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Question Paper Code : 52530

B.E/B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fifth Semester

Aeronautical Engineering

AE 6502 — Aircraft Structures —II

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write down the general expression for stress due to unsymmetrical bending.
2. Write down the expression for orientation of neutral axis.
3. Define the shear flow and how shear stress is determined using shear flow.
4. Indicate the position of shear center for a symmetrical channel section.
5. Derive the relation between shear flow and twisting moment.
6. Explain the steps involved in the determination the shear flow distribution in a two cell closed section subjected to twisting moment.
7. Write the buckling load expression for a simply supported thin plate subjected to unidirectional compression.
8. Define effective width.
9. Draw a typical V-n diagram and indicate salient points.
10. Define complete tension and semi tension field beam

PART B — (5 × 13 = 65 marks)

11. (a) A thin walled section shown in Fig.1 is subjected to M_x = 1500 N-m and M_y = 500 N-m where X and Y are centriodal axes of the section. Determine the bending stresses at the indicated points using k-method.

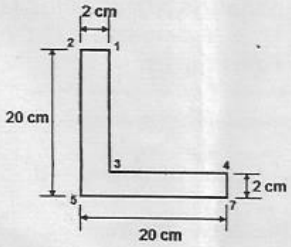

Fig.1

Or

(b) A thin walled section shown in Fig.2 is subjected moment about centroidal axes M_x = 1200 N-m and M_y = 600 N-m. Thickness of top and vertical segments are same and is equal to 3 mm and that of bottom segment is 2 mm. Determine the stress at the points indicated using neutral axis method.

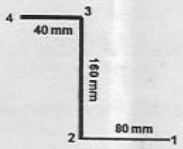

Fig.2

12. (a) Determine the shear flow pattern due to upward vertical shear force 2000 N applied to the thin walled section shown in Fig.3. Thickness of the section is uniform and is equal to 2 mm.

Fig.3

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(b) Determine the shear center for the idealized section shown in Fig.4. Assume the skin is ineffective in bending and the section is subjected to upward shear force of 2000 N.

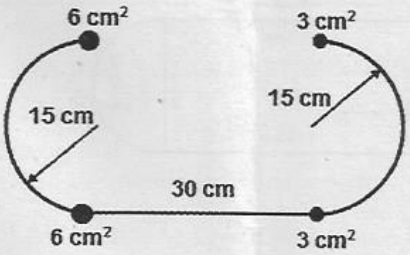

Fig.4

13. (a) Determine the shear flow pattern for the single cell closed section shown in Fig.5.

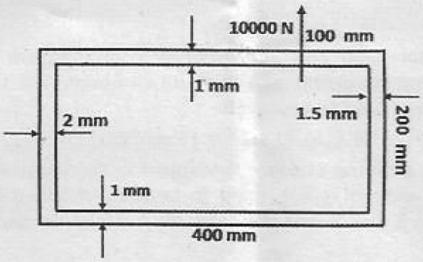

Fig.5

Or

(b) Determine the shear flow pattern for the idealized section shown in Fig.6. Area A is 2 Cm^2.

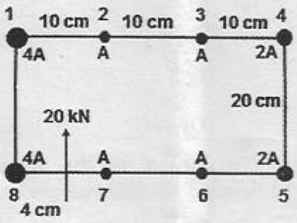

Fig.6

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14. (a) Determine the shear flow pattern for the thin walled closed section shown in Fig.7. The section is subjected to a torque 10 kN-m (anti-clockwise direction).

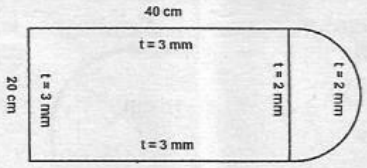

Fig.7

Or

(b) Derive the buckling load expression for a thin rectangular plate subjected to unidirectional compression. Also draw the figure showing the variation of buckling load constant with aspect ratio of the plate.

15. (a) Describe the methods used for estimation of crippling stress thin walled composite section.

Or

(b) Write short notes on the following. (i) V-n diagram (ii) Shear force bending moment diagrams of wing and fuselage. (iii) Complete tension and semi-tension field beam.

PART C — (1 × 15 = 15 marks)

16. (a) Determine the bending stresses developed in the idealized section shown in Fig.8. The section is subjected to bending moments with respect to centroidal axes X and Y and they are M_x = 10 kN-m and My = 5 kN-m.

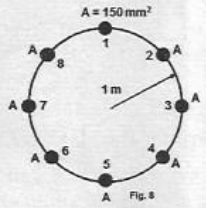

Fig.8

Or

(b) Determine shear flow distribution for the idealized section shown in Fig.8. The section is subjected to upward shear force of 20 kN at the center.

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