AR16

CODE: 16CE2002 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

Strength of Materials-I

(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) In the fig. 1 shown a steel bar of cross sectional area 300mm^{2}held firmly by the end supports and loaded by an axial force of 30kN. Determine the reaction at A and B and extension of the left portion E= 200MPa. 7 M

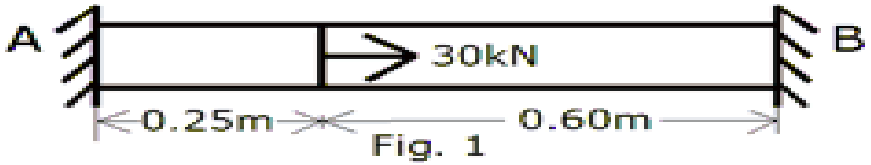

Fig. 1

b) A load of 150 kN is applied on a short concrete column size 150mm x 150mm. The column is reinforced with a steel of 2400mm^2. The modulus of elasticity of concrete is 1/15 of steel. Find stress in concrete and steel. 7 M

(OR)

2. a) A rod of steel is 20 meters long at a temperature of 20^{0}C. Find the free expansion of the rod, when the temperature is raised to 65^{0}C. Find the temperature stress produced. 7 M
   i) When the expansion of the rod is prevented,
   ii) When the rod is permitted to expand by 5.80 mm.
   Take $\alpha = 12 \times 10^{-6}$ per^{0}c and E = 2 x 10^5 N/mm^2

   b) Derive the relation between young's modulus and modulus of rigidity. 7 M

UNIT-II

3. Draw the shear force and bending moment diagrams for the beam shown in fig. 2 14 M

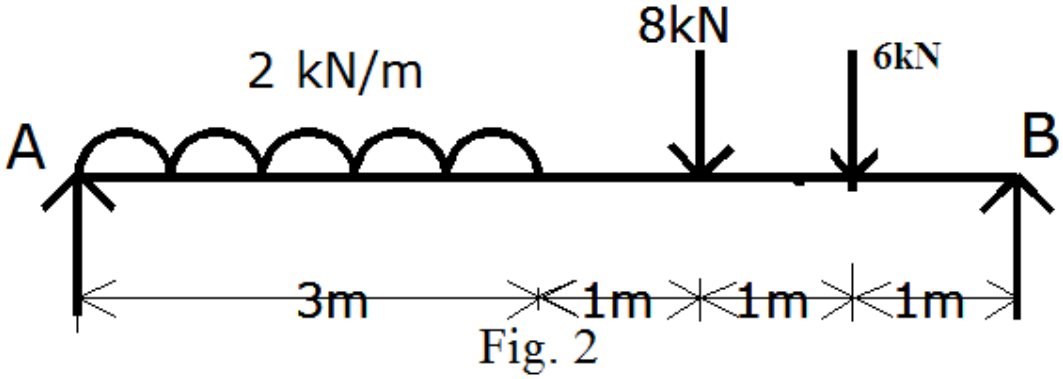

Fig. 2

(OR)

4. Draw the shear force and bending moment diagrams for the beam shown in fig. 3

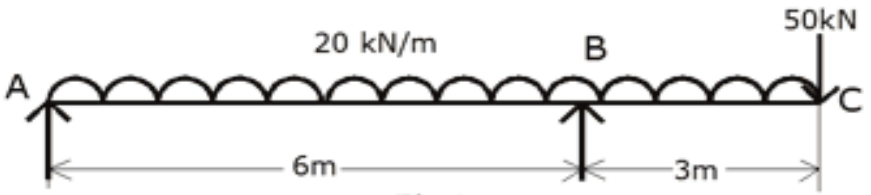

Fig. 3

14 M

UNIT-III

5. a) Explain a short notes about neutral axis 4 M
   b) A simply supported timber beam has a span of 6m, it carries a uniformly distributed load of 12 kN/m run. If the stress in the timber is not to exceed 8 N/mm^2. Determine the width and depth, where depth of the section is twice the width. 10M

(OR)

6. a) Write the assumptions in theory of simple bending 4 M
   b) The moment of inertia of a beam section 500mm deep is 69.49 x 10^7 mm^4. Find the longest span over which a beam of this section, when simply supported could carry a uniformly distributed load of 50kN/m run. The flange stress in the material is not to exceed 110N/mm^2 10M

UNIT-IV

7. a) Derive the shear stress distribution equation $\tau = Fa\tilde{y}/IB$ 6 M
   b) A wooden beam 100 mm wide and 150 mm deep is simply supported over a span of 4 meters. If shear force at a section of the beam is 4500N. Find shear stress at a distance of 25mm above the neutral axis. 8 M

(OR)

8. a) Determine and draw the shear stress distribution across circular section. 6 M
   b) The cross section of simply supported beam is that of 'T' section consisting of 150mm x 10mm flange and 10mm x 140 mm web. Draw the shear stress distribution across the depth of the section. Showing all important values on them. Take shear force = 10kN 8 M

UNIT-V

9. a) Derive the torsion equation. 7 M
   b) A solid shaft transmits 250 kW at 100 rpm. If the shear stress is not to exceed 75 N/mm^2. What should be the diameter of the shaft? If this shaft is to be replaced by hollow one whose internal diameter is 0.6 times outer diameter. Determine the size and percentage of saving weight. The maximum shear stress being the same. 7 M

(OR)

10. a) Derive the expression for power transmitted by a shaft. 5 M
    b) A hollow circular shaft 20mm thick transmits 300kw at 200rpm. Determine external diameter of the shaft, if the shear strain due to torsion is not to exceed 0.00086, C = 8 x 10^4 N/mm^2. Where length of the shaft is 3meters. 9 M

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AR16

CODE: 16EE2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

ELECTRICAL MACHINES-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 how DC generators are classified with neat diagrams
   b) What is the armature reaction? Explain armature reaction process with necessary diagrams 14

(OR)

2. A 4 pole generator supplies a current of 143 A. it has 492 armature conductors (a) wave connected, (b) lap connected. When delivering a full load, the brushes are given an actual lead of 10°, calculate the de magnetizing armature ampere turns per pole. The field winding is shunt connected and takes 10 A; find the extra shunt field turns necessary to neutralize this demagnetization. 14

