GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2150101   **Date:21/05/2016**
Subject Name:Flight Mechanics
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.**

Q.1	**(a)**	With neat sketch explain V-n diagram.	**07**
	(b)	Derive formula to Calculate Thrust required for level, unacclerated flight. Also derive aerodynamic condition for minimum thrust required.	**07**
Q.2	**(a)**	Define the pressure coefficient and explain the Prandtl-Glauert rule in detail along with a plot.	**07**
	(b)	Explain the critical pressure coefficient and critical Mach number for different airfoils along with a plot.	**07**
		OR	
	(b)	Write a short note on:	**07**
		1. Explain flow separation	
		2. Significance of standard atmosphere in flight mechanics	
Q.3	**(a)**	Discus types of drag and explain Induced Drag in detail.	**07**
	(b)	Describe in detail the advantages of trailing edge flaps.	**07**
		OR	
Q.3	**(a)**	Derive Breguet Range formula. Also list out important points to maximize the range for reciprocating engine, propeller driven airplane.	**07**
	(b)	Explain Static stability and dynamic stability.	**07**
Q.4	**(a)**	Explain with neat sketches a short note on Mach cone.	**07**
	(b)	Estimate the liftoff distance at sea level for the aircraft having total weight of 19815 N. Assume that C_{Lmax} is 1.Also when the airplane is on the ground the wings are 1.83 m above the ground. Wing Span is 16.25 m. Wing area is 29.54 m^2.$C_{D,0}$ = 0.022 & μ_r=0.02.	**07**
		OR	
Q.4	**(a)**	Explain Directional Static Stability.	**07**
	(b)	Which are the necessary criteria for longitudinal balance and static stability? Explain in detail.	**07**
Q.5	**(a)**	Derive formula to calculate Lift off distance.	**07**
	(b)	Derive equation to calculate steady Rate of Climb.	**07**
		OR	
Q.5	**(a)**	Explain Lateral Static Stability.	**07**
	(b)	Write a short note on Neutral Point.	**07**

****