AR16

CODE: 16CE2002 **SET-2**

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**

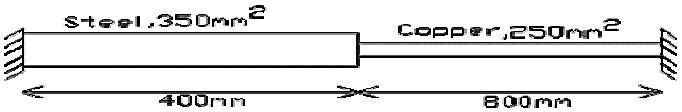
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a	A tensile test was conducted on a mild steel bar having diameter 2cm gauge length of bar is 30cm. Load at elastic limit was found as 290KN . Extension at a load of 150KN is observed as 0.21mm. Maximum load is 430KN and total extension of the bar is 80mm. Diameter of the rod at failure is 1.6cm.Determine Young's modulus , stress at elastic limit, percentage of elongation and percentage decrease in area.	8
	b	A tensile load of 60 KN is acting on a rod of diameter 40mm and of length 4m .A bore of diameter 30mm is made centrally on the rod. To what length the rod should be bored so that the total extension will increase 20% under the same tensile load. Take E = 2 X 10^5 N/mm^2	6

(OR)

2.	a	The modulus of a rigidity of a material is 0.8 X 10^5 N/mm^2 . When a 6mm X 6mm rod of this material was subjected to an axial pull of 3600 N. It was found that the lateral dimension of the rod changed to 5.9991mm X 5.9991mm. Find the Poisson's ratio and modulus of elasticity.	7
	b	Find the stresses in copper and steel bars due to a temperature raise of 80^0 C. Given that E_S = 210GPa, E_C = 105GPa. $\alpha_S = 12x10^{-6}$ /^{0}C, $\alpha_C = 16x10^{-6}$ /^{0}C.	7

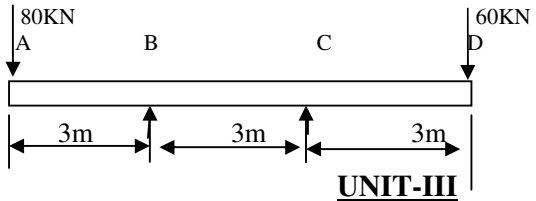


UNIT-II

3.	a	List various types of loads acting on beams and explain	4
	b	A cantilever beam of length 5m carries two point loads 3KN and 5KN at free end and 3m from free end respectively. It also carries UDL 2KN/m between two point loads Draw SFD and BMD.	10

(OR)

4.	a	Define shear force and bending moment and what is the relationship between them	4
	b	A Over hang beam ABCD of length 9m is shown in figure below. AB =3m, BC =3m and CD = 3m.Draw SFD and BMD	10



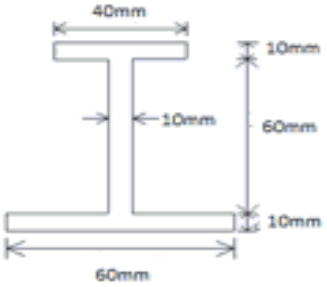
UNIT-III

5.	a	Define section modulus. Calculate the section modulus of hollow circular shaft of outer diameter d_o and ratio of inner diameter to outer diameter of hollow shaft is K	4
	b	A 60 mm wide and 120 mm height I-beam is acted upon by a maximum bending moment of 100kN-m. The web thickness is 4 mm and the flange thickness is 6 mm. Determine the distribution of bending stresses.	10

(OR)

6.	a	Mention the assumption in deriving bending equation	4

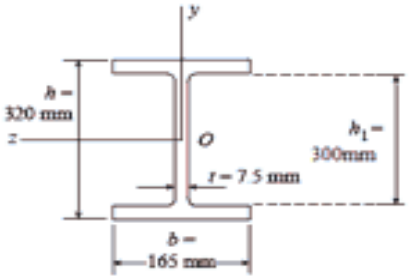
b Determine the maximum tensile, compressive bending stress caused by a concentrated load of 8KN acting at the free end on a cantilever beam of span 2.6m. The cross section is as shown in the Figure. 10



UNIT-IV

7. a Write the equation of shear stress when shear force and geometry of the section is given. 2

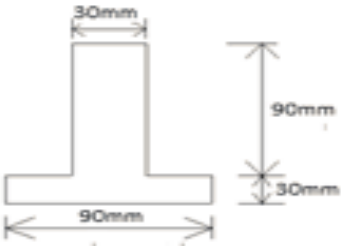
b A concentrated load of 50kN acting at the free end on a cantilever beam of span 2.4m. The cross section is as shown in the Figure. Draw the shear stress distribution across the cross section and find maximum bending stress 12



