AR16

CODE: 16CE2002 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular & Supplementary Examinations, November-2018

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) A prismatic steel bar with 300mm^2 cross sectional area is subjected to three axial loads of 2000N, 1500N and 2500N as shown in fig. 1, Assuming E= 200GPa, Find the change in length of the bar. Take AB= 1 m, BC= 1m, and CD = 2m. 7 M

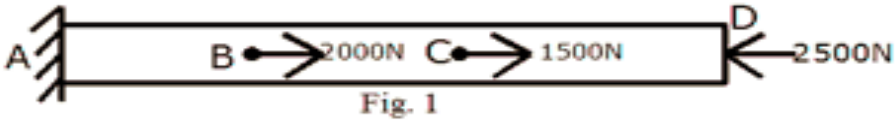

Fig. 1

b) Derive the expression for elongation produced in a bar due to self weight. 7 M

(OR)

2. a) Define temperature stress. Derive expression for temperature stress developed in a bar due to , when the expansion is prevented, when the expansion is allowed as 'δ' 5M

b) A gun metal rod 22mm diameter screwed at the ends passes through a steel tube 25mm and 30mm internal and external diameters. The temperature of whole assembly is raised to 116^{0}C and the nuts on the rod are then screwed lightly on the ends of the tube. Find the intensity of stress in the rod and tube, when the common temperature has fallen to 16^{0}C, αs = 12 x 10^{-6} per^{0}C, αg = 12 x 10^{-6} per^{0}C, Es = 2.10 x 10^{5}N/mm^2, Eg = 0.94 x 10^{5}N/mm^2. 9 M

UNIT-II

3. Draw the shear force and bending moment diagrams for the beam shown in fig. 2. Show the values at significant points.

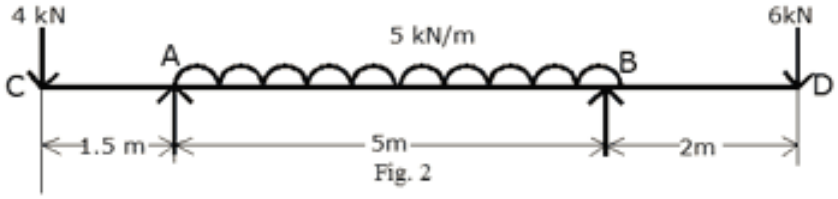

Fig. 2

14 M

(OR)

4 Draw the shear force and bending moment diagrams for the beam shown in fig. 3. Show the values at significant points. 14 M

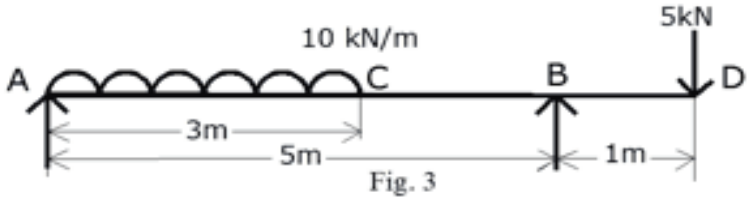

Fig. 3

UNIT-III

5. a) Define section modulus. Find the section modulus for rectangular section 4 M
   b) Write assumptions in theory of simple bending. Derive the expression $M/I = \sigma/y = E/R$ 10 M

(OR)

6. a) A cast iron beam section in of I section with top flange 80mm x 20 mm thick, bottom flange 160mm x 40mm thick and web 200mm deep and 20mm thick. The beam is freely supported one span of 5 meters. If the tensile stress is not to exceed 20 N/mm^2. Find the safe uniformly distributed load, which the beam can carry. Find also the maximum compressive stress. 14 M

UNIT-IV

7. Determine the shear stress at significant points of a I section having flanges 120mm x 20mm and web 20mm x160 mm having a shear force 200kN. Draw the shear stress distribution diagram. Also find the percentage of shear force taken by web. 14 M

(OR)

8. a) Draw the shear stress distribution across a rectangular section show maximum value. 6 M
   b) A laminated wooden beam 100 mm wide 150mm deep is made of three 50mm x 100mm planks glued together to resist longitudinal shear. The beam is simply supported over a span of 2m. If the allowable shearing stress in the glued joints is 0.4 N/mm^2, find the safe concentrated load that the beam may carry at its centre. 8 M

UNIT-V

9. a) Write assumptions in deriving torsion equation. 4M
   b) A solid shaft 180mm diameter is to be replaced by a hollow steel shaft, whose internal diameter is 60% of external diameter. Determine the internal and external diameters and saving in the materials. The value of maximum shear stress may be as same for both the shafts. 10 M

(OR)

