Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160113 Date:22-05-2024

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 aerodynamic heating for hypersonic flow.	**03**
	(b)	Draw and explain entropy layer for airfoil in hypersonic flow.	**04**
	(c)	Prove L/D = Cotα	**07**
Q.2	**(a)**	Explain Area Rule with diagram	**03**
	(b)	What is the difference between Tangent wedge and Tangent cone method for curved surfaces? Define shock layer and viscous retraction	**04**
	(c)	What is Newtonian theory? Or Prove $Cp=2\sin^2\theta$ for Newtonian theory	**07**
		OR	
	(c)	Explain with neat sketch High temperature Flows.	**07**
Q.3	**(a)**	From equation of Newtonian flow obtain value of L/D for flat plate	**03**
	(b)	Define shock layer and viscous retraction	**04**
	(c)	Explain Drag Divergence Mach number- Sound Barrier with Diagram	**07**
		OR	
Q.3	**(a)**	What is critical mach number?	**03**
	(b)	Differentiate subsonic, supersonic and transonic range of flows.	**04**
	(c)	Derive Linearised velocity potential equation	**07**
Q.4	**(a)**	Enlist Application of supersonic airfoil	**03**
	(b)	Explain Centrifugal force corrections to Newtonian theory with neat sketch.	**04**
	(c)	Derive co-efficient of pressure for hypersonic Prandtl Mayer flow in terms of hypersonic similarity parameter.	**07**
		OR	
Q.4	**(a)**	Enlist the applications of hypersonic flow	**03**
	(b)	Explain Tangent wedge/ Tangent cone method for curved surfaces.	**04**
	(c)	Explain hypersonic expansion wave relations	**07**
Q.5	**(a)**	Explain flow over an airfoil case for hypersonic case	**03**

	(b)	Write a short note on low density flows associated with hypersonic flow	**04**
	(c)	Define with neat sketch physical effects characteristics of hypersonic flow	**07**

OR

Q.5	**(a)**	Explain flow over an airfoil case for hypersonic case	**03**
	(b)	Draw and explain entropy layer for airfoil in hypersonic flow	**04**
	(c)	To explain $\theta - \beta - M$ diagram and prove $\beta = 1.20$ for hypersonic flow	**07**

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