Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170101 Date:19-05-2025

Subject Name:Aircraft Design

Time:02:30 PM TO 05:00 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)**	List the steps involved in the weight estimation process of a flight vehicle.	**03**
	(b)	Summarize the relationship between the weight of a flight vehicle and its performance characteristics.	**04**
	(c)	How would you implement standard weight estimation methods for a new conceptual design of a UAV (Unmanned Aerial Vehicle)?	**07**
Q.2	**(a)**	What is a mission profile? Provide an example to illustrate.	**03**
	(b)	Describe two types of aft-tail configurations, including a figure.	**04**
	(c)	Explain how the thrust-to-weight ratio is related to an aircraft's takeoff and climb performance.	**07**
		OR	
	(c)	Discuss the structural considerations involved in the design process, including a relevant figure.	**07**
Q.3	**(a)**	Explain the significance of Aspect ratio	**03**
	(b)	What is Geometric Aerodynamic Centre? What is role of GAC to find tail sizing?	**04**
	(c)	Explain shock absorbers, including an accompanying figure.	**07**
		OR	
Q.3	**(a)**	Define Centre of Pressure, Neutral point, Centre of Gravity.	**03**
	(b)	Differentiate between layout and lofting.	**04**
	(c)	Explain the method for determining the thickness-to-chord ratio of an airfoil. How does this ratio influence cruise speed and the critical angle of attack?	**07**
Q.4	**(a)**	Explain Airfoil selection in ailerons and rudder?	**03**
	(b)	Shortly explain conic lofting.	**04**
	(c)	Briefly explain method to determine wing loading of any fighter jet.	**07**
		OR	
Q.4	**(a)**	What is VTOL?	**03**
	(b)	What is the function of winglet?	**04**
	(c)	Develop a plan for integrating a retractable landing gear system into an existing aircraft design.	**07**
Q.5	**(a)**	Discuss gun installation.	**03**
	(b)	Define Visual detectability and Aural signature	**04**
	(c)	Write a note on Statistical group weight method.	**07**
		OR	
Q.5	**(a)**	Shortly explain importance of an approximate group weight method.	**03**
	(b)	Explain Prop VTOL.	**04**
	(c)	Explain the geometry of nose wheel and tail wheel castoring with a clear sketch.	**07**

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