PVP 12

Code: **MEMD1T2**

I M.Tech - I Semester - Regular Examinations – March 2014

ADVANCED MECHANICS OF SOLIDS

(MACHINE DESIGN)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. The cross section of a thin-walled beam is as shown in the fig1. Determine the location of the shear centre 'O' of the cross section. 14M

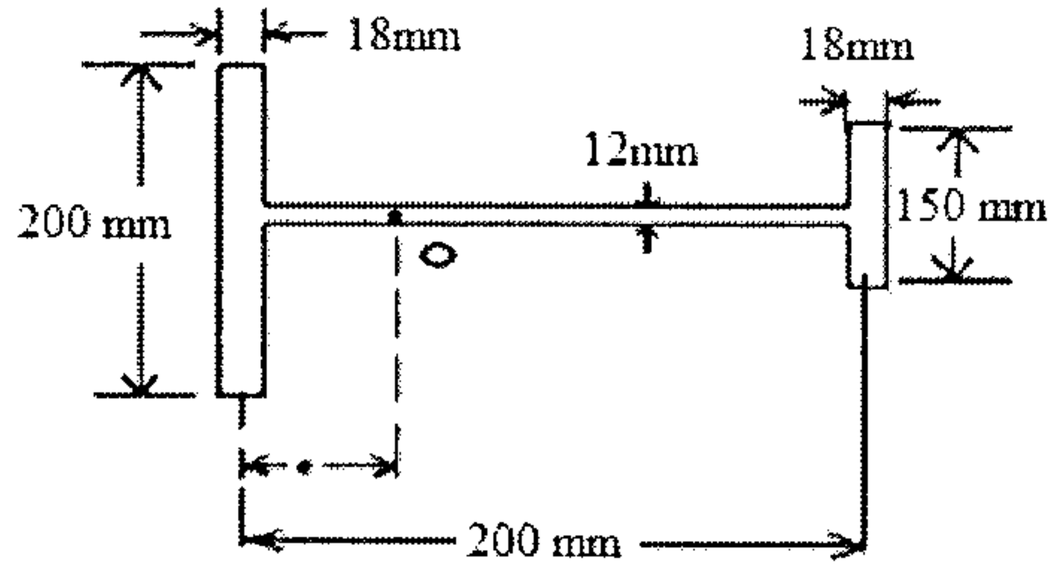


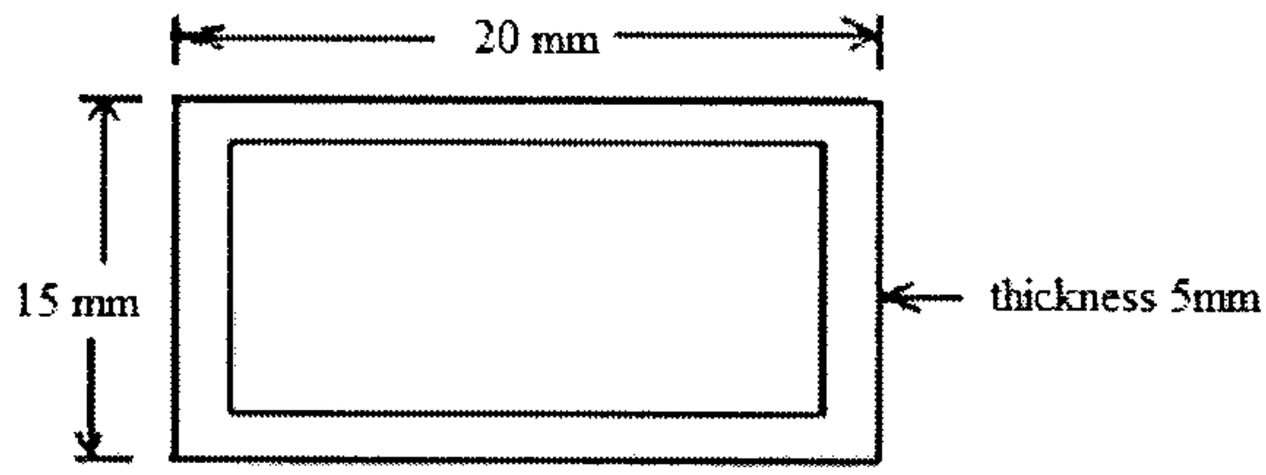
Fig.1.

2. A 60mm x 40mm x 6mm unequal angle is placed with the longer leg vertical and is used as a beam. It is subjected to a bending moment of 12kN-cm acting in the vertical plane through the centroid of the section. Determine the maximum bending stress induced in the section. 14M

3. A central horizontal section of a hook is symmetrical trapezium 50mm deep, the inner width being 60mm and the outer width being 30mm. Estimate the extreme intensities of stress when the hook carries a load of 27kN, the load line passing 40mm from the inside edge of the section and the centre of curvature being in the load line. Also, plot the stress distribution across the section. 14M

4. a) Derive the expression for the torsional resistance of a bar having rectangular cross section. 7 M

b) A cantilever of rectangular section shown in fig 2 is built in at one end and twisted by a couple M_t at the other end. Find the angle of twist. 7 M



5. Derive the necessary expressions and solve the following problem:

A flat steel disc of uniform thickness and of 1m diameter rotates at 2400 rpm. Determine the intensities of principal stresses. Take ρ=7.85x10^-5N/mm^3 and m=3. 14M

6. Derive a complete set of equilibrium equations for small displacement theory of flat plates. 14M

7. a) Explain the analysis procedure for a semi-infinte beam on an elastic foundation. 7 M

b) Find the deflection curve for a semi-infinite beam on an elastic foundation hinged at the end and acted up on by a couple M_o as shown in the fig 3. 7 M

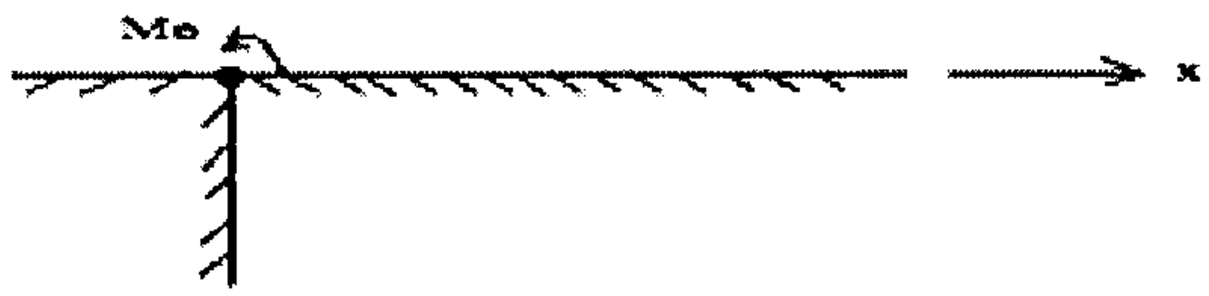


Fig 3

8. a) With suitable examples, explain plane stress and plane strain problems. 7 M

b) Derive two dimensional differential equations of equilibrium in rectangular co-ordinates. 7 M