10. b) A hollow steel shaft 200mm external diameter and 150mm internal diameters transmits 735kw at a speed of 100 rpm. Calculate the shearing stresses at the inner and outer surfaces of the shaft and strain stored in the material per meter length. Take $C = 80\ GN/m^2$. 14 M

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AR16

CODE: 16EC2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular & Supplementary Examinations, November-2018

ELECTRONIC DEVICES AND CIRCUITS

(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 PN junction diode in forward and reverse bias mode.	6M
	b)	Which diode has highest impurity concentration tunnel diode and explain its working with the help of energy band diagrams for different biasing conditions.	8M
		(OR)	
2.	a)	Analyze full-wave rectifier circuits (without filter) to deduce the values of rectification efficiency.	8M
	b)	A half-wave rectifier has a peak output voltage of 12.2 V at 50 Hz and feeds a resistive load of 100 Ω. Determine the value of triple factor for shunt capacitor.	6M

UNIT-II

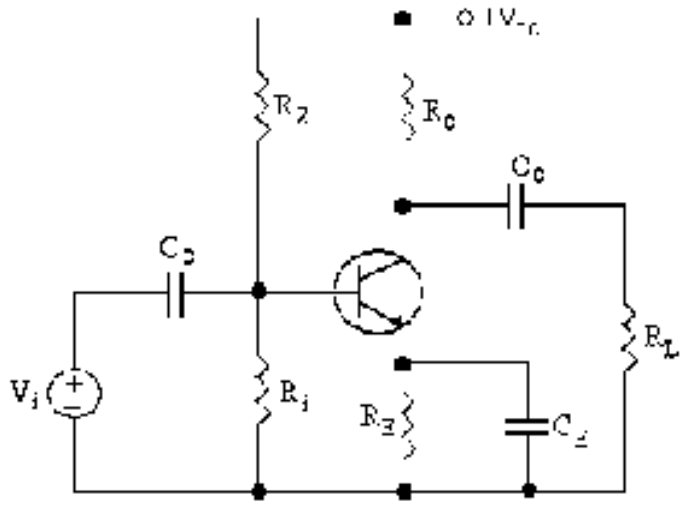
3.		Draw a figure to show the output V-I characteristic curves of a BJT in CE configuration. Indicate thereon, the saturation, active and cut off regions. Explain how, using these characteristics, one can determine the value of h_{fe} or β_F.	14M
		(OR)	
4.	a)	Illustrate the structure of an N-channel E-MOSFET with neat sketches. Explain its operation under cut-off, non-saturation, and saturation region using appropriate curves.	8M
	b)	Draw the symbol and characteristics of an N-channel JFET and mark linear region, saturation region and breakdown region.	6M

UNIT-III

5.	a)	Derive the expression for operating point (I_C , V_{CE}) of fixed-bias circuit using BJT.	7M
	b)	How many factors can cause the bias point to drift from the designed point of operation? Determine the stability factor $S(I_{CO})$ for fixed bias circuit.	7M
		(OR)	
6.	a)	Derive the expression for operating point (I_C , V_{CE}) of collector to base bias circuit using BJT.	7M
	b)	Explain about thermal runaway and thermal stability.	7M

UNIT-IV

7. a) Draw a small signal h-parameter equivalent circuit for the CE amplifier shown in figure below. 8M



Find an expression for voltage gain of the amplifier. Compute the value of voltage gain, if $R_C = R_L = 800\ \Omega$, $R_1 = 1.5\ k\Omega$, $R_2 = 3\ k\ \Omega$, $h_{re} = 0$, $h_{oe} = 100\ \mu S$, $h_{fe} = 90$ and $h_{ie} = 150\ \Omega$.

b) Compare CE,CB and CC transistor configurations in terms of A_V , A_I , R_i ,R_O. 6M

(OR)

8. a) Derive the voltage gain, current gain, input resistance and output resistance expressions of the common collector amplifier using approximate h-parameter model. 8M

b) Derive the expression for current gain and voltage gain of common base amplifier using exact h-parameter model. 6M

UNIT-V

9. a) i) Show that in an amplifier, the gain reduces if negative feedback is employed. 6M

b) Derive an expression for input impedance and output impedance of current-series feedback amplifier. 8M

(OR)

10. Derive and explain the Wien bridge oscillator using BJT. Show that the gain of the amplifier. 14M

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AR16

CODE: 16ME2005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular & Supplementary Examinations, November-2018

