Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3161910 Date: 20-05-2025

Subject Name: Applied Thermodynamics

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.**

Q.1	**(a)**	Define (1) Thermal efficiency (2) Indicated power (3) Mechanical efficiency.	**03**
	(b)	Draw schematic diagram and p-h chart for simple vapor compression refrigeration cycle.	**04**
	(c)	Explain Thermodynamic , Physical and Chemical Properties of Refrigerants.	**07**
Q.2	**(a)**	Explain in brief about Dalton's law of partial pressure.	**03**
	(b)	Differentiate between Otto cycle and Diesel cycle.	**04**
	(c)	Explain Vander Waal's Equation of State. Derive an expression for evaluation of Constant 'a' and 'b'.	**07**
		OR	
	(c)	What are the needs of multi-staging? Derive the equation of work done on air for multi-stage reciprocating air compressor.	**07**
Q.3	**(a)**	Define: indicated power, brake power, friction power.	**03**
	(b)	Differentiate between axial flow compressor and centrifugal compressor.	**04**
	(c)	Derive an Expression for Velocity of Sound Wave in Compressible Fluid Flow and also Express in terms of Bulk Modulus.	**07**
		OR	
Q.3	**(a)**	Define: Mach waves, Mach cone and Mach angle.	**03**
	(b)	Explain in brief about heat balance sheet in context to IC Engine.	**04**
	(c)	With neat sketch, Explain Li-Br Vapor Absorption System.	**07**
Q.4	**(a)**	Explain with neat sketch Catalytic Converter used in SI Engines.	**03**
	(b)	Explain Global warming potential of refrigerants.	**04**
	(c)	What is Psychometric chart? Explain the measurement of different lines on it.	**07**
		OR	
Q.4	**(a)**	Difference between Euro norms and Bharat stage norms.	**03**
	(b)	What is Mach number? Why is this parameter so important for the study of flow of compressible fluid.	**04**
	(c)	Explain with neat Sketch Effect of Impeller Blade Shape on Performance in Centrifugal Compressor.	**07**
Q.5	**(a)**	Define the following; (i) Relative Humidity, (ii) wet bulb depression, (iii) Dew point temperature.	**03**
	(b)	Explain designation system of refrigerants.	**04**
	(c)	Explain Fundamental equations for compressible flow.	**07**
		OR	
Q.5	**(a)**	What is compressibility chart? What are the observations can be made from this chart?	**03**
	(b)	Explain the phenomenon of surging and stalling in an axial flow compressor.	**04**

(c) Explain with neat sketch flash intercooling. What are the advantages of it? **07**