

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V EXAMINATION – SUMMER 2025****Subject Code:3150107****Date:17-05-2025****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) What is Aerodynamics? Explain (b) What is Airfoil? Give the nomenclature of Airfoil with figure. (c) Explain the construction and working od subsonic open circuit wind tunnel.	03 04 07
Q.2	(a) Explain NACA 4 digit series. (b) Explain Bio-Savart law. (c) Explain the phenomenon of Upwash and Downwash.	03 04 07
	OR	
	(c) Explain Kelvin's Circulation Theorem.	07
Q.3	(a) Draw weak and strong shock wave for supersonic case. (b) Explain supersonic flow over a corner. (c) Derive Rankine-Hugoniot equation for flow with Oblique shock wave.	03 04 07
	OR	
Q.3	(a) Briefly explain - Expansion of supersonic flow. (b) Explain Helmholtz's theorem with lift distribution diagram. (c) Explain Prandtl-Meyer relation in flow with normal shockwaves.	03 04 07
Q.4	(a) Write a short note on Rarefaction wave. (b) Derive fundamentals relations of oblique shock. (c) Derive Governing equation for inviscid compressible flow.	03 04 07
	OR	
Q.4	(a) Define laminar flow and turbulent flow. (b) Explain Kutta Condition with sketch. (c) Explain $C_L-\alpha$ Curve for symmetrical and cambered Airfoil.	03 04 07
Q.5	(a) Explain NACA 5 digit Series Airfoil. (b) Explain airfoil stalling with appropriate sketch (c) Explain Numerical Nonlinear Lifting Line Method.	03 04 07
	OR	
Q.5	(a) Explain Ground effect. (b) Define Lift and Drag with appropriate equation. (c) Explain Vortex flow and Vortex sheet with the help of schematic diagram.	03 04 07