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

B.Tech II Year I Semester Regular & Supplementary Examinations March-2023

STRENGTH OF MATERIALS

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

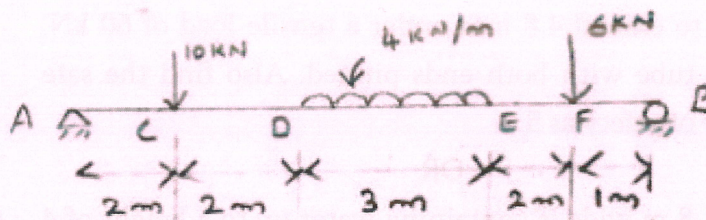
(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Find out the degree of static indeterminacy for the following beams: CO1 L4 6M
 (i) Fixed beam (ii) Beam with hinges at both ends (iii) Simply supported beam
 b A simply supported beam subjected to couple 'M' at its mid span. Draw shear CO1 L3 6M
 force and bending moment diagrams.

OR

- 2 A 10 m long simply supported beam carries two point loads of 10 kN and 6 kN at CO1 L3 12M
 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
 shear force and bending moment diagrams



UNIT-II

- 3 A cast iron water pipe of 500 mm inside diameter and 20 mm thick is supported CO2 L4 12M
 over a span of 10 m. Find the maximum stress in the pipe metal, when the pipe is
 running full. Take density of cast iron as 70.6 kN/m^3 and that of water as 9.8
 kN/m^3

OR

- 4 A timber beam of rectangular section is simply supported at the ends and carries CO2 L4 12M
 a point load at the centre of the beam. 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.

UNIT-III

- 5 a Define the terms: Torsion, torsional rigidity and polar moment of inertia. CO3 L1 6M
 b A solid shaft of 150 mm diameter is used to transmit torque. Find the maximum CO3 L3 6M
 torque transmitted by the shaft if the maximum shear stress induced to the
 shaft is 45 kN/mm^2 .

OR

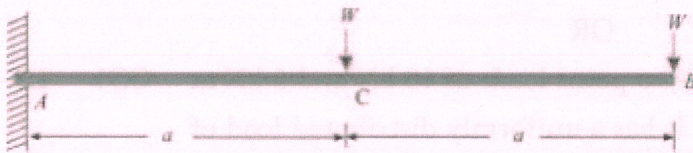
- 6 A carriage spring is to be 600 mm long and made of 9.5 mm thick steel plates and 50 mm broad. How many plates are required to carry a load of 4.5 kN, without the stress exceeding 230 MN/m^2 . What would be central deflection and the initial radius of curvature, if plates straighten under the load? $E = 200 \text{ GN/m}^2$. CO3 L3 12M

UNIT-IV

- 7 A simply supported beam of length 'l' is carrying a uniformly distributed load of magnitude w per unit length throughout the span. Using Moment Area Method determine slope at the supports and deflection at the mid span. CO4 L3 12M

OR

- 8 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. CO4 L3 12M



UNIT-V

- 9 A hollow alloy tube 4 m long with external and internal diameters of 40 mm and 25 mm respectively was found to extend 4.8 mm under a tensile load of 60 kN. Find the buckling load for the tube with both ends pinned. Also find the safe load on the tube, taking a factor of safety as 5 CO5 L4 12M

OR

- 10 A masonry wall 5 m high and 1.8 m wide is containing water up to a height of 4 m. If the coefficient of friction between the wall and the soil is 0.6, check the stability of the wall. Take weight of the masonry and water as 22 kN/m^3 and 9.81 kN/m^3 . CO5 L4 12M

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