electrical & 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) State Gauss's law and derive the expression for electric flux density D for infinite sheet charge ρ_s using Gauss's law. 7M

   b) Point charge Q_1 = 300μC located at (1,-1,3) mts experiences a force $F=(8a_x+8a_y+4a_z)$ N due to a charge Q_2 at (3,-3,2) mts. Determine Q_2. 7M

(OR)

2. a) State and explain Coulomb's law. 7M

   b) Determine D at (4,0,3) if there is a point charge -5π mC at(4,0,0) and a line charge 3π mC/m along y axis 7M

UNIT-II

3. Derive Laplaces's and Poission's equation for static electric field. 14M

(OR)

4. a) Derive the expression for capacitance of co-axial capacitor. 7M

   b) Find the polarization, P in a homogenous and isotropic dielectric material. Whose ε_r=2.0 when D=4.0a_r μC/m^2 7M

UNIT-III

5. Find the expression for magnetic field intensity **H** for infinitely long coaxial transmission line using amperes law 14M

(OR)

6. a) Derive the expression for Magnetic field Intensity H at the center of a square loop of side L meters, carrying a current I amps using Bio-Savart' s law 7M

   b) Determine the magnetic field intensity, H at the center of a square current element. The length of each side is 4 m and the current, I=2.0 Amp 7M

UNIT-IV

7. a) Derive the expression for torque on a current loop placed in a magnetic field 7M

   b) A Toroid has air core and has a cross–sectional area of 1 mm^2. It has100 turns and its mean radius is 10 mm. Find its Inductance. 7M

(OR)

8. a) Derive the force equation, force on a long current carrying conductor in Magnetic field. . 7M

   b) In a magnetic flux density of B=(2.0a_X+ 4.0 a_Y) Wb/m^2 , a current element, 20 a_Z mA/m is placed. Find the force on the current element 7M

UNIT-V

9. a) State and explain the faradays laws of electromagnetic induction 7M

   b) Find out the average power density of EM wave travelling in free space has associated with $E=24\ e^{j(\omega t+\beta z)}\ V/m$ 7M

(OR)

10 Explain word statements of Maxwell's equations for both static and time-varying fields. 14M