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

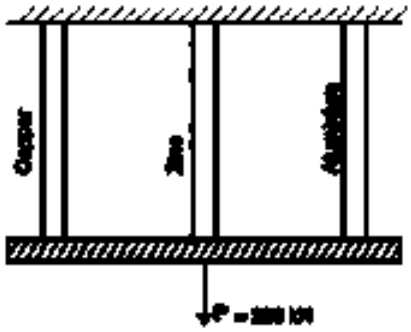
UNIT-I

1. a) Draw a stress - strain diagram for mild steel under tension, describing briefly the salient points. (6M)

   b) A tensile test was conducted on a mild steel bar. The following data was obtained from the test:
   Diameter of the steel bar = 20 mm; Gauge length of a bar =150 mm;
   Load at the elastic limit = 200 kN; Extension at a load of 100kN = 0.2 mm;
   Maximum load = 300 kN; Total extension = 50 mm;
   Diameter of the rod at the failure = 12.5 mm;
   Determine i) Young's modulus, ii) Stress at the elastic limit, iii) Ultimate stress, iv) Percentage elongation and v) Percentage decrease in area. (8M)

(OR)

2. Three bars made of Copper, Zinc and Aluminium are of equal length and have cross sectional areas 500 mm^2, 750 mm^2 and 1000 mm^2 respectively. They are rigidly connected at their ends. If this composite bar is subjected to a load of 250 kN as shown in figure, estimate the load carried by each rod and the stress induced in each rod. Take the values of E for Copper =1.3 x 10^5 N/mm^2, E for Zinc = 1 x 10^5 N/mm^2 and E for Aluminium = 0.8 x 10^5 N/mm^2. (14M)



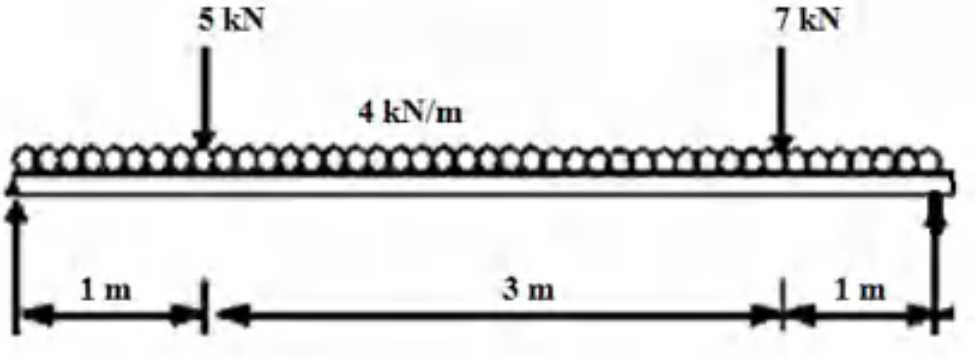
UNIT-II

3. a) Briefly explain the following: (6M)
   i) Principal stresses and principal planes ii) Mohr's circle for plane stress

   b) At a point in a strained material, on plane BC there are normal and shear stresses of 560 N/mm^2 (Tensile) and 140 N/mm^2 respectively. On plane AC, perpendicular to plane BC, there are normal and shear stresses of 280 N/mm^2 (Compressive) and 140 N/mm^2 respectively. Determine (i) principal stresses and location of the planes on which they act (ii) maximum shear stress and the plane on which it acts. (8M)

(OR)

4 Draw the S.F and B.M diagrams for the beam loaded as shown in the figure (14M)



UNIT-III

5. Derive bending equation for a beam subjected to bending moment M and state assumptions. (14M)

(OR)

6. a) Derive the governing equation to find the shear stress in beams. (6M)
   b) A beam of cross section of an isosceles triangle of base width 150 mm and height 450 mm is subjected to a shear force of 30 kN. Determine the position and magnitude of maximum shear stress from the top of the beam. (8M)

UNIT-IV

7. a) Derive torsion equation for a circular shaft subjected to torque and state assumptions. (8M)
   b) A Solid steel shaft transmits 100 kW at 150rpm. Determine the suitable diameter of the shaft if the maximum torque transmitted exceeds the mean 20%. The shear stress is not to exceed 60 MPa. Also find the maximum angle of twist in a length of 4 m of the shaft. Take G = 80 GPa. (6M)

(OR)

8. a) Derive an expression for Euler's critical load when one end of column is fixed and other end is hinged. (8M)
   b) A hollow cylindrical cast iron column is 4m long with both ends fixed. Determine the minimum diameter the column, if it has to carry a safe load of 250 kN with a factor of safety of 5. Take the internal diameter as 0.8 times the external diameter. Take σ_c = 550 MPa and α = 1/1600. (6M)

UNIT-V

9. a) Briefly explain following methods as applicable to deflections of beams (6M)
      i) Macaulay's method ii) Moment area method
   b) Find the angle of rotation and deflection at the free end of a cantilever beam AB of length 'L' subjected to a uniformly distributed load of intensity 'q' acting over a part of length 'a' from fixed end. (8M)

(OR)

10. A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a uniformly distributed load of 7 kN/m over the entire span of 6m. If the modulus of elasticity of the material of the beam is 1 x 10^4 N/mm^2, find the slope at the supports and the maximum deflection. Use moment area method. (14M)

