Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(NEW) EXAMINATION – SUMMER 2022

Subject Code:3150107 Date:09/06/2022

Subject Name:Aerodynamics

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Briefly Explain Application of airfoil.	**03**
	(b)	Short note on wind tunnel	**04**
	(c)	What is NACA airfoil? Explain NACA Series Airfoil with example.	**07**
Q.2	**(a)**	Explain Downwash.	**03**
	(b)	Explain Characteristics of airfoil with airfoil stalling.	**04**
	(c)	Derive fundamental equation of Classical Thin Airfoil Theory.	**07**
		OR	
	(c)	Explain Kelvin's Circulation Theorem and starting vortex.	**07**
Q.3	**(a)**	Explain bound vortex and Horse shoe vortex with diagram.	**03**
	(b)	Explain Helmholtz's theorem with lift distribution diagram.	**04**
	(c)	Explain Vortex sheet with the help of schematic diagram	**07**
		OR	
Q.3	**(a)**	Explain Kutta Condition.	**03**
	(b)	Explain Bio-Savart low for infinite and semi infinite vortex.	**04**
	(c)	Explain The Vortex Lattice Numerical Method with appropriate diagram	**07**
Q.4	**(a)**	Briefly explain - Expansion of supersonic flow	**03**
	(b)	Derive fundamentals relations of oblique shock	**04**
	(c)	Explain Prandtl's Classical Lifting Line Theory	**07**
		OR	
Q.4	**(a)**	Write a short note on Rarefaction wave	**03**
	(b)	Explain Modern low speed airfoil	**04**
	(c)	Derive Governing equation for inviscid compressible flow	**07**
Q.5	**(a)**	Explain Total condition.	**03**
	(b)	Write a short note on Development of a shockwave	**04**
	(c)	Explain Numerical Nonlinear Lifting Line Method.	**07**
		OR	
Q.5	**(a)**	Explain airfoil definition and types of airfoil	**03**
	(b)	Derive Rankine-Hugoniot equation for flow with Oblique shock wave.	**04**
	(c)	Explain Prandtl-Meyer relation in flow with normal shock waves.	**07**

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