Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2170101 **Date:19/01/2021**

Subject Name:Aircraft Design I

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Make sketches by drawing instruments only**

			MARKS
Q.1	**(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**
Q.2	**(a)**	Explain importance of structure factor in aircraft design.	**03**
	(b)	Discuss relationship between fuel quantity and range.	**04**
	(c)	Explain how maximum take off weight is determined.	**07**
Q.3	**(a)**	Explain how to set fraction of size of horizontal and vertical stabilizer.	**03**
	(b)	Draw and explain geometry of tricycle type landing gear.	**04**
	(c)	Discuss under carriage retraction geometry of a low wing, dihedral jet transport aircraft having sweep back angle of 23^0.	**07**
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 airfoil selection for tail plane.	**03**
	(b)	Explain effects of T/W ratio on flight performance.	**04**
	(c)	Discuss the effects of taper ratio and aspect ratio of vertical fin on spin recovery.	**07**
Q.6	**(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**
Q.7	**(a)**	Only draw possible tail plane configuration of single engine jet fighter empennage.	**03**
	(b)	Classify types of engines used in supersonic aircrafts.	**04**
	(c)	Explain conventional and co-axial rotor configuration.	**07**

Q.8	**(a)**	Shortly explain function of main and tail rotor in conventional helicopter.	**03**
	(b)	What different types of airfoils are used for construction of main rotor and tail rotor blades of helicopters?	**04**
	(c)	With neat sketch explain cyclic and collective pitch controls of conventional helicopter.	**07**

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