Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2023

Subject Code:3140101 Date:24-01-2024

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.**

Q.1	**(a)**	List out different types of trusses.	**03**
	(b)	Define Principal Moment of Inertia.	**04**
	(c)	Briefly explain about the load bearing members of wing and fuselage section with neat sketches.	**07**
Q.2	**(a)**	What are the failures occur in structural components of aircraft in different flight conditions?	**03**
	(b)	Difference between Symmetrical Bending and Unsymmetrical Bending?	**04**
	(c)	Enlist various methods to find slope and deflection. Mention the assumptions required for deriving the differential equation.	**07**
		OR	
	(c)	Derive the equation for the shear flow of open section.	**07**
Q.3	**(a)**	Suggest different way of reducing the effect of buckling in long column.	**03**
	(b)	Define the term Effective Length of Column.	**04**
	(c)	Give the difference between Unit Load Method and Flexibility method.	**07**
		OR	
Q.3	**(a)**	Write down the difference between torsion of open and closed Sections.	**03**
	(b)	Explain the principal of least work for Statically Indeterminate structure.	**04**
	(c)	Derive the expression for strain energy when an elastic member is subjected to axial force, shear force, bending moment and torsion.	**07**
Q.4	**(a)**	Explain the State of Plane Stress.	**03**
	(b)	State the assumptions and limitations of Euler's Theory of Column Buckling.	**04**
	(c)	Explain the derivation for Bending stress in unsymmetrical section.	**07**
		OR	
Q.4	**(a)**	Name the different type of Materials used in Aircraft wing.	**03**
	(b)	Define: Crushing Load and Slenderness Ratio	**04**
	(c)	Draw the probable sketch which represents the buckled shape of the column with different support conditions.	**07**
Q.5	**(a)**	Define the terms: Determinate Structures & Indeterminate Structures.	**03**
	(b)	Explain the role of bulkheads and longerons in detail.	**04**
	(c)	How the structure of passenger aircraft is different from fighter aircraft?	**07**

OR

Q.5	**(a)**	Define: Stress, Strain, Shear Modulus.	**03**
	(b)	Explain shear stress in thinned walled open section.	**04**
	(c)	Explain Flight Envelope (V-N diagram) with the help of neat sketch.	**07**

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