Code: 9A01302

R09

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

STRENGTH OF MATERIALS - I

(Civil Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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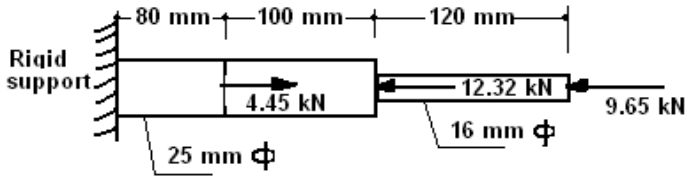
1 (a) Define stress and strain and specify the units for both. Write two examples for each of the ductile material and brittle material.

(b) A circular stepped bar carries a series of loads as shown in figure. Compute the stress in each segment of the bar. All loads act along the central axis of the bar.



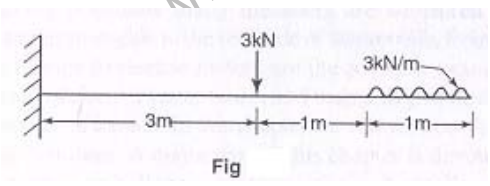
Bar carrying axial loads

2 A lintel of span 3 m supports a brick wall of 20 cm thickness. The height of wall is 1 m at one end, and increases to 3 m at the other end. Compute the maximum bending moment on the lintel if the brick masonry weights 20kN/m^3. Draw SFD & BMD for the lintel.

3 Derive the bending equation stating the assumptions made. Draw the strain variation, stre variation across the cross – section of the beam.

4 A steel beam of I –section, 200 mm deep and 160 mm wide has 16 mm thick flanges and 10 m thick web. The beam is subjected to a shear force of 200 kN. Determine the shear stre distribution over the beam section.

5 Find the slope and deflection at the free end of the cantilever shown in figure. Take EI = 1 x 10^{10}kN-mm^2.



Fig

6 A horizontal cantilever ABC ,4 m long is built in at 4 ,and simply supported at B ,3 m from A by rigid prop so that AB is horizontal .If AB and BC carry a uniformly distributed load of 20 kN/m and 30 kN/m respectively find the load taken by the prop.

7 The principal strains at a point in a two –dimensional stress system were observed to be 0.00035, extension and 0.00025 contractions. Determine: (a) the principal stresses; (b) the maximum shear stress, taking E = 2 x 10^6 kg /cm^2 and Poisson's ratio = 1/3.

8 A solid circular shaft is subjected to a bending moment of 40 kN- m and a torque of 10kN-m. Design the diameter of the shaft according to: (i) Maximum principal stress theory.
(ii) Maximum strain theory. (iii) Maximum shear stress theory.
Take μ = 0.25, stress at elastic limit = 200 N/mm2 and Factor of safety = 2.

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