Code: 15A01303

R15

B.Tech II Year I Semester (R15) Supplementary Examinations June 2018

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) Define factor of safety?
(b) Define resilience.
(c) What do you mean by point of contra flexure?
(d) For a cantilever beam where the maximum bending moment occurs.
(e) What are the assumptions in simple bending?
(f) Write down the formula to find the section modulus of rectangular section.
(g) Why the deflection is to be considered in the design?
(h) Write down Mohr's theorems.
(i) What is the basic concept of conjugate beam method?
(j) Define core of a section.

PART – B

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

UNIT – I

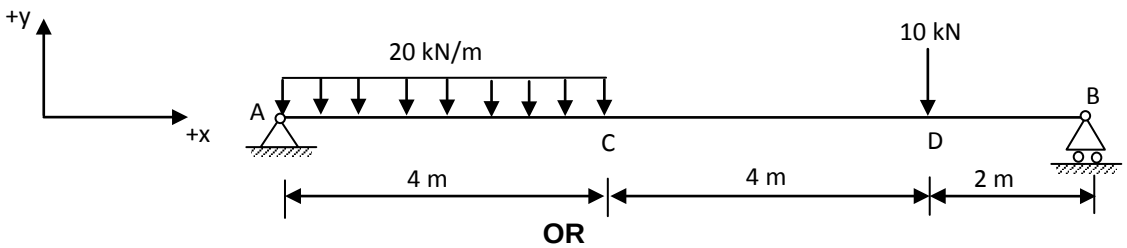
2 A mild steel bar 20 mm diameter and 400 mm long is enclosed in a copper tube of 50 mm outside diameter and 25 mm inside diameter. The composite bar is heated through 50^0C. Determine the stresses induced in each metal. Determine also the extension of the composite bar. Hence calculate the axial thrust P required to nullify the extension. The elastic modulus and coefficient of thermal expansion for steel are 200 GPa and 11.7 × 10^{-6} per °C respectively and for copper 70 GPa and 21.6 × 10^{-6} per °C respectively.

OR

3 A 1 m long bar of rectangular cross section 50 x 80 mm is subjected to an axial load of 1.2 kN. Write the maximum stress and strain energy developed in the bar if the load applied is: (i) Gradual. (ii) Sudden. (iii) Falls through a height of 25 mm. Take E = 205 GPa.

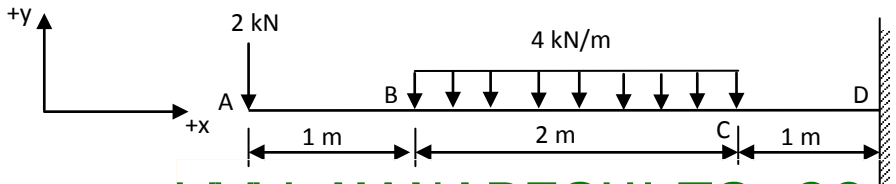
UNIT – II

4 Determine the bending moment and shear force values for the given beam and draw the BMD and SFD.



OR

5 Determine the bending moment and shear force values for the given beam and draw the BMD and SFD.



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UNIT – III

6 A cantilever beam, 50 mm wide by 150 mm high and 6 m long, carries a load that varies uniformly from zero at the free end to 1000 N/m at the wall: (i) Compute the magnitude and location of the maximum flexural stress. (ii) Determine the type and magnitude of the stress in a fiber 20 mm from the top of the beam at a section 2 m from the free end.

OR

7 Derive the expression for the shear stress distribution for a circular section.

UNIT – IV

8 A simple beam of span 4 m is loaded uniformly with 40 kN/m for the third quarter of the span from the left end. Using Macaulay's approach, determine the maximum deflection. E = 2 x 10^5 MPa and I = 5 x 10^7 mm^4.

OR

9 An overhanging beam of span 'l' and a single overhang 'a' is loaded uniformly with w/unit length throughout. Determine the deflection at the free end by moment area method.

UNIT – V

10 Determine the deflection of the simply supported beam AB of length 9m carrying two point loads 30 kN and 50 kN at a distance of 3 m and 7 m respectively from the left support using conjugate beam method.

OR

11 A masonry chimney 20 m high of uniform circular section, 5 m external diameter and 3 m internal diameter has to withstand a horizontal wind pressure of intensity 2 kN/m^2 of the projected area. Find the maximum and minimum stress intensities at the base. Take unit weight of masonry as 21 kN/m^3.

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