Code: 15A01303

R15

B.Tech II Year I Semester (R15) Regular & Supplementary Examinations November/December 2017

STRENGTH OF MATERIALS – I

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Draw the stress-strain diagram for mild steel.
(b) What is resilience?
(c) Write the slope and deflection values at the ends of simply supported beam.
(d) What do you mean by shear force?
(e) Write the section modulus for a T-section.
(f) Draw the shear stress distribution for an I-section.
(g) What is a propped cantilever?
(h) Write the relation between slope, deflection and radius of curvature.
(i) Write the uses of conjugate beam method.
(j) Write the middle quarter rule for circular sections.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 The ultimate stress, for a hollow steel column which carries an axial load of 1.9 mN is 480 N/mm^2, if the external diameter of the column is 200 mm, determine the interval diameter. Take the factor of safety as 4.

OR

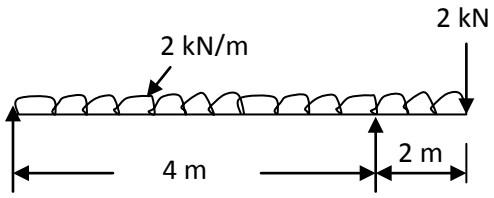
3 A bar of uniform cross-section 'A' and length 'L' hangs vertically, subjected to its own weight. Prove that the strain energy stored within the bar is given by $U = \frac{A\rho^2 L^3}{6E}$ where E = modulus of elasticity & ρ = weight per unit volume of the bar.

UNIT – II

4 A cantilever of length 2 m carries a u.d.l of 1 kN/m run over a length of 1.5 m from the free end. Draw the shear force and bending moment diagrams.

OR

5 Draw the shear force and bending moment diagrams for the beam shown in figure below. Locate the point of contra flexure.



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UNIT – III

6 Determine the dimensions of joist of a timber for span 8 m to carry a brick wall 200 mm thick and 5 m high, if the density of brickwork is 1850 kg/m^3 and the maximum permissible stress is limited to 7.5 MN/m^2, given that the depth of joist is twice the width.

OR

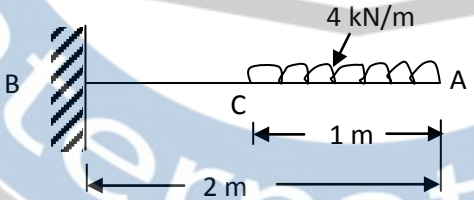
7 A beam has triangular cross-section with base b and height h, and is used with the base horizontal. Calculate the intensity of maximum shear stress and plot the variation of shear stress intensity along the section.

UNIT – IV

8 A steel girder of uniform section 14 m long is simply supported at its ends. It carries concentrated loads of 90 kN and 60 kN at two points 3 m and 4.5 m from the two ends respectively. Calculate: (i) The deflection of the girder at the points under the two loads. (ii) The maximum deflection. Use Macaulay's method.

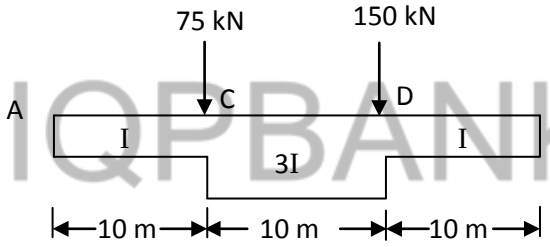
OR

9 Find the slope and deflection at the free end A of the cantilever loaded as shown in figure below. Take E = 2.1 x 10^8 kN/m^2. Use moment area method.



UNIT – V

10 Using conjugate beam method, for the beam shown in figure below find the slopes and deflection at A, B, C and D. Given E = 200 x 10^6 kN/m^2 and I = 300 x 10^{-4} m^4. Neglect the weight of the beam.



OR

11 A short column of hollow cylindrical section 25 cm outside diameter and 15 cm inside diameter carries a vertical load of 400 kN along one of the diameter planes 10 cm away from the axis of the column. Find the extreme intensities of stresses and state their nature.

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