UNIT-II

3. Explain and plot the external characteristics of compound dc generator (both cumulative and differential) and compare the same with self excited dc shunt generator external characteristics. What is critical loading condition? Explain the magnetization characteristics of dc series generator and what are the limitations? 14

(OR)

4. a. Derive the expression of torque in dc machine. 5
   b. A shunt generator delivers 50 kW at 250 V and 400 rpm. The armature and field resistance are 0.02Ω and 50Ω respectively. Calculate the speed of the machine running as a shunt motor and taking 50 kW input at 250 V. Allow 1 V per brush drop. 9

UNIT-III

5. a. Derive the condition for maximum efficiency for DC motors. 4
   b. Why starter is necessary for an operation of dc motor? Explain the operation of three point starter of dc shunt motor with neat sketch 10

(OR)

6. a. Which method of speed control is also termed as constant torque method of speed control and justify the reason — 4
   b. In a brake test on a small shunt motor the speed was 1500 rpm, the load on one side of the brake band was 28.9 N and on the other 1.67 N. The diameter of the brake pulley was 15.2 cm. if the input current was 2 A at 250 V, Calculate the torque, the efficiency and the brake horse power. — 10

UNIT-IV

7. a. Derive the expression of emf equation in a single phase transformer — 4
   b. Explain why the magnetising current drawn and mutual flux within the core of the transformer does not change with loading? Draw the phasor diagram under load with leading power factor — 10

(OR)

8. a. Define all day efficiency of a transformer. Prove the conditions for maximum efficiency — 4
   b. The efficiency at unity power factor, of a 6600/384 V, 200 KVA, 1 phase transformer is 98% both at full load and half load. The power factor on the no load is 0.2. Find the core equivalent circuit parameter, core loss, copper loss, magnetizing current and no load current — 10

UNIT-V

9. a. State the conditions for parallel operation, explain how separation of core losses are obtained — 7
   b. A 20 kVA, 2500/250 V, 50Hz transformer gave the following test results: — 7
   O.C. test (on low voltage side) 250 V, 1.4 A, 105 watts
   S.C. test (on high voltage side) 104 V, 8A, 320 watts
   Compute the equivalent circuit parameter referred to low voltage side and draw the exact equivalent circuit referred to primary

(OR)

10. a. Explain the operation of back to back in a single phase transformer. Specify whether it is a direct test or indirect test? What is the significant of this test — 7
    b. Explain the operation of a step down auto transformer, state its advantage and dis advantage compared to two winding transformer — 7

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AR16

CODE: 16ME2005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

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) Explain with neat sketch the stress-strain diagram for a mild steel specimen subjected to tensile force and indicate salient points. 10
   (b) A flange coupling is used to join two shafts which are to transmit 300 kW at 800 rpm. 8 bolts are used at pitch diameter of 120 mm. Assuming a mean shear stress of 80 MPa, determine the diameter of the bolts. 4

(OR)

2. (a) A 20 mm thick and 200 mm wide steel plate tpers uniformly to 10 mm diameter thickness and 150 mm width over a length of 2 m. Determine the increase in length when a pull of 18 kN is applied. E=200 GPa 7
   (b) A steel bar of 10 mm diameter is subjected to an axial loa of 12 kN. If the change in diameter is found to be 0.0022 mm, determine the poisson's ratio and the modulus of elasticity and the bulk modulus. Take G=78GPa. 7

UNIT-II

3. (a) The stresses on two perpendicular planes through a point in a body are 30 MPa and 15 M Pa both tensile along with a shear stress of 25 MPa. Find (i) the magnitude and direction of principle stresses; (ii) The planes of the maximum shear stress; (iii) the normal and shear stresses on the planes of maximum shear stress 7
   (b) A piece of material is subjected to two perpendicular stresses as follows: (a) tensile stresses of 100 MPa and 60 MPa; (b) tensile stress of 100 MPa and compressive stress of 60 MPa, determine normal and tangential stresses on a plane inclined at 30^0 to the plane of 100 MPa stress. Also find the resultant and its inclination with the normal stress using ellipse stress method. 7

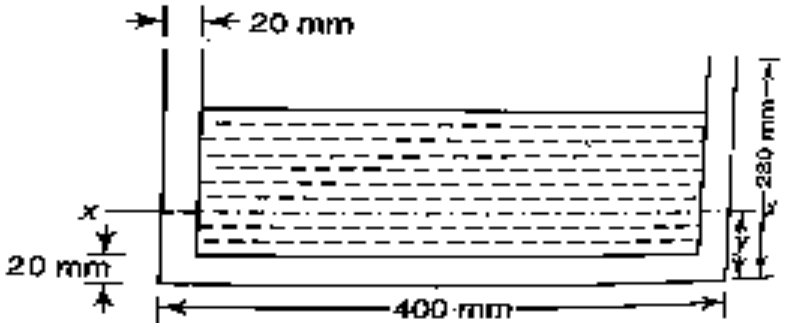
(OR)

4. (a) A simple supported beam of 7 m span with overhangs rests on supports which are 4 m apart. The left end overhanging is 2 m. The beam carries loads of 30 kN nd 20 kN on the left and the right ends respectively apart from a uniformly distributed load of 25kN/m between the supporting points. Draw the shear force and bending moment diagrams. 7
   (b) A cantilever beam carries a distributed load for which the intensity of load varies linearly from zero at start to the maximum value at the free end. Draw the shear force and bending moment diagrams. 7

UNIT-III

5. (a) A 280 mm X 120 mm I section beam is to be used as a cantilever of 3.6 m length. Find the uniformly distributed load which can be carried by the beam if the permissible stress is 125 MPa. $I=75X10^6$ mm^4. If the cantilever is strengthened by 10 mm thick steel plates welded at the top and bottom flanges to withstand a 40% increased load, find the width of the plates and the length over which the plates should extend, the maximum stress being the same. 7

(b) A cast –iron channel supported at two points, 11 m apart, carries water as shown the figure below. Determine the maximum depth of water in the channel if the tensile and compressive bending stresses are not to exceed 18 MPa and 48 MPa respectively. Water weighs 9.81 kN/m^3 and the cast iron 68 kN/m^3. 7



(OR)

6. A 320X 160 mm I section joist has 20 mm thick flanges and a 15 mm thick web. At a certain cross-section it is acted upon by a bending moment of 100 kN m, and a shear force of 200kN. Determine the principle stresses. (i) at the top, (ii) in the flanges at 140 mm from the neutral axis, (iii) in the web at 140 mm from the neutral axis, (iv) at the neutral axis. 14