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AR16

CODE: 16EC2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular & Supplementary Examinations, November-2018

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 Prove that the complex exponential functions are orthogonal functions. [8M]

   b Find the power and rms value of signal x(t)=20 cos2ø t. [6 M]

(OR)

2. a Define Mean square error and derive the expression for evaluating Mean square error. [8M]

   b Define and sketch the following elementary continuous time signals. [6 M]

   i) Unit impulse signal ii) Signum function iii) unit step function

UNIT-II

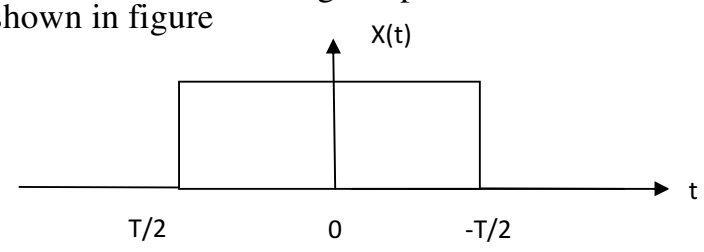
3. a Find the complex exponential Fourier series coefficient of the signal $x(t)=\sin 3\pi t + 2\cos 4\pi t$ [6M]

   b State and prove the following properties of Fourier Transform [8M]
   i) Time shifting ii) Convolution in time domain

(OR)

4. a Explain about complex Fourier spectrum. [7M]

   b Obtain the Fourier transform of Rectangular pulse of duration *T* and amplitude *A* as shown in figure [7M]



UNIT-III

5. a What is Impulse Response? Show that the Response of an LTI system is convolution Integral of its impulse Response with input signal? [7M]

   b State and prove the relationship between rise time and bandwidth. [7M]

(OR)

6. a Explain about distortion less transmission through a system [7M]

   b Explain causality and Poly-Wiener Criterion for physical realization [7M]

UNIT-IV

7. a Sate and prove the relation between convolution and correlation. [6M]

   b State and prove sampling theorem. [8M]

(OR)

8. a State the properties of correlation [7M]

   b Find the cross correlation between triangular and Gate function [7M]

UNIT-V

9. a Distinguish between Fourier transform, Laplace transform and z transforms. [7M]

   b Find the Laplace transform of the following signals [7M]

   i) Impulse function ii) unit step function iii) A sin w_0t u(t)

(OR)

10. a Derive the relation between Laplace transform and Fourier transform of continuous time signal x(t). [7M]

    b Find the Laplace transform of $x(t) = e^{-5t}$ [u(t) - u(t-5)] and its ROC. [7M]

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AR16

CODE: 16BS2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular & Supplementary Examinations, November-2018

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

   b) The contents of urns I, II and III are as follows: 7M
   1 white, 2 black and 3 red balls
   2 white, 1 black and 1 red balls
   4 white, 5 black and 3 red balls.
   One urn is chosen at random and two balls drawn. They happen to be white and red. What is the probability that they come from urn III.

(OR)

2. A random variable X has the following probability function: 14M

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

3. a) Derive the mean and variance of Poisson distribution 7M
   b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. 7M

(OR)

4. Fit a Binomial distribution to the following data: 14M

x	0	1	2	3	4	5	6	7
f	7	6	19	35	30	23	7	1

UNIT-III

5. A population consists of 5,10,14,18,23 and 24. Consider all possible samples of size 2 which can be drawn without replacement. Find 14M

   i) The population mean
   ii) The population Standard deviation
   iii) Mean of the sampling distribution of means
   iv) Standard deviation of the sampling distribution of means

(OR)

6. a) Ten bearings made by a certain process have a mean diameter of 0.506 cm with a standard deviation of 0.04cm. Construct the 95% confidence interval for the actual average diameter of the bearings made by this process. 7M

   b) A research worker wants to determine the average time taken by a machine to rotate tyres of a car and he wants to assert with 95% confidence that the mean of the sample is by at most 0.50 min. If he can presume from past experience that $\sigma=1.6$, how large a sample will he has to take? 7M

UNIT-IV

7. The following are the number of sales which a sample of 9 sales people of industrial chemicals in California and a sample of 6 sales people of industrial chemicals in Oregon made over a certain fixed period of time 14M

   California: 59 68 44 71 63 46 69 54 48
   Oregon: 50 36 62 52 70 41

   Test the null hypothesis $\mu x - \mu y = 0$ against the alternative hypothesis $\mu x - \mu y \neq 0$ at 0.01 level of significance.

