Question Paper Code : 31027

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fifth Semester

Aeronautical Engineering

AE 2302/AE 52/AE 1302/10122 AE 502 — AIRCRAFT STRUCTURES – II

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Show a typical stress distribution for a open/closed section undergoing unsymmetrical bending.
2. Define principal axes of a section.
3. Define shear center.
4. Indicate the position of shear center for a channel section and angle section.
5. How are the shear flow and angle of twist determined for a closed single cell under torsion?
6. Indicate single and multi-cell structures.
7. Describe the buckling modes of a thing walled section.
8. What is a sheet stiffener panel?
9. What is meant by Wagner beam?
10. What is gust load?

PART B — (5 × 16 = 80 marks)

11. (a) An equal angle section with side 20 cm thickness 2 cm is subjected to moments M_x = 20 KN–m and M_y = 15 KN–M. Find the maximum tensile and compressive stresses. (16)

Or

(b) Determine the direct stress distribution in a thin-walled Z — section produced by a positive bending moment M_z. Height of the section = h and flange width = h/2. (16)

(b) Obtain the shear flow for the box beam shown in Fig. 4. A1=A5=25cm², A2 = A3 = A6 = A7 = 7cm² and A4 = A8 = 12cm². (16)

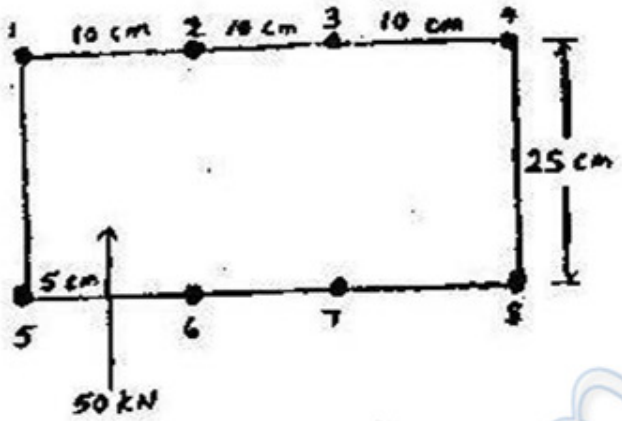

Figure. 4

14. (a) (i) Differentiate between Buckling and Crippling and explain how Buckling stress in compression and shear are calculated. (8)

(ii) Explain using any one method to calculate crippling strength. (8)

Or

(b) Check whether the box beam shown in Fig.5 will withstand the load without buckling and also find the Margin of Safety. Given: $P_1 = P_2 = 5000$ N, Uniform skin thickness = 1.5 mm. Area of each stringer = 2 cm² Assume skin is effective in bending. For a/b= 2, $K_c = 5$, $K_s = 6.5$. (16)

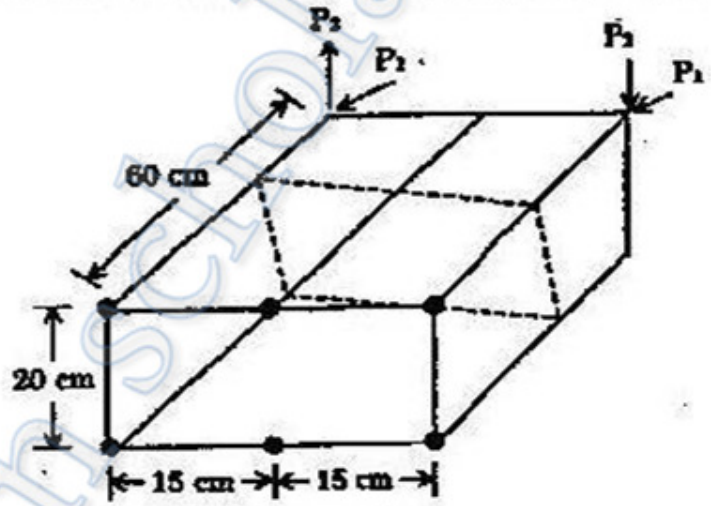

Figure. 5

15. (a) (i) Differentiate between shear resistance beams and tension field beams. (8)

(ii) Discuss the analysis of a semi-cantilever type of aircraft wing. (8)

Or

(b) Bring out the salient factors with regard to stress analysis in wing and fuselage. (16)