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15AE64

Sixth Semester B.E. Degree Examination, July/August 2022
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 What are the assumptions of symmetric bending? Derive the equation of unsymmetric bending. (16 Marks)

OR

- 2 Calculate the position of the shear center of the thin walled channel section shown in the Fig.Q2. the thickness t of the wall is constant.

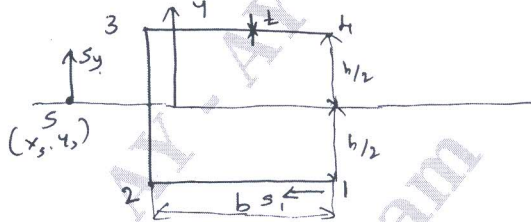


Fig.Q2

(16 Marks)

Module-2

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

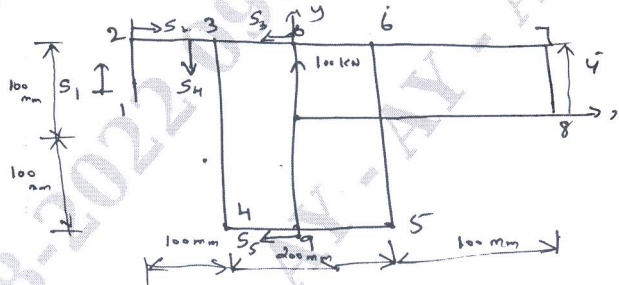


Fig.Q3

(16 Marks)

OR

- 4 Calculate the shear flow distribution in the channel section shown in Fig.Q4 produced by a vertical shear load of 4.8kN 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 300mm² carry all the direct stress.

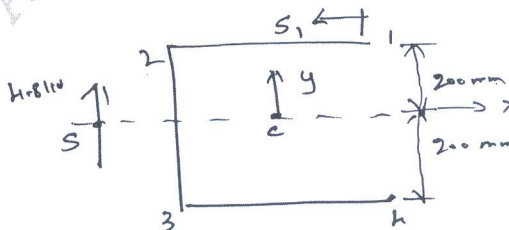


Fig.Q4

1 of 3

(16 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 Derive an expression for buckling stress for isotropic flat plates in compression. (16 Marks)

OR

- 6 Explain design parameters to be considered during design of riveting. (16 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 400mm^2 .

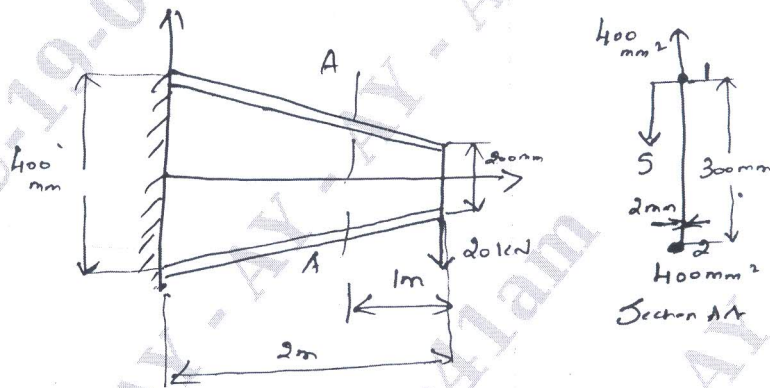


Fig.Q7

(16 Marks)

OR

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

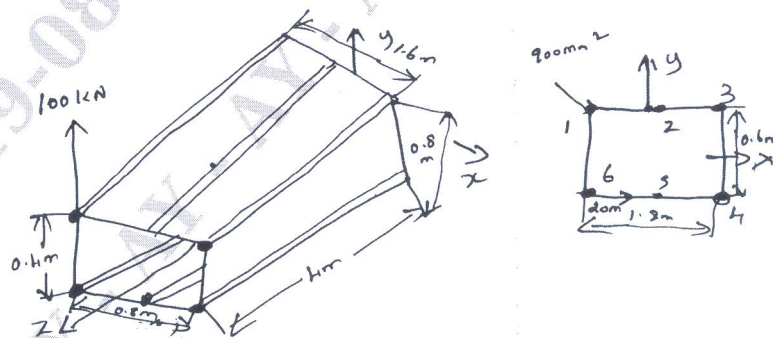


Fig.Q8

(16 Marks)

Module-5

- 9 a. Derive and explain about stress analysis in fuselage frames caused due to torsion. (08 Marks)
 b. Explain about the cut-outs in fuselage structures. (08 Marks)

OR

- 10 The fuselage of the section the bending moment due to self weight was 9.8kNm and due to symmetrical pull out tail load 45.1kNm down. The tail load may be assumed to be acting at 2m away from the section. If the stringers are 16 in number and placed as shown in Fig.Q10, with areas of stringers placed symmetrical about YY axes. Calculate the stress in stringers.

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

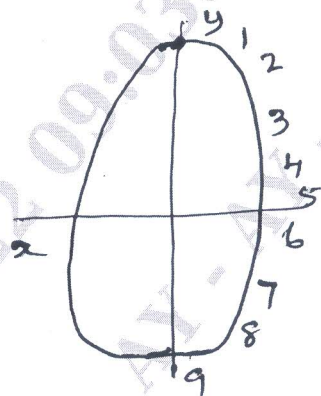


Fig.Q10

(16 Marks)
