Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VIII• EXAMINATION – SUMMER 2015

Subject Code: 180105 **Date:05/05/2015**

Subject Name: High Speed Aerodynamics and Experimental Techniques

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.**

Q.1	**(a)**	Explain with neat sketch physical effects characteristics of hypersonic flow.	**07**
	(b)	Derive hypersonic shock relations in terms of the hypersonic similarity parameters for pressure ratio term.	**07**
Q.2	**(a)**	Apply centrifugal force correction to Newtonian flow theory.	**07**
	(b)	Derive Newtonian sine squared law for pressure coefficient.	**07**
		OR	
	(b)	What are the design considerations for supersonic aircraft?	**07**
Q.3	**(a)**	Derive modified Newtonian equation for hypersonic flow.	**07**
	(b)	What is wind tunnel? Explain construction of subsonic open type wind tunnel with neat sketch.	**07**
		OR	
Q.3	**(a)**	What is Newtonian theory? Derive $\beta = \theta$ for hypersonic flow.	**07**
	(b)	Explain tangent cone method with neat sketch.	**07**
Q.4	**(a)**	Draw and explain shock wave & Mach wave patterns for Supersonic and Hypersonic flow for Airfoil.	**07**
	(b)	Derive the equation Rankine Hugoniot for oblique shock wave.	**07**
		OR	
Q.4	**(a)**	Write a short note on aerodynamic heating for hypersonic flow.	**07**
	(b)	Explain solid blockage and wave blockage for wind tunnel.	**07**
Q.5	**(a)**	Explain with neat sketch swept wing.	**07**
	(b)	Define Supersonic and Hypersonic flow. Draw and explain entropy layer for airfoil in hypersonic flow.	**07**
		OR	
Q.5	**(a)**	Write a short note on Delta wing with neat sketch.	**07**
	(b)	Derive $L/D = \cot \alpha$ for Flat plate.	**07**

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