Seat No: _____   Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 - 19 Examination

Semester: 5   Date: 22/05/2019
Subject Code: 03101304   Time: 10:30am to 01:00pm
Subject Name: Aircraft Structures - II   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Each of one mark)   **(15)**
   1. _____ is zero for any principal axes.
   2. Neutral axis passes through _____ of the section in unsymmetrical bending.
      __
   3. _____ is zero along the neutral axis of the Crossection.
   4. Bending of a symmetric section subject to a skew load will be _____ bending.
   5. _____ frame have less or more members to carry the load than the required embers.

   6. Triangular frame is an example of
   7. What are the conditions of equilibrium used in the method of joints
   8. Where are truss type structures found in an aircraft?
   9. Define stress.
   10. Define shear flow.
   11. Units of shear flow are:
       (a) N/mm   (b) N/m^2 (c) N/m   (d) N/mm^2

   12. No. of degrees of freedom a beam with both ends hinged and a moment at ends can have:
       (a) 4   (b) 3   (c) 2   (d) None

   13. For a redundant frame:
       (a) n<2j-3   (b) n>2j-3   (c) n=2j-3   (d) None

   14. For a statically indeterminate structure:
        a) Conditions of equilibrium are sufficient to analyze
        b) Bending moment is independent of material
        c) Shear force is independent of material
        d) Stresses are caused due to temperature change
   15. No. of degrees of freedom a column with both ends hinged and a moment at ends can have:
   (a) 1   (b) 2   (c) 3   (d) 4

Q.2 Answer the following questions. (Attempt any three)   **(15)**
   A) Differentiate between the statically determinate structures and statically in determinate structures
   B) What is symmetrical section and When does unsymmetrical bending takes place?
   C) Determine the deflected form of a thin rectangular plate a× b which is simply supported along its edges and carries a uniformly distributed load intensity of q.
   D) Determine the distribution of bending moment of a thin rectangular plate a× b which is simply supported along its edges and carries a uniformly distributed load intensity of q.

Q.3 A) Calculate the maximum direct stress due to bending of the structure shown in figure subjected to   **(07)**
      a bending moment of 1500 Nm in vertical plane. (Compulsory)
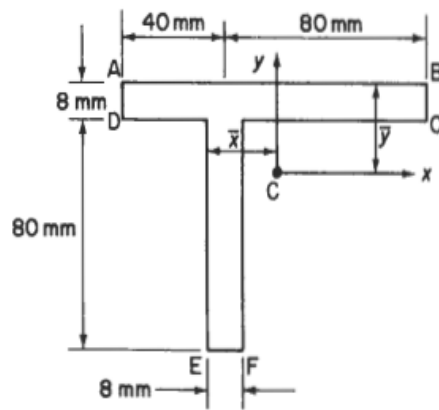
B) Calculate the direct stress distribution of the thin walled Z section produced by a positive bending moment M_x (Optional) **(08)**
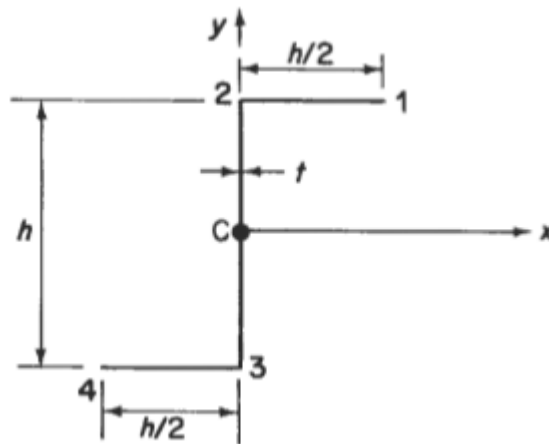
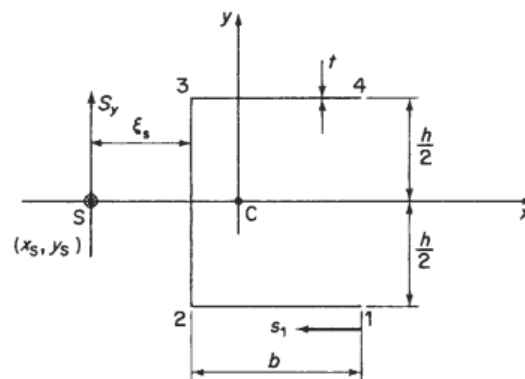

OR

B) Derive the compatibility equations of 3D elastic body (Optional) **(08)**

Q.4 A) Find the stress components for the stress function in the form of a polynomial as below: **(07)**

$$\varphi = \frac{A\,x4}{12} + \frac{B\,x3\,y}{6} + \frac{C\,x2\,y2}{2} + \frac{D\,x\,y3}{6} + \frac{E\,y4}{12} \quad \text{(Optional)}$$

OR

A) Calculate the position of shear centre of the thin walled channel section shown in fig. (Optional) **(07)**

B) Derive the stiffness matrix for a uniform beam under vertical forces and moments. (Compulsory) **(08)**