Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V (New) EXAMINATION – WINTER 2019

Subject Code: 2150103   **Date: 04/12/2019**

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.

			MARKS
Q.1	**(a)**	Clearly explain the loads acting on an aircraft for different flight conditions with neat sketches.	**03**
	(b)	Discuss about the failures occur in structural components of aircraft for different flight conditions.	**04**
	(c)	Briefly explain about the load bearing members of wing, fuselage and empennage section with neat sketches	**07**
Q.2	**(a)**	Define Shear Centre and Shear Flow.	**03**
	(b)	What do you understand by the term buckling of a structure? Give an example of an aircraft structural component prone to buckling.	**04**
	(c)	How the structure of civil aircraft is different from fighter aircraft? Discuss using critical points.	**07**
		OR	
	(c)	A simply supported beam has a central point load of W. Determine the deflection curve and the maximum deflection if the beam is doubly symmetric.	**07**
Q.3	**(a)**	Define Stiffness and state the characteristics of Stiffness Matrix.	**03**
	(b)	Explain with neat sketch the state of stress at a point in three dimensions	**04**
	(c)	Derive the equation of torque for a bar from Prandtl stress function	**07**
		OR	
Q.3	**(a)**	Enlist the different ways of making the section free from torsion.	**03**
	(b)	Describe the difference between Symmetrical Bending and Unsymmetrical Bending?	**04**
	(c)	What is the need of V-n diagram? Explain using neat sketch.	**07**
Q.4	**(a)**	Define Principal Centroidal Axis.	**03**
	(b)	What are the different cross sections that can be used in spar of a wing? Which one is most preferable and why?	**04**
	(c)	Explain torsion of multi cell open section beams.	**07**
		OR	
Q.4	**(a)**	Define neutral axis.	**03**
	(b)	Enlist the basic equations of equilibrium, compatibility and stress strain relations for plane stress condition in polar coordinate system.	**04**
	(c)	Explain torsion of multi cell closed section beams.	**07**
Q.5	**(a)**	Explain St Venant's principle.	**03**
	(b)	Describe principle moment of inertia.	**04**
	(c)	Derive the equations for direct bending stress distribution. Also sketch the direct bending stress distribution of an I-section.	**07**
		OR	
Q.5	**(a)**	What do you mean by in plane stress and out of plane stress?	**03**
	(b)	Prove that 'Stiffness matrix and Flexibility matrix are inverse to one another'.	**04**
	(c)	What is redundancy? Explain its significance with suitable example of aircraft structure.	**07**

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