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

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

STRENGTH OF MATERIALS

(Common to ME & AGE)

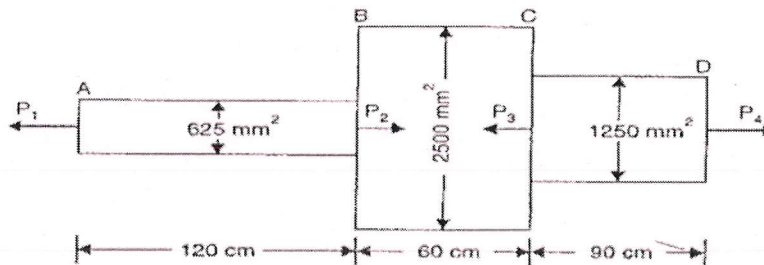
Time: 3 hours

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. 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 2.1×10^5 N/mm². **12M**



OR

- 2 Derive the relation between Young's Modulus (E), Rigidity Modulus (G) and Bulk Modulus (K). **12M**

UNIT-II

- 3 A horizontal beam 10m long is carrying a uniformly distributed load of 1 KN/m. The beam is supported on two supports 6m apart. Find the position of the supports, so that B.M. on the beam is as small as possible. Also draw the S.F. and B.M. diagrams. **12M**

OR

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

UNIT-III

- 5 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 is 12 N/mm² and maximum shearing stress is 1 N/mm², find the ratio of the span to the depth. **12M**

OR

- 6 Derive torsion equation for a circular shaft with necessary assumptions. **12M**

UNIT-IV

- 7 A beam of uniform rectangular section 200mm wide and 300mm deep is simply supported at its ends. It carries a uniformly distributed load of 9 KN/m run over the entire span of 5m. If the value of E for the beam material is 1×10^4 N/mm², find : **12M**
(i) The slope at the supports and
(ii) Maximum deflection.

OR

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- 8 A column of timber section 15cm x 20cm is 6 meter long both ends being fixed. If the Young's modulus for timber = 17.5 KN/mm^2 , determine : **12M**
- Crippling load and
 - Safe load for the column if factor of safety = 3.

UNIT-V

- 9 A copper cylinder, 90cm long, 40cm external diameter and wall thickness 6mm has its both ends closed by rigid blank flanges. It is initially full of oil at atmospheric pressure. Calculate additional volume of oil which must be pumped into it in order to raise the oil pressure to 5 N/mm^2 above atmospheric pressure. For copper assume $E = 1.0 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio $1/3$. Take bulk modulus of oil as $K = 2.6 \times 10^3 \text{ N/mm}^2$. **12M**

OR

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

*** END ***