Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V EXAMINATION – WINTER 2025

Subject Code:3150102 Date:02-12-2025

Subject Name:Fundamentals of Turbomachines

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define Turbomachine. Name the turbomachines found in airplane engines.	**03**
	(b)	Explain the difference between a fan, a blower, and a compressor.	**04**
	(c)	Draw and explain the H-S diagram of an axial turbine stage.	**07**
Q.2	**(a)**	How does energy transfer take place in turbomachines?	**03**
	(b)	Difference between Compressor and Turbine with proper sketch.	**04**
	(c)	Determine the utilization factor for a 50% reaction axial turbine stage.	**07**
		OR	
	(c)	With a neat sketch explain the working principle of axial flow compressor.	**07**
Q.3	**(a)**	Describe the centrifugal compressor choking phenomenon.	**03**
	(b)	Draw sketches of the three types of impellers and the velocity triangles at their exits.	**04**
	(c)	Draw and explain with equations velocity triangle for an axial compressor stage.	**07**
		OR	
Q.3	**(a)**	Define flow co-efficient using the appropriate equation.	**03**
	(b)	Explain the phenomenon of surging.	**04**
	(c)	What is the slip factor? Describe how to calculate the slip factor using the Stodola formula.	**07**
Q.4	**(a)**	List the method of cooling gas turbine blades.	**03**
	(b)	Write a note on stage losses for radial turbine stage.	**04**
	(c)	Draw velocity triangle for an outward flow radial turbine stage.	**07**
		OR	
Q.4	**(a)**	What causes the aerodynamic losses in turbomachines?	**03**
	(b)	Draw a clean sketch of the secondary flow in a cascade of blades.	**04**
	(c)	For an impulse turbine, find expressions for the force, work completed, diagram efficiency, gross stage efficiency, and axial trust.	**07**
Q.5	**(a)**	What is a nozzle and what is its function?	**03**
	(b)	What is the impact of blade friction on turbine performance?	**04**
	(c)	Explain the different parts of a centrifugal compressor using the diagram.	**07**
		OR	
Q.5	**(a)**	What are the losses in turbomachines?	**03**
	(b)	Explain the determination and technique for finding equilibrium points.	**04**
	(c)	Write a short note about the compressor stopping and surging.	**07**

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