UNIT-IV

7. (a) The outer and inner diameters of a hollow steel shaft are 120 mm and 60 mm respectively. The shaft transmits 800kW at a speed of 400 rpm while an end thrust of 70 kN acts on the shaft. Determine the bending moment which can safely be applied to the shaft if the maximum principal stress does not exceed 80 MPa. 7

(b) Two shafts of same material and of the same lengths are applied equal torques. The first shaft is a solid and the second shaft is a hollow shaft with inner diameter two thirds of the external diameter. If the maximum stress developed in each shaftis the same, compare the weights of the two shafts. 7

(OR)

8. (a) What are the different assumptions that are made to analyse struts and columns which fail due to buckling loads. Also derive an expression to calculate the Euler crippling load for the following end conditions: (i) Fixed at both ends (ii) one end fixed and other hinged. 7

(b) A 4 m long circular bar deflects 20 mm at the centre when used as simply supported beam under a 200 N load at the centre. Determine the critical load of the same bar when used as strut which is firmly fixed at one end and pinned-joint at the other. 7

UNIT-V

9. (a) Determine the maximum bending moment and the deflection of a beam of length l and flexural rigidity EI. The beam is fixed horizontally at both ends and carries a uniformly distributed load ***w*** over the whole span using moment area method 7

(b) A 6 m long fixed beam carries a point load of 40 kN at the mid span. Determine the fixed end moments and the deflection under the load. E=205GPA and I=80X$10^6$$mm^4$ 7

(OR)

10. A beam of length ***l*** is loaded with a uniformly distributed load w per unit length. It has one support at the left end and the other at a distance ***l/3*** from the right end. Determine the deflection at the right end of the beam. 14

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AR16

CODE: 16EC2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

SIGNALS AND SYSTEMS

(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 Differentiate the following Signals. 7M

   i) Continuous and discrete signals
   ii) Periodical and non-periodical signals
   iii) Causal and non-Casual signals

   b Show that the signals $\emptyset_k(t) = e^{\frac{j(2\pi kt)}{T}}$,k= 0,±1,±2,... form an orthogonal set on the interval 0<t<T. 7M

(OR)

2. a Consider a discrete – time system with input x(n) and output y(n) related by 8M

   $y(n) = \sum_{k=n-n_0}^{n+n_0} x(k)$ Where n_0 is a finite positive integer.

   (i)Is this system Linear? (ii) Is this system time-invariant? (iii) If x(n) is known to be bounded by a finite integer B_x[i.e; $|x(n)|<B_x$], it can be shown that y(n) is bounded by a finite number 'C' we conclude that the given system is stable. Express 'C' in terms of B_x and n_0

   b Define Mean square error and derive the expression for evaluating Mean square error. 6M

UNIT-II

3. a Define fourier transform and explain about properties of FT 8M

   b Find the Fourier series of Full wave rectifier. 6M

(OR)

4. a Consider a signal x(t) with Fourier transform X(w).suppose we are given the following facts: 8M

   1. x(t) is real and non-negative. ; 2. $F^{-1}[(1+j\omega)X(\omega)] = Ae^{-2t}u(t)$, Where A is independent of t.; 3. $\int_{-\infty}^{\infty}|X(\omega)|^2 d\omega = 2\pi$.

   Using Fourier Transform properties determine the closed form expression for x(t).

   b Find the Fourier transform of the 6M

   i) Gaussian pulse signal x(t)== e^{-at^2} $a > 0$and ii) g(t)=$\frac{1}{\pi t}$

UNIT-III

5. a Determine and sketch the magnitude and phase response of the LTI causal system by the differential equation $\frac{dy(t)}{dt} + y(t) = \frac{dx(t)}{dt} - x(t)$ 7M

   b For the LTI system described by the impulse response $h(t) = \delta(t) - 2e^{-2t}u(t)$ 7M

   Determine and sketch the frequency response. Name the type of filter the system represents.

(OR)

6. a Using Paley-Wiener criterion, prove that $|H(\omega)| = e^{-\omega^2}$ is not a suitable magnitude response for causal LTI system 7M

   b Find the impulse response of the system whose frequency response is given by 7M

$$|H(\omega)| = \begin{cases} 1, -\omega_c < \omega < \omega_c \\ 0\,, Otherwise \end{cases} \angle \mathrm{H}(\omega) = \begin{cases} \frac{\pi}{2}, \omega > 0 \\ -\frac{\pi}{2}, \omega < 0 \end{cases}$$

UNIT-IV

7. a A signal $x(t) = \cos(200\pi t) + 2\ \cos(320\pi t)$ is ideally sampled at f_s=300 Hz.If the sampled signal is passed through an ideal low-pass filter with a gain $1/f_s$ and cutoff frequency of 250 Hz,what frequency components will appear in the output? 7M

   b Specify the Nyquist rate and Nyquist interval for each of the following signals: 7M

   (i) x(t)=sinc(200t) (ii) x(t)=sinc^2(200t) (iii) x(t)=cos(150πt) sin(100πt)

(OR)

8. a Find and sketch the autocorrelation function $R_{XX}(\tau)$ for $x(t) = e^{-at}\,u(t)\ for\ , a > 0$ 7M

   b Evaluate the convolution integral for a system with input x(t) and impulse response h(t) respectively given by x(t)=h(t)=A[u(t+τ)-u(t- τ)]. 7M

UNIT-V

9. a Using Laplace Transform properties find the Laplace transforms and mention ROC s of the following signals: i) g(t)=$te^{-at}u(t)$. ii) g(t)= u(-2t-1). 6M

   b Consider the signal below and denote its Laplace Transform X(s). 8M

$$x(t) = e^{-5t}u(t-1)$$

   I) Evaluate X(s) and find its ROC.

