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

B. Tech II Year I Semester Supplementary Examinations November-2022
STRENGTH OF MATERIALS

(Civil Engineering)

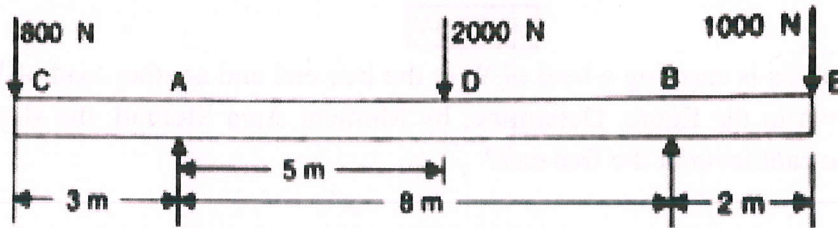
Time: 3 hours

Max. Marks: 60

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

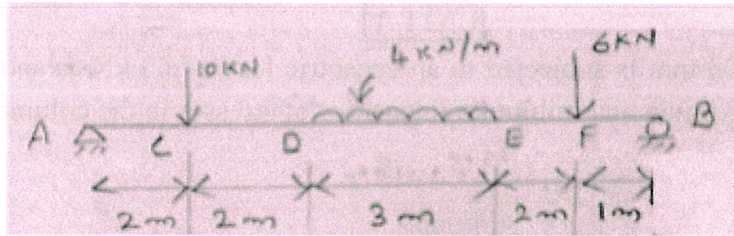
UNIT-I

- 1 Draw the S.F. and B.M. diagrams for the beam which is loaded as shown in figure. L3 12M
Determine the points of contra-flexure within the span AB?



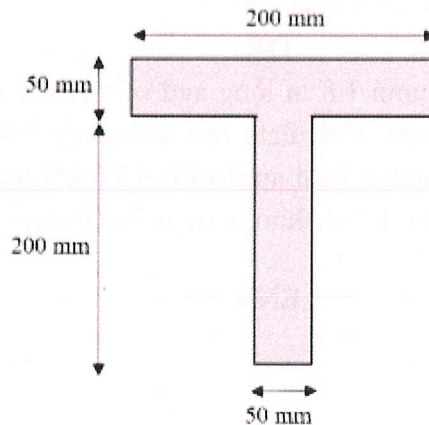
OR

- 2 A 10 m long simply supported beam carries two point loads of 10 kN and 6kN at 2 m and 9 m respectively from the left end. It has a uniformly distributed load of 4 kN/m run for the length between 4 m and 7 m from the left hand end. Draw the shear force and bending moment diagrams. L3 12M



UNIT-II

- 3 A T – shaped cross section of a beam shown in figure is subjected to a vertical shear force of 100 kN. Calculate the shear stress at important points and draw the shear stress distribution diagram? Moment of inertia about the horizontal neutral axis (I) = $113.4 \times 10^6 \text{ mm}^4$. L3 12M



(P.T.O)

OR

- 4 A timber beam of rectangular section is simply supported at the ends and carries a point load at the centre of the beam. If the maximum bending stress is 12 N/mm^2 and maximum shearing stress is 1 N/mm^2 , find the ratio of the span to the depth? **L3 12M**

UNIT-III

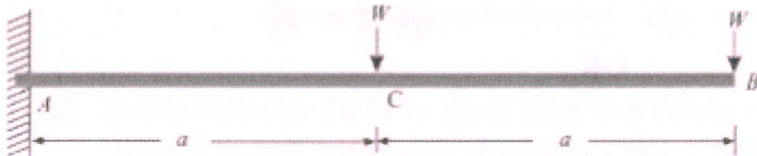
- 5 A solid shaft is subjected to a bending moment of 2.3 kNm and a twisting moment of 3.45 kNm . Find the diameter of the shaft if the permissible tensile and shear stresses for the material of the shaft are limited to 703 and 421.8 MN/m^2 respectively? **L3 12M**

OR

- 6 A carriage spring is to be 600 mm long and made of 9.5 mm thick steel plates and 50 mm broad. How many plates are required to carry a load of 4.5 kN , without the stress exceeding 230 MN/m^2 ? What would be the central deflection and the initial radius of curvature, if the plates straighten under the load? $E = 200 \text{ GN/m}^2$. **L3 12M**

UNIT-IV

- 7 A cantilever of length $2a$ is carrying a load of W at the free end and another load of W at its centre as shown in the figure. Determine, by Moment Area Method, the slope and deflection of the cantilever at the free end? **L3 12M**

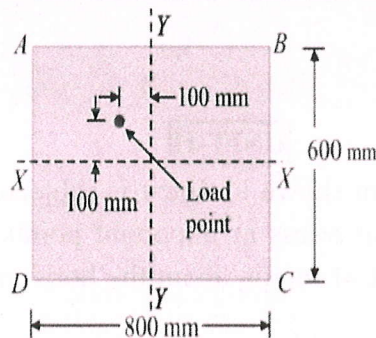


OR

- 8 State the assumptions and derive the equation $M = EI d^2y / dx^2$. **L3 12M**

UNIT-V

- 9 A column $800 \text{ mm} \times 600 \text{ mm}$ is subjected to an eccentric load of 60 kN as shown in figure. What are the maximum and minimum intensities of stresses in the column? **L3 12M**



OR

- 10 A slender pin ended aluminum column 1.8 m long and of circular cross-section is to have an outside diameter of 50 mm . Calculate the necessary internal diameter to prevent failure by buckling if the actual load applied is 13.6 kN and the critical load applied is twice the actual load? Take E for aluminum as 70 GN/m^2 . **L3 12M**

*** END ***