Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2021

Subject Code:3143611   **Date:06/09/2021**
Subject Name:Basics of 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)**	Explain Fourier's law for heat of conduction.	**03**
	(b)	Write short notes on Natural Convection.	**04**
	(c)	Derive equation for heat transfer through a composite wall made up of 3 different materials in close thermal contact with each other, with no heat loss to surrounding.	**07**
Q.2	**(a)**	Give the physical significance of (i) Nusselt Number	**03**
	(b)	Explain the terms absorptivity, emissivity, transmissivity and reflectivity for heat transfer by radiation.	**04**
	(c)	Using Dimension analysis derive expression for forced convection for the fluid flowing inside tube in a turbulent flow.	**07**
		OR	
	(c)	Describe different analogy between heat and mass transfer.	**07**
Q.3	**(a)**	Discuss Planck's law of radiation.	**03**
	(b)	Steel ball bearing (k=50W/mK, α=1.3x10⁻⁵ m²/s) having a diameter of 40 mm are heated to a temperature of 650 °C and then quenched in a tank of oil at 55 °C. If heat transfer coefficient between the ball bearing and oil is 300 W/m²K, determine the time required for bearing to reach at a temperature of 200 °C.	**04**
	(c)	State and explain Stefan-Boltzmann Law of radiation.	**07**
		OR	
Q.3	**(a)**	Define : White body, Grey body, Black body	**03**
	(b)	Define thermal conductivity and discuss the effect of temperature on thermal conductivity of solid, liquid and gas.	**04**
	(c)	A hot metallic ball having surface temperature 800 °C behaves as a gray body with emissivity of 0.8. Calculate (i) the emissive power, (ii) the wavelength corresponding to the maximum spectral intensity of radiation.	**07**
Q.4	**(a)**	What do you mean by fouling of heat exchangers?	**03**
	(b)	Write Dittus-Boeltier equation explaining each term	**04**
	(c)	Discuss construction and working of Plate type heat exchanger.	**07**
		OR	
Q.4	**(a)**	Draw the temperature profile for Co-current and Counter- current heat exchanger.	**03**
	(b)	Write short notes on Natural Convection.	**04**
	(c)	What is importance of LMTD? Derive the equation for parallel flow arrangement.	**07**

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Q.5	(a)	Explain Dropwise and Filmwise Condensation.	03
	(b)	Describe Regimes of Pool Boiling.	04
	(c)	Define objectives of evaporation and explain construction, working and applications of Calendria type evaporator	07

OR

Q.5	(a)	Write short note on condensation of superheated vapors.	03
	(b)	Explain Boiling Point Elevation	04
	(c)	Write a short note on Multiple Effect Evaporator.	07

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