

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**

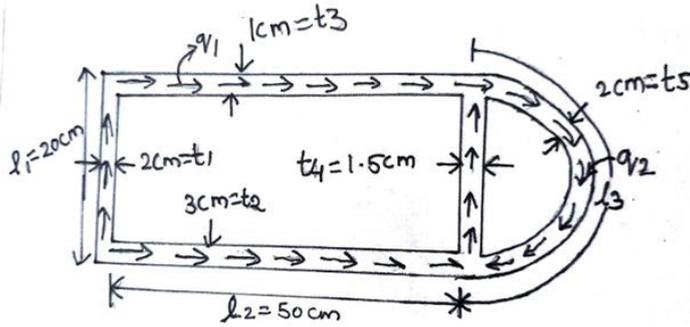


Figure-1

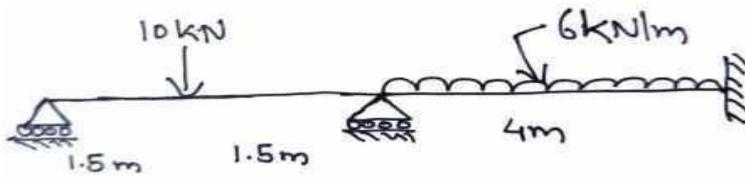


Figure-2

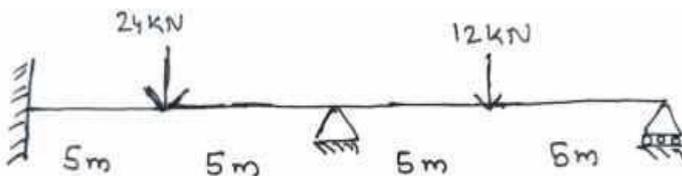


Figure-3
