GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2023

Subject Code:3150107   **Date:11-12-2023**
Subject Name:Aerodynamics
Time:10:30 AM TO 01:00 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)**	What is airfoil? Explain Types of airfoil.	**03**
	(b)	What is NACA airfoil? Explain NACA Series Airfoil with example.	**04**
	(c)	Explain Airfoil stalling theory with Diagram	**07**
Q.2	**(a)**	Explain airfoil Nomenclature with diagram	**03**
	(b)	Short note on wind tunnel with diagram.	**04**
	(c)	Explain Vortex sheet with the help of schematic diagram	**07**

OR

	(c)	Explain importance of Kelvin's Circulation Theorem and starting vortex.	**07**
Q.3	**(a)**	What are the Applications of airfoil?	**03**
	(b)	Explain Bio-Savart low for semi infinite vortex.	**04**
	(c)	Explain Prandtl's Classical Lifting Line Theory and derive induce angle of attack equation.	**07**

OR

Q.3	**(a)**	Briefly explain - Expansion of supersonic flow	**03**
	(b)	Explain Helmholtz's theorem and it's observation..	**04**
	(c)	Explain The Vortex Lattice Numerical Method with appropriate diagram	**07**
Q.4	**(a)**	Explain Modern low speed airfoil	**03**
	(b)	Derive fundamentals relations of oblique shock	**04**
	(c)	Derive fundamental equation of Classical Thin Airfoil Theory	**07**

OR

Q.4	**(a)**	Explain Horse shoe vortex with diagram.	**03**
	(b)	Explain Total condition.	**04**
	(c)	Explain Numerical Nonlinear Lifting Line Method.	**07**
Q.5	**(a)**	Explain Kutta Condition with diagram.	**03**
	(b)	Write a short note on Development of a shockwave with diagram.	**04**
	(c)	Explain Prandtl-Meyer relation in flow with normal shock waves.	**07**

OR

Q.5	**(a)**	Write a short note on Rarefaction wave.	**03**
	(b)	Derive Rankine-Hugoniot equation for flow with Oblique shock wave.	**04**
	(c)	Derive governing equation for inviscid compressible flow	**07**

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