Q.P. Code: 16CE104 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations December-2021

STRENGTH OF MATERIALS

(Common to ME & AGE)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Explain briefly about the stress strain diagram for mild steel specimen.	L1	6M
	b	A circular rod of diameter 20 mm and 500 mm long is subjected to a tensile force of 45 KN. the modulus of elasticity for the material is 2.1×10^5 N/mm2. Find the stress, strain & the elongation of circular rod.	L3	6M

OR

2	a	Define Bulk Modulus. Calculate the Bulk modulus for a material having young's modulus 1.2×10^5 N/mm2 and $\mu = 1/4$.	L2	6M
	b	A bar of 30mm diameter is subjected to a pull of 60 KN. The measured extension on gauge length of 200 mm is 0.1mm and change in diameter is 0.004 mm, calculate: i. Young's modulus ii. Poisson's Ratio and iii. bulk modulus	L3	6M

UNIT-II

3	a	Draw the S.F and B.M diagram for a cantilever beam of span 'L'm loaded with UDL of W KN/m.	L4	6M
	b	Define Shear force, Bending moment and point of contra flexure.	L1	6M

OR

4	a	Simply supported beam of length 6 m carries a uniformly increasing load of 600 N/m at one end to 1500 N/m run at the other end. Draw SFD and BMD for the beam.	L3	6M
	b	A cantilever of length 3 m carries a uniformly distributed load of 2.5 KN/m length over the whole length and a point of 3.5 KN at the free end. Draw SFD and BMD for the cantilever.	L3	6M

UNIT-III

5	a	Derive the simple bending equation stating the assumptions made. Draw the strain variation, stress variation across the cross – section of the beam.	L4	6M
	b	A timber beam of rectangular section is to support a load of 30 k N uniformly distributed over a span of 4 m when beam is simply supported. If the depth of section is to be twice the breadth, and the stress in the timber is not to exceed 8 N/mm2, find the dimensions of the cross section.	L4	6M

OR

6	a	A timber beam 120 mm wide and 200 mm deep is simply supported over a span of 4 m. The beam carries a UDL of 2.8 KN/m over the entire length. Find the maximum bending stress induced. Plot the bending stress distribution at the quarter span cross section of the beam.	L3	6M
	b	A beam is simply supported and carries a uniformly distributed load of 40KN/m run over the whole span. The section of the beam is rectangular having depth as 500mm. If the maximum stress in the material of the beam is 120 N/mm2 and moment of inertia of the section is 7×10^8 mm4, find the span of the beam.	L3	6M

UNIT-IV

7	A beam of length 8 m is simply supported at its ends and carries two-point loads of 36 KN and 46 KN at a distance of 1.5 m and 4 m from the left support. Find: (i) deflection under each load. (ii) Maximum deflection and (iii) The point at which maximum deflection occurs, given E = 2 x 105 N/mm2 and I = 85 x 106 mm4. Use Macaulay's method.	L3	12M
	OR3		
8	A composite shaft consists of steel rod 60 mm diameter surrounded by a closely fitting tube of brass. Find the outside diameter of the tube so that when a torque of 1000N-m is applied to the composite shaft, it will be shared equally by the two materials. Take C for steel 8.4 x104 N/mm2 and C for brass 4.2 x104 N/mm2. Find also the maximum shear stress in each material and common angle of twist in a length of 4 m.	L3	12M
	UNIT-V		
9	Copper cylinder, 90 cm long, 40 cm external diameter and wall thickness 6 mm has its both ends closed by rigid blank flanges. It is initially full of oil at atmospheric pressure. Calculate additional volume of oil which must be pumped into it in order to raise the oil pressure to 5 N/mm2 above atmospheric pressure. For copper assume E= 1.0 x 105 N/mm2 and Poisson's ratio 1/3. Take bulk modulus of oil as K= 2.6 x 103 N/mm2	L3	12M
	OR		
10	A steel tube of 200 mm external diameter is to be shrunk on to another steel tube of 60 mm internal diameter. After shrinking the diameter at the junction is 120 mm. Before shrinking on the difference of diameter at the junction is 0.08 mm. Find the hoop stresses developed in the two tubes after shrinking on and the radial pressure at the junction. Take E= 2x 10^5 N/mm2.	L3	12M

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