AR13 **Set 02**

Code: 13CE2001

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

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

STRENGTH OF MATERIALS-I

(Civil Engineering)

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

PART – A

Answer all Questions [10X1=10M]

1. (a) Define working stress and factor of safety.
   (b) Define temperature stress.
   (c) Write the relation between bending moment and shear force.
   (d) Draw the shear force and bending moment diagram for simply supported beam having uniformly distributed load throughout its length.
   (e) Find the section modulus for rectangular section
   (f) Draw the flexural stress distribution along the depth of section Also write the equation for theory of simple bending.
   (g) Write the equation for shear stress distribution.
   (h) Draw the shear stress distribution for rectangular section. Show the maximum value.
   (i) Write the slope and deflection at free end of a cantilever subjected to uniformly distributed load through out its length.
   (j) State first moment of area theorem.

PART – B

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

UNIT - I

2. A bar of ABCD fixed at A and D, is subjected to axial forces as shown in fig.1 Determine the forces in each portion of the bar and displacement of point B & C Take E = 200 GN/m^2 [12M]

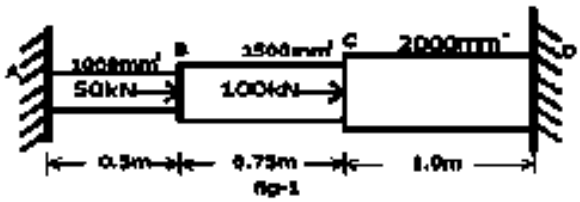


fig-1

(OR)

3) A rectangular block 250 mm x 100 mm x 80 mm is subjected to axial loads as follows. [12M]
480 kN (tensile) in the direction of length
900 kN (tensile) on 250 mm x 100 mm of face
1000 kN (compressive) on 250 mm x 80 mm of faces. Take E = 200 GN/m2 and poissions ratio as 0.25. Find the following

i) Change in the volume of block.

ii) Values of modulus of rigidity and bulk modulus for the material of the block.

UNIT - II

4. Draw shear force and bending moment diagram for the beam shown in fig.2 [12M]

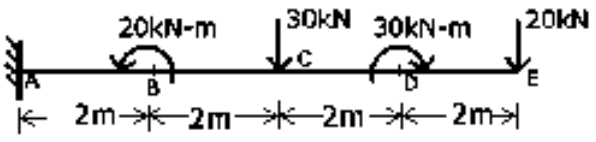


fig-2

(OR)

5 Draw shear force and bending moment diagram for the beam shown in fig. 3 [12M]

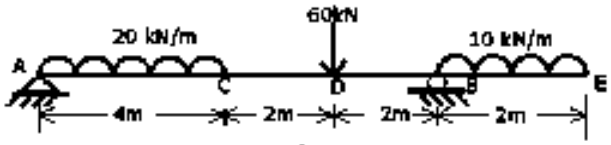


fig-3

UNIT - III

6. Determine the minimum width 'b' of the rectangular beam shown in fig. 4. The flexural stress is not exceeding 10 MPa. [12M]

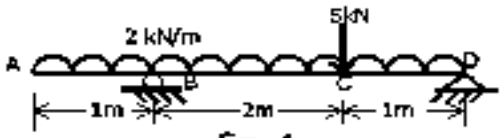


fig-4

(OR)

7. A cast iron beam of I section shown in fig. 5. The beam is simply supported on a span of 6 m. If tensile stress is not to exceed 20 MPa. Find the safe point load which the beam can carry. Also find the compressive stress. Draw the sketch showing the stress across the section. [12M]

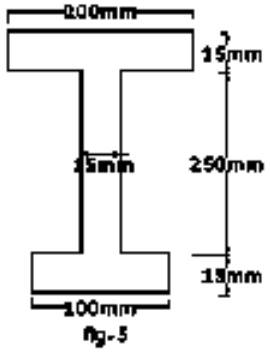


fig-5

UNIT - IV

8. a) Derive an expression for shear stress distribution equation $\tau = Fay^{-} / IB$
   b) Derive the shear stress distribution across rectangular section . Sketch the stress distribution and show maximum value. [6M+6M]

