Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Aerospace Engg.) (2012 Onwards) (Sem.–4)

AEROSPACE STRUCTURES – I

Subject Code : ASPE-206

Paper ID : [A2622]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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) What do you mean by τ_{yz}?

(b) Define principal stresses and principal planes.

(c) Write compatibility equation for plane strain case.

(d) What is a statically determinate truss?

(e) Define castigliano's theorem.

(f) Define Maxwell reciprocal theorem.

(g) What is use of south well plot?

(h) Write boundary conditions for a column with both ends pinned.

(i) Explain maximum strain theory.

(j) Explain distortion energy theory.

SECTION–B

2. Direct stresses of 160 N/mm^2 (tension) and 120 N/mm^2 (compression) are applied at a particular point in an elastic material on two mutually perpendicular planes. The principal stress in the material is limited to 200 N/mm^2 (tension). Calculate the allowable value of shear stress at the point on the given planes.

3. State and prove castigliano's first theorem.

4. A column of length L is fixed at one end and other end is free. It is subjected to a compressive load P. Obtain the value of buckling load.

5. Derive the condition when failure occurs according to maximum shear stress theory. Also plot the yield locus.

6. Explain the differences in structures of air plane, rockets and satellites.

SECTION–C

7. Find the loads in all the members of the truss shown below by method of joints.

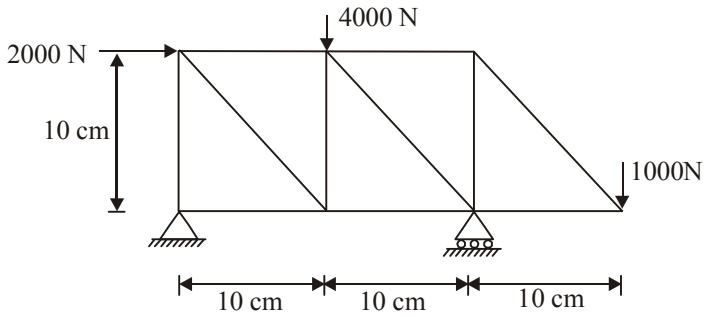

Fig. 1

8. The stress function for the cantilever beam shown below is given as $\phi = Axy + \frac{Bxy^3}{6}$. Obtain the values of σ_x, σ_y and τ_{xy} in terms of second moment of area of beam cross-section , I.

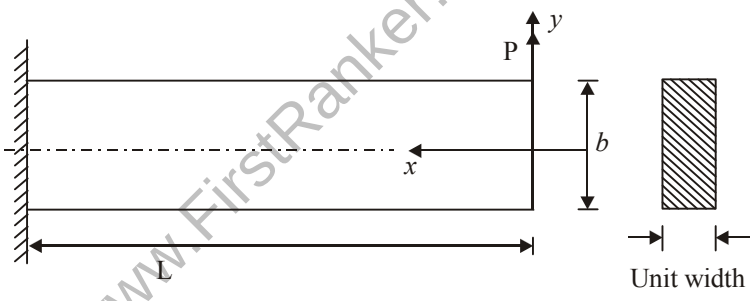

Fig. 2

9. Consider a pin-ended beam carrying a uniformly distributed load of intensity *w* per unit length and an axial load P as shown below. Derive the value of maximum bending moment.

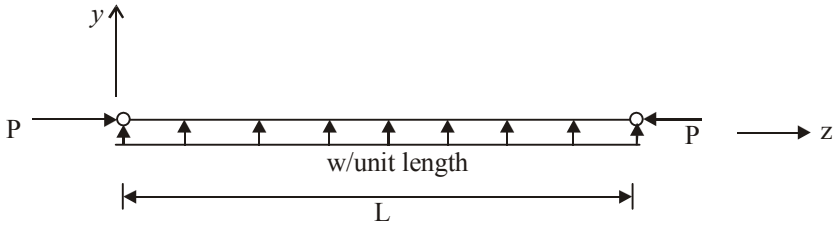

Fig. 3