Code: 13A01301

R13

B.Tech II Year I Semester (R13) Regular & Supplementary Examinations December 2015

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) Write the classification of loads.
(b) Write the classification of stresses.
(c) Write the classification of beams.
(d) Define shear force and bending moment.
(e) Write the assumptions in the theory of simple bending.
(f) A circular beam of 100 mm diameter is subjected to a shear force of 30 kN. Calculate the value of average shear stress across the section.
(g) Explain beam deflection.
(h) Write the uses of Macaulay's method for determining the deflection of a beam.
(i) Write the advantages of conjugate beam method over other methods.
(j) Explain the condition for no tension in the section in terms of eccentricity.

PART – B

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

UNIT – I

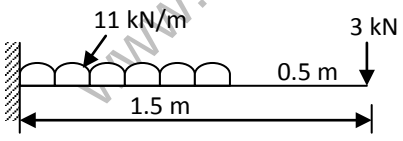
2 The following observations were made during a tensile test on a mild steel specimen 40 mm in diameter and 200 mm long. Elongation with 40 kN load, $\delta l = 0.0304$ mm, yeild load = 161 kN, maximum load = 242 kN and length of specimen at fracture = 249 mm. Determine: (i) Young's modulus of elasticity. (ii) Yield point stress. (iii) ultimate stress. (iv) Percentage elongation.

OR

3 Derive the relation between E, C and K.
(Where E = Youngs modulus, C = Rigity modulus and K = Bulk modulus).

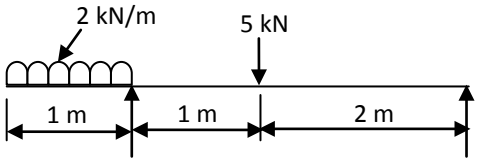
UNIT – II

4 Draw the shear force and bending moment diagrams for the cantilever loaded as shown in figure below.



OR

5 Draw the shear force and bending moment diagram for the overhanging loaded as shown in figure below. And also locate the point of contra-flexure.



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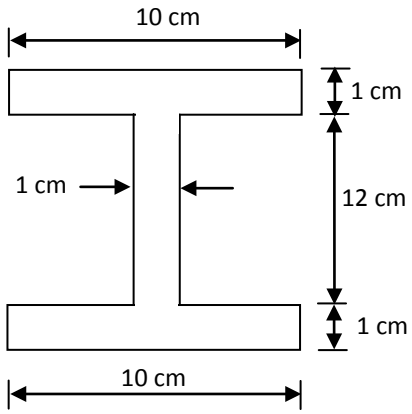
UNIT – III

6 A simply supported beam of span 5 m has a cross-section 150 mm × 250 mm of the permissible stress is 10 N/mm^2. Find: (i) Maximum intensity of uniformly distributed load it can carry. (ii) Maximum concentrated P applied at 2 m from one end it can carry.

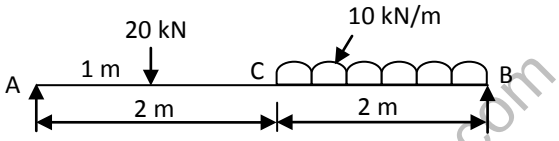
OR

7 Calculate the maximum tensile and shear stresses induced in the I - section with rectangular ends shown in figure below is subjected to a bending moment of 5 kNm and a shearing force of 5 kN.



UNIT – IV

8 A beam AB of 4 m span is simply supported at the ends and is loaded as shown in figure below. Determine: (i) Deflection at C. (ii) Maximum deflection. (iii) Slope at the end A. Take E = 200 × 10^6 kN/m^2 and I = 20 × 10^{-6} m^4.

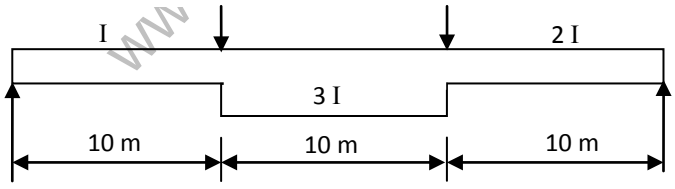


OR

9 A cantiliver beam of 4 m span carries a U.D.L of 3 kN/m over its entire span and a point load of 3 kN at free end. If the same beam is simply supported at two ends, what point load at the centre should it carry to have same deflection as the cantiliver.

UNIT – V

10 Find the slopes and deflections at A, B, C and D for the beam shown in figure below, using conjugate beam method. Take E = 200 × 10^6 kN/m^2 and I = 300 × 10^{-4} m^4. Neglect the weight of the beam.



OR

11 A rectangular strut is 20 cm wide and 15 cm thick. It carries a load of 60 kN at an eccentricity of 2 cm in a plane bisecting the thickness. Find the maximum and minimum intensities of stress in the section.

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