Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) EXAMINATION – WINTER 2022

Subject Code:3140101 Date:17-12-2022

Subject Name:Aircraft Structures

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What are the failures occur in structural components of aircraft in different? flight conditions?	**03**
	(b)	Define the terms: Determinate Structures & Indeterminate Structures.	**04**
	(c)	Explain Factors of safety-flight envelope with the help of sketch.	**07**
Q.2	**(a)**	Define principle moment of inertia	**03**
	(b)	Explain the role of bulkheads and longerons in detail.	**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)**	Explain theorem of virtual work and its applications.	**03**
	(b)	Enlist different types of trusses.	**04**
	(c)	Derive the expression for strain energy when an elastic member is subjected to axial force, shear force, bending moment and torsion.	**07**
		OR	
Q.3	**(a)**	Explain how to find of degree of indeterminacy of structure.	**03**
	(b)	Briefly explain about the load bearing members of wing, fuselage and empennage section with neat sketches.	**04**
	(c)	Enlist various methods to find slope and deflection. Mention the assumptions required for deriving the differential equation.	**07**
Q.4	**(a)**	Differentiate plane stress and plane strain conditions.	**03**
	(b)	Find Slope and Deflection at the free end of the cantilever beam subjected to UDL load at the free end.	**04**
	(c)	State and prove “Maxwell’s Reciprocal Theorem”.	**07**
		OR	
Q.4	**(a)**	Differentiate plane stress and plane strain conditions.	**03**
	(b)	Explain shear stress in thinned walled open section.	**04**
	(c)	Enlist various methods to find slope and deflection. Mention the assumptions required for deriving the differential equation.	**07**
Q.5	**(a)**	Suggest different way of reducing the effect of buckling in long column.	**03**
	(b)	State the assumptions and limitations of Euler’s Theory of Column Buckling.	**04**

	(c)	Explain the principal of least work for Statically Indeterminate structure.	**07**

OR

Q.5	**(a)**	Derive the strain energy equation for a member subjected to shear force.	**03**
	(b)	Difference between torsion of open and closed sections	**04**
	(c)	Explain the energy method to calculate the buckling loads in columns.	**07**

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