CBCS SCHEME

USN

15AE64

Sixth Semester B.E. Degree Examination, July/August 2021
Aircraft Structures – II

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions.***

1 a. Define unsymmetrical bending. Derive Euler-Bernoulli equation for unsymmetrical bending. **(06 Marks)**

b. A beam having the cross sectional is subjected to a bending moment of 1500 Nm in a vertical plane. Calculate the maximum direct stress due to bending stating the point at which it acts. **(10 Marks)**

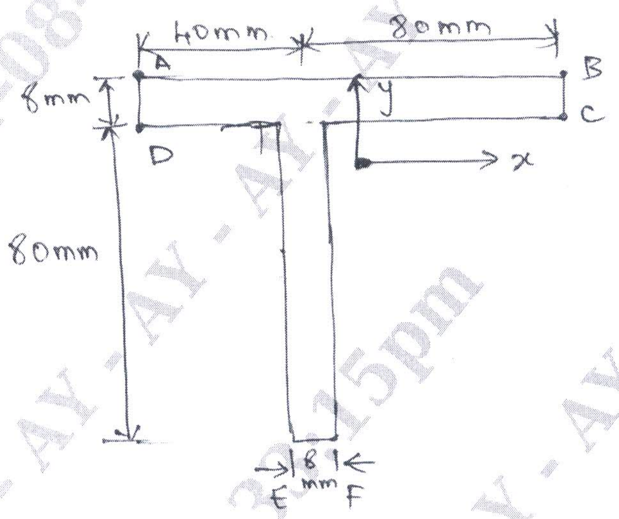

Fig. Q1 (b)

2 a. Determine the shear flow distribution in the thin-wallers Z section due to shear load Sy applied through the shear centre of the section. **(10 Marks)**

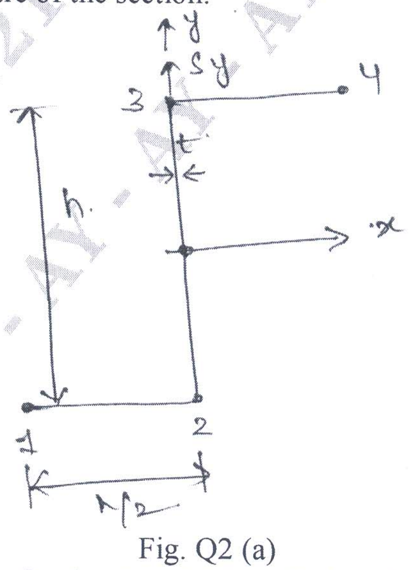

Fig. Q2 (a)

b. Derive the shear flow equation for the closed thin walled section beams. **(06 Marks)**

3 Determine the shear flow distribution in the beam section shown in Fig. Q3, when it is subjected to a shear load in its vertical plane of symmetry. The thickness of the walls of the section is 2 mm. **(16 Marks)**

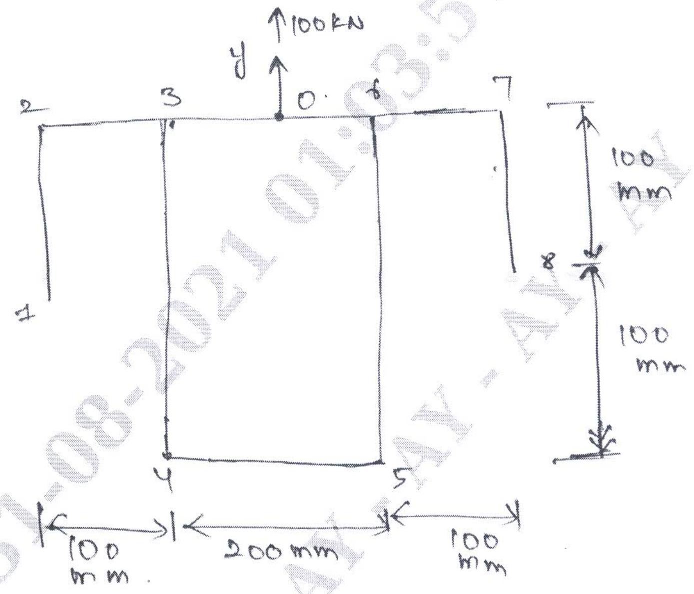

Fig. Q3

4 The thin walled single cell beam shown in Fig. Q4 has been idealized into a combination of direct stress. Carrying booms and shear stress only carrying walls. If the section supports a vertical shear load of 10 kN acting in a vertical plane through booms 3 and 6. Calculate the distribution of shear flow along the section. **(16 Marks)**

