Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- IVth SEMESTER–EXAMINATION – MAY/JUNE- 2012

Subject code: 142101 **Date: 23/05/2012**

Subject Name: Transport Phenomena in Materials Processing

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.**

Q.1	**(a)**	Derive equation of continuity for incompressible & steady state laminar fluid flow in rectangular coordinates.	**07**
	(b)	What is Viscosity? State Newton's law of viscosity & derive unit of viscosity. Also classify different types of fluids.	**07**
Q.2	**(a)**	Derive momentum balance equation or equation of motion.	**07**
	(b)	Derive Bernoulli's equation from Euler's equation.	**07**
		OR	
	(b)	Derive an expression for the terminal velocity of a solid sphere falling through a liquid following Stoke's law.	**07**
Q.3	**(a)**	Derive general mass transfer equation.	**07**
	(b)	Explain terms : a) Mass & Molar concentrations b) Mass & Molar fractions	**07**
		OR	
Q.3	**(a)**	Explain flow through fluidized bed.	**07**
	(b)	Derive general heat conduction equation in rectangular coordinates.	**07**
Q.4	**(a)**	Explain Fourier's law of heat conduction and define thermal conductivity (k).	**07**
	(b)	Derive equation of temperature profile for steady state one dimensional heat conduction through a large plane.	**07**
		OR	
Q.4	**(a)**	Derive equation for radial heat conduction rate 'Q' through the sphere.	**07**
	(b)	Write a short note on different types of convective heat transfer with examples.	**07**
Q.5	**(a)**	What is newton's law of cooling ? Give correlations of dimensionless numbers which play important role in natural & forced convections	**07**
	(b)	What is radiation ? Explain absorptivity , reflectivity transmissivity & emissivity.	**07**
		OR	
Q.5	**(a)**	Discuss Black body radiation & lambert's law.	**07**
	(b)	Explain Stefan Boltzman's & Plank's distribution law	**07**

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