GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (OLD) - EXA	MINATION – SUMMER 2017
Code: 140102	Date: 08/06/2017

Subject Code: 140102 Subject Name: Aerodynamics-1

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)	Define: Mach Number, Uniform Flow, Chord Line, Trailing Edge, Reynolds Number and Angle of Attack.	07
	(b)	What is airfoil? Explain characteristics of airfoil with a neat sketch.	07
Q.2	(a) (b)	Derive Continuity Equation. Explain airspeed measurement in supersonic aircraft. Derive equation for airspeed in supersonic flow.	07 07
		OR	
	(b)	Write a short note on flow over an airfoil.	07
Q.3	(a)	What is Potential flow? Prove that scalar function velocity potential exist only for potential flow.	07
	(b)	Write a short note on vortex flow with a neat sketch. OR	07
Q.3	(a)	Classify the NACA series standard for airfoils with a neat sketch.	07
	(b)	Derive θ - β -M relation for inviscid, adiabatic flow with no body forces.	07
0.4	(a)	Prove that shock is irreversible in nature.	07
X ···	(b)	Show that free vortex is an example of irrotational motion.	07
	()	OR	
Q.4	(a)	Draw and explain coefficient of lift vs angle of attack for symmetrical airfoil and cambered airfoil.	07
	(b)	Explain with the help of diagram shockwave interaction and reflection.	07
Q.5	(a)	Prove that, the product of flow velocities upstream and downstream of a normal shock wave is equal to the square of critical velocity of sound.	07

(b) Explain basic elementary flows in terms of stream function and potential 07 function.

OR

- Q.5 (a) Differentiate between normal shock wave, oblique shock wave and expansion 07 wave with neat sketch.
 - (b) Explain with neat sketches the forces and moments acting on an aircraft. 07
