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10AE72

Seventh Semester B.E. Degree Examination, Dec.2014/Jan.2015

Aircraft Structures – II

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain the following loads:
i) Maneuvering loads ii) Control loads iii) Gust load
iv) Thermal loads v) Crash loads vi) Pressurization load **(12 Marks)**

b. Discuss Asymmetric flight maneuvers load in aircraft design. **(08 Marks)**

2 a. Derive an expression for direct stress for an unsymmetric beam. **(10 Marks)**

b. A beam having a cross section shown is subjected to 1 kN-m bending moment in vertical plane. Calculate Max stress and the point where it acts.

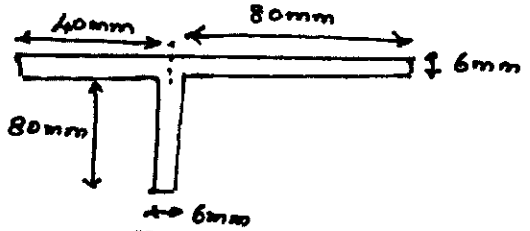


Fig.Q2(b) **(10 Marks)**

3 a. Explain shear flow and assumptions involved in shear flow concept. **(05 Marks)**

b. Find the shear flow distribution and shear centre for a load V.

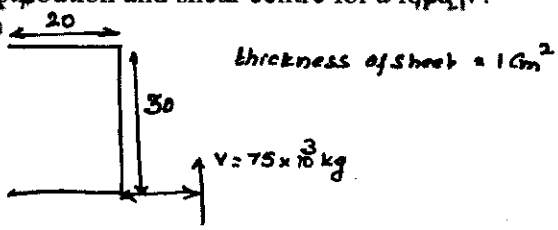


Fig.Q3(b) **(15 Marks)**

4 a. A uniform thin walled cantilever beam of closed rectangular cross section is shown. The shear modulus G of the top and bottom covers of the beam is 18,000 N/mm^2 while vertical web is 26,000 N/mm^2. The beam is subjected to a uniformly distributed torque of 20 N-m/mm along its length. Calculate maximum shear stress according to Bredt-Batho theory of torsion. Also calculate the twist distribution along the length.

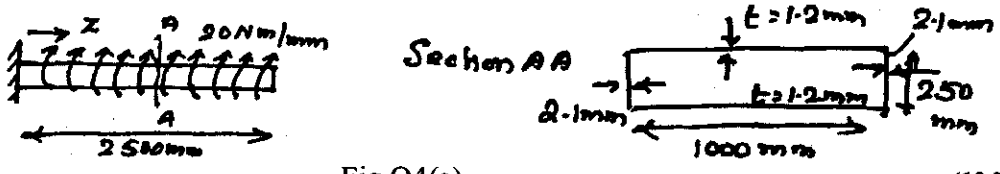


Fig.Q4(a) **(12 Marks)**

b. Explain Bredt-Batho relation and derive T = 2Aq with usual notation. **(08 Marks)**

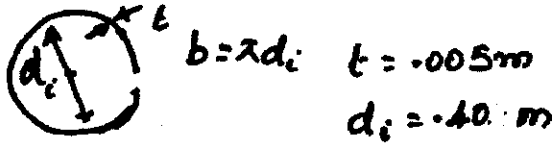
PART – B

5 a. Explain Buckling and Crippling stress bringing out essential difference between them. **(06 Marks)**

b. Define and explain (i) effective skin width, (ii) primary buckling of stiffened panels, (iii) inter rivet and sheet wrinkling. **(14 Marks)**

6 a. What are Complete Tension field beams? Explain and derive an expression for tension stress and normal stress in web. **(14 Marks)**

b. If J of the open circular section is $bt^3/3$, compare it with J of a closed section of the same dimension.



(06 Marks)

7 a. Explain design criteria in relation to aircraft design. **(10 Marks)**

b. For the wing shown in Fig.Q7(b), calculate shear force, BM and torque distribution. Assume lift distribution along 0.25C and elastic axis at 0.45C. **(10 Marks)**

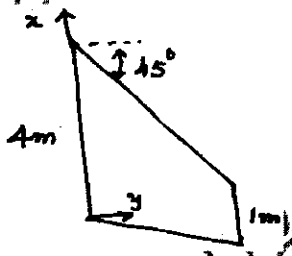


Fig.Q7(b)

y(m)	Lift
0.6	1000 N
1.2	800 N
1.8	600 N
2.4	400 N
3.0	200 N

8 a. A Bracket is attached to the wall with the help of 6 rivets. The different arrangement of rivets are shown in Fig.Q8(a). The maximum allowable stress in shear is given 80 N/mm^2 and the bracket carries a load of 60 kN. Find the required rivet diameter.

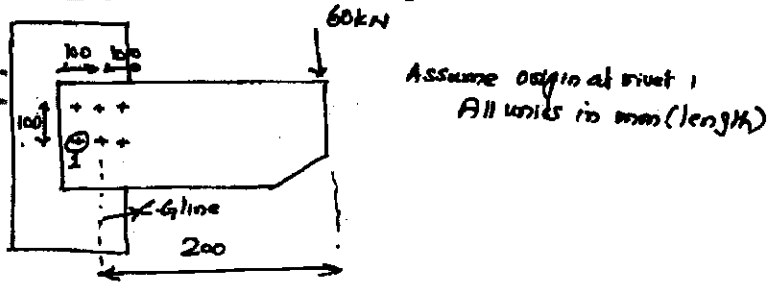


Fig.Q8(a) **(12 Marks)**

b. Given in Fig.Q8(b) is an axially loaded unsymmetrical welded section. Derive expression for ℓ_1 and ℓ_2 so that resisting moment of the welds about C.G axis is zero.

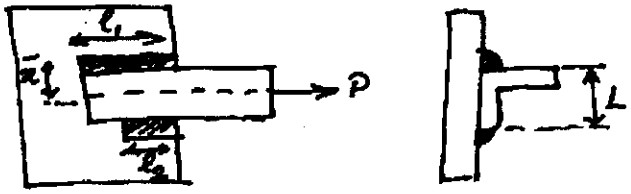


Fig.Q8(b) **(08 Marks)**

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