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) Explain the effect of riveting a long flat plate to a stiffener at regular intervals, in terms of its buckling response.

   (b) Explain Nedham's method and Gerard's method of calculating crippling stress of extruded sections.

   (c) What are the various structural elements used in airplane fuselage? [5+6+5]

2. (a) Explain different types of wing structures.

   (b) Explain the advantages and disadvantages of different materials used for air-craft structures.

   (c) Explain Wagner's theory.　　　　　　　　　　　　　　　　[4+6+6]

3. The Unlipped extruded beam has the cross section shown in figure 1, determine:

   (a) The location of the shear centre.

   (b) The distribution of shearing stresses caused by a 110 KN vertical shearing force applied at O.　　　　　　　　　　　　　　　　[16]
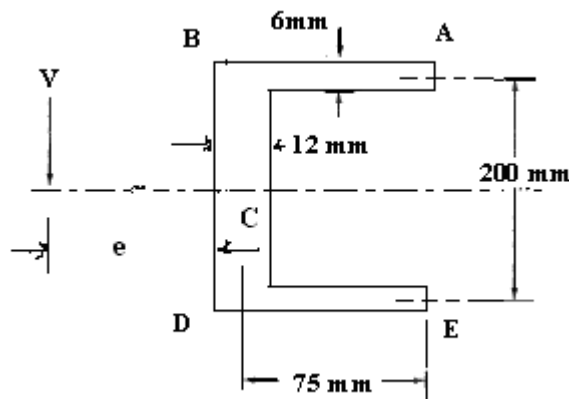

Figure 1:

4. The thin-walled section shown in Figure 2 is symmetrical about the x axis. The thickness to of the centre web 34 is constant, while the thickness of the other walls varies linearly from to at points 3 and 4 to zero at the open ends 1, 6, 7 and 8. Determine the St. Venant torsion constant J for the section and also the maximum value of the shear stress due to a torque T. If the section is constrained to twist

about an axis through the origin O, plot the relative warping displacements of the section per unit rate of twist.
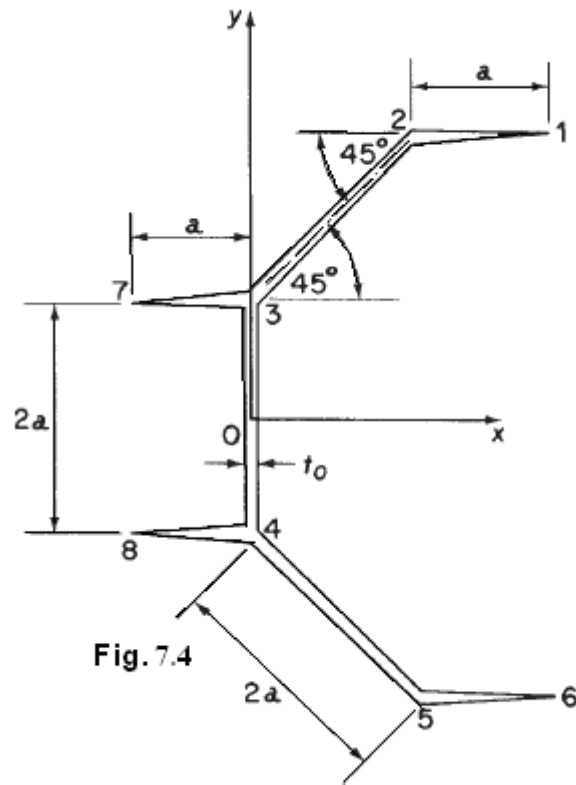
[16]

Fig. 7.4

Figure 2:

5. (a) Explain about torsion bending phenomena.

(b) An open section beam of length L has the section shown in Figure 3 The beam is firmly built-in at one end and carries a pure torque T. Derive expressions for the direct stress and shear flow distributions produced by the axial constraint (the σ_Γ and q_Γ systems) and the rate of twist of the beam.   [4+12]
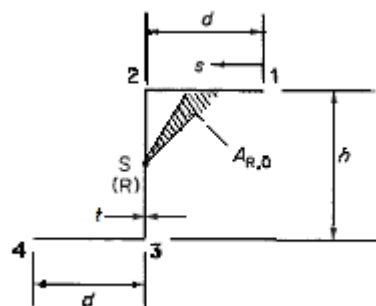

Figure 3:

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6. What are the various forms of fuselage structures? Explain fuselage construction with the help of neat sketches? [4+12]

7. (a) what do you mean by plastic buckling of a flat sheet? Define L/ρ of equivalent column for different conditions.

   (b) Determine the buckling strength of a panel, comprising flat sheet and uniformly spaced stringers, a part of whose cross section is shown in figure 4, under uniform compressive loads. Take E=70GPa and compressive stress = 300 MPa. All dimensions are in mm. [6+10]
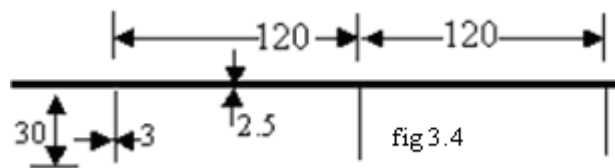

Figure 4:

8. Determine the shear centre for the circular section of radius R, thickness t having a naviour slit. [16]

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