O.P.Code:23CE0106	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech.II Year I Semester Regular Examinations February-2025

STRENGTH OF MATERIALS

(Civil Engineering)

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

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	State Hooke's Law.	CO1	L1	2M
	b	Define Poisson's Ratio.	CO1	L1	2M
	c	Define point of contra flexure. In which beam it occurs.	CO2	L1	2M
	d	What is meant by positive or sagging beam?	CO2	L1	2M
	e	What is shear stress? Write the shear stress formula for various cross sections of the beam.	CO3	L3	2M
	f	Define polar modulus. Write the polar modulus for solid shaft and circular shaft.	CO3	L1	2M
	g	Define: Mohr's Theorem for slope and deflection.	CO5	L1	2M
	h	What is the relation between slope, deflection and radius of curvature of a beam?	CO5	L1	2M
	i	Explain the term Slenderness ratio and describe its mathematical expression.	CO6	L2	2M
	j	Distinguish between thin-walled cylinder and thick-walled cylinder?	CO6	L4	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

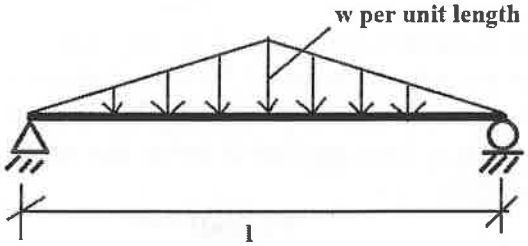
2		Derive the relationship between (i) Modulus of elasticity and modulus of rigidity (ii) Modulus of elasticity and bulk modulus	CO1	L3	10M

OR

3		A specimen of steel 20 mm in diameter with a gauge length of 200 mm is tested to destruction. It has an extension of 0.25 mm under a load of 80 Kn and the load at elastic limit is 102 kN. The maximum load is 130 kN. The total extension is 56 mm and diameter at the neck is 15mm. Find (i) The stress at elastic limit (ii) Young's modulus (iii) Percentage of elongation (iv) percentage reduction in area (v) Ultimate tensile stress.	CO1	L4	10M

UNIT-II

4	a	Derive the relationship between load, shear force, and bending moment for beam.	CO2	L3	5M
	b	A simply supported beam of span 'l' is subjected to gradually varied load as shown in the figure. Draw the shear force and bending moment diagrams.	CO2	L5	5M



OR

5	a	Find out the degree of static indeterminacy for the following beams: (i) Fixed beam (ii) Beam with hinges at both ends (iii) Simply supported beam.	CO2	L1	5M

b	A simply supported beam subjected to couple 'M at its mid span. Draw shear force and bending moment diagrams.	CO2	L3	5M

UNIT-III

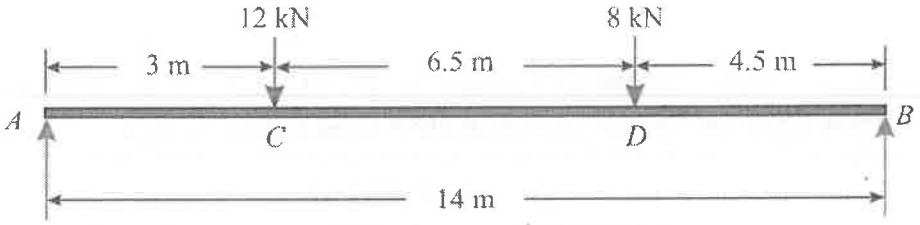
6	A circular log of timber has diameter 'D'. Find the dimensions of the strongest rectangular section to resist moment, one can cut from this log.	CO3	L1	10M

OR

7	A timber beam of rectangular section is simply supported at the ends and carries a point load at the centre of the beam. The maximum bending stress in 12 N/mm^2 and maximum shearing stress is 1 N/mm^2, find the ratio of the span to the depth.	CO3	L1	10M

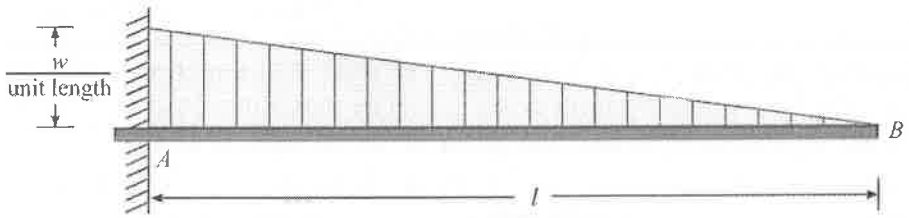
UNIT-IV

8	A horizontal steel girder having uniform cross-section is 14 m long and is simply supported at its ends. It carries two concentrated loads as shown in figure. Calculate the deflections of the beam under the loads C and D. Take E = 200 GPa and I = 160 x 10^6 mm^4.	CO5	L1	10M



OR

9	Find the slope and deflection for a cantilever beam subjected to gradually distributed load as shown in the figure at the free end B.	CO5	L1	10M



UNIT-V

10	A bar of length 4 m when used as a simply supported beam and subjected to a UDL of 30 kN/m over the whole span, deflects 15 mm at the centre. Determine the crippling loads when it is used as a column with following end conditions: (i) Both ends pin-joined (ii) One end fixed and other end hinged (iii) Both ends fixed.	CO6	L4	10M

OR

11	A slender pin ended aluminum column 1.8 m long and of circular cross-section is to have an outside diameter of 50 mm. Calculate the necessary internal diameter to prevent failure by buckling if the actual load applied is 13.6 kN and the critical load applied is twice the actual load. Take E for aluminum as 70 GN/m^2.	CO6	L3	10M

***** END *****