(OR)

8. a Mention the relationship between average and maximum shear stress of a rectangular cross section and prove it. 4

b A concentrated load of 60kN acting at the free end on a cantilever beam of span 2.5m. The cross section is as shown in the Figure. Draw the shear stress distribution across the cross section. 10



UNIT-V

9. a A solid shaft is subjected to a maximum torque of 15 MN-mm Estimate the diameter for the shaft, if the allowable shearing stress and the twist are limited to 10 N/mm^2 and 1^o respectively for 2000mm length of shaft. 6

b A hallow circular shaft of 6m length and inner and outer diameters of 75mm and 100mm is subjected to a torque of 10KN-m.If G=80Gpa, determine the maximum shear stress produced and the total angle of twist. 8

(OR)

10. a A leaf spring carries a central load of 3000N . The leaf spring is to be made of 10 steel plates 5cm wide and 6mm thick. If the bending stress is limited to 150 N/mm^2. Determine length of the spring and deflection at the centre of the spring Take E= 2 X 10^5 N/mm^2. 6

b A closely coiled helical spring is to carry a load of 500 N. Its coil diameters to be 10 times that of wire diameter. Calculate these diameters if the maximum shear stress in the material of the spring is to be 80 N/mm^2.If the stiffness of the spring is 20 N per mm deflection and modulus of rigidity is 8.6 X 10^4 N/mm^2 . Find the number of coils in the closely coiled helical spring. 8

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AR16

CODE: 16EE2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

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

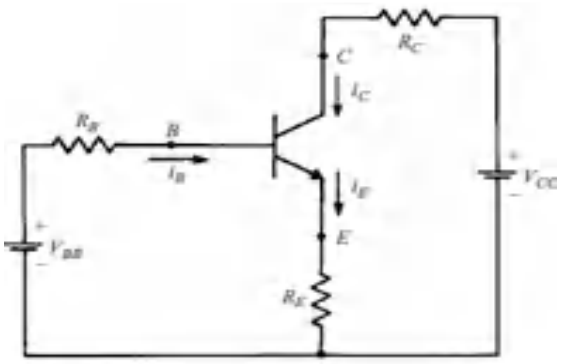
1.	a)	Design voltage regulator using Zener diode and explain its working.	6M
	b)	How practical diode is different from ideal diode? Draw voltage-current characteristics of two diodes in forward and reverse biased condition.	8M
		(OR)	
2.	a)	Elucidate the operation of half wave rectifier with input and output voltage waveforms. Derive the expression for efficiency.	7M
	b)	A full wave rectifier is fed with a voltage, 50 sin 100 πt. Its load resistance is 400 Ω. The diodes used in the rectifier have a forward resistance of 30 Ω. Compute the (i) Idc and Irms (ii) ripple factor and (iii) efficiency of rectification.	7M

UNIT-II

3.	a)	A BJT has $\alpha = 0.99$, $I_B = 25\ \mu A$, and $I_{CBO} = 200$ nA. Find (i) the dc collector current, (ii) the dc emitter current.	7M
	b)	Draw and explain input & output characteristics of transistor in CE configuration? Explain why CE configuration is most popular in amplifier circuits?	7M
		(OR)	
4.	a)	Explain operation of and N Channel JFET, Draw its characteristics.	8M
	b)	What is UJT? Draw its electrical equivalent circuit and emitter characteristic curve.	6M

UNIT-III

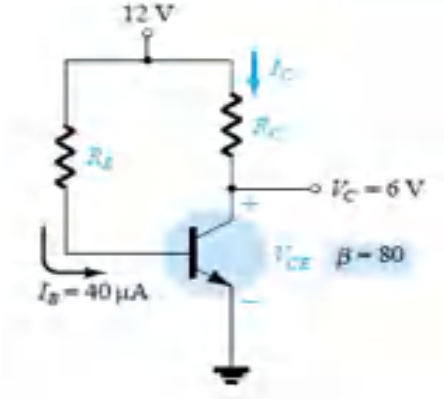
5.	a)	What is the necessity of biasing? Derive the expression for stability in fixed bias circuit.	6M
	b)	The transistor shown in figure is a Si device with a base current of 40 μA and $I_{CBO} = 0$. If $V_{BB} = 6$ V, $R_E = 1$ kΩ, and $\beta = 80$, find (i) I_E (ii) R_B and (iii) If $V_{CC} = 15$ V and $R_C = 3$ kΩ , find V_{CE}.	8M



