USN ☐☐☐☐☐☐☐☐☐☐   **10AE72**

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 30^0 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)**
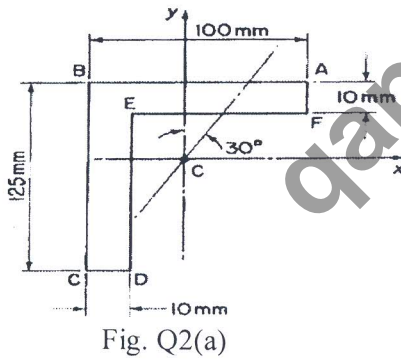

Fig. Q2(a)   Fig.Q2(b)
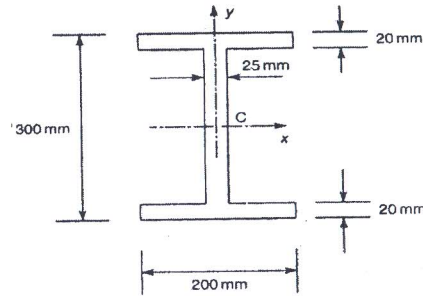
3.   a.   Derive an expression for the shear stress of an open section which supports shear forces S_x and S_y in the XY axis as shown in fig. Q3(a). There is no twist on the beam cross section.   **(10 Marks)**
    b.   Determine the shear flow distribution in the thin – walled Z – section shown in fig. Q3(b) due to shear load S_y applied through the shear centre of the section.   **(10 Marks)**
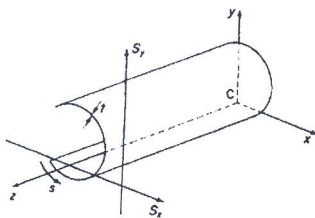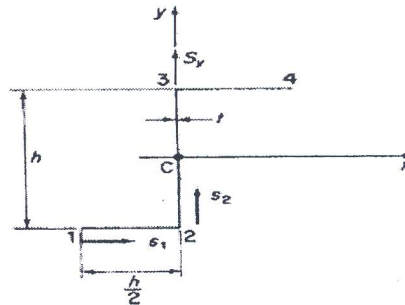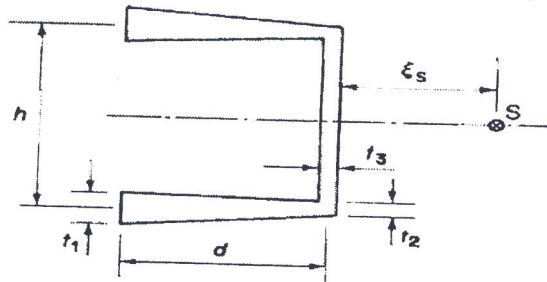

Fig. Q3(a)   Fig. Q3(b)

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)**
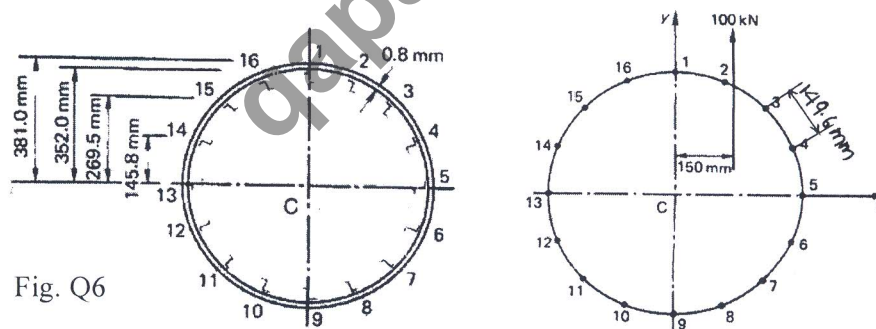

Fig. Q6

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)**

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