Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2170101 **Date: 02/11/2017**

Subject Name: Aircraft Design I

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.**

			MARKS
Q.1	**(a)**	Write down the significance of vortex generator.	**03**
	(b)	How the wing configuration of passenger aircraft is different from fighter aircraft.	**04**
	(c)	With the help of block diagram briefly explain about three stages of aircraft design.	**07**
Q.2	**(a)**	Why the high lift devices are operated at take-off and landing conditions?	**03**
	(b)	With neat sketch explain function of trim tab.	**04**
	(c)	Which aerodynamic considerations will you make to design a supersonic jet fighter's fuselage?	**07**
		OR	
	(c)	Explain cyclic pitch and collective pitch control in brief with neat sketches.	**07**
Q.3	**(a)**	Explain the significance of sweep back angle.	**03**
	(b)	Only draw any type of plan form shaped wing and mention Mean Aerodynamic Chord, Geometric Aerodynamic Centre, Root Chord, Tip Chord, C.G Range and Neutral Point.	**04**
	(c)	With neat sketch explain advantages and disadvantages of different tail plane configuration.	**07**
		OR	
Q.3	**(a)**	List out the different types of aircraft.	**03**
	(b)	Explain the significance of Dihedral, Polyhedral and Anhedral wing configurations	**04**
	(c)	Write down procedure to design wing geometry of a public transport jet aircraft.	**07**
Q.4	**(a)**	Explain how tail rotor supports maneuvering of a conventional helicopter?	**03**
	(b)	Explain about the control surface sizing of a tail plane.	**04**
	(c)	Explain the advantages and disadvantages of retractable landing gear over fix landing gear.	**07**
		OR	
Q.4	**(a)**	Why there is a variation in thickness of airplane wing from root to tip?	**03**
	(b)	Explain how to determine track and base distance of landing gears.	**04**
	(c)	Write down the design differences between fighter aircraft and passenger aircraft.	**07**
Q.5	**(a)**	How to determine load acting upon wheels of aircrafts when aircraft is fully loaded with payload and fuel?	**03**

(b) Discuss maneuvering techniques of a tandem rotor helicopter. 04

(c) Discuss about the different types of engine mounting locations for different aircraft. Also explain its significance. 07

OR

Q.5 **(a)** Explain the significance of tapper ratio. **03**

(b) Suppose you want to convert single engine piston prop aircraft into jet plane configuration how will you convert Hp/Wo from Tmax/ Wo Ratio? **04**

(c) Discuss different rotor configurations with neat sketches. **07**

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