(OR)

8. a) A sample of heights of 6400 persons has a mean of 65 inches. Could it be regarded as having been drawn from the population of Indians with a mean of 66 inches and a standard deviation of 7 inches? Test at 5% level of significance. 7M

   b) The manufacturer of a patent claims that it was 90% effective in relieving an allergy for a period of 8 hours. In a sample of 200 people who have the allergy the medicine provides relief for 160 people. Determine whether the manufacturer's claim is legitimate at 5% level of significance. 7M

UNIT-V

9. Find the Karl Pearson's correlation coefficient to the given data: 14M

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

(OR)

10. a) Fit a second degree parabola of the form $Y=a+bX+cX^2$ to the following data: 7M

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

   b) Find the regression lines to the given data and estimate the values of Y when X=9 7M

X	2	4	5	6	8	11
Y	18	12	10	8	7	5

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AR13

CODE: 13CE2001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, November-2018
STRENGTH OF MATERIALS-I
(Civil Engineering)

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

PART-A

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

1. a) Define Hooks Law
   b) The Magnitude of temperature stress on a bar of length 2 M supported freely , subjected to temperature from 20^0 to 80^0, where α (alpha) = $12x10^{-6}/\ ^0C$.
   c) Define point of contra flexure
   d) Write the relation between Shear Force and Bending Moment
   e) Define the Section Modulus
   f) Write the Simple Bending Equation
   g) Relation between max Shear stress to average Shear stress for triangular section
   h) Relation between average Shear stress to Maximum Shear stress for circular cross section
   i) Maximum slope of simply supported beam of length L subjected to central point load of W kN is
   j) Maximum Deflection of a cantilever beam of length L subjected to end point load of W kN is

PART-B

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

UNIT-I

2. a) Define the following i) Elasticty ii) Plasticty (iii) Ductility (iv) Poisson's ratio . 6M
   b) Draw the stress strain curve for a Mild steel bar and locate and explain the various salient points 6M

(OR)

3. a) Define the following i) Working stress ii) Factor of safety iii) Lateral strain iv) volumetric strain 6M
   b) Determine the stress developed in the each part of the bar shown in Fig.1 and also the total change in length of the bar given E=210GPa 6M

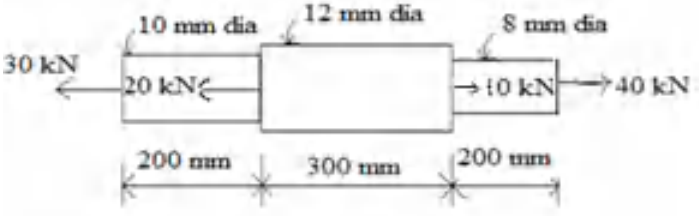

Fig.1

UNIT-II

4. Construct S.F. and B.M. diagrams for the following loaded overhang beam as shown in Fig.2 Also locate the point of contra flexure . 12M

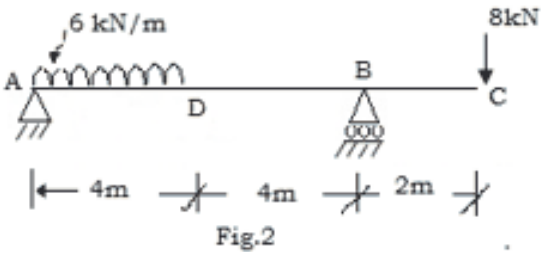

Fig.2

(OR)

5. A beam 8.5m long rests on supports 5m apart. The right hand end overhang is 2m and left end overhang is 1.5m.it carries a uniformly distributed load of 50kN/m run between the supports. A point load of 60kN acts at the extreme right end and another point load 40kN acts at the left hand end. Construct the SFD and BMD and state the position of the points of inflexion. 12M

UNIT-III

6. a) Write any FOUR assumptions in theory of simple bending. 4M

   b) A water main of 500 mm internal diameter and 20 mm thick is running full. The water main is of cast iron and is supported at two points 10 m apart. Find the maximum stress in the metal. The cast iron and water weigh 72000 N/m^3 and 10000N/m^3 respectively. 8M

(OR)

7. A T-beam having flange 160mm x 20mm and web 20mm x170mm is simply supported over a span of 6.5m. It carries a UDL of 6kN/m including self weight over its entire span, together with a point load of 40 kN at mid span. Find the maximum tensile and compressive stresses occurring in the beam section and sketch the stresses across the section. 12M

UNIT-IV

8. A beam of I-section is having overall depth as 600 mm and overall width as 200 mm. The thickness of flanges is 25 mm whereas the thickness of web is 15 mm. If the section carries a shear force of 50 kN, calculate the maximum shear stress. Also sketch the shear stress distribution across the section. 12 M

(OR)

9. a) Derive an expression for the shear stress at any point in a circular section of a beam, which is subjected to a shear force F. Sketch the variation of shear stress across the section. 6M

   b) Obtain from first principles the expression for maximum shear stress in a triangular section of a beam .sketch the variation of shear stress. 6M