(OR)

6. a) Derive the expression for I_E , I_C , and stability factor(S) for voltage divider bias circuit using BJT. 8M

   b) A fixed bias circuit shown in figure , determine I_C, R_C, R_B, V_{CE} 6M



UNIT-IV

7. a) For a single stage transistor amplifier, R_S=1 KΩ and R_L= 10 KΩ The h-parameter values are h_{fe} = 50, h_{ie} =1.1 KΩ, hre = $2.5x10^{-4}$, hoe = 25 μA/V. Find A_I, A_V, R_i, and Ro for the CE transistor configuration. 7M

   b) Draw the exact h-parameter model of CB, CE and CC amplifier. Write the units of h-parameters. 7 M

(OR)

8. a) Write about miller's therom. 4M

   b) Derive the expression for current gain, input resistance and voltage gain of CB amplifier using exact h-parameter model. 10M

UNIT-V

9. a) Derive the voltage gain, impedance and output impedance of voltage-series feedback amplifier. 7M

   b) What is the effect of negative feedback on bandwidth, gain and gain-bandwidth product? Derive the necessary expressions to explain. 7M

(OR)

10. a) Derive the expression for frequency of oscillation of RC phase shift oscillator using BJT. 7M

    b) State Barkhausen criterion for sustained oscillations in a sinusoidal oscillator. The capacitance values of the two capacitors C_1 and C_2 of the resonant circuit of a Colpitt's oscillator are C_1 = 20 pF and C_2 = 70 pF.The inductor has a value of 22μH. What is the operating frequency of oscillator? 7M

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AR16

CODE: 16ME2005 **SET-1**

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**

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 the stress strain diagram for mild steel and explain the salient points. 7 M

   b) A prismatic bar with rectangular cross section (20 x 40 mm) and length L = 2.8 m is subjected to an axial tensile force of 70 kN . The measured elongation of the bar is 1.2 mm. Calculate the tensile stress and strain in the bar. 7 M

(OR)

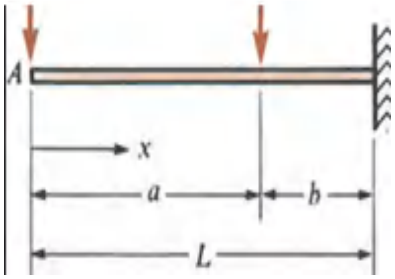
2. a) A short, hollow, circular, cast-iron cylinder (Fig. 1-27) is to support an axial compressive load P = 580 kN. The ultimate stress in compression for the material is au = 240 MPa. It is decided to design the cylinder with a wall thickness t of 25 mm and a factor of safety of 3.0 with respect to the ultimate strength. Compute the minimum required outside diameter d of the cylinder. 7M

   b) A composite rod is 1000 mm long, its two ends are 40 mm^2 and 30 mm^2 in area and length are 300 mm and 200 mm respectively. The middle portion of the rod is 20 mm^2 in area and 500 mm long. If the rod is subjected to an axial tensile load of 1000 N, find its total elongation. (E = 200 GPa). 7M

UNIT-II

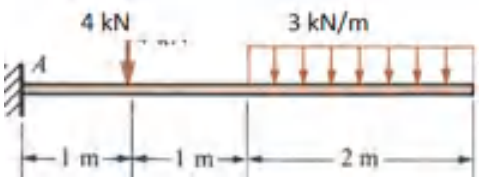
3. a) Define principal stress and principal strain. 4 M

   b) Construct the shear-force and bending-moment diagrams for the cantilever beam of length L=6m with two concentrated loads 10 kN at a distance b=2m from fixed end and 40kN at free end. 10 M

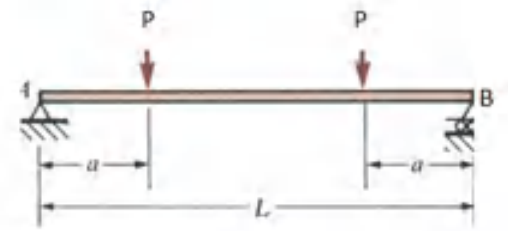


(OR)

