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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech II Year I Semester Supplementary Examinations August-2021**

**INTRODUCTION TO SOLID MECHANICS**

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

**PART-A**

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a What is mean by position of principal planes? 2M
- b Mention the types of supports. 2M
- c Where the shear stress is max for Triangular section? 2M
- d A cantilever is subjected to a point load W at the free end. What is the slope and deflection at the free end? 2M
- e How columns are classified depending upon slenderness ratio? 2M

**PART-B**

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

**UNIT-I**

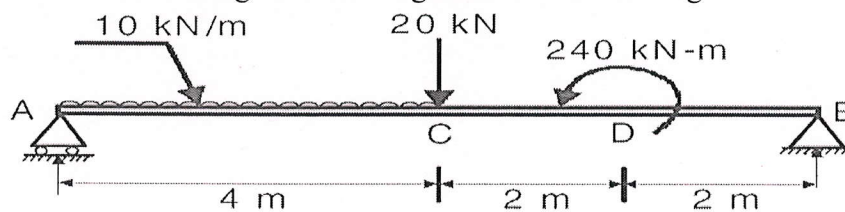
- 2 A steel bar 50 mm wide, 12 mm thick and 300 mm long is subjected to an axial pull of 84 kN. Find the changes in the length, width, thickness and the volume of the bar. 10M

**OR**

- 3 The modulus of rigidity for a material is  $0.51 \times 10^5 \text{ N/mm}^2$ . A 10 mm diameter rod of a material was subjected to an axial pull of 10 kN and the changes in diameter was observed to be  $3 \times 10^{-3} \text{ mm}$ . Calculate Poisson's ratio, E and K. 10M

**UNIT-II**

- 4 Draw shear force and bending moment diagram for the following beam 10M



**OR**

- 5 Draw shear force and bending moment diagram for simply supported beam subjected to Eccentric point load 10M

**UNIT-III**

- 6 An I-section has 100 mm wide and 12 mm thickness, a web of 120 mm height and 10 mm thickness. The section is subjected to bending moment of 15 KN-m and shear force of 10 KN. Find the maximum bending stress and maximum shear stress and draw shear stress distribution diagram. 10M

**OR**

- 7 Derive the relation for a circular shaft when subjected to torsion  $\frac{T}{J} = \frac{\tau}{R} = \frac{C\theta}{L}$  10M

## UNIT-IV

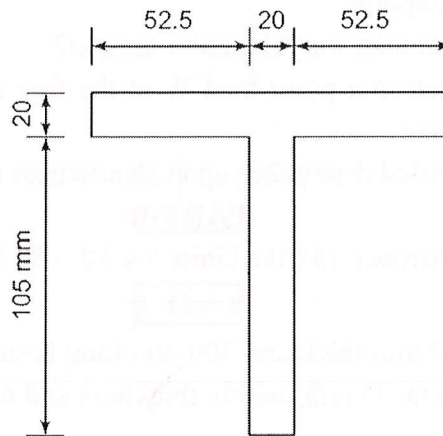
- 8 Derive the expression for slope and deflection of a cantilever beam carrying a point load at the free end by Moment Area method **10M**

OR

- 9 A simply supported beam carries a UDL of 20 kN/m over its span of 8 m. Determine the slope at the ends and the deflection at mid span by moment area method if  $E=200 \text{ G N/m}^2$  and  $I=30,000 \text{ cm}^4$ . **10M**

## UNIT-V

- 10 Determine the Euler critical load for the column section shown in Fig. if its length is 3 m and (i) if its ends are hinged and (ii) if its ends are fixed.  $E = 200 \text{ GPa}$  **10M**



OR

- 11 Drive the equation for the Euler's crippling load for a both ends are fixed. **10M**

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