## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-V (NEW) - EXAMINATION - SUMMER 2017** Subject Code: 2150101 Date: 05/05/2017 **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. MARKS 0.1 **Short Questions** 14 1 Define Altitude 2 **Define** Pressure 3 List out different types of drag What is Mach number? Define 4 5 Write an equation for coefficient of lift  $(C_1)$ 6 Define zero lift line for airfoil 7 For symmetric airfoil, If A.O.A is increases, C<sub>1</sub> is increase or decrease? 8 What is the meaning of equilibrium position 9 What is the meaning of steady level flight Write an equation for gliding angle 10 Write an equation for coefficient of Drag ( $C_d$ ) 11 Write an equation for rate of climb. 12 13 Define moment coefficient **14** Define Density **O.2** (a) List out different types of Airfoil. 03 (b) Define Drag and Lift. 04 What is International standard atmosphere? Explain the 07 (c) variation of temperature with altitude in standard model of atmosphere. OR (c) Derive equation for range and endurance for jet engine 07 propelled aircraft. Base on mathematical equation justify dependency of range and endurance on various parameters. Q.3 (a) Difference between airfoil and wing. 03 Explain Critical Mach number 04 **(b)** Explain V-N Diagram. 07 (c) OR Draw Coefficient of lift vs angle of attack curve for **Q.3** (a) 03 symmetrical airfoil Explain compressibility corrections 04 **(b)** (c) Explain static stability. 07 Draw Coefficient of lift vs angle of attack curve for **Q.4** 03 (a) unsymmetrical airfoil (b) Explain power augmented lift system 04 Derive hydrostatic equation. 07 (c) OR (a) Draw a graph for effect of altitude on power required. **Q.4** 03

(b) Explain Induced drag

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04

	(c)	Plot and explain the pressure distribution over the upper and	07
		lower surface of an airfoil for small angles of attack	
Q.5	<b>(a)</b>	Define Pressure coefficient.	03
	<b>(b)</b>	Explain Wave drag.	04
	(c)	Explain how time to climb can be graphically calculated.	07
		OR	
Q.5	<b>(a)</b>	How lift is generating on airplane? Discuss	03
	<b>(b)</b>	Write a short note on Swept wings	04
	(c)	Derive the condition for Optimum power requirement	07
		during steady level flight.	

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