Course Code: 23CE3T02

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

II - B.Tech I-Semester Regular Examinations (BR23), DECEMBER - 2024

STRENGTH OF MATERIALS (CIVIL ENGINEERING)

Time: 3 hours Max. Marks: 70

Question Paper consists of Part-A and Part-B

*Answer **ALL** the question in **Part-A and Part-B***

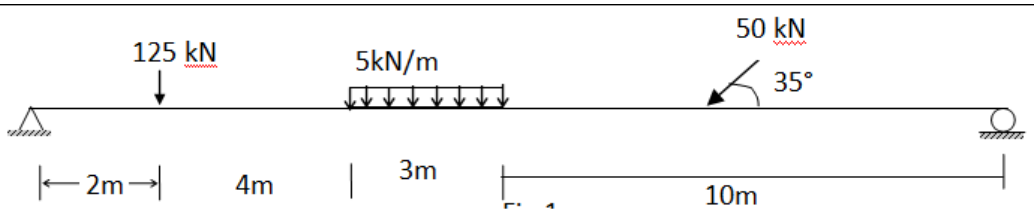
PART–A (10X2 = 20M)

		Marks	CO	BL
1. a)	Define Hooke's Law.	(2M)	CO1	BL2
b)	Find the Young's Modulus glass rod of dia 30mm & length 250mm, which is subjected to tensile load of 60KN when the extension of rod = 0.3mm	(2M)	CO1	BL3
c)	What are the different Types of beams & Loads.	(2M)	CO2	BL2
d)	Derive the expression for Cantilever Beam with Point Load.	(2M)	CO2	BL2
e)	Derive Section Modulus of Rectangular section	(2M)	CO3	BL2
f)	Write the Assumptions of Theory of simple bending.	(2M)	CO3	BL2
g)	Explain Moment Area Method.	(2M)	CO4	BL2
h)	Define Mohr's Theorem.	(2M)	CO4	BL2
i)	What are the Limitations of Euler's Theory.	(2M)	CO5	BL2
j)	Differentiate between Columns & Struts.	(2M)	CO5	BL2

PART–B (5X10 = 50M)

2	A load of 450 KN is supported by a square reinforced concrete (RC) column of size 300 × 300 mm. The column is reinforced with 4 reinforcing bars of 20 mm diameter. If the modulus of elasticity of steel is 16 times that of concrete, find (i) the stresses in steel and concrete (ii) If the stress in concrete is limited to 5 MPa, what is the cross-sectional area of steel required to carry an axial load of 500kN.	10(M)	CO1	BL3
	(OR)			
3	A composite bar of length 900 mm is made up of an aluminium bar of length 450 mm and the steel bar of length 400 mm. The cross-sectional areas of aluminium and steel bars are 120 mm × 120 mm and 80 mm × 80 mm respectively. Assuming that the bars are prevented from buckling sideways, calculate the compressive force P to be applied to the composite bar that will cause the total length of the bar to decrease by 0.4 mm. Assume the modulus of elasticity of aluminium and steel as 72 KN/mm2 and 200 KN/mm2 respectively.	10(M)	CO1	BL3

4	Draw shear force and bending moment diagrams for the beam shown in fig.	10(M)	CO2	BL3

				
	(OR)			
5	A cantilever of span 4 m, carries a uniformly distributed load of 10 KN/m over the entire length, in addition to point load of 30 HN at the free end and a couple of 20 KN-m at mid span. Draw the SF and BM diagrams indicating salient values.	10(M)	CO2	BL3
6	A T – section has a flange width of 200 mm, depth 150 mm and thickness 20 mm. It is subjected to shear force of 120 KN at a section, find the maximum shear stress and also draw the shear stress distribution diagram.	10(M)	CO3	BL3
	(OR)			
7	A beam of I – section is having overall depth as 500 mm and overall width as 190 mm. The thickness of flanges is 25 mm whereas thickness of web is 15 mm. If the section carries a shear force 40 KN, calculate the maximum shear stress and also draw the shear stress distribution across the section.	10(M)	CO3	BL3
8	A cantilever beam of length 6m, carries an UDL of 12 KN/m for a distance of 4 m from the fixed end. Find the deflection and slope at a distance of 4 m from the fixed support and at the free end using Moment Area method. Assume constant Moment of Inertia throughout the beam. Take E = 2.1×105 MPa and I = 89 × 106 mm4.	10(M)	CO4	BL3
	(OR)			
9	A steel girder of uniform cross-section is 16m long and is simply supported at the ends. It carries a concentrated load of 125 KN at 6 m from the left end. It also carries an udl of 15kN/m from a distance, 12m to 16m from left support. Calculate the deflection under the point load and the maximum deflection in the girder. Take I = 70 × 10-4 m4 and E = 206 KN/mm2. Use Double Integration method.	10(M)	CO4	BL3
10a	A thin cylindrical pressure vessel has an internal diameter of 150 mm and a wall thickness of 5 mm. It is subjected to an internal pressure of 7 N/mm2. If the cylinder is 900 mm long and E = 200 GPa, find the stresses induced and also find the Poisson's ratio for the material if the change in volume under this pressure is 15,000 mm3.	5(M)	CO5	BL3
b.	Find the thickness of metal required for a cylindrical shell of internal diameter 120 mm to withstand an internal pressure of 40 MPa. The maximum hoop stress is not to exceed 130 MPa.	5(M)	CO5	BL3
	(OR)			
11a	A cylinder 120 cm long and 20 cm internal diameter having thickness is 15 mm is filled with fluid at atmospheric pressure. If an additional 20 cm3 of fluid is	5(M)	CO5	BL3

b.	pumped into cylinder, find the pressure exerted by the fluid on the cylinder and hoop stress. Take E = 200 GPa and ν = 0.3. A thick cylinder of internal radius 50 mm and external diameter 100 mm is subjected to an external pressure of 25 MPa and internal pressure of 70 MPa. Find the maximum hoop and radial stresses.	5(M)	CO5	BL3

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