CBCS SCHEME

USN | | | | | | | | | |

15AE64

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Aircraft Structures – II

Time: 3 hrs. Max. Marks: 80

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

Module-1

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

b. Derive the relationship between load intensity, shear force and bending moment. **(06 Marks)**

OR

2 a. Derive the Breadth-Batho theory. **(06 Marks)**

b. Find the maximum normal stress due to bending for the section shown in Fig.Q2 (b)
$M_x = 1500$ N.m, $M_y = 0$ **(10 Marks)**

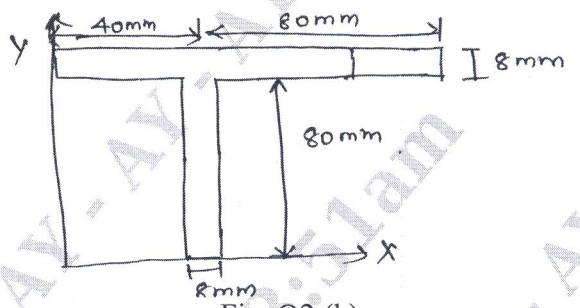


Fig. Q2 (b)

Module-2

3 a. Explain the principle of structural idealization. **(08 Marks)**

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

OR

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

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

c. Derive the equation for shear flow in closed section beams. **(08 Marks)**

Module-3

5 a. Explain Buckling of isotropic flake plate in compression. **(08 Marks)**

b. Explain Needham and Gerard method for determining crippling stress. **(08 Marks)**

OR

6 a. Explain the concept of effective width. **(06 Marks)**

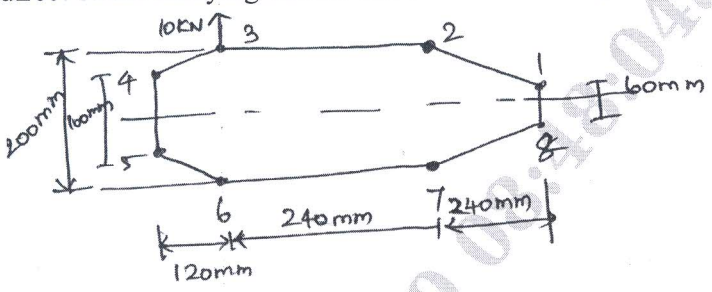
b. Explain bolted or riveted joints. **(04 Marks)**

c. Explain accuracy of fitting analysis. **(06 Marks)**

Module-4

7 a. Explain three-boom shell in detail. **(06 Marks)**

b. The thin walled single cell beam shown in Fig. Q7 (b) has been idealized into a combination of direct stress-carrying booms and shear stress only carrying walls.



Boom areas
$B_1 = B_8 = 200\ mm^2$
$B_2 = B_7 = 250\ mm^2$
$B_3 = B_6 = 400\ mm^2$
$B_4 = B_5 = 100\ mm^2$

Fig. Q7 (b)

If the section supports a vertical shear load of 10 kN acting in a vertical plane through booms 3 and 6, calculate the distribution of shear flow around the section. **(10 Marks)**

OR

8 Determine the shear flow distribution in the web of the tapered beam shown in Fig. Q8 at a section midway along its length. The web of the beam has a thickness of 2 mm and is fully effective in resisting direct stress. The beam tapers symmetrically about its horizontal central axis and a cross sectional area of each flange is 400 mm^2. **(16 Marks)**

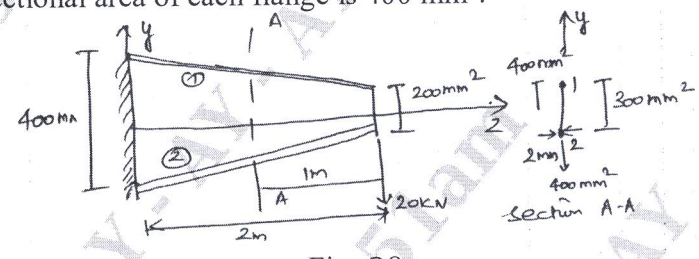


Fig. Q8

Module-5

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

b. Why cut-outs in fuselages is required? Explain the construction of fuselage frames. **(08 Marks)**

OR

10 The fuselage of a light passenger carrying aircraft has the circular cross section shown in Fig. Q10. The cross sectional area of each stringer is 100 mm^2 and the vertical distance given in Fig. Q10 are to the mid-line of the section wall at the corresponding stringer position. If the fuselage is subjected to a bending moment of 200 kNm applied in the vertical plane of symmetry, at this section, calculate the direct stress distribution. **(16 Marks)**

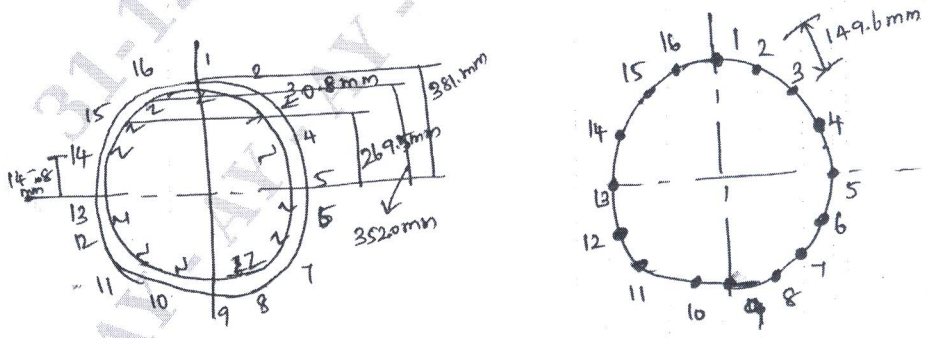


Fig. Q10

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