   II) Determine the values of the finite numbers A and t_o such that the Laplace Transform G(s) of g(t) shown below has the same algebraic form as X(s). What is the ROC corresponding to G(s)? $g(t) = Ae^{-5t}u(-t - t_o)$

(OR)

10. a Define and prove initial value and final value thermos of Laplas Transform 8M

    b Define and explain about ROC of z-transform 6M

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AR16

CODE: 16BS2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

Probability and Statistics

(Common to CSE & IT)

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) Find the probability of drawing 2 red balls in succession from a bag containing 4 red and 5 black balls when the ball that is drawn first is (i) replaced (ii) not replaced — 7M
   b) In a certain college, 25% of boys and 10% of girls are studying Statistics. The girls constitute 60% of the student body. (i) What is the probability that Statistics is being studied in the college? (ii) If a student is selected at random and found to be studying Statistics, find the probability that the selected student is a boy? — 7M

(OR)

2. a) Define mathematical expectation of a discrete and continuous random variables — 7M
   b) If the probability density function of a random variable is given by

$$f(x)=\begin{cases} k(1-x^2), & for 0<x<1, \\ 0, & elsewhere \end{cases}$$ — 7M

Find the value of k and the probabilities that a random variable having this probability density will take on a value (i) between 0.1 and 0.2 (ii) greater than 0.5

UNIT-II

3. a) The mean and variance of a binomial distribution with parameters n and p are 16 and 8 respectively. Find $P(X\leq 1)$ and $P(X>2)$ — 7M
   b) If X is a Poisson variate such that $3P(X=4)=0.5P(X=2)+P(X=0)$, find (i) mean of X and (ii) $P(X<2)$ — 7M

(OR)

4. a) Define normal and standard normal distributions and mention its properties — 7M
   b) If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that (i)$26\leq X\leq 40$ and (ii) $X>45$ — 7M

UNIT-III

5. A population consists of 5 observations 3, 6, 9, 15 and 27. Consider all possible samples of size two which can be drawn without replacement from this population. Find (i) the mean and standard deviation of the population (ii) the mean of the sampling distribution of mean (iii) show that the mean of sampling distribution of mean is equal to the population mean — 14M

(OR)

6. Determine 99% confidence interval for the mean content of soft drink bottles, if the contents of 7 such soft drink bottles are 10.2,10.4, 9.8, 10.0, 9.8, 10.2, 9.6 ml. — 14M

UNIT-IV

7. a) A random sample of 6 steel beams has a mean compressive strength of 58,392psi, with a standard deviation of 648psi. Use this information and the level of significance of $\alpha = 0.05$ to test whether the true average compressive strength of the steel beam from which this sample came is 58,000psi. Assume normality. 7M

   b) According to the norms established for a mechanical aptitude test, persons who are 18 years old should average 73.2 with standard deviation of 8.6. If 45 randomly selected persons of that age averaged 76.7, test the null hypothesis $\mu = 73.2$ against the alternative hypothesis $\mu > 73.2$ at the 0.01 level of significance. (T test) 7M

(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. Chi square test for independence of attribute. 14M

	Favourable	Not favourable
New Treatment	60	30
Conventional Treatment	40	70

UNIT-V

9. Obtain the regression equations of Y on X and X on Y from the data given below 14M

Price	10	12	13	12	16	15
Demand	40	38	43	45	37	43

(OR)

10. Determine the constants a and b by the method of least squares such that $y = a e^{bx}$ fits to the following data and hence find the required curve, also the value of y when X=5 14M

X	2	4	6	8	10
Y	4.077	11.084	30.128	81.897	222.62

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AR13

CODE: 13CE2001 **SET 2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

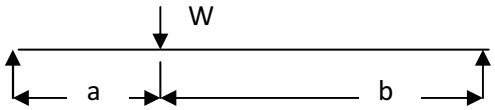
II B.Tech I Semester Supplementary Examinations, October-2017
STRENGTH OF MATERILAS-1
(Civil Engineering)

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

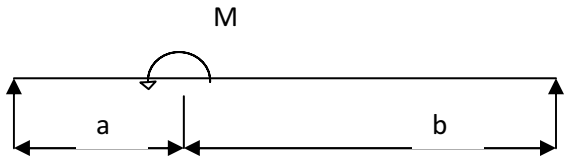
PART –A

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

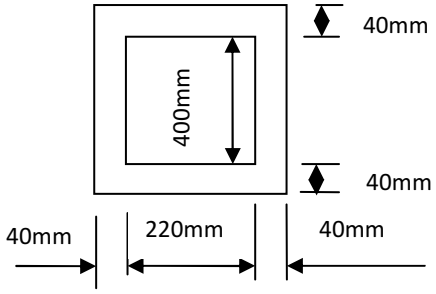
1. (a) Define normal stress and shearing stress.
   (b) Draw the stress-strain diagram of steel.
   (c) Write the relationship between Young's modulus, modulus of rigidity and bulk modulus.
   (d) Draw the shear force and bending moment diagrams for the structure shown below.



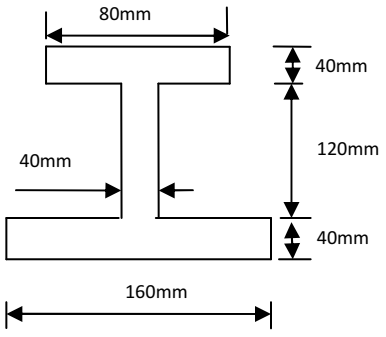
   (e) Draw the shear force and bending moment diagrams for the structure shown below.



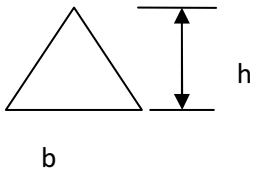
   (f) Find the section modulus of the section shown below.



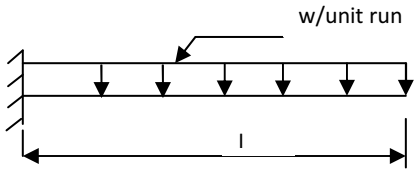
   (g) Find the position in the section where bending stress is zero when subjected to 50kNm moment.



(h) Draw the shape of the shear stress diagram in the section shown in the figure and mark the position of maximum shear stress.



(i) What is the maximum deflection in the structure shown below?



(j) What is the slope at mid length of the following structure?

