CBCS Scheme

USN | | | | | | | | | | |

15AE64

# Sixth Semester B.E. Degree Examination, June/July 2018
## Aircraft Structures – II

Time: 3 hrs. Max. Marks: 80

**Note: Answer any FIVE full questions, choosing one full question from each module.**





### Module-1

1 a. Define unsymmetrical Bending and explain its sign conventions. **(06 Marks)**

b. Derive the equation for direct stress distribution due to bending and position of the neutral axis. **(10 Marks)**

**OR**

2 a. The beam section shown in Fig Q2(a) is subjected to a bending moment of 10kN.m in both the axes. Determine the distribution of direct stress

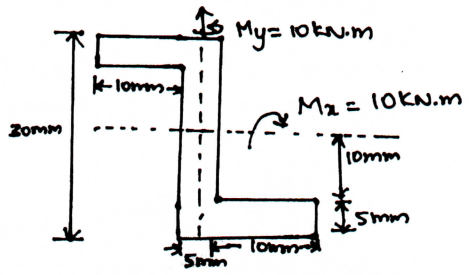


Fig Q2(a) **(12 Marks)**

b. Derive the Bredth – Batho Theory (Rule) **(04 Marks)**

### Module-2

3 a. Explain the structural Idealization principle and explain the Idealization procedure of a panel. **(08 Marks)**

b. Describe the effect of idealization on the analysis of open and closed section beams. **(04 Marks)**

c. Justify the effects of booms in the idealized structure whether the shear stress distribution will get affected or not, because of its presence (booms). **(04 Marks)**

**OR**

4 a. Calculate the shear flow distribution is the channel section, shown in Fig Q4(a) produced by a vertical load of 4.8kN acting through its shear center. Assume that the walls of the section are effective in resisting only shear stresses, while the booms, each of area 300mm$^2$, carry all the direct stress. **(08 Marks)**

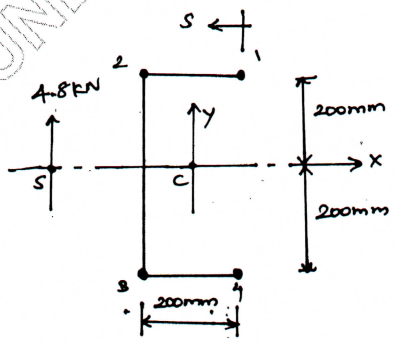


Fig Q4(a)

b. Derive the equation for shear flow of open section beams. **(08 Marks)**

## Module-3

5 a. Determine the Crippling stress using Needham and Gerard method. **(08 Marks)**

b. Explain Bolted joint (or) riveted joints and welded joints and explain the concept of effective width. **(08 Marks)**

**OR**

6 a. Explain eccentrically loaded convections. **(08 Marks)**

b. Determine the Buckling of Isotropic flat plates in compression. **(08 Marks)**

## Module-4

7 Determine the shear flow distribution in the web of the tapered beam shown in Fig Q7(a) at a section midway along its length. The web of the beam has a thickness of 2mm and is fully effective in resisting direct stress. The beam tapers symmetrically about its horizontal centroidal axis and the cross sectional area of each flange is 400mm$^2$. The internal bending moment and shear load at the section A-A produced by external load are $M_x$ = 20kNm and $S_y$ = -20kN. **(16 Marks)**

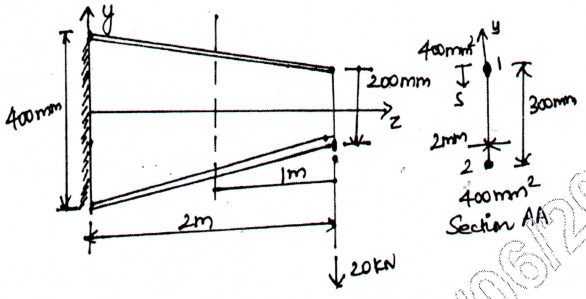


Fig Q7

**OR**

8 a. Explain the three boom shell structure in wings. **(08 Marks)**

b. Calculate the shear stress distribution in the walls of the three cell using section as shown in Fig Q8(b) when it is subjected to counterclockwise torque of 11.3 kN.m. The data are in the table 8(b) **(08 Marks)**

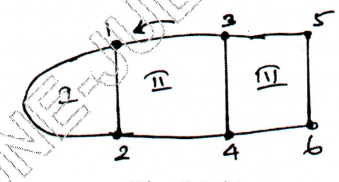


Fig Q8(b)

Table Q8(b)

| Wall | Length (mm) | Thickness (mm) | G(N/mm$^2$) | Cell area (mm$^2$) |
|---|---|---|---|---|
| 12° | 1,650 | 1.22 | 24,200 | $A_I$ = 258,000 |
| 12° | 508 | 2.03 | 27,600 | $A_{II}$ = 355,000 |
| 13,24 | 775 | 1.22 | 24.200 | $A_{III}$ = 161,000 |
| 34 | 380 | 1.63 | 27,600 | |
| 35,46 | 508 | 0.92 | 20,700 | |
| 56 | 254 | 0.92 | 20,700 | |

Note : The superscript symbols O and i are used to distinguish between outer and inner walls connecting the same tow boom.

## Module-5

9 The fuselage shown in Fig Q9-(a) subjected to a vertical shear load of 100kN applied at a distance of 150mm from the vertical axis of symmetry as shown for the idealized section in Fig Q9-(b).Calculate the distribution of shear flow is the section. **(16 Marks)**

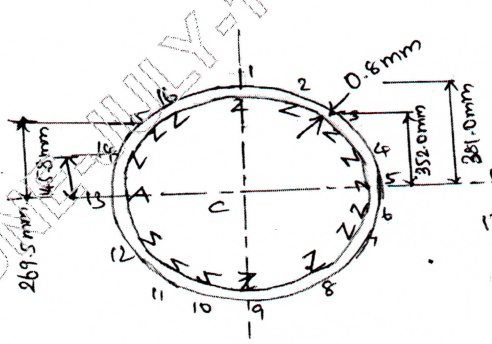


Fig Q9 (a)

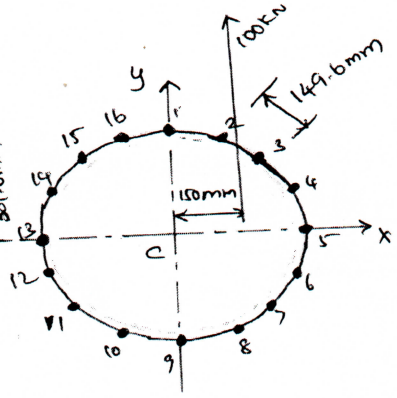


Fig Q9 (b)

**OR**

10 a. Explain the principles of stiffeners construction with an example. **(08 Marks)**

b. Write a short note on Fuselage Frames and explain the shear flow distribution in the frames. **(08 Marks)**

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