Code No: RR322102 **Set No. 1**

III B.Tech II Semester Regular Examinations, Apr/May 2006
AIRCRAFT STRUCTURES-II
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Show that, if a solid rectangular beam is bent by a couple applied in a plane containing one diagonal of the rectangular cross-section, the neutral axis will lie along the other diagonal. [16]

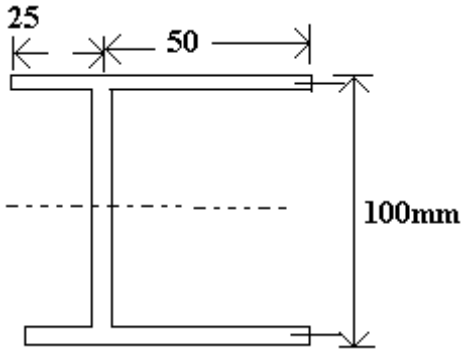

Figure 1:

2. Thickness is uniform 10mm. Determine the shear flow and shear force for the entire structure shown in figure 1. [16]

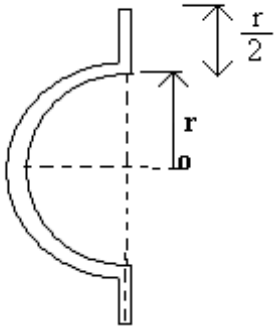

Figure 2:

3. Determine the location for Shear Centre for the thin walled section shown in figure 2. [16]

4. (a) Explain torsional shear flow

   (b) A structural Aluminium tuning of 60100mm rectangular cross section was fabricated by extrusion. Determine the shearing stress in each of the four

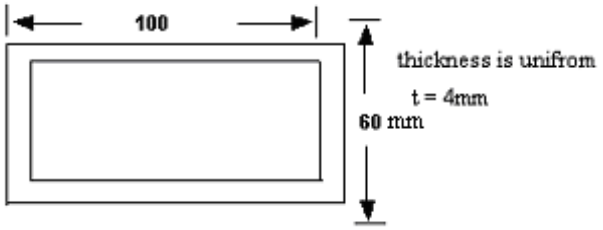

Figure 3:

walls of such tubing when it is subjected to a torque of 2700N-m. Shown in figure 3. [6+10]

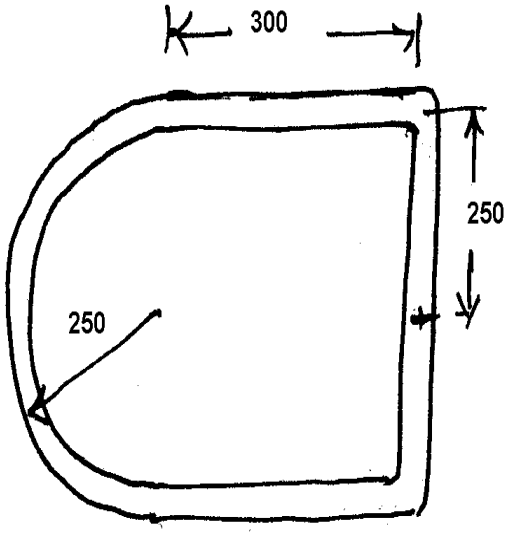

Figure 4:

5. Uniform thickness t=5mm Determine the Shear Centre for an air craft box beam shown in figure 4. [16]

6. Find crippling stress of the rectangular tubes shown in Figure 5 and figure 6. using Gerard's's method when formed form following material.

   (a) 2024-73 Aluminum alloy

   (b) 7075-T6 Aluminum. [16]

7. What is shear flow in structural elements? Explain shear flow in wing and fuselage and sketch the variation? [16]

8. Write short notes on the following:

   (a) stringers

   (b) bulk heads

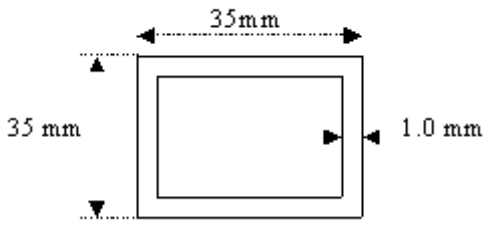

Figure 5:

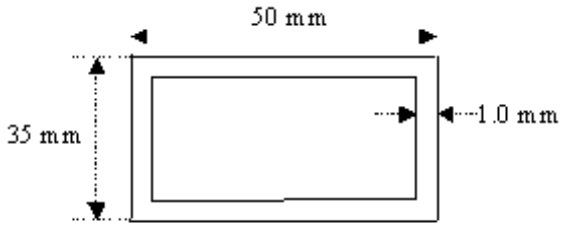

Figure 6:

