

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2170101

Date:10/05/2019

Subject Name:Aircraft Design I

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. Use drawing instruments for sketches.

		MARKS
Q.1	(a) What is the reason behind selection of Supercritical airfoils for jet transport aircraft?	03
	(b) Enlist type of aircrafts with respect to their applications. Shortly explain their application in one sentence.	04
	(c) With block diagram explain aircraft development process.	07
Q.2	(a) What is the reason for choosing laminar supercritical airfoils rather than supersonic airfoil for supersonic jet transport aircrafts?	03
	(b) Discuss factors affecting cruise range of aircraft.	04
	(c) How will you determine maximum takeoff weight for a supersonic jet fighter aircraft carrying expandable payload?	07
	OR	
	(c) How will you determine wing loading of a conventional non aerobatic civil aircraft?	07
Q.3	(a) What are disadvantages of using Y tail?	03
	(b) Draw and explain graph showing selection of engine with respect to mach number.	04
	(c) How will you determine size of horizontal stabilizer and Vertical fin of T-Tail configuration?	07
	OR	
Q.3	(a) What is the reason for not choosing high bypass turbofan engines in spite of low thrust specific fuel consumption for supersonic aircrafts?	03
	(b) How does wing loading affect take off and landing performance?	04
	(c) Discuss factors affecting static and dynamic stability of aircraft?	07
Q.4	(a) Define Centre of pressure, Aerodynamic centre, C.G. Range.	03
	(b) Differentiate between expandable and non expandable payloads.	04
	(c) How will you choose type of airfoils for various applications of main wing?	07
	OR	
Q.4	(a) Define Static margin, Neutral Point, Mean Aerodynamic Chord.	03
	(b) How will you determine fuel weight of any piston prop aircraft?	04

- (c) How will you choose location of high by pass Jet engines in case of 2, 3 and 4 units? Discuss with respect to ground clearance, Thrust- Drag couple. **07**
- Q.5** (a) Only draw a conventional rotary wing aircraft with nomenclature. **03**
- (b) Discuss aerodynamic and structural design of main rotor. What are major differences between geometry of propellers and main rotors? **04**
- (c) Discuss control system of contra rotor and tandem rotor configurations of helicopters with neat sketch. **07**
- OR**
- Q.5** (a) What are reasons for cambered airfoil on vertical fin and horizontal stabilizer of conventional helicopters? **03**
- (b) What are major differences between main rotor and tail rotor swash plates? **04**
- (c) Explain mechanism and operation of swash plate of main rotor. **07**
