Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma Engineering - SEMESTER–III • EXAMINATION – WINTER • 2014

Subject Code: 330502 **Date: 29-11-2014**

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	(a)	Define the following terms 1) Heat flux 2) Thermal conductivity 3)Emissive power 4) Emissivity 5) Resistance 6)Temperature 7) Steady state Heat Conduction	**07**
	(b)	Derive the Equation of steady sate one dimensional heat flow through a single layer wall	**07**
Q.2	(a)	Explain any three laws of heat transfer	**07**
	(b)	A furnace wall is constructed with 10 mm thick of steel plate lined on inside with silica brick 150mm thick .and on outside with magnesite brick 150 mm .temperature of inside edge of wall is 973 ^{0}k and on outside is 288 ^{0}k. Find rate of loss of heat per unit area.(**Data:**thermal conductivity in (W/m ^{0}k) are 16.86,1.75 and 5.23 respectively for steel, silica brick and magnesite bricks	**07**
		OR	
	(b)	Derive an equation for Overall heat transfer coefficient 'U' based on inside and outside diameter of tube.	**07**
Q.3	(a)	Write a short note on ' Double pipe heat exchanger '	**07**
	(b)	(1)Write about the significance of Baffles. (2) Why square pitch is preferred over triangular pitch? **03**	**04**
		OR	
Q.3	(a)	Define condesation and differiatiate beteween drop wide &filmwise condesation	**07**
	(b)	Mention any four dimensionless groups used in heat transfer and give significance of each group.	**07**
Q.4	(a)	Describe regime of pool boiling with neat diagram.	**07**
	(b)	Describe Fourier's law and derive the S.I. unit of thermal conductivity	**07**
		OR	
Q. 4	(a)	Explain Kirchhoff's law	**07**
	(b)	A hollow sphere has an inside surface temp 300 ^{0}c and outside temp of 30 ^{0}c calculate the heat loss by conduction for an inside diameter of 5cm and outside diameter of 15 cm .the thermal conductivity of material is 15 kcal/hr.m ^{0}c	**07**
Q.5	(a)	Explain boiling point elevation and state the Duhring's Rule	**07**
	(b)	Explain the feed arrangement of multiple effect evaporation system	**07**
		OR	
Q.5	(a)	What is economy of evaporator? How it can be improve?	**07**
	(b)	Explain the various characteristics of evaporative liquid which affect the Evaporation.	**07**

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