(c) floor beams

(d) spar webs. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR322102 **Set No. 2**

III B.Tech II Semester Regular Examinations, Apr/May 2006
AIRCRAFT STRUCTURES-II
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Derive the Equation for Bending stress in unsymmetric section about both the axes when it is subjected to moment M_z, M_y. Also locate the orientation of NA. [16]

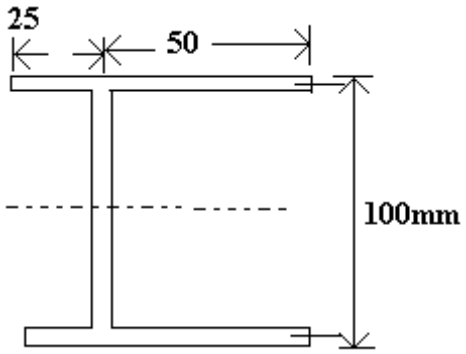

Figure 1:

2. Thickness is uniform 10mm. Determine the shear flow and shear force for the entire structure shown in figure 1. [16]

3. (a) Explain what do you mean by shear centre.
   (b) Prove that the shear centre lies at the junction for an angle section with equal legs. [6+10]

4. Derive the Bredt- Batho formula related to torsion. What are the assumptions made? [16]

5. Box beam of uniform thickness t = 3mm is subjected to a shear force of 20kN. Determine the variation of shear flow through out the cross-section. Shown in figure 2. [16]

6. A sheet panel is 75 - 230- 1.3 mm size. Consider all sides as simply supported. Determine the buckling load if the normal compressive load is applied normal to the 75mm sides. Do so for 3 different materials
   (a) Al alloy 70 75 -T6
   (b) Magnesium HK31A
   (c) Titanium Ti-8Mn. [16]

7. What are the longorons, transverse stringers and span web? Explain their significance with the help of net sketches for wing and fuselage? [16]

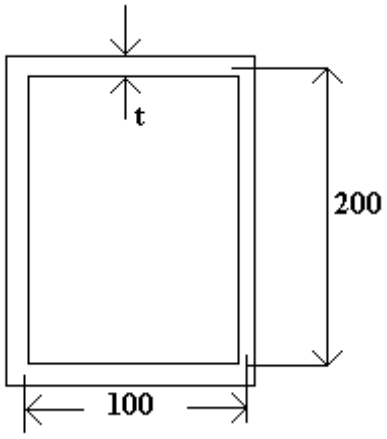

Figure 2:

8. Write short notes on the following:
   (a) shear stresses in structural components
   (b) flexural stresses in structural components. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR322102 **Set No. 3**

III B.Tech II Semester Regular Examinations, Apr/May 2006
AIRCRAFT STRUCTURES-II
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Derive the Equation for M.I. about rotational axes when rotated by an angle θ about x-axis. Shown in figure 1. [16]

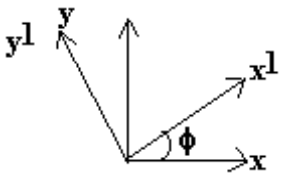

Figure 1:

2. Derive the equation for shear flow in the flange and web of thin walled I-section. Plot the shear flow variation. [16]

3. Determine the shear centre for the circular section of radius R, thickness t having a navour shit. [16]

4. Derive the Bredt- Batho formula related to torsion. What are the assumptions made? [16]

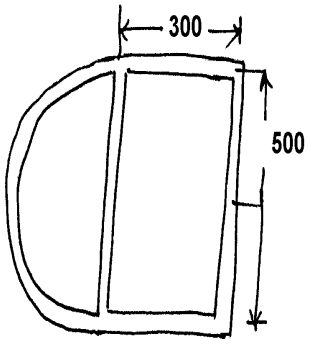

Figure 2:

5. Uniform thickness locate the shear centre for the multi compartment box beam. Shown in figure 2. [16]

6. Stiffener of flange member is an extrusion of 7075-T6 Aluminum alloy. Skin and web sheets are 7075-T6 Aluminum alloy. Thickness of skin is 0.9 mm and thickness of stiffener is 1.3 mm. Skin is fastened to stiffener by two rows of 3.2mm diameter rivets of brazier head type space 22mm apart. The web is attached to the stiffener

by one row of 5mm diameter rivets spaced 25mm apart. Determine the effective skin area and total compressive load that the unit can carry. Shown in figure 3.[16]

