

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022****Subject Code:2132502****Date:20-07-2022****Subject Name:Engineering Thermodynamics & Heat transfer****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) What are different types of Thermodynamic Systems? Explain with suitable example.	03
	(b) Give the limitations of first law of thermodynamics and explain Kelvin plank statement with neat sketch.	04
	(c) Derive equation for thermal efficiency of Carnot cycle with neat sketch.	07
Q.2	(a) Define the following terms: (a) Thermal energy reservoir (b) Heat Pump (c) Mechanical energy reservoir.	03
	(b) Discuss following terms. 1) p-v-T surface 2) Phases of pure substance.	04
	(c) Write Kelvin's and Clausius statements of second law. Describe the concept of reversibility and irreversibility	07
OR		
	(c) Define Irreversibility. What are the causes of Irreversibility?	07
Q.3	(a) Define PMM1 and PMM2.	03
	(b) Explain the following laws: (a) Fourier's Law of heat conduction (b) Newton's Law of cooling.	04
	(c) Derive general steady flow energy equation.	07
OR		
Q.3	(a) Differentiate between free convection and forced convection.	03
	(b) Explain the concept of Mollier diagram for a pure substance with neat sketch.	04
	(c) Explain concept of boundary layer in convection heat transfer.	07
Q.4	(a) Differentiate between Laminar and Turbulent flow.	03
	(b) What is the difference between fin efficiency and fin effectiveness ?	04
	(c) Derive an expression for three dimensional time dependent heat conduction with internal heat generation and constant thermal conductivity in Cartesian coordinate system. Reduce it as Fourier equation.	07
OR		
Q.4	(a) Illustrate classification of heat exchanger according to flow arrangement of fluids with neat sketch.	03
	(b) What do you mean by fouling factor? What are causes of fouling?	04
	(c) By dimensional analysis show that for forced convection heat transfer the Nusselt number can be expressed as a function of Prandtl number and Reynolds number.	07
Q.5	(a) State silent features of shape factor.	03
	(b) Explain & draw the pool boiling curve.	04

- (c) Derive the equation for logarithmic mean temperature difference (LMTD) for parallel flow heat exchanger. **07**

OR

- Q.5** (a) Define following terms. 1) Reflectivity 2) Absorptivity. **03**
3) Transmissivity.
- (b) Define condensation process also explain film condensation and drop-wise condensation. **04**
- (c) Explain the following laws of Radiation (i) Planck's law (ii) Wein's displacement law. **07**
