Roll No. | | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(Aerospace Engg.) (2012 Onwards) (Sem.–6)

AEROSPACE STRUCTURES-II

Subject Code : ASPE-312

M.Code : 72457

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION–A

1. Write briefly :

a) How does the transverse load affect the buckling load of a beam column?

b) Give some typical examples of beam column in Aerospace structure with neat sketches.

c) Explain the safe-line design and fail safe design.

d) Draw chordwise and spanwise load distribution of a typical wing.

e) "*Aircraft structure is necessarily statically indeterminate*". Explain why?

f) For a fixed-free column, write down the boundary conditions at the two ends.

g) Write down the behavior of Riveted joints.

h) Define the shear center and shear flow.

i) Explain: Beam-Ties.

j) Explain Neuber Tube with appropriate example.

SECTION-B

2. Explain the concept of V-N diagram. What are the limit load factors as depicted in the V-N diagram?

3. Find the reactions on member ABC and the loads in other members of the beam-truss structure (See Figure 1). Note that ABC is a continuous beam.

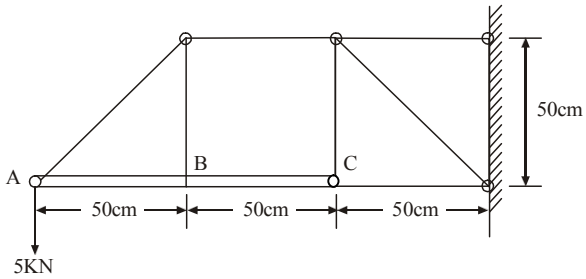

Fig. 1

4. The end of the semi-circular member shown in Figure 2 is subjected to Torque T. What is the twist of the end A? The member is circular in section.

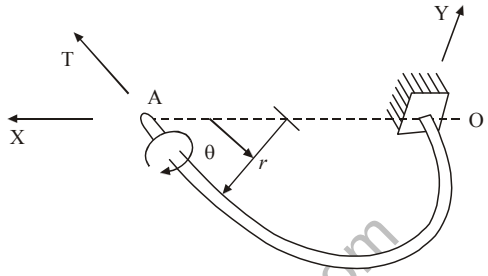

Fig. 2

5. The 2-cell tube indicated in Figure.3 is subjected to a clockwise twisting moment of 1000 Ncm. Determine the shear flows in the walls of the tube. All other wall thickness is 1 mm.

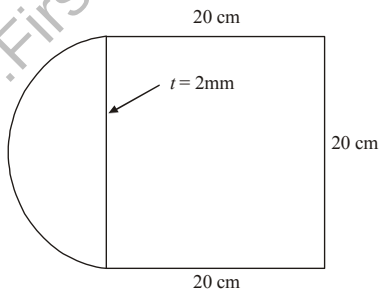

Fig. 3

6. Comments on the following :

   a) Future Airworthiness requirement.

   b) Two-bay-crack criteria

   c) Widespread fatigue damage

SECTION-C

7. The plane structure shown in Figure 4 consists of a uniform continuous beam ABC pinned to a fixture at A and supported by a framework of pin-jointed members. All members other than ABC have the same cross-sectional area A. For ABC, the area is 4A and the second moment of area for bending is $Aa^2/16$. The material is the same throughout. Find (in terms of w, A, a and Young's modulus E) the vertical displacement of point D under the vertical loading shown. Ignore shearing strains in the beam ABC

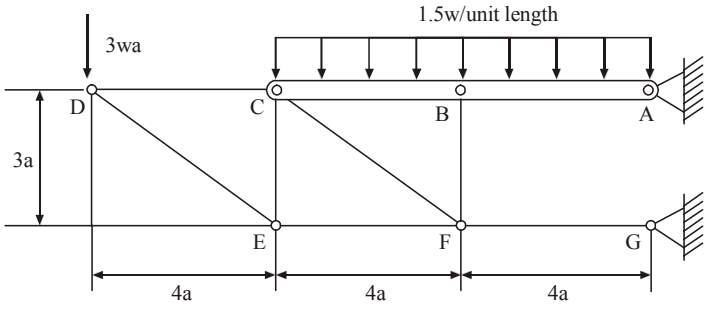

Fig. 4

8. The deflection of a square plate of side a which supports a lateral load represented by the function $q(x, y)$ is given by

$$W = W_0 \cos\frac{\pi x}{a}\cos\frac{3\pi y}{a}$$

where x and y are referred to axes whose origin coincides with the centre of the plate and W_0 is the deflection at the centre. If the flexural rigidity of the plate is D and Poisson's ratio is v determine the loading function q, the support conditions of the plate, the reactions at the plate corners and the bending moments at the centre of the plate.

9. Compare shear stress and torsional stiffness of the closed section thin square channel and the open section thin square channel with side a=10 cm and thickness t=1.6 mm as shown in Figure 5 when torsional moment M_t = 10 KN-m is applied. Where shear modulus of the channel, G=80GPa.

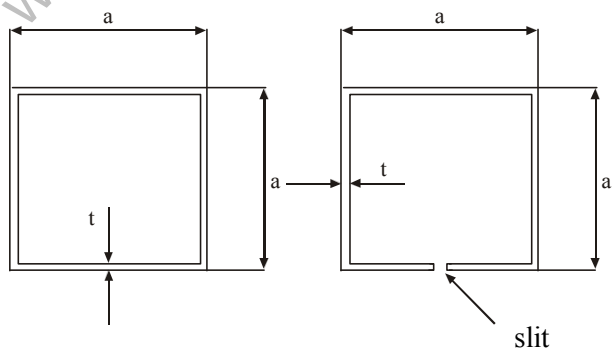

Fig. 5

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.