(OR)

9. Sketch the shear stress distribution across a square section of side 'a' one of its diagonal is horizontal. Show stresses at significant points. [12M]

UNIT – V

10.a) Derive an expression EI $d^2y/dx^2 = M$
   b) A cantilever 3 m long is loaded with a udl of 15 kN/m over a length of 2m from the fixed end and also carries a point load of 10 kN at free end. Find maximum deflection and slope .
   E = 2.10×10^8 kN/m^2, I= 0.000095 m^4 [6M+6M]

(OR)

11.A beam 4 m long is freely supported at the ends. It carries a concentrated load of 20 kN each at points 1 m from the ends. Calculate the maximum slope and deflection of the beam and slope and deflection under each load by moment of area method. EI = 13000kN-m^2. [12M]

AR13

CODE: 13EC2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, January-2019
ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronics Engineering)

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

PART-A

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

1. a) What is Hall voltage.
   b) Describe Einstein relationship.
   c) What is Mass Action law.
   d) What is transition capacitance?
   e) Express temperature dependence of reverse saturation current.
   f) Define the regulation of a rectifier.
   g) Express input impedance of CE amplifier in h parameters.
   h) What is pinch off voltage?
   i) Define sensitivity.
   j) What is frequency of FET phase shift oscillator?

PART-B

Answer one question from each unit **[5×12=60M]**

UNIT-I

2. a) What is Hall Effect? Explain the phenomenon with the aid of Lorentz force law. 8M
   b) Define the terms mobility and conductivity. Give their dimensions. 4M

(OR)

3. a) Derive volt-ampere characteristic of a *pn* junction diode. Explain the temperature dependence of volt-ampere characteristic of diode. 6M
   b) Give a brief description of dynamic resistance of diode 6M

UNIT-II

4. a) Mention different types of breakdown diodes and give a detailed account of their applications. 6M
   b) Describe the special features of tunnel diode? Explain how it is able to provide dynamic negative resistance. 6M

(OR)

5. a) Draw the circuit diagram of a half-wave rectifier circuit. Explain its functioning with the help of neatly drawn sinusoidal waveforms. 6M

b) Calculate (i) peak load current (ii) dc load current (iii) ac load current (iv) percentage regulation from no load to the given load (v) the efficiency of rectification when the diode with an internal resistance of 25Ω is to supply power to a 150Ω load from 110V (rms) source of supply. 6M

UNIT-III

6. a) Sketch the current components in various layers of BJT and explain their origin. 6M

b) Describe the characteristics, input as well as the output, of BJT in CB configuration. 6M

(OR)

7. a) Explain the characteristics of JFET. 6M

b) Using the low frequency model of FET, analyze CS and CD amplifier 6M

UNIT-IV

8. a) Define and differentiate (i) stabilization techniques and (ii) compensation techniques. 6M

b) Draw a circuit that uses a diode compensation for changes in base voltage and collectors reverse saturation current. 6M

(OR)

9. a) Develop small signal equivalent circuits of BJT for all its three configurations using h-parameters. 6M

b) Sketch the h-parameter equivalent circuits of BJT for all its three configurations and write down the conversion relations of h-parameters. 6M

UNIT-V

10. a) Draw the block diagram of a typical feedback amplifier. Name and identify each block stating its function. 6M

b) Give a proof to show that series mixing increases input resistance and shunt mixing reduces it. 6M

(OR)

11 Draw the circuit diagram of BJT RC phase-shift oscillator and obtain an expression for its frequency of oscillation. 12M

AR13

CODE: 13ME2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, January-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 Poisson's ratio.
   b) Define modulus of rigidity.
   c) Name the different types of beams?
   d) What is meant by point of contraflexure?
   e) Define neutral axis of a cross-section.
   f) Define polar moment of inertia.
   g) When Macaulay's method is preferred?
   h) What are the boundary conditions for a fixed end?
   i) Define longitudinal stress.
   j) Write the maximum value of shear stress in thin cylinder.

