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10AE72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021

Aircraft Structure – II

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Analyze the aircraft structural components for various load carrying capacity with considering wings and fuselage components. (12 Marks)
- b. Define gust load. Briefly explain and derive for sharp-edge gust load factor. (08 Marks)
- 2 a. A beam having the cross-section as shown in Fig.Q2(a) 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.

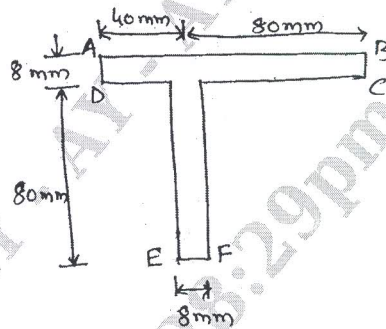


Fig. Q2 (a)

- b. Define unsymmetrical bending with example and derive equation for direct stress distribution in case of unsymmetrical bending. (12 Marks)
- (08 Marks)
- 3 a. Derive shear flow of open section of beams. (08 Marks)
- b. What is shear center? Calculate position of shear centre of thin walled channel section. The thickness 't' of wall is constant. (06 Marks)
- c. What is effective and in-effective of wall in bending? Explain idealization of a panel. (06 Marks)
- 4 a. Derive Breadth – Batho formula. (05 Marks)
- b. Fig. Q4 (b) shows a typical 2 cell tabular section as formed by a conventional aerofoil shape and having one interior rib. An external applied torque T of 9.45 kN/m is acting as shown. Calculate the shear flow pattern of the two cell beam?

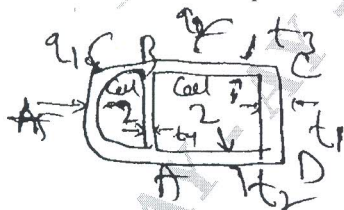


Fig. Q4 (b)

- $t_1 = 1.27 \text{ mm}$ Area of cell 1 = $6.83 \times 10^4 \text{ mm}^2$
- $t_2 = 0.81 \text{ mm}$ Area of cell 2 = $2.5 \times 10^5 \text{ mm}^2$
- $t_3 = 1.00 \text{ mm}$ Length segment AA₁B = 680 mm
- $t_4 = 1.00 \text{ mm}$ BC = 640 mm, CD = 400 mm
- $t_5 = 0.64 \text{ mm}$ DA = 645 mm, AB = 340 mm

(15 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.

PART - B

- 5 a. Explain Buckling and crippling stress? Bring out essential difference between them? (08 Marks)
 - b. Define the explain : i) Effective skin width ii) Primary buckling of stiffened Panels iii) Inter rivet and sheet wrinkling. (12 Marks)
- 6 Calculate the shear flows in the web panels and the axial loads in the flanges of the wing rib show in Fig Q6. Assume that the web of the rib is effective only in shear while the resistance of the wing to bending moment is provided entirely by the three flanges 1, 2, and 3.

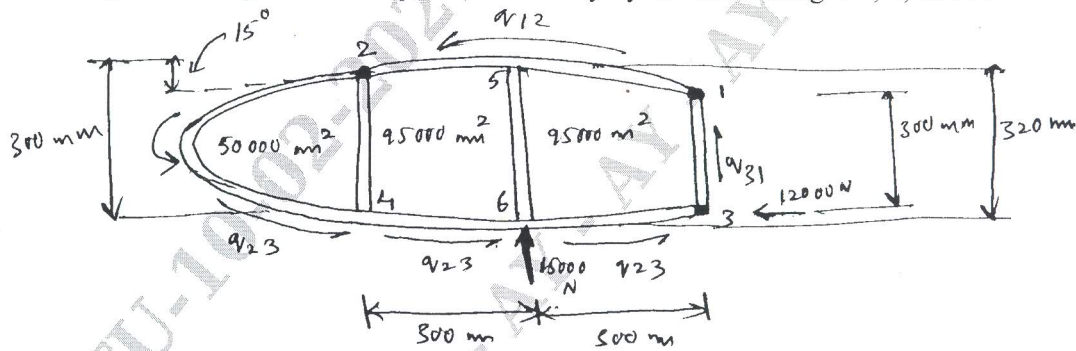


Fig Q6

(20 Marks)

- 7 a. Explain the criteria of design in aircraft structure. (04 Marks)
 - b. Explain life assessment procedures in design of aircraft structures. (08 Marks)
 - c. What is fatigue? Explain two bay crack criteria and wide spread fatigue damage. (08 Marks)
- 8 a. Explain the general rules for using bolts in aerospace design. (06 Marks)
- b. Discuss the salient points to be considered while rivet joints are to be considered. (06 Marks)
- c. A bracket is supported by means of 4 rivets of same size as shown. Determine the diameter of the rivet, if the maximum shear stress is 140 N/mm^2 .

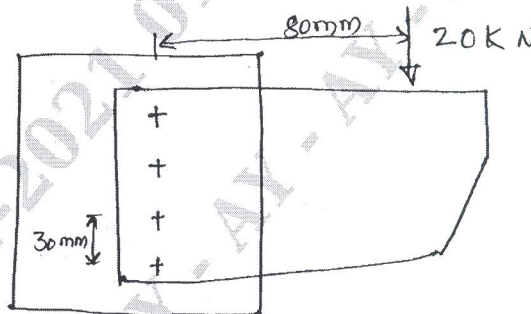


Fig. Q8 (c)

(08 Marks)
