Reg. No. : | | | | | | | | | | | | |

Question Paper Code: 1105255

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024

Fifth Semester

Aerospace Engineering

U20AS503 - AEROSPACE STRUCTURAL MECHANICS

(Regulation 2020)

Time: Three Hours Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. A beam bends about its neutral axis for both symmetrical and unsymmetrical bending. (True/ False).

2. Bending of a symmetric section subject to a skew load will be (symmetric / un-symmetric) Explain.

3. Define the concept of shear flow.

4. Draw shear flow diagram for I section and Channel section.

5. Draw shear flow diagram due to bending load and torsional moment.

6. State assumptions made in the Bredt-Batho theory.

7. Define- crippling stress.

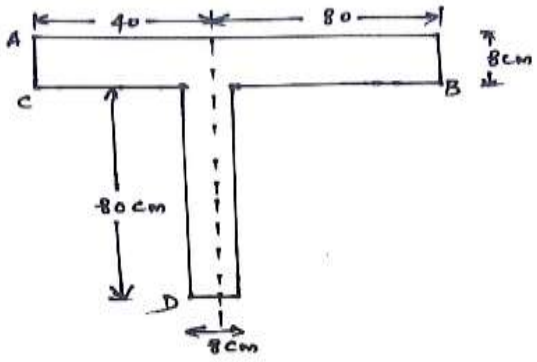
8. What is a diagonal tension field beam?

9. List a few materials used in the construction of modern aerospace structures.

10. Functions of spacecraft spar. Which cross section you prefer for a stringer?

PART – B (5 x 16 = 80 Marks)

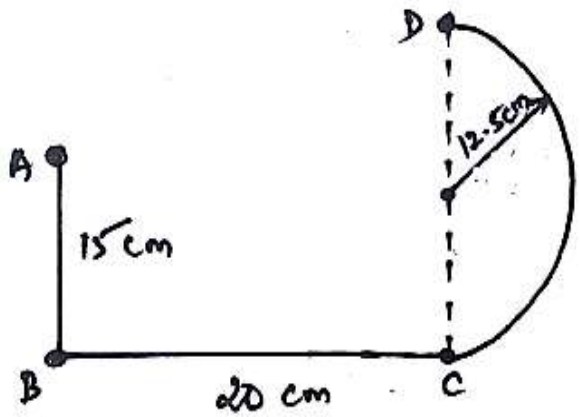
11. (a) The section shown in Figure. is subjected to bending moment Mx=30kNm.determine the bending stress at the corner points A, B, C and D. (16)



(OR)

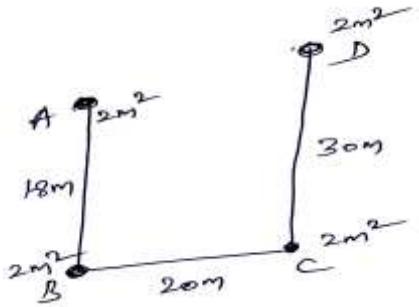
(b) Obtain the general equation for bending stress in un-symmetric section. (16)

12. (a) Obtain the shear flow distribution for the structure shown in Figure. With Vx=2000N and Vy=1000N. Area of all the stringers=$2cm^2$. (16)

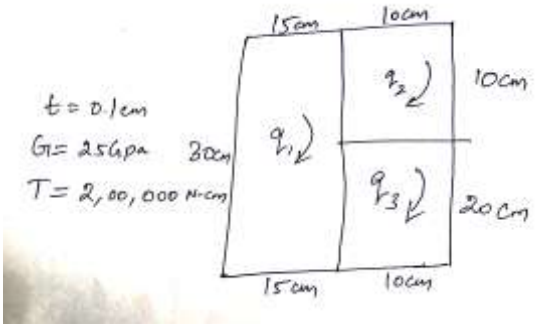


(OR)

(b) Calculate the shear flow and shear centre of the given section shown in Fig. Conditions: (i) Vx=1000N and Vy=0N (ii) Vx=0N and Vy=1000N. (16)



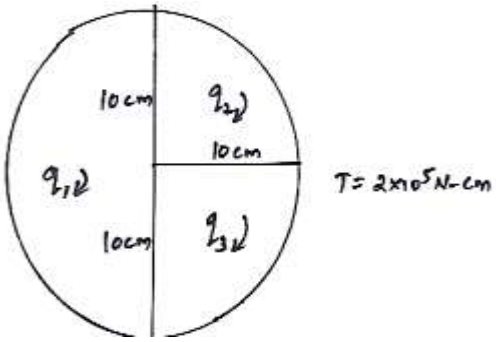
13. (a) Find the shear flow and angle of twist per unit length for the given closed section.



(16)

(OR)

(b) For a multi shell structure shown below in Figure.5, determine the shear flow and angle of twist per unit length. (16)



14. (a) Explain the buckling of flat rectangular plates under shear and bending loads.(16)

(OR)

(b) Explain the following methods for calculating crippling stress in a plate subjected to compression (i)Gerard (ii) Needham's method. (16)

15. (a) To Analyze the Composite structures in Aircraft fuselage structure and draw the shear and bending moment distribution. (16)

(OR)

(b) Write the short notes on Composite applications of Space vehicles. (16)
(i) Stringers (ii) Bulk heads (iii) Floor beams (iv) Spar webs

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