

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Aircraft Structures - II

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1
 - a. Explain the loads acting on wing and fuselage. (08 Marks)
 - b. Briefly explain and derive sharp edged gust. (06 Marks)
 - c. Explain factor of safety and margin of safety. (06 Marks)

- 2
 - a. Fig. shows Q2(a), the section of an angle purlin. A bending moment of 3000Nm is applied to the purlin in a plane at an angle of 30° to the vertical of axis. If the sense of bending moment is such that its components M_x and M_y both produces tension in the positive xy quadrant, calculate the maximum direct stress in the purlin stating clearly the point at which it acts. (14 Marks)
 - b. The cross section of a beam has the dimensions shown in fig. Q2(b). If the beam is subjected to a negative plane, determine the distribution of direct stress through the depth of section. (06 Marks)

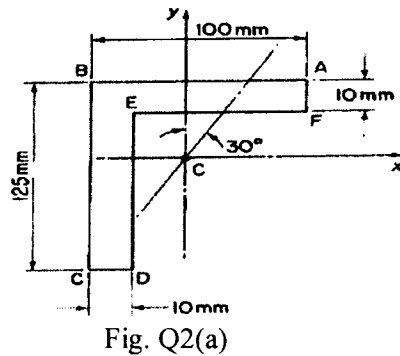


Fig. Q2(a)

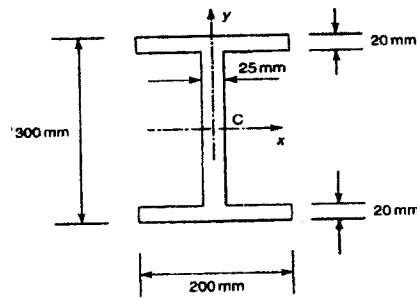


Fig. Q2(b)

- 3
 - a. Derive an expression for the shear stress of an open section which supports shear forces S_x and S_y in the XY axis as shown in fig. Q3(a). There is no twist on the beam cross section. (10 Marks)
 - b. Determine the shear flow distribution in the thin - walled Z - section shown in fig. Q3(b) due to shear load S_y applied through the shear centre of the section. (10 Marks)

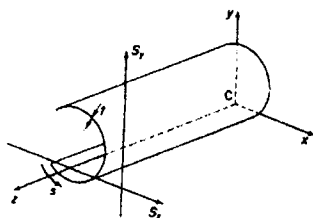


Fig. Q3(a)

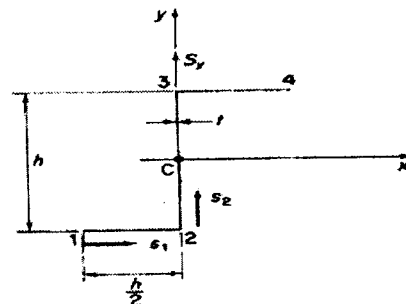
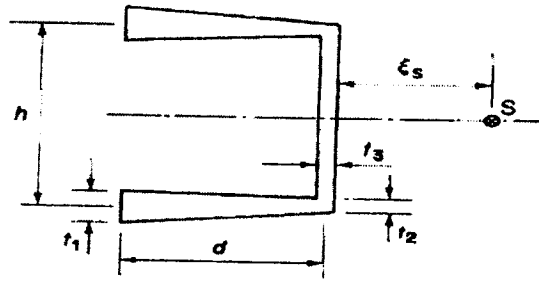


Fig. Q3(b)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any scribbling, identification, appeal, evaluation and/or signature within the 12 x 8 x 56 will be treated as malpractice.

- 4 a. Derive and explain shear of closed section beams. (08 Marks)
 b. A thin – walled beam has the cross – section shown in fig. Q4(b). The thickness of each flange varies linearly from t_1 at the tip to t_2 at the junction with the web. The web itself has a constant thickness t_3 . Calculate the distance ξ_s from the web to the shear centre S. (12 Marks)



PART – B

- 5 a. Define : i) Local instability ii) Inter rivet buckling iii) Primary and secondary buckling iv) Effective skin width. (12 Marks)
 b. Derive an equation for critical stress of rectangular sheet under compression. (08 Marks)
- 6 The fuselage is subjected to a vertical shear load of 100kN applied at a distance of 150mm from the vertical axis of symmetry as shown from idealized section in fig. Q6. Calculate the shear distribution flow in the section. (20 Marks)

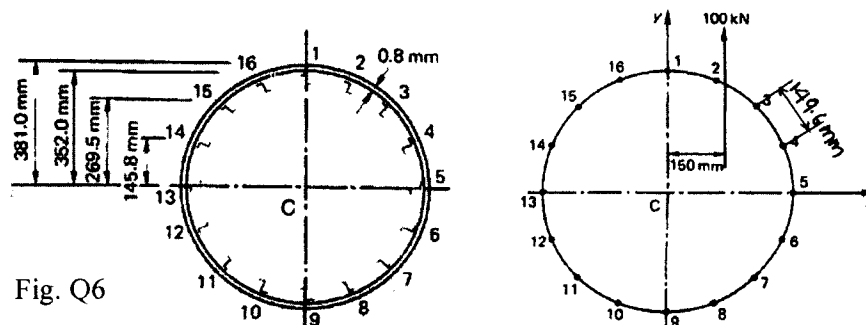


Fig. Q6

- 7 a. Discuss the life assessment procedures of aircraft during its design and qualification process. (12 Marks)
 b. Explain design principles of damage tolerant design approach. (08 Marks)
- 8 a. Explain behaviour of Riveted joints. (05 Marks)
 b. What are the design parameters of riveted joint? (10 Marks)
 c. Explain tension failure of riveted or bolted joint. (05 Marks)