UNIT-V

10. a) What is Macaulay's method for finding out the slope and deflection of a beam. Discuss the cases, where it is of a particular use. 6M

    b) A 3 m long cantilever is loaded with a point load of 450 N at the free end . if the section is rectangular 80 mm (wide) x 160 mm (deep) and E = 10 GN/m^2 . Calculate slope and deflection.(i) at the free end of cantilever (ii) at a distance of 0.55 m from the free end**.** 6M

(OR)

11. A simply supported 6 meters long rolled steel joist carries a uniformly distributed load of 9.5 kN/meter length and a point load of 40kN at its centre . Determine slope and deflection at a distance of 3 meters from one end of the beam**.** 12M

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AR13

CODE: 13EC2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, November-2018
ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronics Engineering)

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

PART-A

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

1. a) Define intrinsic and extrinsic semiconductors **1M**
   b) What is the relation between temparute and diode current? **1M**
   c) Mention the applications of diode? **1M**
   d) What is the expression for alpha (α) of a transistor? **1M**
   e) What is relation between α and β of a transistor? **1M**
   f) Define amplification factor μ for a JFET? **1M**
   g) Define trans conductance of JFET? **1M**
   h) Draw the dc load line for CE configuration? **1M**
   i) What is the need for biasing? **1M**
   j) Mention the types of RC & LC oscillators? **1M**

PART-B

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

UNIT-I

2. a) Define Hall effect? What is the significance of hall effect in terms of semiconductors? 6M
   b) Define knee voltage, Draw and explain the V-I characteristics of PN junction diode 6M

(OR)

3. a) Define the following i) mobility ii) conductivity 6M
   b) Explain the law of junctions and define the concept of diffusion in a semiconductor 6M

UNIT-II

4. a) What is meant by zener effect, explain with V-I characteristics of zener diode 6M
   b) What are the applications of a zener diode? 6M

(OR)

5.	a)	Mention how the intensity of a LED can be varied with its operating principle?	4M
	b)	What is the significance of a filter in rectifiers and draw the output wave form of full wave rectifier with c- filter circuit?	8M

UNIT-III

6.	a)	Compare CE, CB, CC configuration in terms of input, output impedances, gains	6M
	b)	Explain the operation and construction of JFET	6M
		(OR)	
7.	a)	Draw the characteristics of UJT and explain the operation of UJT?	6M
	b)	Define stability factor s and derive the expression for SELF biased circuit	6M

UNIT-IV

8.	a)	Draw and explain voltage series feedback amplifier with transistor circuit? Derive voltage gain ?	8M
	b)	Explain the limitations of negative feedback?	4M
		(OR)	
9.	a)	With negative feedback how gain and band width varies in feedback amplifiers.	8M
	b)	What are the applications of current series feedback amplifier?	4M

UNIT-V

10.	a)	Explain about RC phase shift oscillators?	6M
	b)	Explain about wein bridge oscillators?	6M
		(OR)	
11.	a)	Explain about COLPITTS oscillators?	6M
	b)	Explain about HARTLEY oscillators?	6M

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AR13

CODE: 13ME2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH I SEM SUPPL. EXAMINATIONS, NOVEMBER, 2018
MECHANICS OF SOLIDS
(Mechanical Engineering)

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

PART-A

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

1. a) Explain Generalized Hooke's Law.
   b) What is Factor of Safety?
   c) Name the various types of load.
   d) State the relationship between shear force and bending moment.
   e) What is section modulus?
   f) Write the expression for power transmitted by a shaft.
   g) What are the different methods used for finding deflection and slope of beams?
   h) State the two theorems in moment area method.
   i) Define Hoop Stress.
   j) When is the longitudinal stress in a thin cylinder is zero?

PART-B

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

UNIT-I

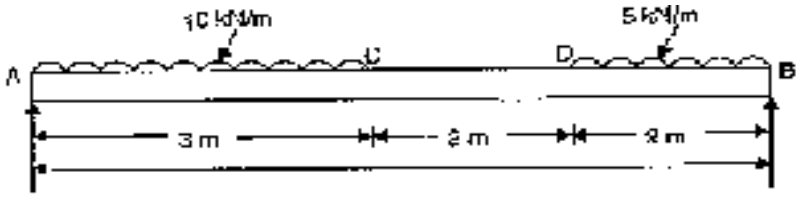
2. a) Draw a typical stress-strain curve for both ductile and brittle materials and explain clearly the salient points.
   b) A Steel bar 900 mm long: its two ends are 40 mm and 30 mm in diameter and the length of each rod is 200 mm. The middle portion of the bar is 15 mm in diameter and 500 mm long. If the bar is subjected to an axial tensile load of 15 kN, find its total extension.