PART-B

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

U.NIT-I

2. a) A copper rod of 40 mm diameter is surrounded tightly by a cast-iron tube of 80 mm external diameter, the ends being firmly fastened together. When put to a compressive load of 30 kN, what load will be shared by each? Also determine the amount by which the compound bar shortens if it is 2 m long. Take $E_{Cast\ Iron}$ = 175 GN/m^2 and E_{Copper} = 75 GN/m^2
   b) Derive the relation between Modulus of elasticity and Bulk Modulus.

(OR)

3. a) A Steel rod 15 m long is at a temperature of 15^{0}C. Find the free expansion of the length when the temperature is raised to 65^{O}C. Find the temperature stress produced when: (i) The expansion of the rod is prevented; (ii) The rod is permitted to expand by 6 mm. Take: α = 12 x 10^{-6} per^{0}C and E = 200 GN/m^2

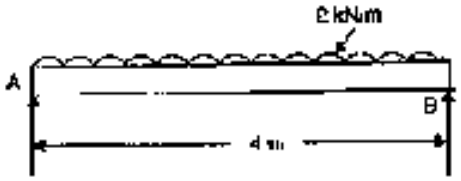
   b) At a point in a stressed body the principal stresses are 100 MN/m^2 (tensile) and 60 MN/m^2 (compressive). Determine the normal stress and the shear stress on a plane inclined at 50^O to the axis of major principal stress. Also calculate the maximum shear stress at the point.

UNIT-II

4. A beam AB 10 m long has supports at its end A and B. It carries a point load of 2.5 kN at 3m from A and a point load of 2.5 kN at 7 m from A and a uniformly distributed load of 0.5 kN/m between point loads. Draw the shear force and bending moment diagram for the beam. And also locate the maximum bending moment on beam.

(OR)

5. Draw the shear force and bending moment diagrams for the beam carrying uniformly distributed load of 2 kN/m over the entire length as shown in fig. Locate the point of contraflexure.



UNIT-III

6. Two wooden planks 150 mm X 50 mm each are connected to form a T-section of a beam. If a moment of 3.4 kN-m is applied around the horizontal neutral axis, inducing tension below the neutral axis, find the stresses at the extreme fibres of the cross-section. Also calculate the total tensile force on the cross-section.

(OR)

7. Explain the term torsion and derive the torsion equation for a solid shaft with usual notation indicating clearly the assumptions made.

UNIT-IV

8. Derive the expressions for the slope and deflection of a simply supported beam carrying uniformly distributed load 'w' over the whole length L.

(OR)

9. A beam of length 6 m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1m and 3m respectively from the left support. Find (a) deflection under each load (b) max deflection (c) the point at which max deflection occurs.

UNIT-V

10. Derive the expressions for hoop stress and longitudinal stress in thin cylindrical shell subjected to internal fluid pressure.

(OR)

11. Determine the maximum & minimum hoop stress across the section of pipe of 400 mm internal diameter and 100 mm thickness. When the pipe contains fluid at pressure of 8 N/mm^2. Sketch the radial stress and hoop stress distribution across the section.

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AR13

CODE: 13EC2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

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

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 Linear System
   b) Draw unit impulse signal
   c) What are Dirichlet's conditions?
   d) Write Linearity property of Fourier transform
   e) Define Signal Bandwidth
   f) What is Paley- Wiener criterion?
   g) Define Nyquist rate.
   h) What is the relation between convolution and correlation?
   i) Define ROC of Laplace transform
   j) What is the Z transform of signal x(n)= {1,2,3}?

