Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
Diploma Engineering - SEMESTER–IV • EXAMINATION – SUMMER • 2015

Subject Code: 3340501   **Date: 01-05-2015**
Subject Name: Process Heat Transfer
Time: 10:30 am - 01:00 pm   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **English version is considered to be Authentic.**

Q.1		Answer any seven out of ten.	**14**
	1.	State Newton's law of cooling.	
	2.	State Duhring's rule for evaporation.	
	3.	Define steady state heat transfer.	
	4.	Give two applications of insulation.	
	5.	Define baffle and list types of baffles.	
	6.	What are the major disadvantages of double pipe heat exchanger?	
	7.	What is a fin? List types of fins.	
	8.	Define condensation.	
	9.	Define emissivity.	
	10.	Give advantage of multiple effect evaporator over single effect evaporator.	
Q.2	(a)	Define: Heat flux, Rate of heat transfer and temperature gradient.	**03**
		OR	
	(a)	Discuss variation of thermal conductivity with temperature for liquids.	**03**
	(b)	Differentiate between free convection and forced convection.	**03**
		OR	
	(b)	Define thermal conductivity and derive its unit.	**03**
	(c)	Differentiate between dropwise and filmwise condensation.	**04**
		OR	
	(c)	A body at 32 ºC is placed in a large furnace whose wall temperature is 1500 K. If absorptivity of body is 0.5, calculate amount of heat absorbed per unit area. Stefan Boltzmann constant is 4.8 x 10^{-8} Kcal/hr.m^2.K^4.	**04**
	(d)	Give any four dimensionless numbers used in heat transfer.	**04**
		OR	
	(d)	Give neat sketch of regime of pool boiling.	**04**
Q.3	(a)	Define: tube pitch, shell, LMTD	**03**
		OR	
	(a)	Differentiate between condenser and cooler.	**03**
	(b)	Classify heat exchangers based on flow pattern.	**03**
		OR	
	(b)	Write a short note on finned tube heat exchanger.	**03**
	(c)	Give only neat sketch of 1-1 shell and tube heat exchanger.	**04**
		OR	
	(c)	Give only neat sketch of double pipe heat exchanger.	**04**
	(d)	For a double pipe heat exchanger, hot fluid temperature is 145 ºC and 90 ºC and cold fluid temperature is 35 ºC and 65 ºC. Calculate LMTD for counter flow.	**04**
		OR	

	(d)	Give classification of evaporators.	**04**
Q.4	(a)	Describe evaporator capacity and economy.	**03**

<div align="center">OR</div>

	(a)	Define evaporation. How it differs from distillation?	**03**
	(b)	Discuss any two characteristics of liquid for evaporation.	**04**

<div align="center">OR</div>

	(b)	Give only neat sketch of climbing film evaporator.	**04**
	(c)	Derive equation for overall heat transfer coefficient.	**07**
Q.5	(a)	Derive Fourier's law.	**04**
	(b)	Define radiation. Explain Stefan Boltzmann law.	**04**
	(c)	Classify Modes of heat transfer.	**03**
	(d)	Discuss fundamental facts of radiation.	**03**

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