Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2150101 **Date:17/12/ 2015**

Subject Name: Flight Mechanics

Time:10:30am to 1:00pm **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)**	Obtain lift coefficient from pressure coefficient. Plot and explain the pressure distribution over the upper and lower surface of an airfoil for small angles of attack.	**07**
	(b)	Derive equations of Motion for an Airplane in translational motion. Reduce the same for level, unaccelerated flight.	**07**
Q.2	**(a)**	Derive formula to Calculate Power required for level, unaccelerated flight. Also derive aerodynamic condition for minimum power required.	**07**
	(b)	Explain Static stability and Dynamic stability.	**07**
		OR	
	(b)	Explain Critical Mach number and Drag divergence Mach number	**07**
Q.3	**(a)**	1. Explain compressibility corrections 2. Distinguish between finite and infinite wings.	**07**
	(b)	Write a short note on Swept wings	**07**
		OR	
Q.3	**(a)**	Write a short note on Neutral Point.	**07**
	(b)	Which are the necessary criteria for longitudinal balance and static stability? Explain in detail.	**07**
Q.4	**(a)**	Estimate the Landing ground roll distance at sea level for the aircraft having empty weight of 54966 kg. No thrust reversal is used; However, spoilers are operated such that L=0. The maximum lift coefficient ($C_{L\ max}$) with fully flaps employed at touch down is 2.5. Wing area is 29.54 m^2.$C_{D,0}$ = 0.022 & μ_r=0.4.	**07**
	(b)	Derive formula to calculate Lift off distance.	**07**
		OR	
Q.4	**(a)**	Derive and explain Wave drag.	**07**
	(b)	Explain Lift Augmentation	**07**
Q.5	**(a)**	Write a short note on Accelerated Rate of climb using Energy Method.	**07**
	(b)	With neat sketch explain V-n diagram.	**07**
		OR	
Q.5	**(a)**	Explain Directional Static Stability.	**07**
	(b)	Explain Lateral Static Stability.	**07**

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