PART-B

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

UNIT-I

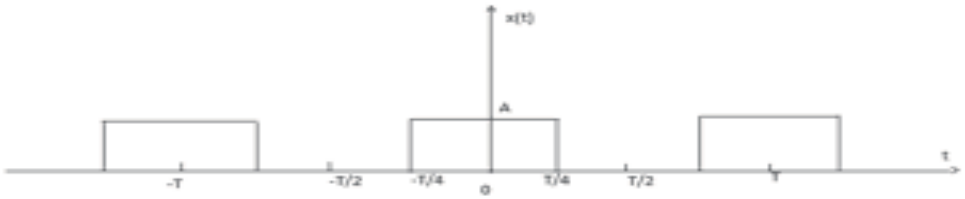
2. a) Explain the following Signals (i)Energy signal and Power signals (ii) Even and Odd Signals 6M
   b) Find whether the following signals are periodic or not.
   (i) $x(t) = 2\cos(10t+1) - \sin(4t-1)$ (ii) $2u(t)+2\sin 2t$ 6M

(OR)

3. a) Explain how a function can be approximated by a set of mutually orthogonal functions. 6M
   b) A rectangular function f(t) is defined by
   $f(t) = 1 ; 0 < t < \pi$ 6M
   $= -1; \pi < t < 2\pi$
   Approximate this function by a waveform sint over the interval $[0, 2\pi]$ such that mean square error is minimum.

UNIT-II

4. a) Explain trigonometric and exponential Fourier series. 6M
   b) Find trigonometric Fourier series for the signal shown below. 6M



(OR)

5. a) Derive the Fourier Transform from Fourier series. 6M
   b) Find the Fourier Transform of the following signals (i) $e^{-2t}u(t)$ 6M
   (ii) e^{-2t} cos 5t u(t)

UNIT-III

6. a) Explain filter characteristics of an LTI system. 6M
   b) Check whether the following systems are linear or not 6M

   a) $\frac{d^2y(t)}{dt^2} + 2ty(t) = t^2x(t)$ b) $y(t) = x(t^2)$

(OR)

7. a) Discuss distortion less transmission through a system and System Bandwidth 6M
   b) For a causal LTI system with frequency response H(ω)=$\frac{1}{4+j\omega}$. 6M
   For a particular input x(t) it is observed that the output is $y(t) = (e^{-2t} - e^{-4t})u(t)$. Find its input x(t).

UNIT-IV

8. a) Discuss cross correlation and autocorrelation of signals 6M
   b) A filter has an input x (t) =$e^{-t}\,u(t)$ and its impulse response 6M
   h(t)= $e^{-3t}\,u(t)$.Find the energy spectral density of the output

(OR)

9. a) Explain Sampling theorem 8M
   b) Discuss Flat top sampling 4M

UNIT-V

10. a) Explain any three properties of Laplace transform 6M
    b) Find the inverse Laplace transform of X(s) = $\frac{3}{(s+1)(s+4)}$ 6M

(OR)

11. a) Derive the relation between Laplace transform and Fourier transform 6M
    b) Explain z transform and its ROC 6M

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AR13

CODE: 13BS2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

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

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) Define Conditional Probability
   b) Define a random variable
   c) Write the probability density function of Exponential distribution
   d) Write any three properties of Normal distribution
   e) Define Type-I error
   f) Define Null hypothesis
   g) State the principle of least squares.
   h) Define correlation coefficient.
   i) Define a queue
   j) What is pure birth process

PART-B

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

UNIT-I

2. a) The odds that a book will be favorably reviewed by three independent critics are 5 to 2, 4 to 3 and 3 to 4 respectively. What is the probability that, of three reviews, a majority will be favorable?. 6M
   b) In a factory which manufactures bolts, machines A,B and C manufacture respectively 25%, 35% and 40% of the bolts. Of their output 5,4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability it is manufactured by machine A 6M

(OR)

3. a) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is 1/7 and that of wife's selection is 1/5. What is the probability that 6M
   i) only one of them will be selected and
   ii) none of them will be selected.

   b) A random variable X has the following probability function: 6M

X	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

   i) Find k
   ii) Evaluate $P(X<6)$, $P(X\geq 6)$, $P(3<X\leq 6)$
   iii) Find the minimum value of x so that $P(X\leq x)>1/2$.

