

Subject Code:G1502/R13

M. Tech –I Semester Regular/Supplementary Examinations, April, 2015

ADVANCED MECHANICS OF SOLIDS

(Common to MD and MED)

Time: 3 Hours

Max Marks: 60

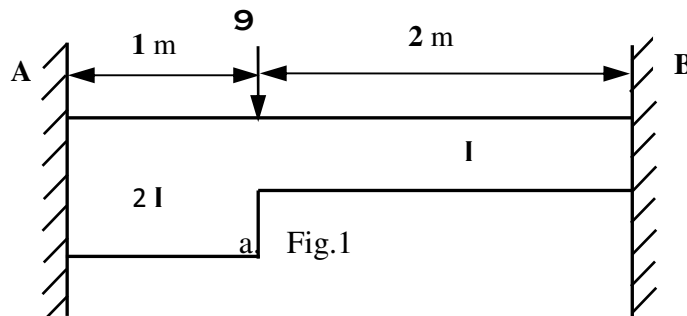
Answer any FIVE questions

All questions carry EQUAL marks

1. a) Differentiate between plane stress and plane strain problems. (4+8)
b) The state of stress at a point is given as follows. Calculate three principal stresses

$$\sigma_{ij} = \begin{bmatrix} 12.31 & 4.2 & 0.84 \\ 4.2 & 8.96 & 5.27 \\ 0.84 & 5.27 & 4.34 \end{bmatrix} MPa$$

2. a) Define buckling. Calculate buckling load of a hinged-hinged column subjected to end axial compressive load.
b) Differentiate between statically determinate and indeterminate structures (8+4)
3. A beam AB of span 3m is fixed at both ends and carries a point load of 9KN at a distance of 1m from support A. The moments of inertias are shown in fig.1. Using Castigliano's theorem, calculate the reactions and moments. (12)

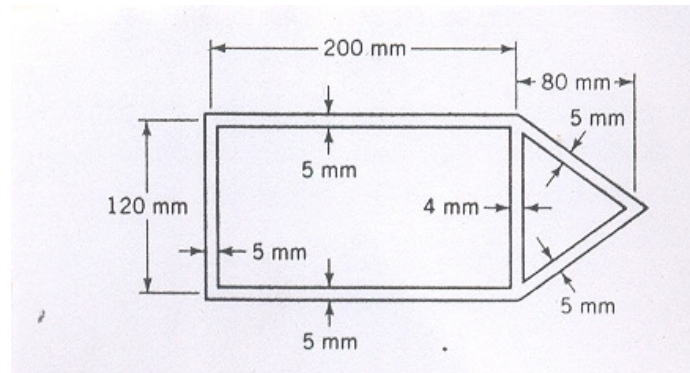


4. A simply supported beam of rectangular section of 8cm and 12cm depth subjected to a point load of 1000N at center and is inclined at an angle of 45 degrees to the vertical plane of symmetry. What is the stress due to bending at four corners of the cross section. Also locate neutral axis. Take length of the beam as 3m. (12)
5. a) Differentiate between straight and curved beams
b) Derive Winkler-Bach formula for the given curved beam from first principles. Also sketch stress distribution across the depth of the section. (4+8)



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6. The aluminum ($G=27.1\text{GPa}$) hollow thin walled torsion member has shown dimensions in Fig.2. Its length is 3m. If the member is subjected torque of 11KN-m, determine the maximum shear stress and angle of twist. (12)



1. Fig.2

7. Explain the solution of elliptical cross section bar subjected to torque by stress function approach (12)
8. a) What is the significance of calculating contact stresses when two bodies in contact. Explain?
b) Explain the procedure to calculate principal stresses when two bodies (sphere and sphere) in contact (6+6)

