Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV EXAMINATION – WINTER 2015

Subject Code: 140102 **Date:01/01/2016**

Subject Name: Aerodynamics I

Time: 02:30pm to 05:00pm **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 Energy and Momentum terms. Derive momentum equation in cartesian coordinate system.	**07**
	(b)	Define Subsonic flow and Supersonic Flow with suitable examples.	**07**
Q.2	**(a)**	Explain flow past rotating circular cylinder and show pressure distribution around cylinder.	**07**
	(b)	Explain pressure distribution on an airfoil with respect to various angles of attack.	**07**
		OR	
	(b)	Prove that shockwave is irreversible and Mach number downstream the normal shockwave is always less than unity.	**07**
Q.3	**(a)**	Explain various types of drags on an airfoil.	**07**
	(b)	Difference between normal shock and oblique shock with neat sketch.	**07**
		OR	
Q.3	**(a)**	Define doublet and derive equation for stream function and velocity potential for doublet.	**07**
	(b)	Write a short note on vortex flow with neat sketch.	**07**
Q.4	**(a)**	Derive Bernoullie's equation with neat sketch.	**07**
	(b)	Draw and explain the C_L vs α (alpha) curve for symmetrical and unsymmetrical airfoil.	**07**
		OR	
Q.4	**(a)**	Prove that shock is irreversible in nature.	**07**
	(b)	Explain Lift and Drag terms for Airfiol.	**07**
Q.5	**(a)**	Explain flow over a Flatplate for subsonic flow with neat sketch.	**07**
	(b)	Derive the Energy equation.	**07**
		OR	
Q.5	**(a)**	Explain basic elementary flow in terms of stream function and potential function.	**07**
	(b)	Explain airspeed measurement in supersonic aircraft. Derive equation for airspeed in supersonic flow.	**07**