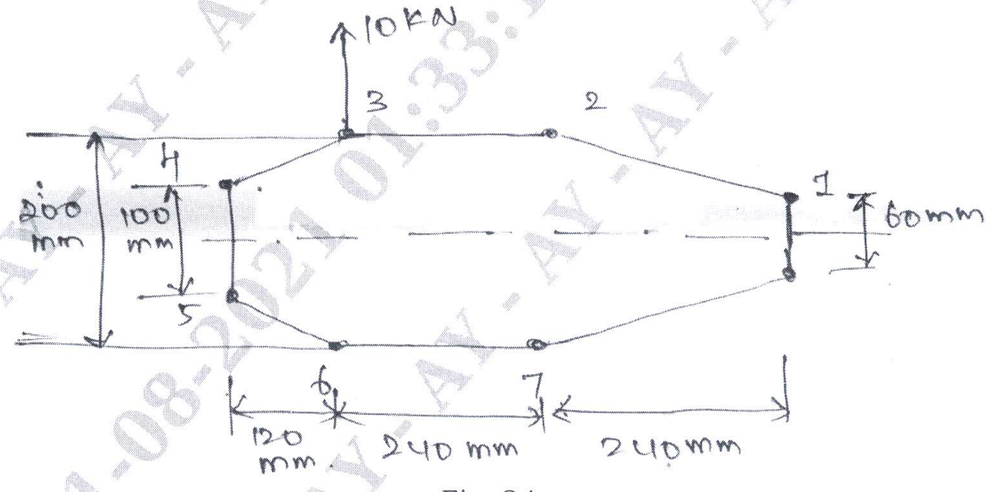

Fig. Q4

5 a. Derive the crippling stress of a thin plate subjected to inplane compression along one axis and it is simply supported at all the four edges. **(12 Marks)**

b. Explain Guard's methods of finding crippling stress with neat sketch. **(04 Marks)**

6 a. Explain the possible modes of failure for a Simple Rivet joint in a plate. **(08 Marks)**

b. The bracket shown in Fig. Q6 (b) carries an offset load of 5 kN. Determine the resultant shear forces in the Rivets A and B. **(08 Marks)**

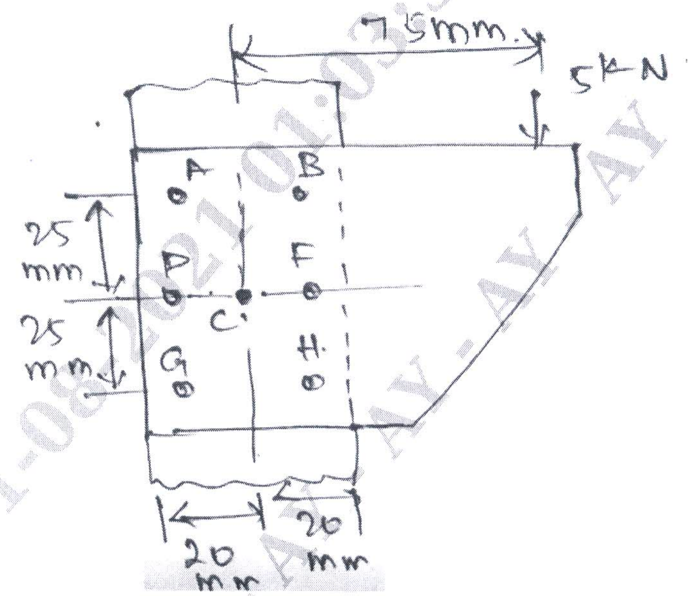

Fig. Q6 (b)

7 The Cantilever beam shown in Fig. Q7 (a) is uniformly tapered along its length in both x and y directions and carries a load of 100 KN at its free end. Calculate the forces in the booms and the shear flow distribution in the walls at a section 2 m from the built-in end if the booms resist all the direct stresses while the walls are effective only in shear. Each corner boom has a cross sectional/ area of 900 mm^2, while both central booms have cross sectional areas of 1200 mm^2. **(16 Marks)**

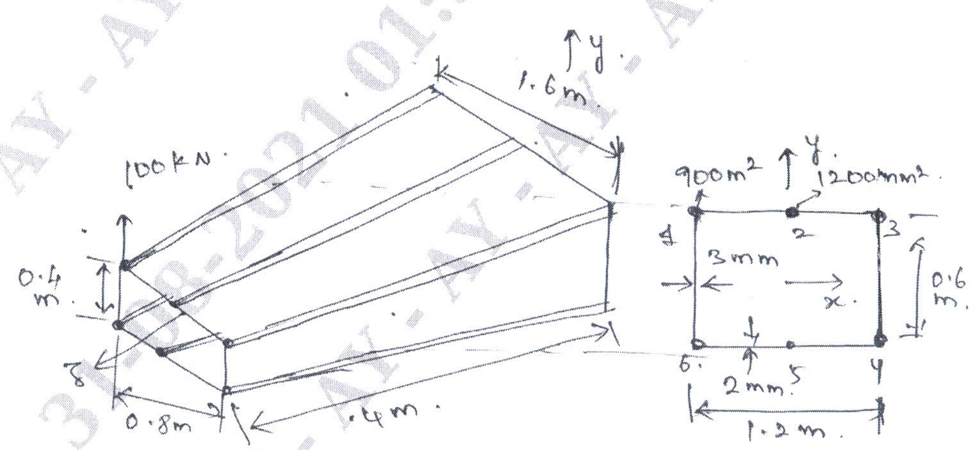

Fig. Q7 (a)

