Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3160113 Date:08/06/2022

Subject Name:Advance 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)**	Explain First law of thermodynamics.	**03**
	(b)	What is Hyper Sonic Flow? Explain.	**04**
	(c)	Write a note on Supersonic Flow.	**07**
Q.2	**(a)**	Why it is important to study Hypersonic Aerodynamics?	**03**
	(b)	Define Critical mach number. How it is affected by airfoil thickness?	**04**
	(c)	Write a note on Drag Divergence Mach number.	**07**
		OR	
	(c)	Derive Hypersonic shock relations in terms of hypersonic similarity parameters.	**07**
Q.3	**(a)**	State applications of Hypersonic Flows.	**03**
	(b)	Write a note on Entropy layer.	**04**
	(c)	What is Mach number independence? Explain in detail.	**07**
		OR	
Q.3	**(a)**	Explain the term Aerothermodynamics.	**03**
	(b)	Explain Prandtl Glauert rule.	**04**
	(c)	Derive Prandtl-Mayer expansion wave relations.	**07**
Q.4	**(a)**	Write a note on Newtonian Flow.	**03**
	(b)	With neat sketch explain Super Critical Airfoil.	**04**
	(c)	Derive basic Hypersonic shock relations.	**07**
		OR	
Q.4	**(a)**	Define Entropy, Adiabatic Process, Isentropic Process.	**03**
	(b)	Explain Supersonic flow over a flat plate.	**04**
	(c)	Derive linearized Velocity potential equation for 2-D irrotational, isentropic flow over an airfoil.	**07**
Q.5	**(a)**	Explain linearized Supersonic flow over an airfoil.	**03**
	(b)	Derive an expression for Linearized supersonic pressure coefficient.	**04**
	(c)	With neat sketch explain Area Rule.	**07**
		OR	
Q.5	**(a)**	State and explain modified Newtonian law.	**03**
	(b)	Explain Tangent-Wedge method.	**04**
	(c)	Explain Newtonian sine-squared law.	**07**

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