(OR)

3. a) A compound bar consists of a circular rod of steel of diameter 20 mm rigidly fitted into a copper tube of internal diameter 20 mm and thickness 5 mm. If the bar is subjected to a load of 200 kN, find the stresses developed in the two materials. Take $E_{steel} = 2 \times 10^5$ N/mm^2 and $E_{copper} = 1.2 \times 10^5$ N/mm^2
   b) The Principal stresses at a point across two perpendicular planes are 75MN/m^2 (tensile) and 35 MN/m^2 (tensile). Find the normal, tangential stresses and the resultant stress and its obliquity on a plane at 20^O with the major principal plane.

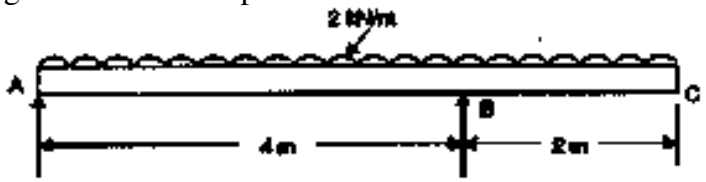
UNIT-II

4. Draw the S.F and B.M diagrams for the following simply supported beam shown in fig and state the value of maximum bending moment.



(OR)

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



UNIT-III

6. Derive the pure bending equation and state all necessary assumptions.

(OR)

7. An I-section beam 340 mm X 200 mm has a web thickness of 10 mm and flange thickness of 20 mm. It carries a shearing force of 100 kN. Sketch the shear stress distribution across the section.

UNIT-IV

8. A beam AB of 4 metres span is simply supported at the ends and is loaded as shown in fig. Determine: (i) Deflection, (ii) Maximum deflection, and (iii) Slope at the end A. Take E = 200 x 10^6 kN/m^2, and I = 20 x $10^{-6}$$m^4$

(OR)

9. Derive the expressions for the slope and deflection of a cantilever carrying uniformly distributed load 'w' over the whole length L.

UNIT-V

10. A cylindrical vessel whose ends are closed by means of rigid flange plates is made of steel plate 3 mm thick. The internal length and diameter of vessel are 50cm and 25 cm respectively. Determine the longitudinal and circumferential stresses in the cylindrical shell due to an internal fluid pressure of 3 MN/m^2. Also calculate increase in length, diameter and volume of the vessel.
Take E = 200 GN/m^2, and μ = 0.3

(OR)

11. A pipe of 200 mm internal and 50 mm thickness carries a fluid at a pressure of 10 MN/m^2. Calculate the maximum and minimum intensities of circumferential stresses across the section. Also sketch the radial stress (pressure) distribution and circumferential stress distribution across the section.

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AR13

CODE: 13EC2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, November-2018
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 Causal Signal
   b) Draw unit step signal
   c) Write the expression for Exponential Fourier series
   d) What is the Fourier transform of unit impulse signal?
   e) Define System band width
   f) What is the condition for Distortionless transmission through LTI system?
   g) What is meant by under sampling?
   h) Write the expression for autocorrelation of f(t).
   i) What is the Laplace transform of unit impulse signal?
   j) Write the Z transform of x(n)= {2,3,4}

PART-B

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

UNIT-I

2. a) Explain the following systems(i) Linear System (ii) Time Invariant System 6M
   b) Find even and odd components of the given signal x (t) = sin t +2 sin t +2 $\sin^2 t$ cost 6M

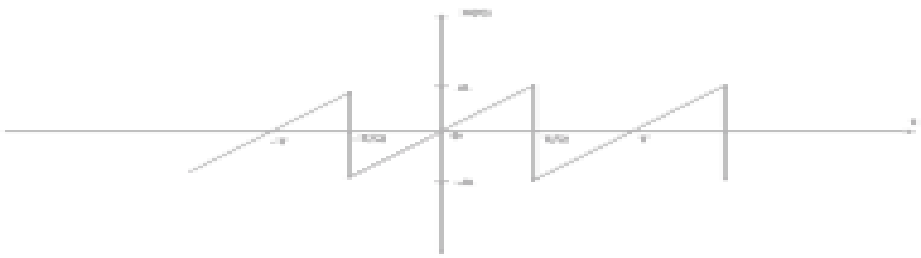
(OR)

3. a) Explain Orthogonality in functions. 6M
   b) Determine the power and rms value of the signal x(t) = A sin ($\omega_0 t + \varphi$). 6M

UNIT-II

4. a) Explain (i) Dirichlet's conditions (ii) Complex Fourier spectrum 6M

   b) Obtain the trigonometric Fourier series for the waveform. 6M



(OR)

5. a) Discuss any three properties of Fourier transform 6M

   b) Find Fourier transform of the following (i) $e^{-at}u(t)$ (ii) Unit step signal 6M