8 Determine the shear flow distribution in the web of the tapered beam shown in Fig. Q8 at a section midway along its length. The web of the beam has a thickness of 2 mm and is fully effective in resisting direct stress. The beam tapers symmetrically about its horizontal centroidal axis and the cross sectional area of each flange is 400 mm^2. **(16 Marks)**

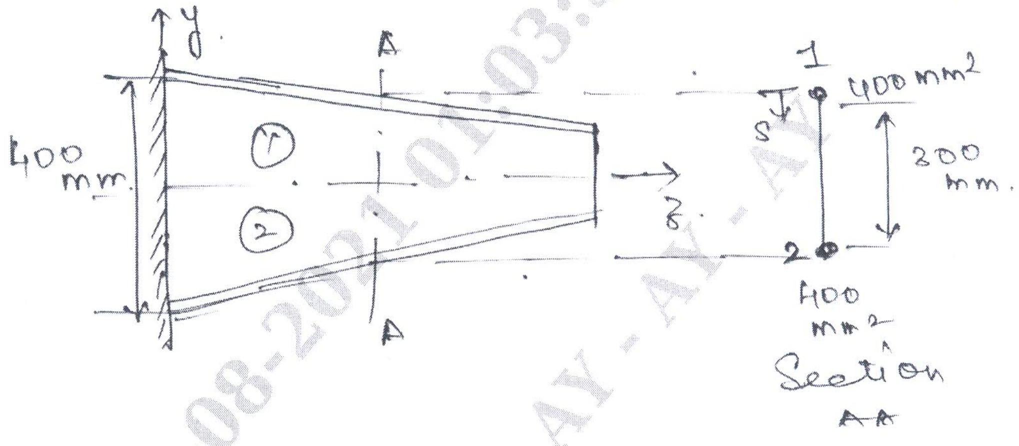

Fig. Q8

9 The fuselage is subjected to a vertical shear load of 100 kN applied at a distance of 150 mm from the vertical axis of symmetry as shown for the idealized section in Fig. Q9. Calculate the distribution of shear flow in the section. **(16 Marks)**

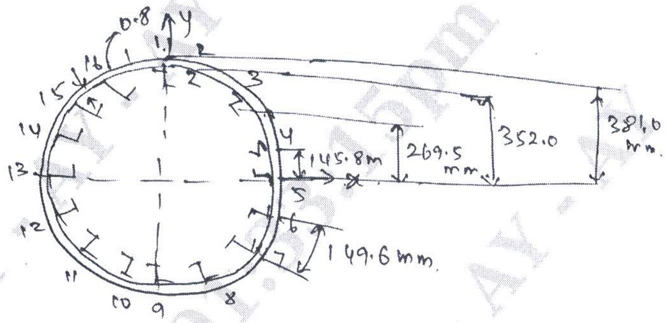

Fig. Q9

10 A cantilever beam carries concentrated loads as shown in Fig. Q10. Calculate the distribution of stiffness loads and the shear flow distribution in the web panels, assuming that the later an effective only in shear. **(16 Marks)**

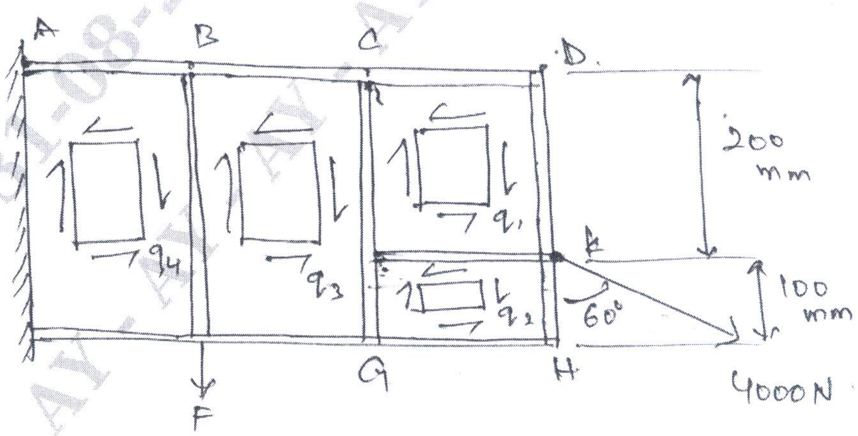

Fig. Q10

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