PART – B

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

UNIT – I

2. a) A bar of steel is of length 'l' and is of uniform thickness 't'. The width of the bar varies uniformly from 'a' at one end to 'b' at the other end. Find the extension of the rod when it carries an axial pull P. **[7M]**

b) A load of 270kN is applied on a short concrete column 250mm x 250mm. The column is reinforced with 8 bars of 16mm diameter. If the modulus of elasticity for steel is 18 times that of concrete, find the stresses in concrete and steel. If the stress in concrete shall not exceed 4 N/mm^2, find the area of steel required so that the column may support a load of 400kN. **[5M]**

(OR)

3. a) A steel block 360mm x 80mm x 160mm is subjected to the following forces

i)a tensile force of 1280kN on the 160x80mm faces,

ii) a tensile force of 3456kN on the 360mm x 80mm faces and

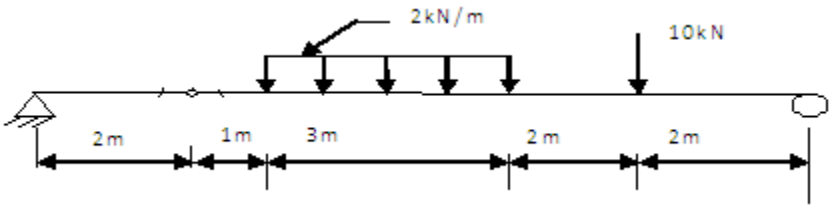
iii) a compressive force of 5184kN on the 160mm x 360mm faces.

Find the changes in the dimensions of the block and also the change in volume. Take $E = 2 \times 10^5 N/mm^2$ and 1/m = 0.25. **[8M]**

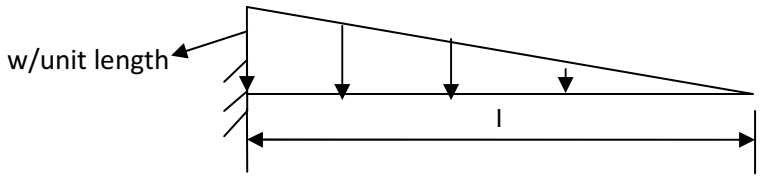
b) A steel tube of 45mm external diameter and 3mm thick encloses centrally a solid copper bar of 30mm diameter. The bar and the tube are rigidly connected together at the ends at a temperature of 30^0C. Find the stress in each metal when heated to 180^0C. Also find the increase in length if the original length of the assembly is 300mm. Coefficients of expansion for steel and copper are $1.08 \times 10^{-5}/^0C$ and $1.7 \times 10^{-5}/^0C$ respectively. $E = 2.1 \times 10^5 N/mm^2$ for steel and $1.1 \times 10^5 N/mm^2$ for copper. **[4M]**

UNIT - II

4.a) Draw the shear force and bending moment diagrams of the beam shown below. [7M]

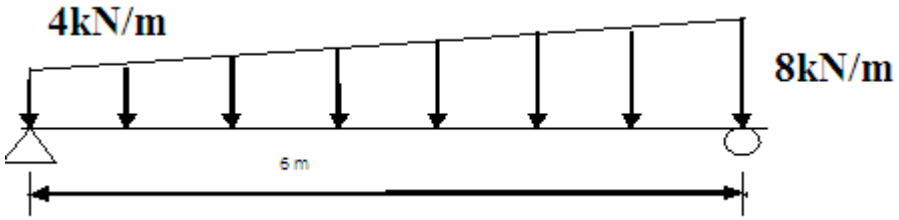


b) Draw shear force and bending moment diagrams for the following structure. [5M]

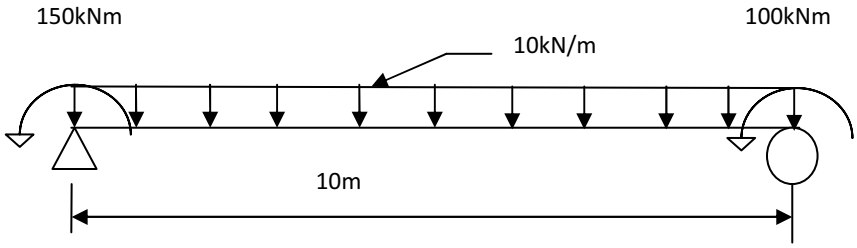


(OR)

5. a) Draw shear force and bending moment diagrams for the following structure. [7M]



b) Draw shear force and bending moment diagrams for the following structure. Find the maximum bending moment and its position. Find the position of contra flexure point. [5M]



UNIT - III

6. a) A simply supported beam spanning over 2m with a overhang of 0.75m from right support is of T section consisting of a top flange 150mm x 20mm and a web 20mm wide and 80mm deep. If the tensile and compressive stresses are not to exceed 40 N/mm^2 and 70N/mm^2 respectively find the safe concentrated load W that can be applied at the right end of the overhang. [6M]

b) Write the assumptions made while deriving flexure formula as per pure bending theory [6M]

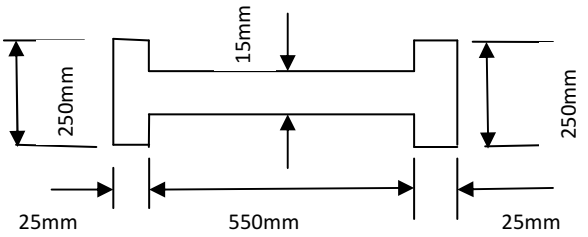
(OR)

7. a) The moment of inertia of a beam section 500mm deep is 69.49 x 10^7mm^4. Find the longest span over which a beam of this section, when simply supported, could carry a uniformly distributed load of 50kN per meter run. The flexural stress in the material is not to exceed 110N/mm^2. **[7M]**

   b) Find the maximum bending stress in a beam of rectangular cross section spanning over 5m with UDL of 5kN/m. The cross section has a width of 100mm and a depth of 150mm. **[5M]**

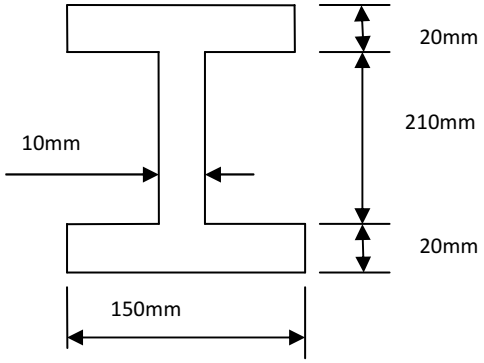
UNIT-IV

8. Draw the shear stress distribution in the H - section shown below when subjected to 500kN shear force. **[12M]**



(OR)

