Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3160113 Date:02-12-2024

Subject Name: Advance 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.**
5. **Use drawing instruments to make figures.**

			MARKS
Q.1	**(a)**	What do you mean by Aerothermodynamics?	**03**
	(b)	Define Mach number and Shockwave.	**04**
	(c)	Explain construction of subsonic open type wind tunnel with neat sketch.	**07**
Q.2	**(a)**	Prove Cp=2sin2 ɵ for Newtonian theory.	**03**
	(b)	What is the difference between supersonic and hypersonic wind tunnel?	**04**
	(c)	Explain Centrifugal force corrections to Newtonian theory with neat sketch.	**07**
		OR	
	(c)	Explain Critical Mach number and Drag divergence mach number.	**07**
Q.3	**(a)**	Enlist Application to supersonic airfoils.	**03**
	(b)	List out flow visualization techniques.	**04**
	(c)	Explain Solid blockage and wake blockage.	**07**
		OR	
Q.3	**(a)**	Define wind tunnel balances.	**03**
	(b)	Explain Hypersonic expansion wave relation.	**07**
	(c)	Explain Aerodynamic heating.	
Q.4	**(a)**	Explain viscous retraction with sketch.	**03**
	(b)	Define The velocity potential equation.	**04**
	(c)	Why car is not fly at Subsoinc, Supersoinc and hypersonic speed?	**07**
		OR	
Q.4	**(a)**	Explain flow over an airfoil case for hypersonic case.	**03**
	(b)	With neat sketch explain thin shock layer.	**04**
	(c)	Define Supercritical Airfoil, Rayleigh flow and Fanno flow.	
Q.5	**(a)**	What is The sound barrier and Area Rule.	**03**
	(b)	Explain Low density flow.	**04**
	(c)	Derive L/D = Cotα equation for flat plate using aerodynamic forces.	**07**
		OR	
Q.5	**(a)**	Define compressible flow and Incompressible flow.	**03**
	(b)	Write a note on “Prandtl-Glauert Compressibility correction”.	**04**
	(c)	Explain Rayleigh flow with sketch.	**07**

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