Code No: 07A62102 **R07** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations,May 2010
Aerospace Vehicle Structures -II
Aeronautical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. A thin-walled cantilever beam of length L has the cross-section shown in Figure 5 and carries a load P positioned as shown at its free end. Determine the torsion bending constant for the beam section and derive an expression for the angle of twist θ_T at the free end of the beam. Calculate the value of this angle for P=100 N, a=30 mm, L =1000 mm, t =2.0 mm, E =70 000 N/mm^2 and G=25 000 N/mm^2. [16]

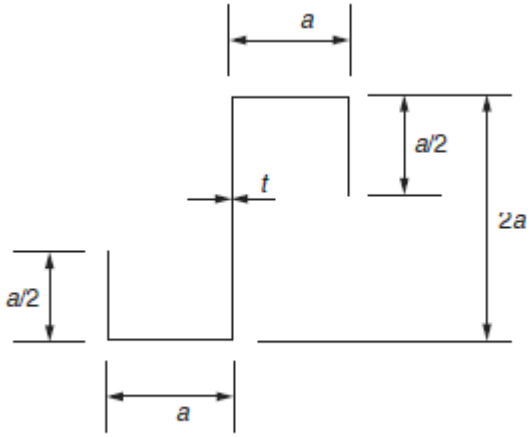

Figure 5:

2. Thickness of the I section is uniform of 10 mm. Determine the shear flow and shear force for the entire structure shown in figure 2. [16]

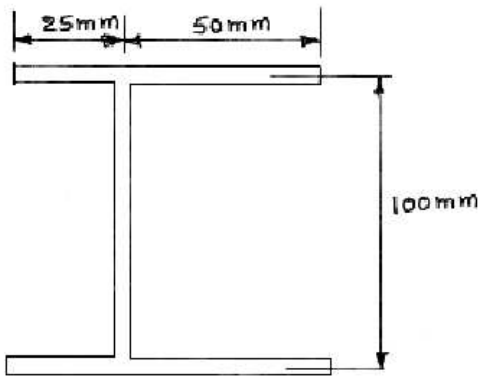

Figure 2

3. Write short notes on the following:
   (a) Effective walls & in effective walls.
   (b) Sheet wrinkling. [8+8]

4. (a) Derive an expression for the angle of diagonal tension.
   (b) Find the shear flow in each web of the beam shown in the figure 4b. Plot the distribution of axial load along each stiffening member when P_1=20kN and P_2=15kN. All dimensions are in cm. [6+10]

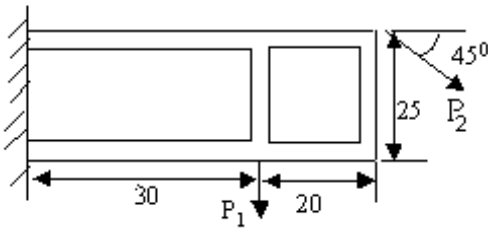

Figure 4b

5. A circular section with outer radius 25mm, inner radius 20mm, having small slit. Find out the shear center of the section due to vertical load applied at shear center. [16]

6. (a) Explain the effect of riveting a long flat plate to a stiffener at regular intervals, in terms of its buckling response.
   (b) The angle extrusion shown in figure 6b is loaded in compression. Each leg of the angle buckles as a plate simply supported on the ends and on one side and free on the other side. Find the stress, at which buckling occurs. If a sheet of 1mm thick is riveted to the extrusion by rivets spaced 25mm apart, find also the compression stress in the extrusion, which produces buckling of the sheet between rivets. Assume E_t = 55 GPa for the extrusion material and 37.5 GPa for the sheet material. All dimensions are in mm. [4+12]

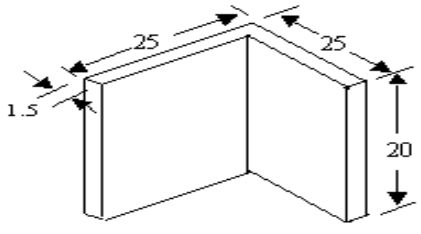

Figure 6b

7. (a) Explain buckling waves in a simply supported flat plate.
   (b) Determine the buckling strength of a panel, comprising flat sheet and uniformly spaced Z-section stringers, a part of whose cross section is shown in figure 6, under uniform compressive loads. [4+12]

8. Determine the rate of twist per unit torque of the beam section shown in Figure 7 if the shear modulus G is 25 000 N / mm^2. [16]

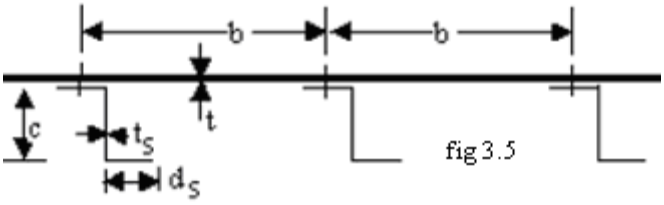

Figure 6:

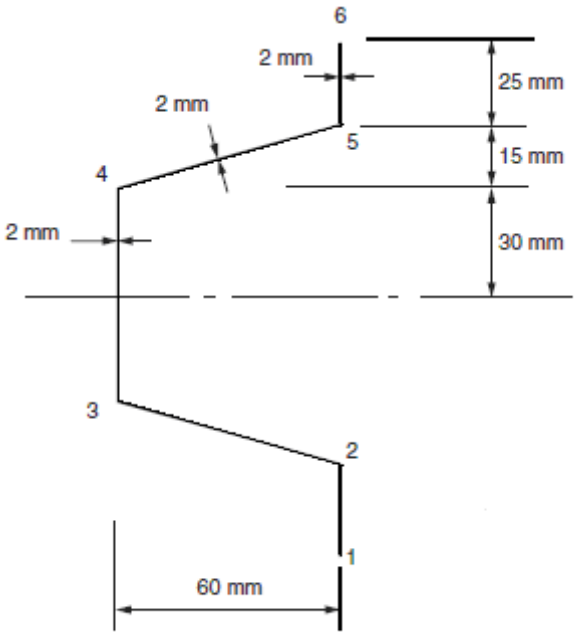

Figure 7:

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