Sea	No:	Enro	ollment No:		
	PARUL UNIVERSITY				
	FACULTY OF ENGINEERING & TECHNOLOGY				
	B.Tech. Summer 2022-23 Examination				
			Date: 27/03/2023		
			Time: 02:00 pm to 04:3	0 pm	
	ject Name: Heat and Mass Transfer		Total Marks: 60	•	
	tructions:				
1. <i>A</i>	All questions are compulsory.				
	igures to the right indicate full marks.				
3. Make suitable assumptions wherever necessary.					
4. 5	tart new question on new page.				
Q.1 1	Objective Type Questions - (Fill in the blan of MCQ) (All are compulsory) (Each of one Thermal conductivity is lower for (a) Wood (b) Water at 100°C The unit of heat transfer coefficient is		more than Five in case	(15)	
_	(a) W	(c) W/mK			
	(b) W/m ² K	(d) W/m ²			
3	In shell and tube heat exchanger, baffles are n	· /			
	(a) Increases the mixing of fluid (c) deflect the flow in desired direction				
	(b) Increase the heat transfer area	(d) reduce fouling of the tube su			
4	Fick's law is given by the formula	6			
		$N_b = -3 D_{bc} dC_b / dx$			
		$N_b = -4 D_{bc} dC_b / dx$			
5	Heat transfer through electromagnetic wave is				
	(a) Conduction	(c) Radiation			
	(b) Convection	(d) None of the above			
6					
	equation .				
7	Conduction heat transfer takes place in				
	For a current carrying wire of 20 mm diameter expressed to air (h = 20 W/m ² K), maximum heat				
	dissipation occurs when thickness of insulation (0.5 W/mK) is mm.				
9	In liquids and gases, heat transmission is primarily caused by				
	NTU stands for				
	Define: Fourier's law of conduction				
12	State "Stefan Boltzmann's law of radiation".				
13	Define: Heat Exchanger				
14	State application of fins.				
15 Assuming the sun is to be a black body emitting radiation with maximum intensity at $\lambda = 0.49$ µ					
	Calculate the surface temperature of the sun.				
Q.2	Answer the following questions. (Attempt a A) Define following terms:	ny three)		(15)	

- - 1. Moisture content
 - 2. Bound moisture
 - 3. Unbound moisture
 - 4. Equilibrium moisture
 - 5. Free moisture
- B) What is meant by crystallization? Draw flow process of crystallization.
- C) Define the terms thermal conductivity and thermal diffusivity with physical significance and
- D) The literature of heat transfer generally recognizes distinct modes of heat transfer. How many modes are there? Explain it shortly.

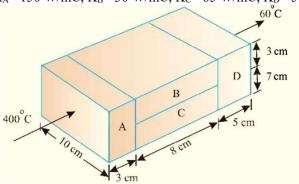
- Q.3 A) (i) Draw the temperature distribution graph of counter and Parallel flow type heat exchanger and write the LMTD equation for same. (03)
 - (ii) A wall of furnace is made up of inside layer of silica brick 120 mm thick covered a layer of magnesite brick 240 mm thick. The temperature at inside surface of silica brick wall and outside surface of magnesite brick wall are 725°C and 110°C respectively. If the thermal conductivities of silica and magnesite are 1.7 W/m°C and 5.8 W/m°C. Calculate the rate of the heat transfer per unit area of wall
 - B) Explain henry's law with limitation and Enlist Factors Affecting the Henry's Law Constant. (08)

OR

- B) Explain the concept of Height equivalent of theoretical plate (HETP).
- Q.4 A) (i) Distinguish between natural and forced convection heat transfer. (07)
 - (ii) Explain Overall heat transfer coefficient concept in detail.

OR

- A) Explain tunnel truck dryer with neat sketch. (07)
- B) Find out the heat flow rate through the composite wall as shown in figure. Assume one dimensional flow. K_A= 150 W/m²C, K_B= 30 W/m²C, K_C= 65 W/m²C, K_D= 50 W/m²C



(08)

(08)