

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1.
 - a. With neat sketch, explain V-n diagram and its importance in design features. (10 Marks)
 - b. With neat sketch, explain the structural components of a semi monocoque fuselage and wing of an aircraft. (06 Marks)
 - c. Define :
 - i) Factor of safety
 - ii) Margin of safety. (04 Marks)
2.
 - a. What are the assumption made for unsymmetrical bending and derive the equation for direct stress distribution due to bending (unsymmetrical Bending). (10 Marks)
 - b. A beam having cross section as shown in Fig Q2(b), is subjected to a bending moment of 1500Nm in a vertical plane. Calculate the maximum direct stress due to bending stating the point at which it acts.

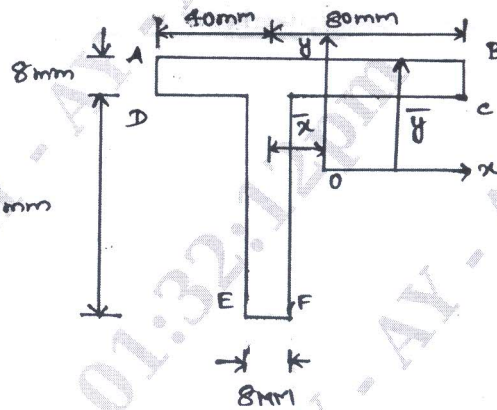


Fig Q2(b)

(10 Marks)

3.
 - a. Determine the shear flow distribution in the thin walled z-section shown in Fig Q3(a) due to the shear load S_y applied through the shear center of the section.

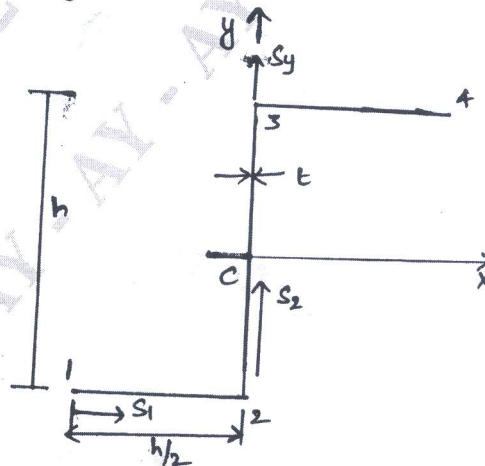


Fig Q3(a)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Derive the equation for shear flow distribution in open section beams and define shear center. (10 Marks)
- 4 a. Determine the shear flow distribution in the walls of the thin walled closed section beam shown in Fig Q4(a). The walls thickness t , is constant throughout.

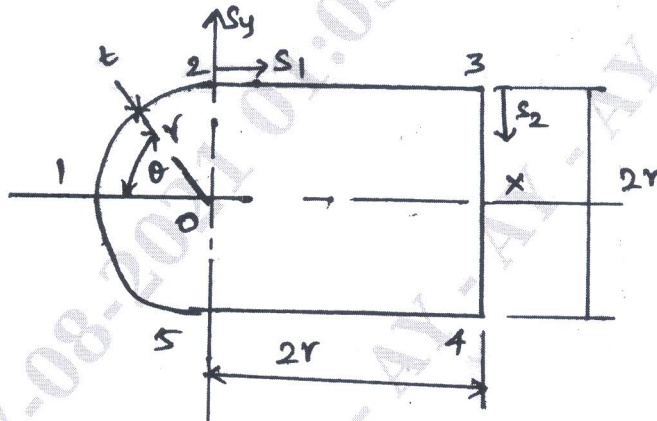


Fig Q4(a)

(10 Marks)

- b. Derive the equation to determine the shear flow distribution in closed section beams. (10 Marks)
- 5 a. Explain the Needham and Gerard method for determining crippling stresses. (10 Marks)
- b. Explain the buckling of Isotropic flat plates in compression. (10 Marks)
- 6 a. Determine the shear flow distribution in the web of the tapered beam shown in Fig Q6(a) at a section midway along its length. The web of the beam has a thickness of 2mm 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 400mm^2 .

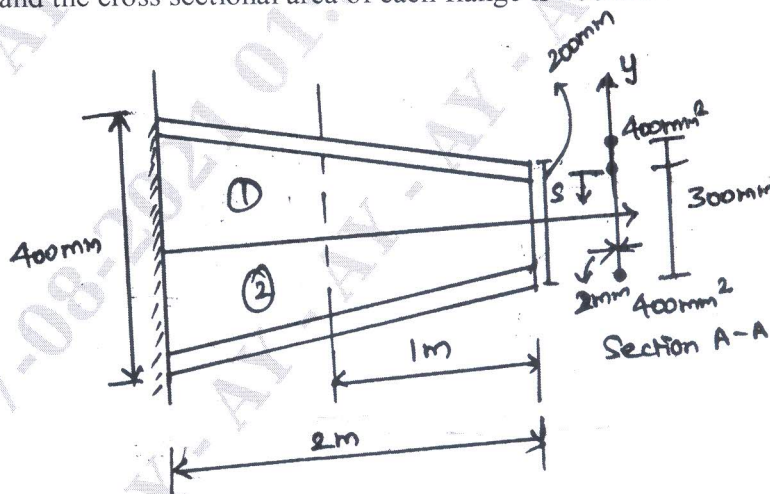


Fig Q6(a)

(10 Marks)

- b. The fuselage of a light passenger carrying aircraft has the circular cross-section shown in Fig Q6(b). The cross-sectional area of each stringer is 100mm^2 and the vertical distances given in figure, are to the mid-line of the section wall at the corresponding stringer position. If the fuselage is subjected to a bending moment of 200kN-m applied in the vertical plane of symmetry, at this section, calculate the direct stress distribution where the distance between the boom section are 149.6mm .

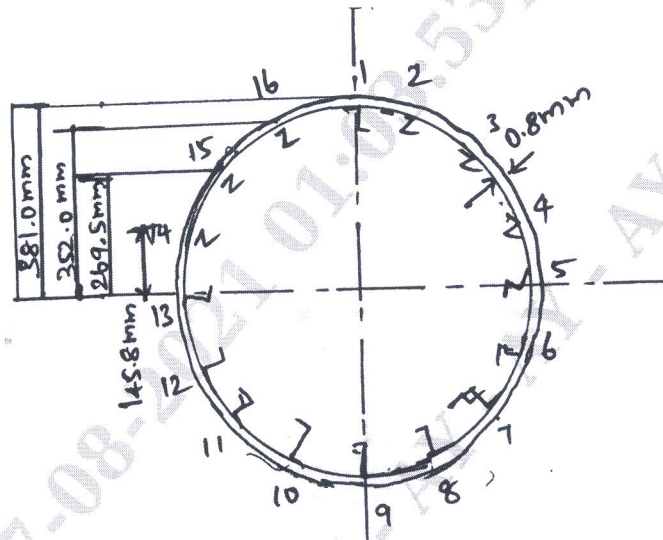


Fig Q6(b)

(10 Marks)

- 7 a. Explain the life Assessment procedures for an aircraft with safe-structural design. (10 Marks)
- b. Explain:
- Two-bay crack criteria
 - Wide spread fatigue damage.
- (10 Marks)
- 8 a. Explain the eccentrically loaded connections in bolts and Rivets. (10 Marks)
- b. Describe the concept of effective width. (10 Marks)
