Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– V • EXAMINATION – WINTER 2016

Subject Code: 150102 **Date: 02/12/2016**
Subject Name: Fundamentals of Turbo machines
Time: 10:30AM – 01:00PM **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)**	A nozzle has pressure ratio of 1.8. Pressure at entry is 1.01325 bar and temperature is 280K. Efficiency of nozzle is 85%. Determine exit velocity and exit mach number.	**07**
	(b)	Draw and explain the H-S diagram for the axial Compressor stage.	**07**
Q.2	**(a)**	Draw and explain zero percent, fifty percent and hundred percent reaction axial turbine stages.	**07**
	(b)	Explain the stalling and surging for an axial compressor stage.	**07**
		OR	
	(b)	Explain the stage losses in centrifugal compressor	**07**
Q.3	**(a)**	Explain the matching procedure for the compressors and turbines.	**07**
	(b)	Classify and explain the turbo machines with respect to flow direction, types of fluid and degree of reaction.	**07**
		OR	
Q.3	**(a)**	Explain: Elements of Centrifugal compressor stage.	**07**
	(b)	Explain choking of centrifugal flow compressor stage at inlet, impeller and diffuser.	**07**
Q.4	**(a)**	Differentiate turbo-machines and positive displacement machines.	**07**
	(b)	Define degree of reaction and derive the expression for the same for axial compressor stage.	**07**
		OR	
Q.4	**(a)**	Write a short note on losses in turbine.	**07**
	(b)	A multi stage axial flow air compressor has eight stage of equal pressure ratio 1.35. The flow rate through the compressor and its polytropic efficiency are 40kg/s and 85%. If condition of air at entry are 1 bar and 400C. find overall efficiency, adiabatic efficiency of each stage. Polytropic index of compression and power required to drive the compressor falling of power transmission as 93%.	**07**
Q.5	**(a)**	Differentiate axial compressor and centrifugal compressor.	**07**
	(b)	Draw h-s diagram for radial turbines.	**07**
		OR	
Q.5	**(a)**	Draw and explain the sketch of a ninety degree inward flow radial turbine stage with an exit diffuser showing its main components. Give its applications.	**07**
	(b)	With a suitable sketch explain the working principle of an axial compressor stage.	**07**

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