Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2018

Subject Code: 2180105 Date: 02/05/2018

Subject Name: High Speed Aerodynamics(Department Elective III)

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.**

			MARKS
Q.1	**(a)**	What is Newtonian theory?	**03**
	(b)	What are the characteristics of hypersonic flow?	**04**
	(c)	Draw and explain shock wave & Mach wave patterns for Supersonic and Hypersonic flow for Airfoil.	**07**
Q.2	**(a)**	Differentiate subsonic, supersonic and transonic range of flows.	**03**
	(b)	How shock layer thickness is affected by Mach number? Explain.	**04**
	(c)	What is wind tunnel? Explain construction of subsonic open type wind tunnel with neat sketch.	**07**
		OR	
	(c)	Draw and explain entropy layer for airfoil in hypersonic flow.	**07**
Q.3	**(a)**	What is delta wing? Can it be used in hypersonic flow regimes explain?	**03**
	(b)	Explain wind tunnel balances.	**04**
	(c)	Derive modified Newtonian equation for hypersonic flow.	**07**
		OR	
Q.3	**(a)**	Explain wind tunnel corrections in brief.	**03**
	(b)	Explain solid blockage in detail.	**04**
	(c)	Explain the components of wind tunnel along with their advantages.	**07**
Q.4	**(a)**	Explain wake blockage.	**03**
	(b)	Write a note on hypersonic wind tunnels.	**04**
	(c)	Write a note on flow visualization techniques.	**07**
		OR	
Q.4	**(a)**	Enlist the applications of hypersonic flow.	**03**
	(b)	Define shock layer, entropy layer and viscous retraction.	**04**
	(c)	Prove “Hypersonic limit for a slender wedge, the wave angle is only 20% larger than the wedge angle.	**07**
Q.5	**(a)**	Explain with neat sketch High temperature Flows.	**03**
	(b)	Using Oblique shock wave geometry, derive Temperature ratio relation for hypersonic case.	**04**
	(c)	Write a short note on aerodynamic heating for hypersonic flow.	**07**
		OR	
Q.5	**(a)**	Explain with sketches viscous interactions.	**03**
	(b)	Write a note on shock expansion method.	**04**
	(c)	Explain Centrifugal force corrections to Newtonian theory with neat sketch.	**07**

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