Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2150107 **Date: 19/06/2019**

Subject Name: Aerodynamics 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.**

Q.1	**(a)**	What are the aerodynamic forces and moments?	**03**
	(b)	Describe about pressure coefficient.	**04**
	(c)	Explain airfoil nomenclature with neat sketch.	**07**
Q.2	**(a)**	Briefly explain about critical Mach number.	**03**
	(b)	Explain airfoil Stalling with neat sketch.	**04**
	(c)	Elaborate about centre of pressure.	**07**
		OR	
	(c)	Discuss about the types of drag.	**07**
Q.3	**(a)**	Explain C_L – α curve for symmetrical as well as cambered Airfoil.	**03**
	(b)	Explain angular velocity of fluid element.	**04**
	(c)	Express stream function and velocity potential for source flow.	**07**
		OR	
Q.3	**(a)**	What is circulation?	**03**
	(b)	Derive the expression for velocity potential and stream function for vortex flow.	**04**
	(c)	Elaborate the combination of source flow and sink flow with uniform flow.	**07**
Q.4	**(a)**	Write a note on vorticity of fluid element.	**03**
	(b)	Explain stream function.	**04**
	(c)	Explain about non-lifting flow over a cylinder.	**07**
		OR	
Q.4	**(a)**	Explain velocity potential.	**03**
	(b)	Discuss about doublet flow.	**04**
	(c)	Derive an equation of Speed of Sound.	**07**
Q.5	**(a)**	What is shock wave? Write a note on Normal shock with a suitable diagram.	**03**
	(b)	Discuss about Oblique shock with neat sketch.	**04**
	(c)	Derive a relation between an actual Mach number (M) and Characteristic Mach number (M*).	**07**
		OR	
Q.5	**(a)**	What happens to flow properties when shock wave encounters?	**03**
	(b)	Write a note on Prandtl-Meyer Expansion waves.	**04**
	(c)	Derive θ-β-M relation.	**07**

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