

**Reg. No:**

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

**B.Tech II Year I Semester Supplementary Examinations July-2022**

**STRENGTH OF MATERIALS**

(Common to ME & AGE)

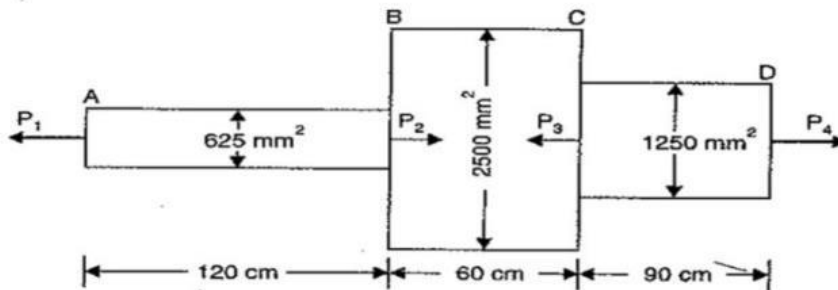
Time: 3 hours

Max. Marks: 60

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

**UNIT-I**

- 1 A member ABCD is subjected to point loads  $P_1$ ,  $P_2$ ,  $P_3$  and  $P_4$  as shown in figure. **L1 12M**  
Calculate the force  $P_2$  necessary for equilibrium, if  $P_1=45$  kN,  $P_3=450$  kN and  $P_4=130$  kN. Determine the total elongation of the member, assuming the modulus of elasticity to be  $2.1 \times 10^5$  N/mm<sup>2</sup>



OR

- 2 Write a note about **L2 12M**  
(i) Hooke's Law,  
(ii) Lateral strain,  
(iii) Poisson's ratio,  
(iv) Volumetric strain,  
(v) Factor of safety,  
(vi) Modulus of elasticity

**UNIT-II**

- 3 A beam 10 m long and simply supported at each end, has a uniformly distributed load of 1000 N/m extending from the left end upto the centre of the beam. There is also an anti-clockwise couple of 15 kNm at a distance of 2.5 m from the right end. Draw the S.F. and B.M. diagrams. **L1 12M**

OR

- 4 A square beam 20 mm x 20 mm in section and 2 m long is supported at the ends. The beam fails when a point load of 400 N is applied at the centre of the beam. What uniformly distributed load per metre length will break a cantilever of the same material 40 mm wide, 60 mm deep and 3 m long? **L2 12M**

**UNIT-III**

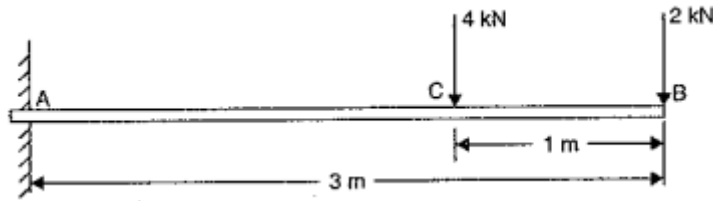
- 5 Derive shear stress distribution formula for triangular section with a neat sketch **L1 12M**

OR

- 6 A hollow shaft, having an inside diameter 60% of its outer diameter, is to replace a solid shaft transmitting the same power at the same speed. Calculate the percent-age saving in material, if the material to be used is also the same. **L2 12M**

**UNIT-IV**

- 7 A cantilever of length 3 m carries two point loads of 2 kN at the free end and 4 kN at a distance of 1 m from the free end. Find the deflection at the free end. Take  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $I = 108 \text{ mm}^4$  **L1 12M**

**OR**

- 8 A column of timber section 15 cm x 20 cm is 6 metre long both ends being fixed. If the Young's modulus for timber =  $17.5 \text{ kN/mm}^2$ , determine : **L2 12M**  
 (i) Crippling load and  
 (ii) Safe load for the column if factor of safety = 3.

**UNIT-V**

- 9 Derive an expression for hoop and radial stresses across thickness of the thick cylinder. **L1 12M**

**OR**

- 10 Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of  $8 \text{ N/mm}^2$ . Also sketch the radial pressure and hoop stress distribution across the section. **L2 12M**

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