9. Draw the shear stress diagram in the I - section shown below when subjected to a shear force of 250kN. **[12M]**

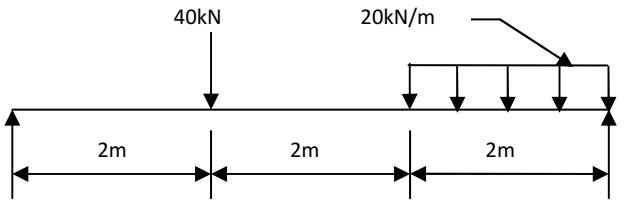


UNIT – V

10. A simply supported beam of 6m span is subjected to a concentrated load of 18kN at 4m from the left support. Calculate
    i) the position and the value of maximum deflection
    ii) slope at mid span
    iii) deflection at the load point **[12M]**

(OR)

11. Find the maximum deflection and the maximum slope for the beam loaded as shown in figure below. **[12M]**



AR13

CODE: 13EE2005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, October-2017

ELECTRICAL MACHINES-I
(Electrical & Electronics Engineering)

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

PART-A

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

1. a) What is function of commutator in DC Machine?
   b) Define the term critical field resistance?
   c) What are the conditions for parallel operation of DC Generators?
   d) How to minimize the iron loss in DC Machine?
   e) Define field energy.
   f) State the energy balance equation in the energy conversion process.
   g) What are fringing fields?
   h) How do you minimize iron losses in a D.C Machine?
   i) Why a series resistance is added with no-voltage release in a four point starter?
   j) What is the important precaution is to be taken while conducting HOPKINSON's test?

PART-B

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

UNIT-I

2. a Show that the torque developed in a doubly excited magnetic system is equal to the rate of increase of field energy with respective to the displacement at constant currents. **5M**

   b Two coupled coils have self and mutual inductance of $L_{11}=2+0.5x, L_{22}=1+1/2x, L_{12}=L_{21}=1/2x$ over excitation range of linear displacement 'x'. The first coil is excited by a constant current of linear displacement 'x'. The first coil is excited by a constant current of 20A and second by the constant current of 10A.Find i)Mechanical work done if 'x' changes from 0.5 to 1mm ii)Energy supplied for the above change. **7M**

(OR)

3. a Derive the EMF equation of D.C Generator from the first principles. **5M**

   b A 4pole D.C Shunt generator with shunt field resistance of 100 Ωand armature resistance of 1 Ω has 378 wave connected conductors in its armature flux/pole is 0.02wb.If the load resistance of 10 Ω is connected across the armature and generator is driven at 1000RPM.Calculate power absorbed by the load. **7M**

UNIT-II

4. a Derive expressions for De-magnetising, cross magnetising ampere turns/pole. **5M**

   b A 4-pole wave-wound motor armature has 880 conductors and delivers 120A. The brushes have been displaced through 3 angular degrees from the geometrical axis. Calculate (i) demagnetising amp-turns/pole (ii) cross-magnetising amp-turns/pole (iii) the additional field current for neutralizing the demagnetisation of the field winding has 1100 turns/pole. **7M**

(OR)

5.	a	Write short notes on effect of armature reaction.	**6M**
	b	What are the improving methods of commutation?	**6M**

UNIT-III

6.	a	Explain the necessity of parallel operation and state the conditions to be fulfilled for parallel operation.	**4M**
	b	Two shunt generators with straight line characteristics are operated in parallel their no load voltages being 240V and 245V respectively. The rating of above generators are 500KW at 230V and 250KW at 220V.If the total load supplied is 650KW.Calculate i)the terminal voltage and ii)Power supplied by each machine in KW.	**8M**

(OR)

7.	a)	Explain open circuit characteristics for DC shunt generator and also explain how will you find critical resistance and critical speed from it .	**7M**
	b)	Explain internal and external characteristics for DC series generator	**5M**

UNIT-IV

8.	a	Derive torque equation of a D.C motor from first principles.	**5M**
	b	A 6KW ,230V,4pole wave connected D.C motor has an efficiency of 80% and 400 armature conductors. A full load, the usefull flux/pole is 0.02wb and rotational losses are 100w.Find the full load speed and also shaft torque.	**7M**

(OR)

9.	a	Compare the Speed-Current, Torque-Current and Speed-Torque characteristics of a D.C shunt and series motors.	**6M**
	b	A 230V shunt motor has an R_a =0.15 Ω and R_{sh} = 250 Ω.The motor draws 50A at 800rpm.Find the resistance to be added to the field circuit to increase the speed to1000 rpm at an armature current of 80A.Assume flux proportional to the field current.	**6M**

UNIT-V

10.		Explain Hopkinson's test in detail with the help of neat circuit .In the above test the following are the readings obtained. Line voltage 230V, line current excluding field currents 50A.Motor armature current 380A.Field currents are 5A&4.2A.Calculate the efficiency of each machine. The armature resistance of each machine is0.02Ω.	**12M**

(OR)

11.	a	Explain the Swinburne's test to determine efficiency of D.C machine and what the limitations of the test are.	**6M**
	b	In a brake test on D.C shunt motor the load on one side of the brake drum was3Kgs and the other side is 5Kgs.The motor was running at a speed of 1350rpm.Input current is70A at 420VD.C.The pulley diameter is 1mt.Determine the torque, output power and efficiency.	**6M**

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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-2017

MECHANICS OF SOLIDS
(Mechanical Engineering)

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

PART – A

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

1. a) Define Poisson's ratio.
   b) State the relationship between the principal stresses and maximum shear stress?
   c) What is the maximum bending moment in a cantilever beam of span 'L' carrying a UDL of intensity 'q' per unit length?
   d) What is point of contraflexure? How many points of contraflexure will normally be there in a doubly overhanging beam?
   e) Write the flexural formula and name all the terms.
   f) Sketch the variation of bending stress and shear stress distribution across the depth of a rectangular section beam.
   g) What is Macaulay's method?
   h) Why moment area method is more useful, when compared with double integration in determining the deflections of beams?
   i) What are the limitations of thin cylinders?
   j) State Lame's equations.

