Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2150107 **Date:10/05/2017**

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	What do you mean by Critical Mach Number?	
	2	Why car can't fly?	
	3	Write D'Alembert's paradox.	
	4	With increasing of Angle of Attack what happens to the location of Centre of Pressure in Symmetrical and Cambered Airfoil?	
	5	How would you define Stream line?	
	6	What do you mean by Drag Divergence Mach Number?	
	7	What is the difference between Aerodynamics and Hydrodynamics?	
	8	At which Mach number Shock wave starts to generate?	
	9	How would you define Path line?	
	10	What is the full form of NACA?	
	11	What do you mean by Wave Drag?	
	12	How would you define Lift?	
	13	What is Camber?	
	14	What do you mean by Angle of Attack?	
Q.2	**(a)**	Classify the different types of Airfoil based on its applications.	**03**
	(b)	What is Aerodynamics? Write an application of Aerodynamics in the various fields.	**04**
	(c)	What is Bernoulli's Theorem? Derive Bernoulli's Equation.	**07**
		OR	
	(c)	Define: Stream Function, Source, Path line, Continuum flow, Mach number, Profile Drag and Gas Dynamics.	**07**
Q.3	**(a)**	Define Stall. Explain stall with proper diagram by giving an example.	**03**
	(b)	Write a note on NACA Series. Explain NACA 4-digit and 5-digit with a proper diagram.	**04**
	(c)	Derive an equation of speed of sound.	**07**
		OR	
Q.3	**(a)**	What is Shock? What happens to the flow properties during the shock? Explain in brief.	**03**
	(b)	Classify the different types of flow for Aerodynamics.	**04**
	(c)	With a neat sketch explain lifting flow over circular cylinder.	**07**
Q.4	**(a)**	Explain Vortex flow.	**03**
	(b)	What is Airfoil? Explain Airfoil Nomenclature with a neat sketch.	**04**
	(c)	Derive continuity equation.	**07**
		OR	
Q.4	**(a)**	What is the significance of Bernoulli's theorem?	**03**
	(b)	Write a note on Normal Shock wave.	**04**
	(c)	Explain $C_L - \alpha$ curve for symmetrical as well as cambered Airfoil.	**07**

Q.5	**(a)**	Explain the aerodynamics of Pitot Tube.	**03**
	(b)	Derive an equation for Stream function and Velocity potential for a uniform flow.	**04**
	(c)	Explain the concept of oblique shock wave and expansion wave with a suitable diagram.	**07**

OR

Q.5	**(a)**	Explain the physics of Rankine Oval Body.	**03**
	(b)	What is Prandtl-Meyer expansion wave? Explain with proper diagram.	**04**
	(c)	What are the Aerodynamic forces and moments? Derive equations for Lift and drag with a suitable diagram.	**07**

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