UNIT-III

6. a) Explain ideal filter characteristics. 6M

   b) Determine whether the following systems are time invariant or not. a) $y(t) = t^2 x(t)$ b) $y(t) = x(t)\sin 10\pi t$ 6M

(OR)

7. a) Derive convolution integral of LTI System and explain how to evaluate it. 6M

   b) The input voltage to an RC network is x(t)=$te^{-3t}u(t)$ and the impulse response is $2e^{-4t}u(t)$. Determine y(t). 6M

UNIT-IV

8. a) Explain Energy and Power density spectra. 6M

   b) Derive the relation between convolution and correlation of signals 6M

(OR)

9. a) Discuss Sampling theorem. 6M

   b) Explain Natural Sampling. 6M

UNIT-V

10. a) Explain Laplace transform and its ROC 6M

    b) Find Laplace transform and ROC of x(t)= e^{-4t}u(t)+e^{-3t}u(t). 6M

(OR)

11. a) Discuss any three properties of Laplace transform 6M

    b) Explain Z transform and its region of convergence 6M

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AR13

CODE: 13BS2006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, November-2018

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 Baye's theorem
   b) Define a discrete random variable
   c) Define Exponential distribution
   d) Define moment generating function
   e) Define Type-II error
   f) Define alternative hypothesis
   g) Write the two lines of regression
   h) Define correlation.
   i) Define a queue
   j) What is pure death process

PART-B

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

UNIT-I

2. a) A box contains 6 Red, 4 White and 5 Black balls. A person draws 4 balls at random. Find the probability that among the balls drawn there is at least one ball of each colour. 6M

   b) A problem in statistics is given to three students A,B,C whose chances of solving it are ½ , ¾ , ¼ respectively . What is the probability that the problem will be solved if all of them try independently. 6M

(OR)

3. a) In a factory , machine A produces 40% of the output and machine B produces 60% on the average. 9 items in 1000 produced by A are defective and one item in 250 produced by B is defective. An item drawn at random from a day's output is defective. What is the probability that it was produced by machine A? 6M

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

X	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

i) Find the value of a.
ii) Evaluate $P(X<3)$, $P(X\geq 3)$.

UNIT-II

4. Out of 800 families with 4 children each, how many families would be expected to have (assume equal probability for boys and girls) 12M
i) 2 boys and 2 girls. ii) at least one boy. iii) no girl.

(OR)

5. a) A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which 6M
i) neither car is used. ii) some demand is refused.

b) A population consists of four numbers 2,3,4 and 5. Consider all distinct samples of size two, without 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) A sample of nine items had the values 45,47,50,52,48,47,49,53 and 51. Does the mean of the nine items differ significantly from the assumed population mean of 47.5? Test at 1% level of significance. 6M

   b) The following are the number of sales which a sample of 9 sales people of industrial chemicals in California and a sample of 6 sales people of industrial chemicals in Oregon made over a certain fixed period of time? 6M

California:	59	68	44	71	63	46	69	54	48
Oregon:	50	36	62	52	70	41			

Test the null hypothesis $\mu_x - \mu_y = 0$ against the alternative hypothesis $\mu_x - \mu_y \neq 0$ at 0.01 level of significance.

(OR)

7. Perform an ANOVA to test at 0.05 level of significance whether the differences among the sample means at the 3 positions are significant. 12M

Position 1:	90	82	79	98	83	91	
Position 2:	105	89	93	104	89	95	86
Position 3:	83	89	80	94			

UNIT-IV

8. Fit a second degree parabola of the form $Y=a+bX+cX^2$ to the given data: 12M

X:	0	1	2	3	4
Y:	2.4	2	4.4	6.2	11

(OR)

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

x	7	9	4	10	6	7	8	8	5
y	6	8	6	10	8	5	10	7	7

UNIT-V

10. a) A washing machine repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is repairman's expected idle time each day. How many jobs are ahead of the average set just brought in? 6M

    b) If for a period of 2 hours in a day, trains arrive at a station every 20 minutes but the service time to remain is 36 minutes, then calculate for this, period assuming the capacity of the station is 4 trains only, 6M

    i) Probability that the station is empty.

    ii) The average queuing length.

(OR)

11. Arrivals at a telephone booth are considered to be Poisson distributed, with an average time of 10 minutes between one arrival and the next. The length of a phone call assumed to be distributed exponentially with mean 3 minutes. Then 12M

    i) What is the probability that a person arriving at the booth will have to wait

    ii) What is the average length of the queue that from time to time.

    iii) The telephone department will install a second booth convinced that an arrival would be expect to have to wait atleast three minutes for the phone. By how much must the flow of arrivals be increased in order to justify a second booth?