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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(ANE) (Sem.-4)
AIRCRAFT STRUCTURES – I
Subject Code : ANE-206
Paper ID : [A1031]

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 :**

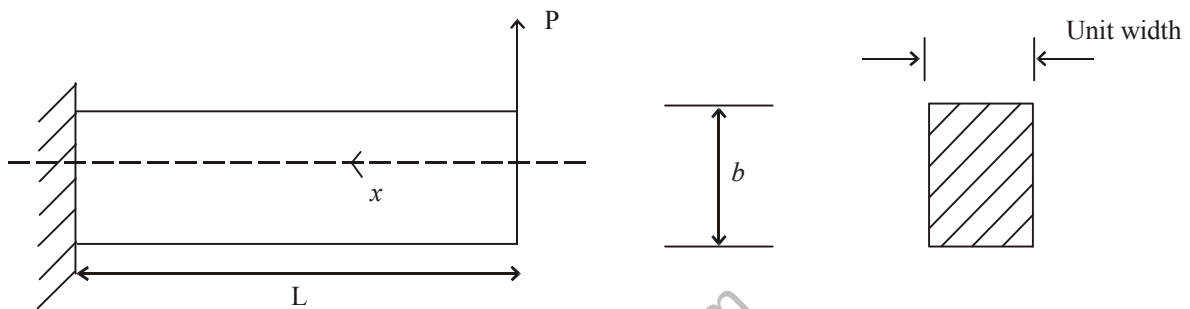
- a) What do you mean by plane stress and plane strain?
- b) What do you mean by principal stresses?
- c) What is St. Venant's principle?
- d) Explain Airy Stress Function.
- e) Define Strain energy of a structural member.
- f) Explain Maxwell Reciprocal Theorem.
- g) What do you understand by statically determinate and statically indeterminate truss?
- h) Define degree of redundancy of a truss.
- i) Define limit load and factor of safety.
- j) Explain Shear lag.

SECTION-B

- A Structural member is subjected to tensile stress of 80N/mm^2 and a shear stress of 45 N/mm^2 on the same plane. Calculate the values and directions of principal stresses and also the maximum shear stress, stating on which planes this will act.
- The stress function for the cantilever beam shown below is given as

$$\phi = Axy + \frac{Bxy^3}{6}$$

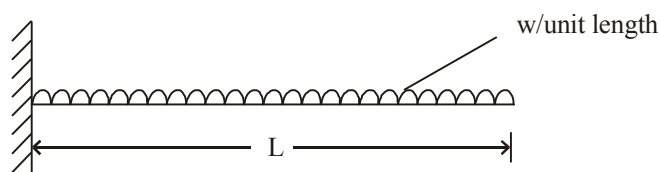
Where A and B are unknown constants. Determine the values of σ_x , σ_y and τ_{xy} .



- A cantilever beam of length L is loaded at the tip as shown below. Determine the tip deflection of the beam by complementary energy method.

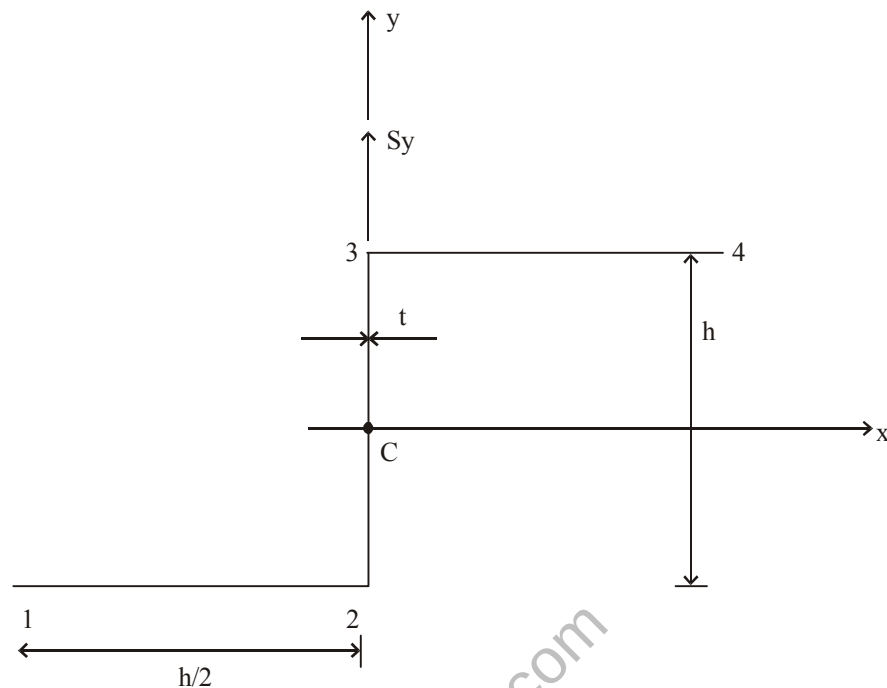


- Draw v-n diagram of a typical airplane and explain all the important points of the diagram.
- Determine the deflection curve and deflection of the free end of the cantilever shown below. The cantilever has a doubly symmetrical cross-section.



SECTION-C

7. Determine the shear flow distribution in thin walled Z-section as shown below due to shear load S_y applied through the shear centre of the section.



8. Explain types of bolted or riveted joints, margin of safety and describe four modes of failures for a simple lap joint. Also define joint efficiency.
9. Determine the rate of twist and stress distribution in a circular section bar of radius R which is subjected to equal and opposite torques T at each of its free ends.