UNIT-II

4. a) The probability that a pen manufactured by a company will be defective is 0.1. If 12 such pens are manufactured , find the probability that 6M
   i) exactly two will be defective
   ii) at least two will be defective
   iii) none will be defective

   b) If X is a normal variate with mean 30 and standard deviation. Then find 6M

   i)) $P(26\leq X\leq 40)$ ii) $P(X\geq 45)$ iii) $P(|X-30|>5)$

(OR)

5. a) Assume that the probability of a coal miner being killed in a mine accident during an year is 1/2400. Use Poisson distribution to calculate the probability that in a mine employing 200 miners there will be at least one fatal accident in a year. 6M

   b) A population consists of five numbers 3,6,9,15 and 27. Consider all distinct samples of size two, with replacement. Find 6M
   i) The Population mean
   ii) The Population standard deviation
   iii) The sampling distribution of means
   iv) Mean of the sampling distribution of means
   v) Standard deviation of the sampling distribution of means

UNIT-III

6. a) Ten individuals are chosen from a normal population and their heights (in inches) are 63,63,66,67,68,69,70,70,71 and 71. Test whether the sample comes from a normal population whose mean height is 66 inches at 0.05 level of significance? 6M

   b) Two independent random samples of 8 and 7 items respectively have the values: 6M

Test								
	Sample 1:	9	11	13	11	15	9	12	14
	Sample 2:	10	12	10	14	9	8	10	

   whether the difference between the variances is significant at 0.01 level of significance?

(OR)

7. Suppose 3 drying formulae for curing a glue are studied and the following times are observed. Carry out ANOVA one-way classification at 0.05 level of significance. 12M

Formula A:	13	10	8	11	8	
Formula B:	13	11	14	14		
Formula C:	4	1	3	4	2	4

UNIT-IV

8. a) Fit a straight line to the given data: 6M

X	1	2	3	4	6	8
Y	2.4	3	3.6	4	5	6

   b) You are given the values of sample means and the sample ranges for 10 samples of size 5 each. Construct Mean and Range chart and comment on the process. 6M

$\bar{x}$	43	49	37	44	45	37	51	46	43	47
R	5	6	5	7	7	4	8	6	4	6

(OR)

9. Find the regression lines to the given data: 12M

X	16	21	26	23	28	24	17	22	21
Y	33	38	50	39	52	47	35	43	41

UNIT-V

10. a) At a Public telephone booth arrivals are considered to be Poisson with an average inter arrival time of 10 mins. The length of a phone call may be treated as service, assumed to be distributed exponentially with mean = 2.5 mins. Calculate 6M
    i) Average number of customers in the booth.
    ii) Probability that a fresh arrival will have to wait for a phone call.
    iii) Probability that a customer completes the phone call in less than 10 mins.

    b) Assume that the trucks with goods are coming in a market yard at the rate of 30 trucks per day and suppose that the inter-arrival times follows an exponential distribution. The time to unload the trucks is assumed to be exponential with an average of 42 minutes. If the market yard can admit 10 trucks at a time, Calculate the probability that the yard is empty. 6M

(OR)

11. a) At a one-man barber shop, customers arrive according to the Poisson distribution with a mean arrival rate of 4 per hour and his hair cutting time was exponentially distributed with an average hair-cut taking 12 minutes. There is no restriction in queue length. Calculate 6M
    i) Expected time in minutes that a customer has to spend in the queue.
    ii) Fluctuations of the queue length.
    iii) Probability that there is atleast 5 customers in the system.

    b) Cars arrive in a pollution testing centre according to Poisson distribution at an average rate of 15 cars per hour. The testing center can accommodate at maximum 15 cars. The service time per car is an exponential distribution with mean rate 10 per hour. 6M
    i) Find the effective arrival rate at the pollution testing centre
    ii) What is the probability that an arriving car has not to wait for testing.