

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° .	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**
