GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–IV (NEW) EXAMINATION – WINTER 2020

Subject Code:3143611   **Date:15/02/2021**
Subject Name:Basics of Heat Transfer
Time:02:30 PM TO 04:30 PM   **Total Marks:56**

Instructions:
1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	Define: (i) Lumped heat capacity analysis (ii) Thermal conductivity (iii) Fourier number	**03**
	(b)	Explain modes of Heat Transfer with suitable example.	**04**
	(c)	Derive an expression of General heat conduction equation through Cartesian. coordinates.	**07**
Q.2	**(a)**	What do you mean by convection? How do you differentiate between free and force convection?	**03**
	(b)	Explain mechanism of thermal and velocity boundary layers along with its relationship.	**04**
	(c)	Write equations for the following analogies and explain the terms involved with their SI units: a) Reynold analogy b) Von-karman analogy	**07**
Q.3	**(a)**	Define Emissivity, Reflectivity, Absorbptivity and Irradiation.	**03**
	(b)	What is radiation? Explain any two laws of radiation.	**04**
	(c)	Explain calendria type evaporator.	**07**
Q.4	**(a)**	Define: black, white and grey body.	**03**
	(b)	Explain Electromagnetic spectrum with diagram.	**04**
	(c)	Explain agitated film type evaporators.	**07**
Q.5	**(a)**	Explain the mechanism of nucleate boiling.	**03**
	(b)	A double pipe parallel flow heat exchanger use oil (Cp= 1.88 kJ/ kg K) at an initial temperature of 205 ^{0}C to heat the water, flowing at 225 kg/hr from 16 ^{0}C to 44^{0}C. The oil flow rate is 270 kg/ hr. what is the heat transfer area required for an overall heat transfer coefficient of 340 W/ m^{2}K.	**04**
	(c)	Explain heat exchanger effectiveness- NTU method and derive an expression for parallel flow.	**07**
Q.6	**(a)**	Draw a pool boiling curve.	**03**
	(b)	Water enters a counter flow double pipe H.E. at 38 ^{0}C flowing at the rate of 0.75 kg/s. it is heated by oil (Cp=1.884 kJ/kg K) flowing at the rate 1.5 kg/s from an inlet temperature of 116 ^{0}C. For an area of 13 m^2 and overall heat transfer coefficient of 340 W/m^{2}K. (value of ε=0.62) Determine the total heat transfer rate.	**04**
	(c)	Derive an expression for counter current flow LMTD.	**07**
Q.7	**(a)**	Draw a diagram of 1-2 and 2-4 shell and tube heat exchanger.	**03**
	(b)	Why there is boiling point rise in evaporators?	**04**
	(c)	Explain the types of condensation with diagram.	**07**

Q.8 **(a)** Draw a neat sketch of 1-2 counter and parallel flow heat exchanger. **03**

(b) Differentiate between types of feeding method in evaporator. **04**

(c) What is condensation? What are the different factors which affects condensation? **07**

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