Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV • EXAMINATION – SUMMER 2015

Subject Code:142101 **Date: 28/05/2015**

Subject Name: Transport Phenomena in Materials Processing

Time: 10.30am-01.00pm **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)**	Explain different types of fluid flow.	**07**
	(b)	Define fluid. State Newton's law of viscosity and classify fluids.	**07**
Q.2	**(a)**	Derive equation of differential mass balance based on law of conservation of mass.	**07**
	(b)	What are different modes of heat transfer? Explain them in briefly.	**07**
		OR	
	(b)	Calculate density, specific weight and weight of one liter of petrol of specific gravity 0.7.	**07**
Q.3	**(a)**	Derive equation of differential momentum balance.	**07**
	(b)	State Fourier law of heat conduction and derive general equation of heat conduction.	**07**
		OR	
Q.3	**(a)**	Derive Bernoulli's equation from differential momentum balance equation.	**07**
	(b)	In brief discuss black body radiation, Planck's Law and Lambert's law.	**07**
Q.4	**(a)**	Define Diffusivity. Give Fick's first law and second law.	**07**
	(b)	Write note on pseudo steady diffusion.	**07**
		OR	
Q.4	**(a)**	Derive Hagen Poiseulle equation for flow through the pipe.	**07**
	(b)	Explain different fluid properties with their units.	**07**
Q.5	**(a)**	Derive equation of viscosity measurement by stoke's method.	**07**
	(b)	State Newton's law of cooling and derive unit for coefficient of convective heat transfer. Differentiate between free and forced convection.	**07**
		OR	
Q.5	**(a)**	What is mass transfer? Briefly explain different modes of mass transfer. Explain following terms: mass density, molar concentration, mass fraction and mole fraction.	**07**
	(b)	Derive General equation of mass diffusion in stationary media.	**07**

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