4. a) Construct the shear force and bending moments for the cantilever beam. 7 M



b) Construct the shear-force and bending-moment diagrams for a simple beam supporting two equal concentrated loads 7 M



UNIT-III

5. Derive the bending equation of a beam. Also write the assumptions made. 14M

(OR)

6. a) A steel wire of diameter *d* is bent around a drum of radius r. Calculate the maximum bending stress t1max and the bending moment M in the wire, assuming *E* = 200 GPa, *d* = 4 mm, and r = 0.5 m. 7 M

b) Discuss the shear stress distribution in rectangular beams 7 M

UNIT-IV

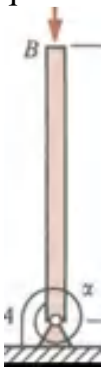
7. a) What is the minimum required diameter *d* for a solid circular shaft if it is to transmit 30 kW at 600 rpm without exceeding an allowable shear stress of 28 MPa? 7 M

b) Derive equation for crippling load for a column with both ends hinged subjected to an axial load P. 7 M

(OR)

8. a) Enumerate the column with both ends fixed. Deduce the equation 7 M

b) Determine the critical load *Per* for the bar-spring system shown in the figure. The bar is free at Band supported at *A* by a rotation al spring of stiffness α(, that is, M = αθ, where M is the moment acting on the spring and θis the angle of rotation of the bar. 7 M



UNIT-V

9. Derive governing differential equation of a beam. 14M

(OR)

10. a) Deduce the equation of deflection and slope for simply supported beam with point load W at its mid point with span L. 7 M

b) Enumerate Macaulay's method. 7 M

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AR16

CODE: 16EC2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

SIGNALS AND SYSTEMS

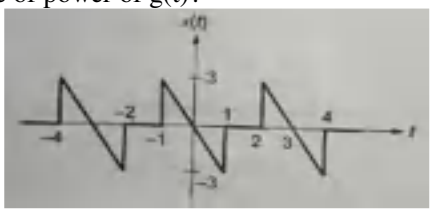
(Electronics and Communication Engineering)

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

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

UNIT-I

1. a) The waveform of a periodic signal x(t) is shown in figure 1.The signal g(t) is defined as x((t-1)/2).Find the average of power of g(t)? **[7M]**



b) Define the error function while approximating signals and hence derive the expression for condition for orthogonality between two waveforms $f_1(t)$ and $f_2(t)$ **[7M]**

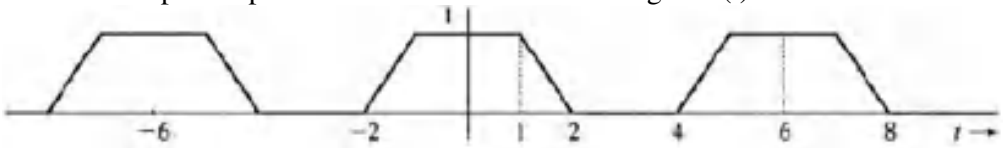
(OR)

2. a) Consider a periodic signal $x(t) = \begin{cases} 1, & 0 \le t \le 1 \\ -2, & 1 < t < 2 \end{cases}$ with period T=2. The derivative of this signal is related to the "impulse train" $g(t) = \sum_{k=-\infty}^{\infty} \delta(t - 2k)$ with period T=2 . It can be shown that $\frac{dx(t)}{dt} = A_1\, g(t - t_1) + A_2 g(t - t_2)$. Determine the values of A_1, t_1, A_2, t_2 **[7M]**

b) Derive the expression for mean square error when a function is approximated by a set of orthogonal signals. **[7M]**

UNIT-II

3. a) Find the complex exponential Fourier series for the signal x(t) shown below **[7M]**

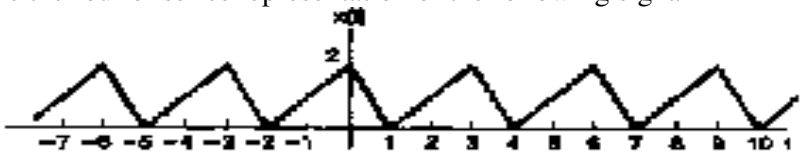


b) State and prove duality property and Find the Fourier transform of the signal **[7M]**

$$g(t) = \frac{4t}{(1+t^2)^2}$$

(OR)