PART – B

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

UNIT – I

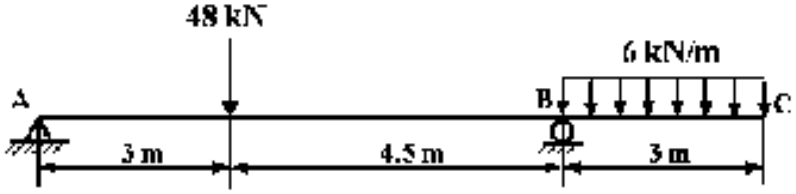
2. a) Explain with neat sketch the stress-strain diagram for a mild steel specimen subjected to tensile force and indicate salient points. [6M]
   b) Derive an expression for the elongation of a tapered bar of length 'L' whose diameter varies uniformly from 'd_1' at one end to 'd_2' at the other end when subjected to an axial pull of 'P'. [6M]

(OR)

3. At a point in a strained material, there are normal stresses of 50 MPa (compressive) and 10 MPa (tensile) at right angles to each other with a shear stress 40 MPa (negative). Determine i) the stresses acting on an element rotated through an angle $\theta=45°$ and ii) the principal stresses, maximum shear stress and the planes on which they act. [12M]

UNIT-II

4. An overhanging beam ABC supported at A and B and it overhangs from B to C and is loaded as shown in Fig. Draw the shear force and bending moment diagrams. [12M]



(OR)

5. A beam 10 m long and simply supported at each end, has a uniformly distributed load of 1000 N/m extending from the left end upto the centre of the beam. There is also an anti-clockwise couple of 15 kN-m at a distance of 2.5 m from the right end. Draw the SF and BM diagrams. [12M]

UNIT-III

6. a) What do you mean by section modulus? Find the expression for section modulus for rectangular, circular and hollow circular sections in usual notation. [6M]
   b) A rectangular beam 300 mm deep is simply supported over a span of 4 m. What uniformly distributed load per meter, the beam may carry, if the bending stress is not to exceed 120 N/mm^2? Take $I = 8 \times 10^6 mm^4$. [6M]

(OR)

7. Draw the shear stress distribution across T-section consisting of a flange 200 mm x 20 mm and web 380 mm x 20 mm, when subjected a flexural shear force of 100 kN. [12M]

UNIT-IV

8. a) Derive the basic differential equation of the deflection curve. [6M]
   b) Obtain the deflection equation for a cantilever of length L causing a distributed load whose intensity varies from zero at the free end to 'q' per unit length at the fixed end by using double integration method. Also determine deflection and slope at the free end. [6M]

(OR)

9. A simply supported prismatic beam AB of length 'L' carries a concentrated load 'P' at a distance 'a' from left support and 'b' from right support. Determine the angles of rotation θ_a and θ_b at supports, the maximum deflection and the deflection at the centre of the beam. [12M]

UNIT-V

10. a) Derive the expressions for the hoop stress and longitudinal stress in case of thin cylindrical pressure vessel subjected to fluid pressure 'p'. [6M]
    b) A boiler shell is to be made of 15 mm thick plate having tensile stress of 120 MPa. If the efficiencies of the longitudinal and circumferential joints are 70% and 30% respectively, determine i) maximum permissible diameter of the shell for an internal pressure of 2 MPa and ii) permissible intensity of internal pressure when the shell diameter is 1.5m. [6M]

(OR)

11. A steel cylinder of 50 cm outer and 30 cm inner diameters is shrunk on a hollow cylinder of external diameter 30 cm and 25 cm inner diameter. The shrinkage pressure being 70 MPa. The compound tube is then subjected to internal fluid pressure of 125 MPa. Determine the final stresses developed in the compound cylinder and sketch the distribution of circumferential stress and radial stress across the section. [12M]

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AR13

CODE: 13EC2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, October-2017
SIGNALS AND SYSTEMS
(Electronics and Communication Engineering)

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

PART-A

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

1. a) Define discrete time unit step and unit impulse functions.
   b) Define energy and power signal.
   c) What is an anti–aliasing filter?
   d) Define Nyquist's rate.
   e) State convolution property of Fourier transform.
   f) What is Z-Transform of $\delta(n+k)$?
   g) What is the condition for a LTI system to be stable.
   h) State the time scaling property of Laplace transform.
   i) State initial value theorem of Z- transform.
   j) What are the Dirichlet's conditions of Fourier series?

PART-B

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

UNIT-I

2. **a** Prove that the complex exponential signals are orthogonal function $x(t)=e^{jn\omega t}$ and $y(t)=e^{jm\omega t}$ let the interval be(t_0, t_0+T) **9**

   b Sketch the following signals $f(t) = 3u(t)+tu(t)-(t-1)u(t-1)-5u(t-2)$ **3**

(OR)

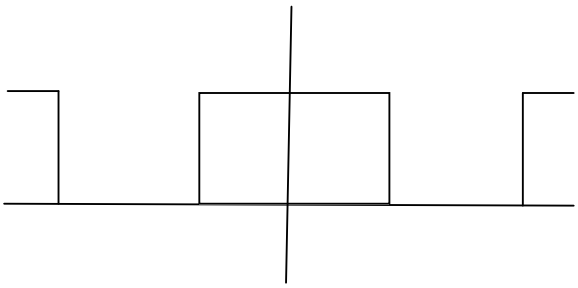
3. A rectangular function is defined as **12**

$$f(t) = \begin{cases} 1, & 0 < t < \pi \\ -1, & \pi < t < 2\pi \end{cases}$$

Approximate the above function by a single sinusoid sint between the intervals $(0,2\pi)$, Apply the mean square error in this approximation.

UNIT-II

4. Obtain the trigonometric fourier series for periodic rectangular wave form as shown below for time interval (-T/4,T/4). **12**



(OR)

5. Find the fourier transform of the following **12**

a) Real exponential, $x(t) = e^{-at} u(t)$, $a>0$

b) Rectangular pulse $x(t) = 1 \quad -T \leq t \leq T$
$0 \quad |t| > T$

c) $x(t)= e^{at} u(-t)$, $a>0$

UNIT-III

6. a Explain about distortion less transmission through a system. **6**
b Write short note on signal bandwidth, system bandwidth. **6**

(OR)

