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

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

STRENGTH OF MATERIALS-I

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

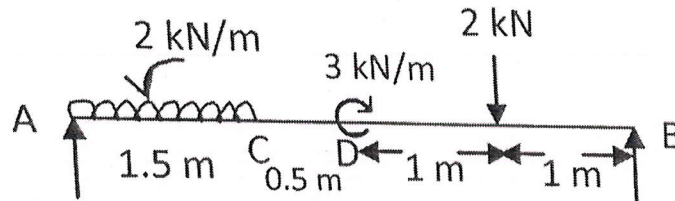
- 1 a A rod 150 cm long and of diameter 2.0 cm is subjected to an axial pull of 20 kN. If the modulus of elasticity of the material of the rod is $2 \times 10^5 \text{ N/mm}^2$, determine the Stress, Strain and Elongation of the rod. **6M**
- b Define Poisson's ratio and Factor of safety. **6M**

OR

- 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. **12M**

UNIT-II

- 3 Draw shear force and bending moment diagram for the following beam. **12M**



OR

- 4 Draw the SFD and BMD for simply supported beam carrying uniformly distributed load of whole length and also derive equation for it. **12M**

UNIT-III

- 5 An I-section has the following dimensions **12M**
Flanges: 150 mm x 20 mm Web: 310 mm x 10 mm. If the shear force acting on the section is 40 kN. Calculate the maximum shear stress developed in I-section and stress distribution diagram.

OR

- 6 A rectangular beam 100 mm wide and 250 mm deep is subjected to a maximum shear force of 50 kN. Determine i) Average shear stress ii) Maximum shear stress iii) Shear stress at a distance of 25 mm above neutral axis. **12M**

UNIT-IV

- 7 Derive the expression for slope and deflection of a simply supported beam carrying a uniformly distributed load by Mohr's theorem. **12M**

OR

- 8 A cantilever of length 3m carries a uniformly distributed load over the entire length. If the deflection at the free end is 40 mm, find the slope at the free end. **12M**

UNIT-V

- 9 A Simply supported beam of length 5 m carries a point load of 5 kN at a distance of 3 m from left end. If $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 1 \times 10^8 \text{ mm}^4$ for the beam, determine: **12M**
 (i) slope at left support and (ii) deflection under the point load using conjugate beam method.

OR

- 10 A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 r.p.m. **12M**
 (rotations per minute) Determine the maximum internal diameter if the maximum stress in the shaft is not exceeded to 60 N/mm^2 .

*** END ***