Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3170101 Date:03-01-2023

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)**	Explain mission profile briefly.	**03**
	(b)	Shortly explain engine selection process.	**04**
	(c)	Explain complete procedure for estimation of takeoff weight calculation.	**07**
Q.2	**(a)**	Define Maximum take-off weight, fuel weight, and basic empty weight.	**03**
	(b)	Explain flight envelope of any one type of aircraft.	**04**
	(c)	Explain three phases of aircraft design.	**07**
		OR	
	(c)	With the help of block diagram briefly explain about three stage of aircraft design.	**07**
Q.3	**(a)**	Shortly explain conceptual Design procedure.	**03**
	(b)	Discuss various types of wing layout and their necessity.	**04**
	(c)	Explain aircraft development process with block diagram.	**07**
		OR	
Q.3	**(a)**	Define all parameters required to start aircraft design.	**03**
	(b)	Explain effect of thrust to weight ratio on climb performance.	**04**
	(c)	How will you determine fuel fraction for weight estimation.	**07**
Q.4	**(a)**	Explain importance of structure factor in aircraft design.	**03**
	(b)	Discuss relationship between fuel quantity and range.	**04**
	(c)	Explain effect of wing loading on takeoff performance in various temperature and density conditions.	**07**
		OR	
Q.4	**(a)**	Only draw side view of an under carriage geometry of tail wheel aircraft.	**03**
	(b)	Explain how to set size of rudder.	**04**
	(c)	Discuss the effects of taper ratio and aspect ratio on flight performance.	**07**
Q.5	**(a)**	Explain procedure to select engine and T/W ratio.	**03**
	(b)	How will you design vertical fin? Discuss with respect to tail plane volume.	**04**
	(c)	Which considerations will you take to select tail plane configuration?	**07**
		OR	
Q.5	**(a)**	Explain method of landing gear arrangement.	**03**
	(b)	How will you choose airfoil section of horizontal stabilizer? write valid comment with justification.	**04**
	(c)	Discuss Aerodynamic considerations during design procedure with appropriate figure.	**07**

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