CBCS SCHEME

USN

15AE64

Sixth Semester B.E. Degree Examination, June/July 2019
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. What are the assumptions of symmetric bending? Explain the unsymmetric bending with associated equations. **(10 Marks)**

b. Determine the deflection curve and mid-span deflection of the simply supported beam shown in Fig.Q1(b); the beam has a doubly symmetrical cross section. **(06 Marks)**

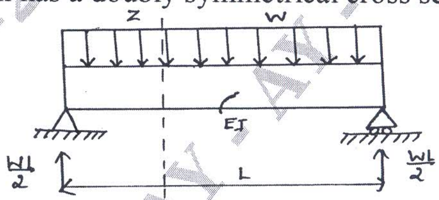

Fig.Q1(b)

OR

2 a. Calculate the position of the shear center of the thin-walled channel section shown in Fig.Q2(a). The thickness t of the wall is constant. **(10 Marks)**

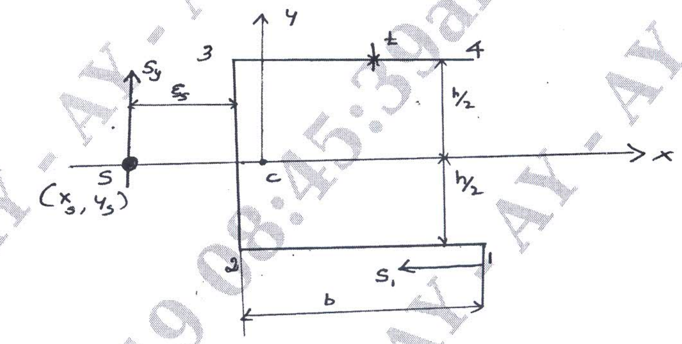

Fig.Q2(a)

b. Derive the displacement associated with the Bredt-Batho shear flow. **(06 Marks)**

Module-2

3 a. Determine the shear flow distribution in the beam shown in Fig.Q3(a). When it is subjected to a shear load in its vertical plane of symmetry. The thickness of the walls of the section is 2 mm throughout. **(10 Marks)**

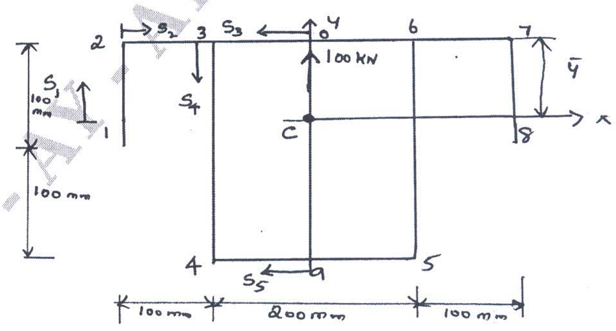

Fig.Q3(a)

b. Explain about Idealization of a panel. **(06 Marks)**

OR

4 Calculate the shear flow distribution in the channel section shown in Fig.Q4. Produced by a vertical shear load of 4.8 kN acting through its shear centre. 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 stresses. **(16 Marks)**

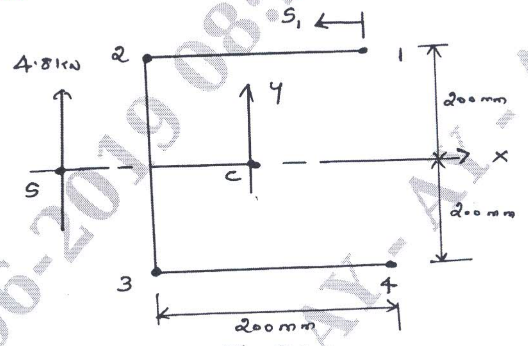

Fig.Q4

Module-3

5 a. Derive an expression for buckling stress for isotropic flat plates in compression. **(08 Marks)**

b. Explain buckling and crippling stress. Bring out the essential differences between them. **(08 Marks)**

OR

6 a. Discuss when riveting is considered advantages in a/c design and explain design parameters that are to be considered during design. **(08 Marks)**

b. Explain the concept of effective width. **(08 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)**

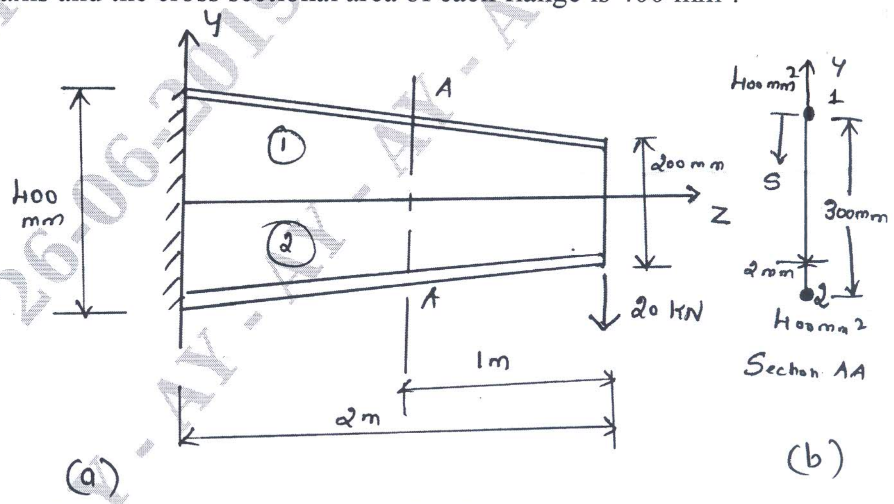

Fig.Q7

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)**

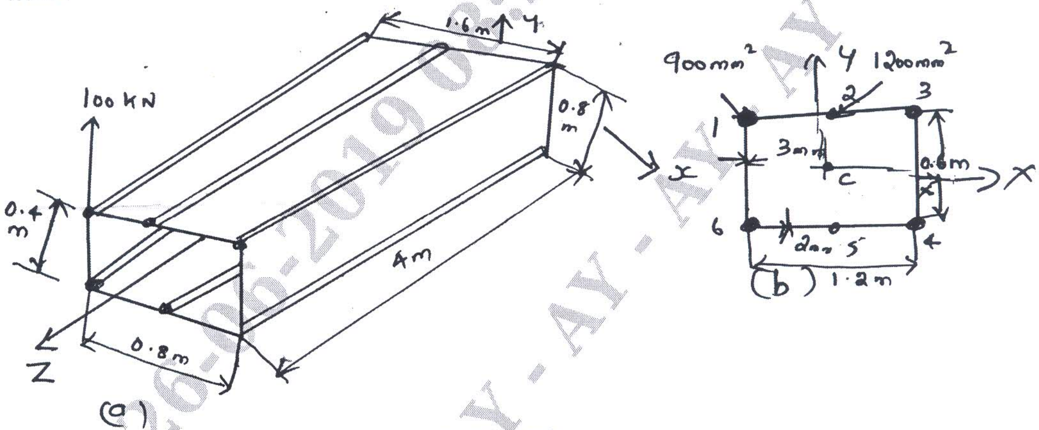

Fig.Q8

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)**

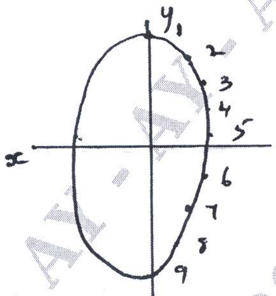

Fig.Q9

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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