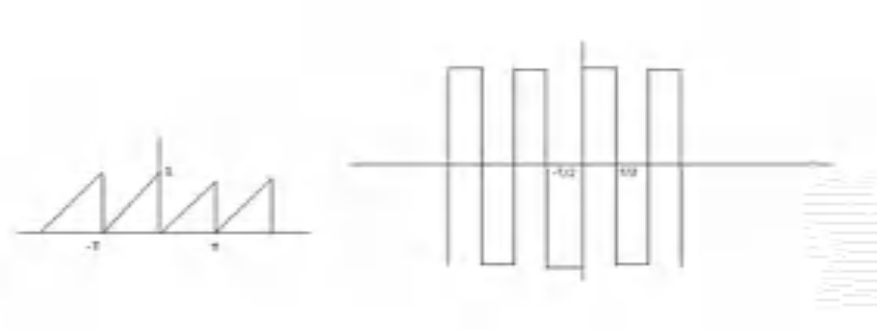
7. a Explain briefly about Filter characteristics of linear systems. **6**
b Explain how input, output signals are related to impulse response of LTI System? **6**

UNIT-IV

8. a State Sampling theorem also Explain the types of sampling techniques. **6**
b Determine the convolution of two functions $x(t) = a\, e^{-at}$; $y(t) = u(t)$. **6**

(OR)

9. **a** Find out the cross correlation function of the following two periodic waveforms. **9**



b Write the properties of correlation. **3**

UNIT-V

10. Find the Z-transform of the following sequences **12**

$x[n]=a^{-n} u[-n-1]$ b) $x[n]=u[-n]$ c) $x[n]= -a^{n} u[-n-1]$

(OR)

11. **a** Determine the time function x(t) for each of the following Laplace transforms **9**

a) $1/(s+1)^2$ $Re\{s\}>0$ b) $s/(s+1)^2$ $Re\{s\}<0$ c) $s+1/(s+1)^2+9$ $Re\{s\}<-1$

b Write short note on Properties of ROC of Laplace transforms **3**

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AR13

CODE: 13BS2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, October-2017

PROBABILITY AND STATISTICS
(Common to CSE and IT)

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

PART-A

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

1. a) State Multiplication theorem of Probability
   b) What is the mean of the probability distribution given by f(x)=1/n for x=1,2,3…n
   c) If the mean and variance of a binomial distribution are 4 and 4/3 the what is the probability of success
   d) Give the relation among mean, median and mode of normal distribution
   e) What is the test statistic to test a statement on the mean of a normal population if sample drawn is of size 10 and with sample mean x, standard deviation is 's'
   f) State when the one-way ANOVA is used.
   g) What are the limits of correlation coefficient and what the extreme values indicate
   h) What does the 'p' chart and 'np' charts represent
   i) What is balking and reneging
   j) What is the traffic intensity if the inter arrival time is 15 min and interservice time is 10 minutes

PART-B

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

UNIT-I

2. a) A class has 10 boys and 5 girls. Three students are selected at random one after the other. Find the probability that (i) First two are boys and the third is girl. (ii) First and third are of same gender and the second is of opposite. 6M
   b) For the continuous probability distribution $f(x)= kx^2e^{-x}$ when x>=0 find i.k, ii. Mean, iii.Variance 6M

(OR)

3. a) A business man goes to hotels X,Y,Z 20%, 50%, 30% of the times respectively. It is known that 5%,4% 8% of the rooms in X,Y,Z hotels have faulty plumbings. What is the probability that business man's room having faulty plumbing is assigned by hotel z. 6M

   b. For the following probability distribution 6M

x	-3	6	9
P(x)	1/6	1/2	1/3

Find i. E(X), ii.$E(X^2)$, iii.$E(2X+1)^2$

UNIT-II

4. a Four coins are tossed 160 times. The number of times x heads occur is given below. 6M

x	0	1	2	3	4
No. Of times	8	34	69	43	6

Fit a Binomial distribution to this data on the hypothesis that they are unbiased.

b A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative. 6M

(OR)

5. A population consists of six numbers 4,8,12,16,20,24 consider all samples of size 2 which can be drawn without replacement from this population. 12M
Find (a). The population mean, (b). The Standard deviation, (c). The mean of the sampling distribution of the means

UNIT-III

6. a A Social worker believes that fewer than 25% of the babies in a certain area have ever used any form of vaccination. A random sample of 120 babies was tested. Twenty of them got vaccinated. Test the belief of the social worker at 0.05%level. 6M

b. The nicotine contents in milligrams in two samples of tobacco were found to be as follows. 6M

SampleA	24	27	26	21	25	-
SampleB	27	30	28	31	22	36

Can it be said that two samples came from same normal population.

(OR)

7. Suppose the National Transportation Safety Board (NTSB) wants to examine the safety of compact cars, midsize cars, and full-size cars. It collects a sample of three for each of the treatments (cars types). Using the hypothetical data provided below, test whether the mean pressure applied to the driver's head during a crash test is equal for each types of car. Use $\alpha = 5\%$. 12M

Compact cars	Midsize cars	Full-size cars
643	469	484
655	427	456
702	525	402

Use one way ANOVA to test whether there is any significant variation in population means.

AR13

CODE: 13BS2006 **SET-1**

UNIT-IV

8. a Fit a linear regression line for the data and find the value of sales at x=3.57 8M

Week	Space(x)	Sales (y)
1	6	526
2	3	421
3	6	581
4	9	630
5	3	412
6	9	560
7	6	434
8	3	443
9	9	590
10	6	570
11	3	346
12	9	672

b Explain the importance of p-chart with an example with a sample data 4M

(OR)

9. a Ten participants in a contest are ranked by three judges as follows: 7M

x	1	6	5	10	3	2	4	9	7	8
y	3	5	8	4	7	10	2	1	6	9
z	6	4	9	8	1	2	3	10	5	7

Find which pair of judges has common approach.

b Explain the importance of x-bar, R charts with suitable examples with a sample data 5M

UNIT-V

10. a A self service canteen employees one cashier at its counter. 8 customers arrive per every 10 minutes on an average. The cashier can serve on average one per minute. Assuming that the arrivals are Poisson and the service time distribution is exponential, determine: i. The average number of customers in the system, ii. The average queue length, iii. The average time the customer spends in the system, iv. Average waiting time of each customer. 6M

b Explain the parameters that describe the queuing system 6M

(OR)

11. a A toll gate is operated on a freeway where cars arrive according to a poisson distribution with mean frequency of 1.2 cars per minute. The time of completing payment follows an exponential distribution with mean of 20 seconds. Find i. The idle time of the counter, ii. Average number of cars in the system, iii. Average number of cars in the queue, iv. Average time that a car spends in the system, v. average time that a car spends in the queue, vi. The probability that a car spends more than 30 seconds in the system. 8M

b Explain what is queuing problem 4M

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