CBCS SCHEME

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

15AE64

Sixth Semester B.E. Degree Examination, June/July 2023
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. 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)**

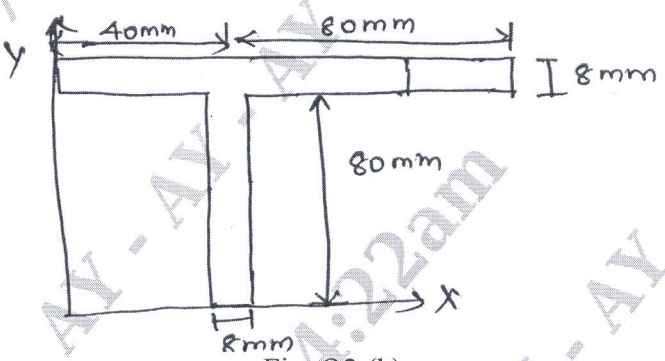

Fig. Q2 (b)

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 Determine the shear flow distribution in the web of the tapered beam shown in Fig.Q7, 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 400 mm^2. **(16 Marks)**

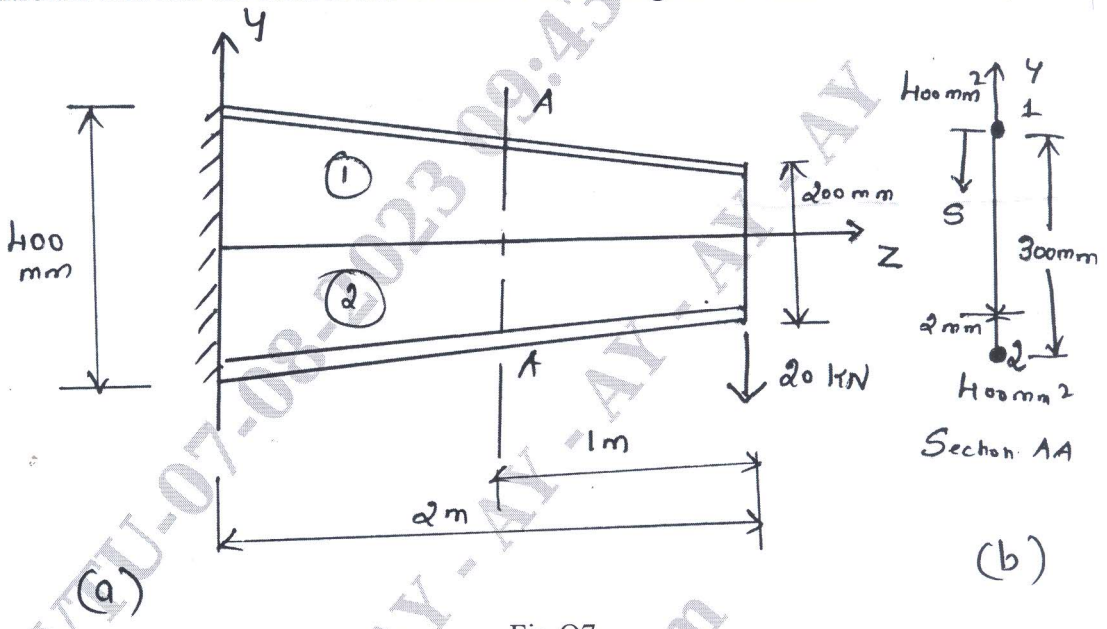

Fig.Q7

OR

8 The cantilever beam shown in Fig.Q8 is uniformly tapered along its length in bath x and y directions and carries a load of 100 kN at its free end. Calculate the forces in the booms and shear flow distribution in the walls at a section 2 m from the built in end if the booms resist all the direct stresses while the walls are effective only in shear. Each comer both has a cross sectional area of 900 mm^2 while both central booms have cross sectional areas of 1,200 mm^2. **(16 Marks)**

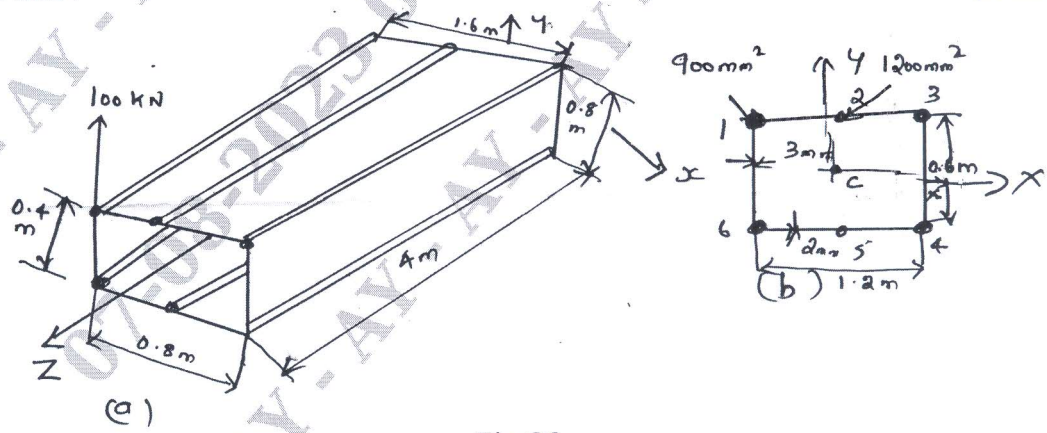

Fig.Q8

Module-5

9 The fuselage of the section, the bending moment due to SCIF weight was 9.8 kNm and due to symmetrical pull out tall load 45.1 kNm down. The tail load may be assumed to be acting at 2 m away from the section. If the stringers are 16 in number and placed as shown in Fig.Q9, with areas of stringers placed symmetrical about yy axis. Calculate the stress in stringers. **(16 Marks)**

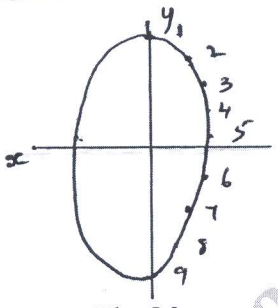

Fig.Q9

Stringers	Area (mm^2)	x	y
1	640	0	660
2	600	100	600
3	600	200	420
4	600	300	228
5	620	500	25
6	640	450	-204
7	640	300	-396
8	850	150	-502
9	640	0	-540

OR

10 a. Explain and derive Cut-Outs in fuselage structure. **(08 Marks)**

b. Derive and explain about stress analysis in fuselage frames caused due to torsion. **(08 Marks)**

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