Code: 15A01303 **R15**

B.Tech II Year I Semester (R15) Supplementary Examinations June 2017

STRENGTH OF MATERIALS - I

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

*****

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

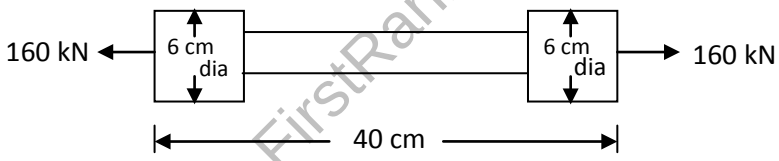
(a) State Hooke's law.
(b) What do you mean by shock loadings?
(c) What is an overhanging beam?
(d) What do you mean by point of contraflexure?
(e) Write the section modulus for solid and hollow circular sections.
(f) Draw the shear stress distribution across a rectangular section.
(g) What do you mean by an elastic line of a beam?
(h) Write the formula for radius of curvature of the deflected beam.
(i) What do you mean by a conjugate beam?
(j) What do you mean by core of a section?

PART - B

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

UNIT - I

2 The bar shown in the figure is subjected to a tensile load of 160 kN. If the stress in the middle portion is limited to 150 N/mm^2, determine the diameter of the middle portion. Find also the length of the middle portion if the total elongation of the bar is to be 0.2 mm. E = 2.1 x 10^5 N/mm^2.



OR

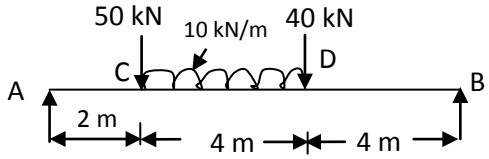
3 A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm.
Calculate: (i) Young's modulus. (ii) Bulk modulus. (iii) Poisson's ratio.

UNIT - II

4 A cantilever of length 2 m carries a u.d.l of 1.5 kN/m run over the whole length and a point load of 2 kN at a distance of 0.5 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 simply supported beam shown in figure. Also calculate the maximum bending moment.



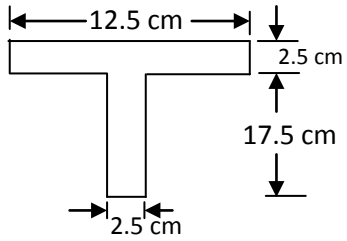
Contd. in page 2

UNIT - III

6 A beam consists of a symmetrical rolled steel joist. The beam is simply supported at its ends and carries a point load at the centre of the span. If the maximum stress due to bending is 140 MPa. Find the ratio of the depth of the beam section to span in order that the central deflection may not exceed $\frac{1}{480}$ of the span. Take E = 200 GPa.

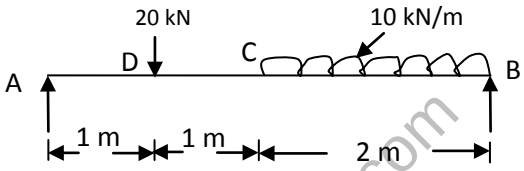
OR

7 A simply supported beam carries a u.d.l of intensity 2.5 kN/m over the entire span of 5 m. The cross-section of the beam is a T-section having the dimensions as shown in figure. Calculate the maximum shear stress for the section of the beam and draw the shear stress distribution.



UNIT - IV

8 A beam AB of 4 m span is simply supported at the ends and is loaded as shown in figure. Determine: (i) Deflection at C. (ii) Maximum deflection. (iii) Slope at the end A. Given $E = 200 \times 10^6\ kN/m^2$ and $\mathrm{I} = 20 \times 10^{-6}\ m^4$. Use Macaulay's method.

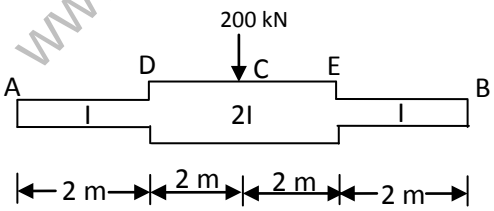


OR

9 A simply supported beam 5 m long carries concentrated loads of 10 kN each at points 1 m from the ends. Calculate:
(i) Maximum slope and deflection of the beam.
(ii) Slope and deflection under each load using moment area method.

UNIT - V

10 Using conjugate beam method find the mid span deflection of the beam shown in the figure below. Take $E = 200 \times 10^6\ kN/m^2$ and $\mathrm{I} = 200 \times 10^{-4}\ m^4$.



OR

11 A rectangular sheet is 20 cm wide and 15 cm thick. If 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.

*****