Code No. 2249

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) I-Semester (Main) Examination, November / December 2012

Subject : Strength of Materials - I

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Write the relationship between deflection, shear force and rate of loading.
2. If the circular shaft is made of material with Young's modulus, Rigidity modulus and Poisson's ratio E, G and v respectively, what is the ratio of Flexural and Torsional Rigidity?
3. Explain with an example the meaning of point of contra flexure.
4. What is the core of hollow circular section of external and internal diameter 'D' and 'd' respectively.
5. State the most important assumptions in theory of bending.
6. What is meant by a flitched beam, what are the advantages of the same?
7. A bar of circular cross section is fixed at one end and free at the other end. What is the ratio of deformation due to an axial tensile force at the free end and due its own weight?
8. Sketch the flexural stress and flexural shear stress distribution across a symmetrically I section.
9. Write the relation between the number of members and joints for a perfect truss.
10. What is meant by dilation? Derive the formula for the same.

PART – B (5x10=50 Marks)

11. A hollow circular chimney of diameter 3.5m and thickness 0.2 m is 40m long. Density of the material of the chimney is 25 kN/m^3. What wind load the chimney can resist so that nowhere tension develops with the body of the chimney? Assume wind load acts uniformly throught the height of chimney.

12. A timber beam 150 mm wide and 200 mm deep has to be strengthened by fixing two steel flitches each of 150 mm x 12 mm in cross section. The flitches may be attached symmetrically at top and bottom or on either side. Suggest the position of flitches for obtaining maximum moment of resistance. The allowable stresses in steel and timer are 126 MN/m^2 and $7MN/m^2$ respectively. Take Young's modulus of steel and timber as 200 GN/m^2 and 10 GN/m^2 respectively.

13. A gun metal rod 20 mm diameter, screwed at the ends, passes through a steel tube 25 mm and 30 mm internal and external diameters respectively. The nuts on the rod are screwed tightly home on the ends of the tube. Find the intensity of stress in each metal, when the common temperature rises by 200 deg F. Take Young's modulus of elasticity for steel and gun metal as 200 GPa and 100 GPa respectively. Take the coefficient of expansion for steel and gun metal as 6×10^{-6} and 10×10^{-6} per deg F.

14. A compound cylinder is made by shrinking a tube of 160 mm internal diameter and 20 mm thick over another tube of 160 mm external diameter and 20 mm thick. The radial pressure at the common surface, after shrinking is 8 MPa. Find the final stresses set up across the section, when the compound cylinder is subjected to an internal fluid pressure of 60 MPa. Sketch the variation of stresses.

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15. Sketch the SFD and BMD for the overhanging simply supported beam loaded as shown in figure 1. Also find the point of contra flexure.

16. Find the forces in the members HD, BC and IH for the pin jointed truss loaded as shown in figure 2.

17. Draw the SFD and BMD for a simply supported beam loaded as shown in figure 3. Using graphical method.

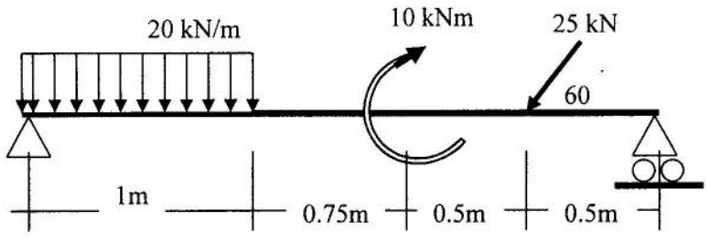

Fig. 1

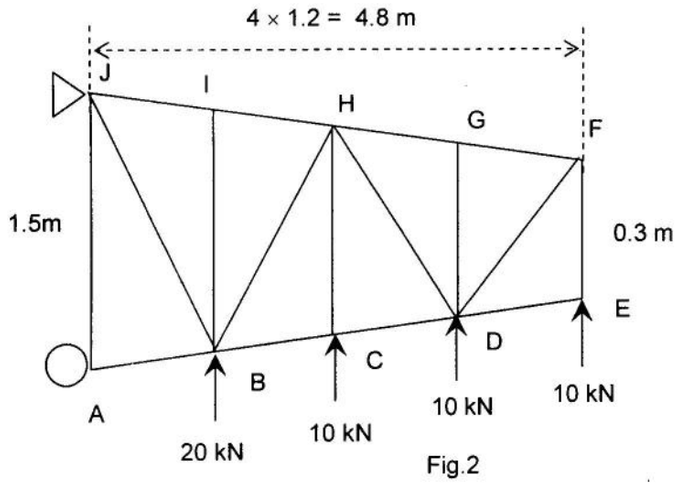

Fig.2

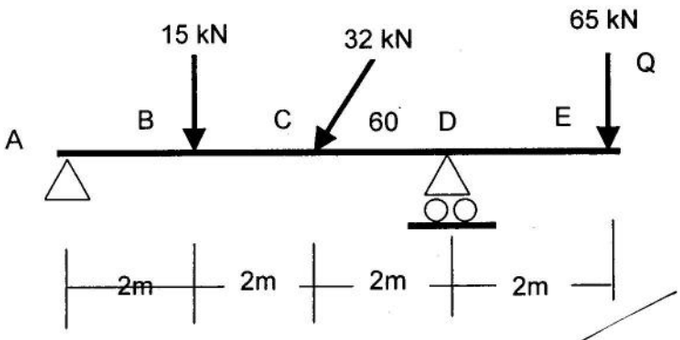

Fig. 3

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