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

B.Tech II Year II Semester Supplementary Examinations February-2022

MECHANICS OF SOLIDS

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

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

- | | | | |
|---|---|--|----|
| 1 | a | Write the formulae for hoop, longitudinal and volumetric stress. | 2M |
| | b | What is meant by unsymmetrical bending? | 2M |
| | c | Define Castiglianos first theorem. | 2M |
| | d | Define point of contraflexure | 2M |
| | e | What is sway and non-sway portal? | 2M |

PART-B

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

UNIT-I

- 2 A cylindrical thin drum **80 cm** in diameter and **3 m** long has a shell thickness of **1 cm**. If the drum is subjected to an internal pressure of **2.5 N/mm²**, determine (i) change in diameter (ii) change in length and (iii) change in volume. Take **E= 2x10⁵ N/mm²** Poisson's ratio **0.25**. 10M

OR

- 3 Calculate the thickness of metal necessary for a cylindrical shell of internal diameter **160 mm** to withstand an internal pressure of **8 N/mm²**, if maximum hoop stress in the section is not exceed to **35 N/mm²**. 10M

UNIT-II

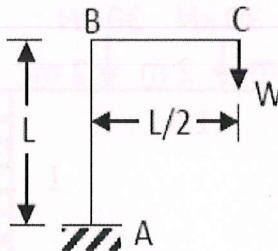
- 4 Derive kernel of section for Rectangular, Circular and Hollow Circular sections 10M

OR

- 5 A **45 mm x 45 mm x 5 mm** angle is used as a **SSB** over a span of **2.4 m**. It carries a load of **300 N** along the vertical axis passing through the centroid of the section. Determine the resulting bending stress on the outer corners of the section, along the middle section of the beam. 10M

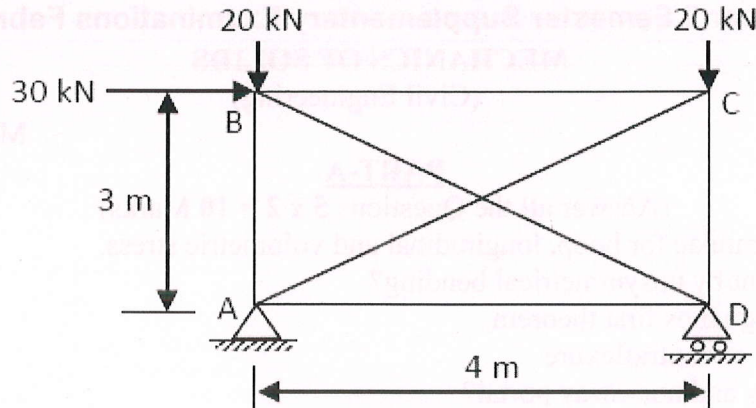
UNIT-III

- 6 A vertical load **W** is applied to the rigid cantilever frame shown in Figure below. Assuming **EI** to be constant throughout the frame determine the horizontal and vertical displacements of the point **C**. Neglect axial deformation. 10M



OR

- 7 Determine the stresses in all the members of the frame shown in Figure below, in which the cross sectional area of vertical members are 30 cm^2 each and those of all other members are 22 cm^2 . Take $E = 200 \text{ GPa}$. 10M

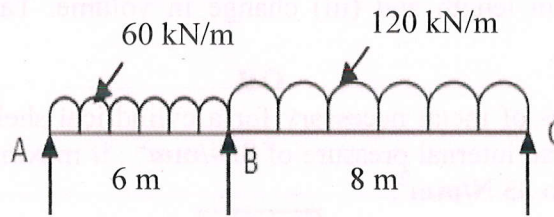


UNIT-IV

- 8 A fixed beam of length 8 m carries two point loads of 40 kN each at a distance of 2 m from both ends. Determine the fixed end moments and draw BMD. 10M

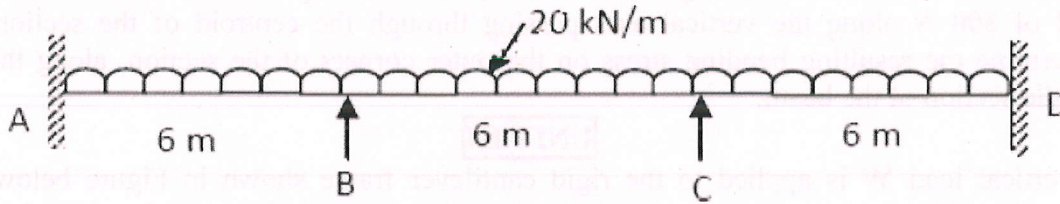
OR

- 9 Analyze the beam and draw BMD and SFD 10M



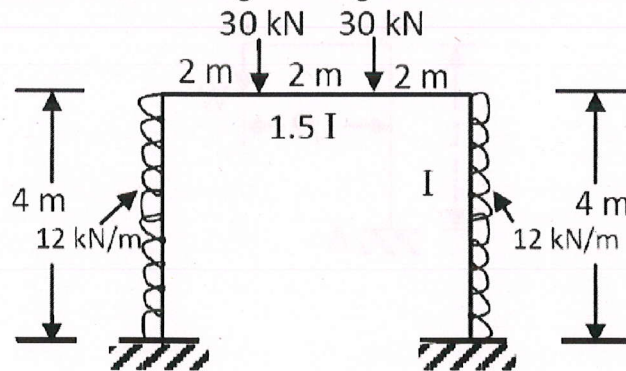
UNIT-V

- 10 Analyze the continuous beam shown in Figure below by slope deflection method and sketch SFD and BMD. EI is constant. 10M



OR

- 11 Analyze the portal frame shown in Figure using moment distribution method. 10M



END