Q.P. Code: 19CE0103 **R19**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

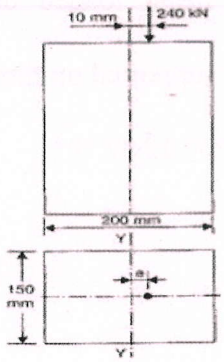
1	a	A water main 80 cm diameter contains water at a pressure head of 100 m. If the weight density of water is 9810 N/m3, find the thickness of the metal required for the water main. Given the permissible stress as 20 N/mm2.	**L3**	**6M**
	b	A hollow cylindrical drum 600 mm in diameter and 3 m long, has a shell thickness of 10 mm. If the drum is subjected to an internal air pressure of 3 N/mm2, determine the increase in its volume. Take E = 2 x 105 N/mm2 and Poisson's ratio = 0.3 for the material.	**L3**	**6M**

OR

2	a	A cylindrical boiler has 450mm in internal diameter, 12mm thick and 0.9 long. It is initially filled with water at atmospheric pressure. Determine the pressure at which an additional water of 0.187 liters maybe pumped into the cylinder by considering water incompressible. Take E = 200 GPa, and $\mu = 0.3$.	**L3**	**6M**
	b	A cylindrical shell has the following dimensions: Length = 3 m Inside diameter = 1 m Thickness of metal = 10 mm Internal pressure = 1.5 MPa Calculate the change in dimensions of the shell and the maximum intensity of shear stress induced. Take E = 200 GPa and Poisson's ratio = 0.3	**L3**	**6M**

UNIT-II

3	a	Determine the maximum and minimum stresses at the base of an hollow circular chimney of height 20 m with external diameter 4 m and internal diameter 2 m. The chimney is subjected to a horizontal wind pressure of intensity 1 kN/m3. The specific weight of the material of chimney is 22 KN/m3.	**L3**	**6M**
	b	A rectangular column of width 200 mm and of thickness 150 mm carries a point load of 240 kN at an eccentricity of 10 mm as shown in Figure below (i). Determine the maximum and minimum stresses on the section.	**L3**	**6M**



OR

4	a	Explain maximum strain energy theory	L2	6M
	b	Explain maximum principal strain theory.	L2	6M

UNIT-III

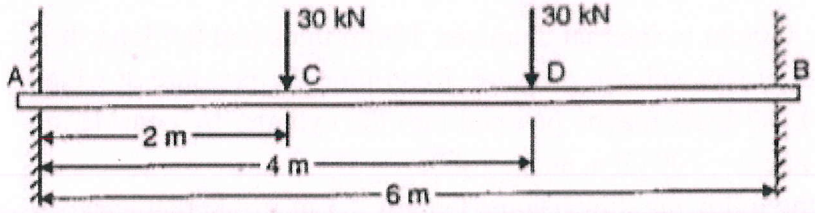
5	a	Determine the torsional stiffness of a hollow shaft of length L and having outside diameter equal to 1.5 times inside diameter d. The shear modulus of the material is G.	L3	6M
	b	A cantilever tube of length 120 mm is subjected to an axial tension P = 9.0 kN,A torsional moment T = 72.0 Nm and a pending Load F = 1.75 kN at the free end. The material is aluminum alloy with an yield strength 276 MPa. Find the thickness of the tube limiting the outside diameter to 50 mm so as to ensure a factor of safety of 4.	L3	6M

OR

6	a	Define Polar modulus, Torsional rigidity.	L1	4M
	b	A hollow steel rod 200 mm long is to be used as torsional spring. The ratio of inside to outside diameter is 1 : 2.The required stiffness of this spring is 100N.m/degree. Determine the outside diameter of the rod. Value of G is 8 x 104 N/mm2.	L3	8M

UNIT-IV

7	a	A fixed beam of length 6 m carries two point loads of 30 kN each at distance of 2 m from both ends. Determine the fixed end moments and draw the B.M. diagram.	L3	6M



	b	A fixed beam AB of length 3 m carries a point load of 45 kN at a distance of 2 in from A. If the flexural rigidity (i.e., EI) of the beam is 1 x 104 kNm2, determine : (i) Fixed end moments at A and B, (ii) Deflection under the load, (iii) Maximum deflection.	L3	6M

OR

8	a	State advantages of fixed supports	L2	6M
	b	A fixed beam AB of length 3 m is having moment of inertia I = 3 x 106 mm4. The support B sinks down by 3 mm. If E = 2 x 108 N/mm2, find the fixing moments.	L3	6M

UNIT-V

9	a	Explain the importance of curved beams in structures	L2	6M
	b	state the assumptions made in the analysis of curved beams	L2	6M

OR

10	a	Explain the importance of circular beam loaded uniformly and supported on symmetrically placed columns.	L2	6M
	b	Analyse the semicircular beam simply supported on three supports equally spaced.	L2	6M

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