Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170101 Date: 27/06/2023

Subject Name: Aircraft Design

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)**	Give brief classification of fixed wing aircrafts.	**03**
	(b)	Differentiate between Expandable and Non Expandable Payloads.	**04**
	(c)	Briefly explain conceptual design process of any fixed wing aircraft.	**07**
Q.2	**(a)**	Define loiter. Shortly explain method to find Fuel fraction while loiter.	**03**
	(b)	Differentiate between fuel fraction and structure factor.	**04**
	(c)	Briefly explain process of determining of fuel fraction.	**07**
		OR	
	(c)	Briefly explain method to determine wing loading of any fighter jet.	**07**
Q.3	**(a)**	Define Centre of Pressure, Neutral point, Centre of Gravity.	**03**
	(b)	What is Geometric Aerodynamic Centre? What is role of GAC to find tail sizing?	**04**
	(c)	Explain method to determine Thickness / Chord ratio of any airfoil. How does this ratio affect cruise speed and critical angle of attack?	**07**
		OR	
Q.3	**(a)**	Shortly explain how will you locate wing on fuselage layout?	**03**
	(b)	Differentiate between layout and lofting.	**04**
	(c)	How will you decide tail plan form shape of any fixed wing aircraft?	**07**
Q.4	**(a)**	Explain advantage of flat wrap fuselage lofting.	**03**
	(b)	Discuss any two considerations required for make a supersonic aircraft aerodynamically efficient.	**04**
	(c)	How will you verify wing lofting of a tapered wing?	**07**
		OR	
Q.4	**(a)**	Explain various applications of circle to square adaptors in aircraft design.	**03**
	(b)	Explain any two method of designing to minimize production cost of wing.	**04**
	(c)	What is crashworthiness? Which considerations will you take with respect to crashworthiness?	**07**
Q.5	**(a)**	How will you determine size of main wheels and nose wheels of a tricycle landing gears?	**03**
	(b)	With neat sketch explain any one type of landing gear retraction geometry of a conventional jet transport aircraft.	**04**
	(c)	Enlist and explain design considerations of a sea plane with neat sketch.	**07**

OR

Q.5	**(a)**	Shortly explain importance of an approximate group weight method.	**03**
	(b)	With neat sketches explain function of oleo type suspension mechanism.	**04**
	(c)	With neat sketch explain geometry of castoring of nose wheel and tail wheel.	**07**

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