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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Regular & Supplementary Examinations November-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	Explain Elasticity and Plasticity of a body.	CO1	L2	2M
	b	State Hooke's Law.	CO1	L2	2M
	c	Define the terms shear force and bending moment.	CO2	L1	2M
	d	Define point of contra flexure. In which beam it occurs.	CO2	L1	2M
	e	Define the terms Bending stress and section modulus.	CO3	L1	2M
	f	What are the assumptions made in theory of simple bending?	CO3	L1	2M
	g	What is deflection of beam? What are the causes of deflection in beams?	CO5	L1	2M
	h	What are the methods for finding out the slope and deflection at a section?	CO5	L1	2M
	i	Define Circumferential stress (or hoop stress) and Longitudinal stress along with formulas.	CO6	L1	2M
	j	Explain the term Slenderness ratio and describe its mathematical expression.	CO6	L2	2M

PART-B
(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

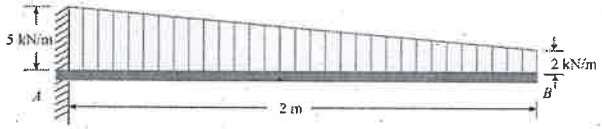
2		Derive the relationship between (i) Modulus of elasticity and modulus of rigidity (ii) Modulus of elasticity and bulk modulus .	CO1	L3	10M

OR

3		A hollow cast iron cylinder 4 m long, 300 mm outer diameter, and thickness of metal 50 mm is subjected to a central load on the top when standing straight. The stress produced is $75x10^3$ kN/m^2. Assume Young's Modulus for cast iron as $1.5x10^8$ kN/m^2 and find (i) magnitude of load (ii) longitudinal Strain produced, and (iii) total decrease in length.	CO1	L1	10M

UNIT-II

4	a	Define shear force and bending moment.	CO2	L1	4M
	b	A cantilever beam of 2 m span is subjected to a gradually varying load from 2kN/m to 5 kN/m as shown in figure. Draw the shear force and bending moment diagrams for the beam.	CO2	L3	6M



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	L4	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	Derive the formula for horizontal shearing stress for a beam subjected to transvers loading.	CO3	L2	5M
	b	Draw the shear stress distribution for a rectangular section of width 'b' and depth 'd'.	CO3	L3	5M

OR

7		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	L4	10M

UNIT-IV

8		Using double integration method determine the maximum slope and deflection for a simply supported beam subjected to uniformly distributed load throughout the length of the beam.	CO5	L3	10M

OR

9		A timber beam of rectangular section has a span of 4.8 m and is simply supported at its ends. It is required to carry a total load of 45kN uniformly distributed over the whole span. Find the value of the breadth (b) and depth (d) of the beam, if maximum bending stress is not to exceed 7 Mpa and maximum deflection is limited to 9.5 mm. Take E for the timber as 10.5 GPa.	CO5	L4	10M

UNIT-V

10		A hollow alloy tube 4 m long with external and internal diameters of 40 mm and 25 mm respectively was found to extend 4.8 mm under a tensile load of 60 kN. Find the buckling load for the tube with both ends pinned. Also find the safe load on the tube, taking a factor of safety as 5.	CO6	L3	10M

OR

11		A steel cylinder of 300 mm external diameter is to be shrunk to another steel cylinder of 150 mm internal diameter. After shrinking, the diameter at the junction is 250 mm and radial pressure at the common junction is 28 N/mm^2. Find the original difference in radii at the junction. Take E = 2 x 10^5 N/mm^2.	CO6	L3	10M

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