Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 150102 **Date: 21/05/2016**

Subject Name: Fundamentals of Turbo M/cs

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.**

Q.1	**(a)**	With a neat sketch explain the h-s diagram for axial turbine stage.	**07**
	(b)	With a neat sketch explain the h-s diagram for axial compressor stage.	**07**
Q.2	**(a)**	Derive the expression for the maximum utilization factor for fifty percent reaction stage.	**07**
	(b)	Explain losses in turbomachines.	**07**
		OR	
	(b)	Explain the phenomenon of slip in centrifugal compressor. What is slip factor? How it affects the actual work done and efficiencies of the centrifugal compressor.	**07**
Q.3	**(a)**	Explain pressure compounding and velocity compounding in multistage axial turbines.	**07**
	(b)	Explain steps for matching of turbine and compressor for a jet engine.	**07**
		OR	
Q.3	**(a)**	Define degree of reaction and derive the expression for the same. Define the low reaction stage and high reaction stage.	**07**
	(b)	How the radial turbine differs than axial turbine? Show the entry and exit velocity triangle for a general inward flow radial turbine stage.	**07**
Q.4	**(a)**	How the spouting velocity is to be defined? Derive the expression for the stage efficiency for the radial turbine stage in terms of pressure ratio and loading coefficient.	**07**
	(b)	What is an equilibrium diagram? How to find out the equilibrium points from the characteristic curves?	**07**
		OR	
Q.4	**(a)**	Classify and explain the turbo machines with respect to flow direction, types of fluid and degree of reaction.	**07**
	(b)	Draw and explain the velocity triangle for stage of axial compressor.	**07**
Q.5	**(a)**	What is radial equilibrium? Derive the equation for radial equilibrium.	**07**
	(b)	With the help of diagram, explain the various components of centrifugal compressor. Also explain role of various components.	**07**
		OR	
Q.5	**(a)**	Explain choking in turbomachines.	**07**
	(b)	Define following terms. 1. Turbomachines 2. Degree of reaction 3. Utilization factor 4. Blade efficiency 5. Flow coefficient 6. Speed ratio 7. Work done factor	**07**

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