R – 640

Seat No.	10659

Total No. of Pages : 3

S.E. (Civil) (Part - I) (Semester - III) (Pre - Revised)Examination, December - 2014

STRUCTURAL MECHANICS - I

Sub. Code : 42656

Day and Date : Monday, 15- 12 - 2014 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Attempt any three questions from each section.

2) Use of non-programmable scientific calculator is allowed.

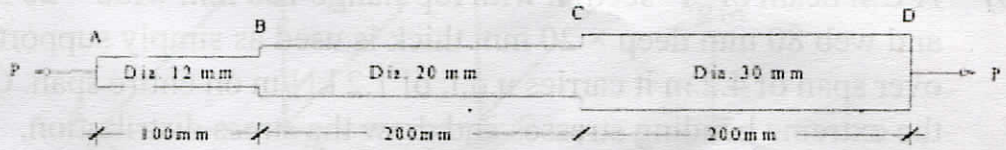
3) Figures to the right indicate full marks.

4) Assume suitable data if necessary.

SECTION - I

Q1) a) Write note on Modulus of Elasticity. **[3]**

b) A circular bar 500 mm length has a cross sectional area as shown in figure. Determine the maximum axial pull which the bar may be subjected if the maximum stresses is limited to 100 N/mm^2. Also find the total elongation. Take E = 2 × 10^5 N/mm^2. **[14]**



Q2) A bar of diameter 20 mm and length 200 mm extends by a length of 0.4 mm upon application of a load P. What is the value of P if E = 2 × 10^5 N/mm^2 ? What is the change in cross sectional area of the bar at this stage if the Poisson's ratio is 0.28? **[16]**

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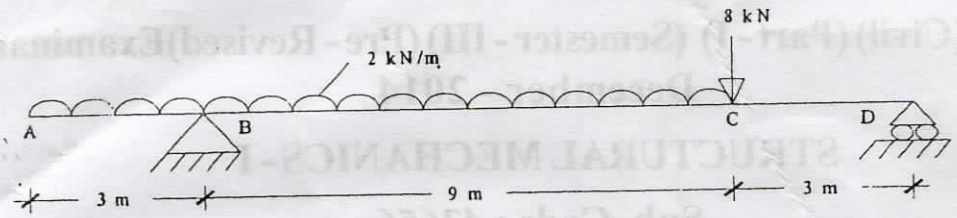
Q3) Draw the shear force and bending moment diagrams for the beam shown in figure. Also show the location of point of contra flexure and maximum bending moment. **[17]**



Q4) a) Write the equation and relation between circumferential and longitudinal stresses in thin cylinders. Explain each term. **[4]**

b) A thin cylinder of internal diameter 1.25 m contains a fluid at an internal pressure of 2 N/mm^2. Determine the maximum thickness of the cylinder if,

i) The longitudinal stress is not to exceed 30 N/mm^2.

ii) The circumferential stress is not to exceeds 45 N/mm^2. **[12]**

SECTION - II

Q5) a) With usual notations derive the flexure formula. **[6]**

b) A C.I. beam of 'T' section with top flange 100 mm wide × 20 mm thick and web 80 mm deep × 20 mm thick is used as simply supported beam over span of 4.2 m it carries u.d.l. of 1.2 kN/m on entire span. Calculate the extreme bending stresses and draw the stress distribution. **[11]**

Q6) a) Derive from the first principle the shear stress distribution for the rectangular section. **[7]**

b) Determine the shear stress intensities at significant layers for the section shown in fig. and sketch the shear stress distribution along the depth of the section, Shear Force = 100 kN. **[10]**

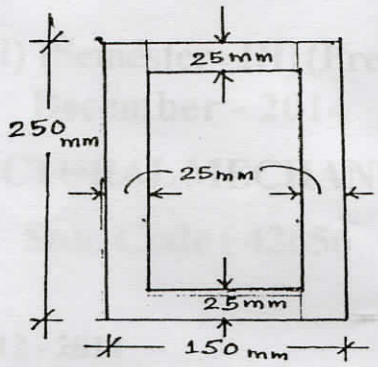


Fig 'Q. 6 (b)

Q7) a) Define the terms **[4]**

i) Strain Energy.

ii) Modulus of resilience.

b) A hammer of weight 8 kN is dropped through a height of 1.8 m on a timber pile 4 m long and 400 mm in dia. neglecting the weight of pile find instantaneous stress and instantaneous contraction. Take E = 9000 MPa. **[12]**

Q8) Determine the forces in the members of truss shown in fig. **[16]**

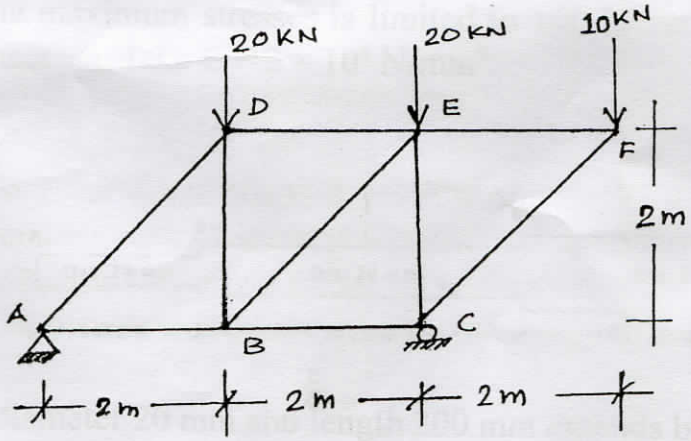


Fig 'Q. 8

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