

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III EXAMINATION – SUMMER 2025****Subject Code:3132504****Date:31-05-2025****Subject Name:Basic and Applied Thermodynamics****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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Explain Zeroth Law of Thermodynamics	03
	(b) Explain Thermodynamic equilibrium with neat sketch	04
	(c) State first law of thermodynamics for closed system undergoing a cycle and explain it with the help of joule's experiment.	07
Q.2	(a) Explain irreversibility and state causes of irreversibility	03
	(b) Explain PMM1 and converse of PMM1	04
	(c) Derive steady flow energy equation with neat sketch	07
	OR	
	(c) A stationary mass of gas is compressed without friction from an initial state of 0.3 m ³ and 0.105 MPa to a final state of 0.15 m ³ and 0.105 MPa, the pressure remaining constant during the process. There is a transfer of 37.6 kJ of heat from the gas during the process. Calculate internal energy change of the gas. Also plot the process on p-v diagram.	07
Q.3	(a) Explain principle of increase of entropy	03
	(b) Explain Clausius statement for second law of thermodynamics with suitable example	04
	(c) A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C. Calculate the least rate of heat rejection per kW net output of the engine	07
	OR	
Q.3	(a) State the limitations of Carnot cycle	03
	(b) Explain Kelvin Planck statement for second law of thermodynamics with suitable example	04
	(c) A steam at 6.85 bar and 205°C enters in an insulated nozzle with velocity of 50 m/s. It leaves at a pressure of 1.35 bar and a velocity of 510 m/s. Determine the final enthalpy of steam	07
Q.4	(a) Explain briefly heat engine and heat pump	03
	(b) Give brief comparison of Otto, diesel and dual cycle	04
	(c) Explain vapour compression refrigeration system with neat sketch also plot the same on P-h and T-s diagrams	07
	OR	
Q.4	(a) Explain reversed Carnot cycle and its limitations	03
	(b) Explain inequality of clausius theorem	04
	(c) Determine expression for air standard efficiency of Diesel cycle with neat sketch of P-V and T-S diagram	07
Q.5	(a) Differentiate open cycle and closed cycle gas turbine	03
	(b) Explain Bell-Coleman cycle	04
	(c) Explain with neat sketch pressure compounding of impulse turbine	07
	OR	
Q.5	(a) Explain three types of turbine seals	03
	(b) Draw P-V and T-S diagram for Dual cycle	04