4. a) Determine the fourier series representation of the following signal **[7M]**



b) State and prove the following properties of the Fourier Transforms **[7M]**

i)Time Scaling ii)Time shifting

UNIT-III

5. a) Find the range of **a** and **b** for the impulse system h(n) to be stable. **[7M]**

$$h(n) = \begin{cases} a^n ; n \geq 0 \\ b^n ; n < 0 \end{cases}$$

b) Let y[n] denote the convolution of h[n] and g[n] where $h[n] = \left(\frac{1}{2}\right)^n u[n]$ and g[n] is causal sequence. If y[0]=1 and y[1]= $\frac{1}{2}$ Then g[1]=? **[7M]**

(OR)

6. a) Find the convolution of the following signals using Graphical method ? **[6M]**

$x(t) = e^{-2t}u(t)$ *and* $h(t) = u(t-2)$

b) Explain about Poly-Wiener Criterion for physical realization **[8M]**

UNIT-IV

7. a) Derive relationship between cross power spectrum and cross correlation function.? **[7M]**

b) Write the characteristics of ideal LPF and HPF, BPF? **[7M]**

(OR)

8. a) State and prove Sampling Theorem. **[8M]**

b) Explain about Natural and Flat Top sampling. **[6M]**

UNIT-V

9. a) Find the inverse Laplace transform of **[6M]**

$$G(S) = \frac{S}{S^2 + 2S + 2} \qquad \sigma > -1$$

b) State and prove Initial and Final value theorem for Laplace Transform? **[8M]**

(OR)

10. a) Find the Z transform and ROC of $(0.8)^n$ u(n)+ $(0.6)^n$ u(-n-1)? **[7M]**

b) Find the inverse Z transform of X(Z)= $\ln(1+aZ^{-1})$? **[7M]**

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AR16

CODE: 16BS2005 **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 & 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) If X is a continuous random variable and Y = a X + b, prove that E(Y) = a E(X) + b and V(Y) = a^2 V(X), where a, b are constants. 7M

b) A random variable X has the density function: 7M

$$f(x)=\begin{cases} K\frac{1}{1+x^2}; -\infty < x < \infty \\ 0 \quad ; otherwise \end{cases}$$ Determine K and the distribution function.

(OR)

2. a) Of the 3 men, the chances that a politician, a business man or an academician will be appointed as a Vice-chancellor(VC) of a University are 0.5, 0.3, 0.2 respectively. Probability that research is promoted by these persons if they are appointed as VC are 0.3, 0.7, 0.8 respectively. 7M
   (i) Determine the probability that research is promoted.
   (ii) If research is promoted, what is the probability that VC is an academician?

b) Define distribution function. State the properties of distribution function. 7M

UNIT-II

3. a) In a sample of 1000 cases, the mean of certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find How many students score between 12 and 15? 7M

b) Derive the mean of Poisson distribution. 7M

(OR)

4. Fit a binomial distribution for the following data. 14M

X:	0	1	2	3	4	5	6
F:	13	25	52	58	32	16	4

UNIT-III

5. A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from city population. Find 14M

i. The population mean
ii. The population standard deviation
iii. The mean of the sampling distribution of means
iv. The standard deviation of the sampling distribution of means.
v. Verify (iii) and (iv) from (i) and (ii) with the help of suitable formula.

(OR)

6 It is desired to estimate the mean time of continuous use until an answering machine will first require service. If it can be assumed that $\sigma = 60$ days, how large a sample is needed so that one will be able to assert with 90% confidence that the sample mean is off by atmost 10 days. 14M

UNIT-IV

7. a) A manufacturer of electric bulbs claims that the percentage defectives in his product doesn't exceed 6. A sample of 40 bulbs is found to contain 5 defectives. Would you consider the claim justified? 7M

b) A random sample of 400 flower stems has an average length of 15 cms. Can this be regarded as a sample from a large population with mean 16 cms and S.D 5 cms. 7M

(OR)

8. The number of automobile accidents per week in a certain community are 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that the accident conditions were same during this 10 week period. 14M

UNIT-V

9. a) Calculate the correlation coefficient for the heights of fathers and sons 7M

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

b) State the properties of Karl pearson correlation coefficient. 7M

(OR)

10. a) Fit $Y = ab^X$ by the method of least squares to the given data. 7M

X	0	1	2	23	4	5	6	7
Y	10	21	35	59	92	200	400	610

b) Find the correlation to the following data: 7M

X	10	12	18	24	23	27
Y	13	18	12	25	30	10