

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018****Subject Code:2150103****Date:16/11/2018****Subject Name:Aircraft Structures II****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What are the failures occur in structural components of aircraft in different flight conditions? **03**
(b) Explain the role of bulkheads and longerons in detail. **04**
(c) Explain Flight Envelope (V-n diagram) with the help of neat sketch. **07**

- Q.2** (a) Define Neutral Axis and its significance. **03**
(b) Explain with neat sketch the state of stress at a point in three Dimensions **04**
(c) How the structure of passenger aircraft is different from fighter aircraft? Discuss in detail. **07**

OR

- (c) Explain the derivation for Bending stress in unsymmetrical section. **07**

- Q.3** (a) Define Principal Moment of Inertia. **03**
(b) Briefly explain about the load bearing members of wing, fuselage and empennage section with neat sketches. **04**
(c) A thin-walled circular section beam has a diameter of 200 mm and is 2 m long; it is firmly restrained against rotation at each end. A concentrated torque of 30 kNm is applied to the beam at its mid-span point. If the maximum shear stress is limited to 200 N/mm² and the maximum angle of twist is 2°, calculate the minimum thickness of beam walls. Take $G = 25000 \text{ N/mm}^2$. **07**

OR

- Q.3** (a) What is the difference between Symmetrical Bending and Unsymmetrical Bending? **03**
(b) Explain torsion of multi cell open section beams. **04**
(c) Two cell tube shown in figure 1 subjected to a torque $T=100 \text{ KN}$. Calculate the shear flow in q_1 and q_2 . **07**

- Q.4** (a) Define the terms: Shear Centre, Shear Flow. **03**
(b) Write the basic equations of equilibrium, compatibility and stress-strain relations for plane stress condition in polar coordinate system. **04**
(c) State the difference between Stiffness and Flexibility Methods of Structural Analysis. **07**

OR

- Q.4** (a) Explain the Saint Venant's Principle for 2D beam problems. **03**
(b) Explain displacement associated with Bredt-Batho Shear flow for closed sections. **04**
(c) Determine the value of the redundant for the beam shown in the Figure-2 using Flexibility Method. **07**

- Q.5 (a) Enlist the assumptions considered while analyzing the beams for unsymmetrical bending. 03
 (b) Define Flexibility and state the characteristics of Flexibility Matrix. 04
 (c) Derive the equation for the shear flow of open section. 07

OR

- Q.5 (a) Write down the difference between torsion of open and closed Sections. 03
 (b) Explain the State of Plane Stress. 04
 (c) Calculate the value of member end reactions for the beam shown in Figure-3 using Stiffness System Approach. $EI = \text{constant}$. 07

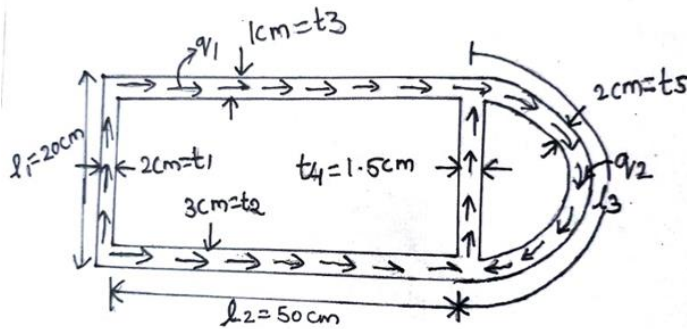


Figure-1

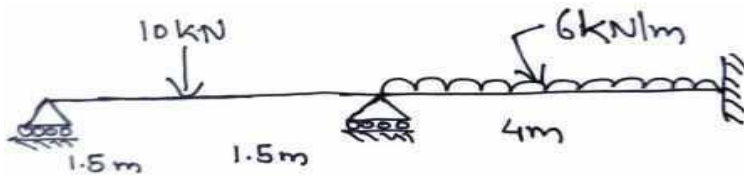


Figure-2

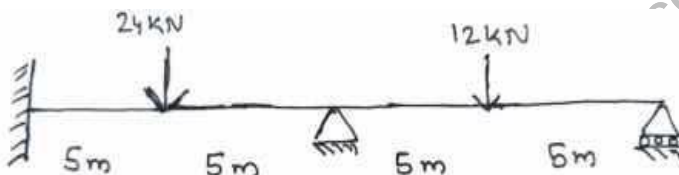


Figure-3