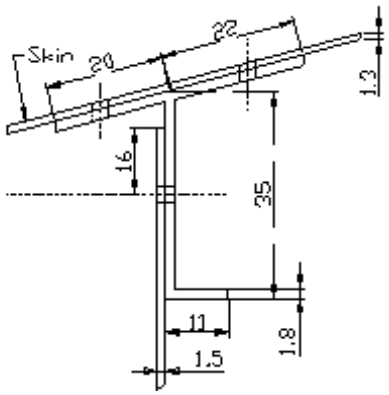

Figure 3:

7. What is structural idealization? Sketch the structural idealization for wing and fuselage? [16]

8. Write short notes on the following:

   (a) shear stresses in structural components

   (b) flexural stresses in structural components. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR322102 **Set No. 4**

III B.Tech II Semester Regular Examinations, Apr/May 2006
AIRCRAFT STRUCTURES-II
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. An unsymmetrical cross-section is subjected to a couple M_z in vertical plan. Show in figure 1 that the stress at point A, of coordinates y and z is $\sigma_A = \left[\frac{I_y Y - z I_{yz}}{I_y I_z - I_{yz}^2}\right] M_z$

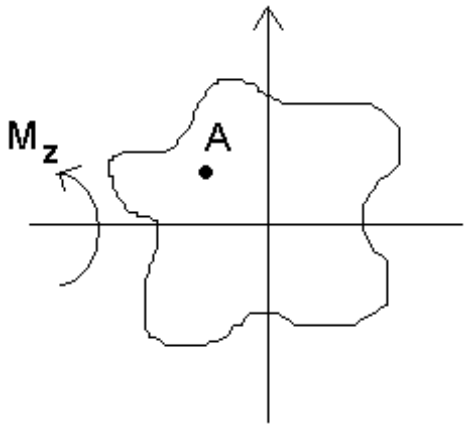

Figure 1:

2. Explain the concept of Shear Stresses in thick beams with the help of neat sketch and draw the shear stress Variation

   (a) Rectangular section

   (b) Circular section. [8+8]

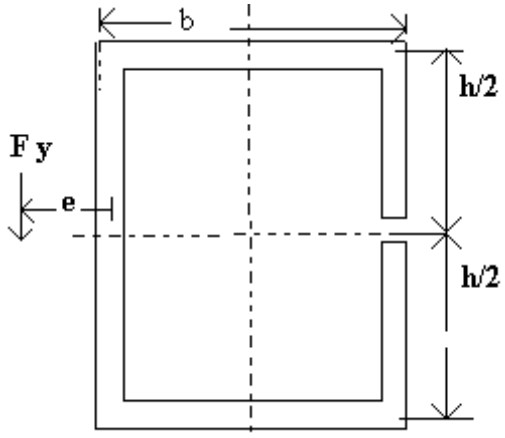

Figure 2:

3. A cross-section of a slit rectangular tube of constant thickness is shown in figure 2. Show that shear centre $e = \frac{b(2h+3b)}{2(h+3b)}$

4. Derive the equation for Torque and angle of twist for two cell closed section. Also calculate the total strain energy stored. [16]

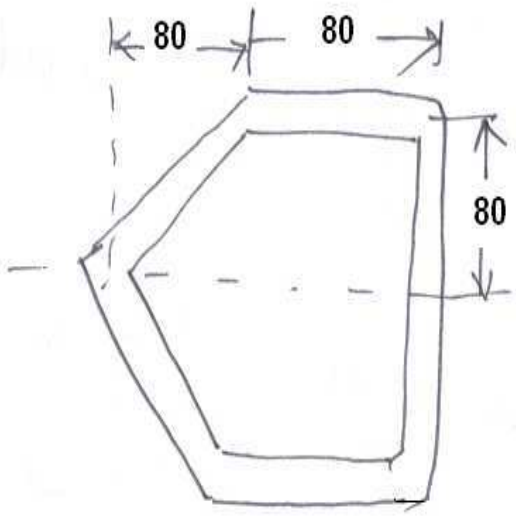

Figure 3:

5. t=3mm uniform locate the shear centre for the aircraft box beam. Shown in figure 3. [16]

6. The Z section shown in Figure 4. Is made of Al alloy 2024-73 sheet. What compressive stresses will start local buckling of element and on which element of the member? [16]

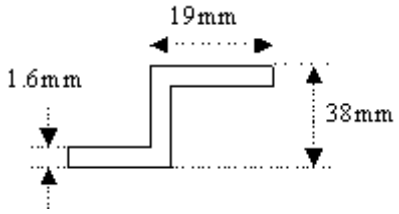

Figure 4:

7. What are the various types of wing structures? Show the construction with different types of stringers and web? [16]

8. Write short notes on the following:

   (a) Effective walls and ineffective walls

   (b) Sheet wrinkling. [16]

⋆ ⋆ ⋆ ⋆ ⋆