

CBCS SCHEME

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18AE62

Sixth Semester B.E. Degree Examination, June/July 2023 Aircraft Structures – II

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Derive an equation for Bending stress and write an equation for Max stress. (10 Marks)
- b. Explain the following :

(i) Structure	(ii) Bending
(iii) Symmetrical bending	(iv) Unsymmetrical bending
(v) Theory of simple bending	

(10 Marks)

OR

- 2 a. Show the equation for direct stress distribution in case of unsymmetrical bending. (10 Marks)
- b. A beam having the cross section as shown is subjected to a bending moment of 1500 Nm in a vertical plane. Calculate the max direct stress due to bending stating the point at which it acts.

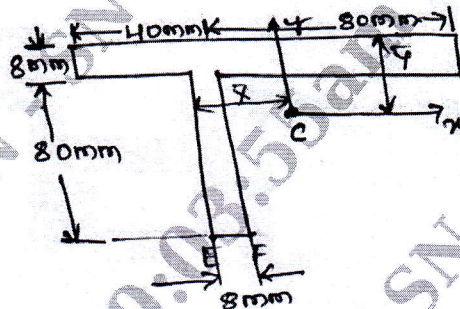


Fig. Q2 (b)

(10 Marks)

Module-2

- 3 a. Discuss the concept of shear flow for a closed section and obtain an equation for Breadth-Batho Theory. (10 Marks)
- b. Derive an expression for twist rate method of constant shear flow (or) Torsion of thin walled closed section. (10 Marks)

OR

- 4 a. Calculate the shear flow distribution of channel section which is subjected to vertical shear load 1000 N.

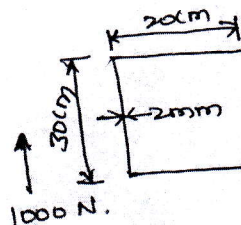


Fig. Q4 (a)

(10 Marks)

- b. Show the expression for the shear stress of an open section which supports shear forces S_x and S_y in the XY axis as shown. (10 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 a. Explain the Buckling of isotropic flat plate in compression. (10 Marks)
 b. Determine the crippling strength of the formed section shown in Fig. Q5 (b).
 $F_{cy} = 288 \text{ MPa}$, $E = 75 \text{ GPa}$, $A = 1.75 \text{ cm}^2$.

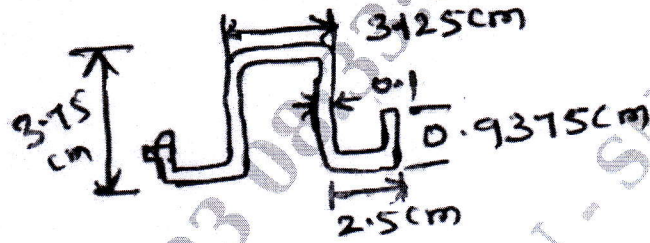


Fig. Q5 (b)

(10 Marks)

OR

- 6 a. Explain briefly about Needham and Gerard method for determining the crippling stress. (10 Marks)
 b. Explain briefly about different types of Riveted joints using in aircraft industry. (10 Marks)

Module-4

- 7 a. A wing section is in the form of 2 cell box as shown in Fig. Q7 (a), in which vertical spars are connected to the wing skin through angle section, all having cross sectional area of 300 mm^2 . Idealize the section.

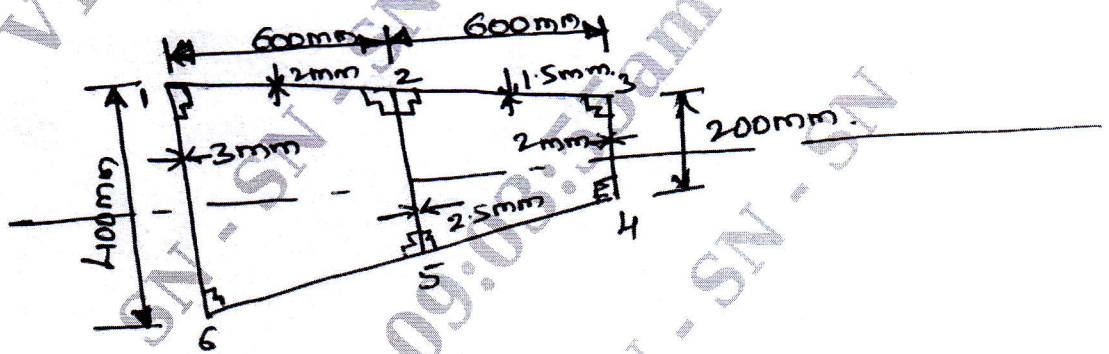


Fig. Q7 (a)

(10 Marks)

- b. Explain briefly about Design Criteria and Safety Factor. (10 Marks)

(10 Marks)

OR

- 8 a. The wing section is shown in Fig. Q8 (a) has been idealized such that Boom's carry all the direct stress, if the wing section is subjected to a bending moment of 300 kNm in a vertical plane. Calculate the direct stress in the Booms.

$B_1 = B_6 = 2580 \text{ mm}^2$, $B_2 = B_5 = 3800 \text{ mm}^2$, $B_3 = B_4 = 3230 \text{ mm}^2$

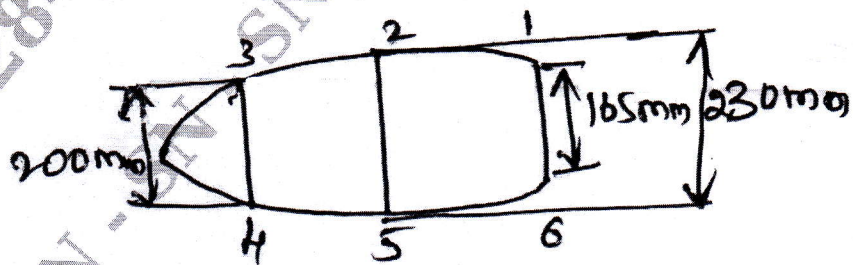


Fig. Q8 (a)

(10 Marks)

- b. Explain the concept of structural idealization and write the Basic Assumptions. (10 Marks)

(10 Marks)