Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV • EXAMINATION – WINTER • 2014

Subject Code: 142101 **Date: 22-12-2014**

Subject Name: Transport Phenomenon in Materials Processing

Time: 02:30 pm - 05:00 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)**	List different modes of heat transfer and differentiate between them.	**07**
	(b)	What is fluid? Give its example and explain any three fluid properties with their units.	**07**
Q.2	**(a)**	State law of conservation of mass and derive equation of mass balance in three dimensions.	**07**
	(b)	State Newton's law of viscosity and classify different types of fluids. Define kinematic viscosity.	**07**
		OR	
	(b)	State Fourier's law of conduction. Derive general heat conduction equation in rectangular coordinates.	**07**
Q.3	**(a)**	Derive equation for heat conduction through composite wall.	**07**
	(b)	List different types of fluid flows and explain them.	**07**
		OR	
Q.3	**(a)**	Derive general equation of mass diffusion in stationary media.	**07**
	(b)	Derive equation for flow thorough fluidized bed.	**07**
Q.4	**(a)**	Derive differential momentum balance equation.	**07**
	(b)	Explain following terms in term of mass transfer: i) Molar Density ii) Mole Fraction iii) Mass Fraction iv) Fick's Laws of Diffusion.	**07**
		OR	
Q.4	**(a)**	Write note on pseudo steady diffusion.	**07**
	(b)	Explain in terms of Radiation: absorptivity, reflectivity, emissivity and transmissivity.	**07**
Q.5	**(a)**	Give differential momentum balance equation and from it derive eulers' equation. Using Euler' equation derive Bernoulli' equation.	**07**
	(b)	Define mass transfer and explain different mass transfer modes.	**07**
		OR	
Q.5	**(a)**	What do you mean by Black body radiation? Explain. State and explain Planck's Law and Lambart's law.	**07**
	(b)	Derive the equation for the viscosity measurement by stokes' method.	**07**

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