GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV (New) EXAMINATION – WINTER 2015

Subject Code:2142105   **Date:28/12/2015**

Subject Name: Heat and Mass Transfer in Metallurgy

Time: 2:30pm to 5:00pm   **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)**	What is Fourier law of heat conduction? Derive one dimensional heat conduction equation through a large plane wall	**07**
	(b)	Derive Bernoulli's equation by using Euler's equation	**07**
Q.2	**(a)**	List different modes of heat transfer and differentiate between them.	**07**
	(b)	Derive continuity equation for overall mass balance	**07**
		OR	
	(b)	Define fluid and viscosity. State Newton's law of viscosity, explain dynamic and kinematic viscosity and classify fluids	**07**
Q.3	**(a)**	What is heat transfer? Write types of heat transfer. Why study of heat transfer is useful in metallurgical processes?	**07**
	(b)	What do you mean by mass transfer? Explain different modes of mass transfer	**07**
		OR	
Q.3	**(a)**	Derive equation for heat conduction through composite wall.	**07**
	(b)	Explain following terms: i) Mass Density ii) Molar concentration iii) Mass Fraction iv) Mole Fraction	**07**
Q.4	**(a)**	Write in brief about Wein's distribution law and Lambert's law	**07**
	(b)	Explain in terms of Radiation: absorptivity, reflectivity, emissivity and transmissivity.	**07**
		OR	
Q.4	**(a)**	Write note on pseudo steady diffusion.	**07**
	(b)	State law of conservation of mass and derive equation of mass balance in three dimensions.	**07**
Q.5	**(a)**	Discuss Black body radiation & lambert's law	**07**
	(b)	What is newton's law of cooling? Give correlations of dimensionless numbers which play important role in natural & forced convections	**07**
		OR	
Q.5	**(a)**	Explain Plank's Law, Kirchoff's and Stefan Boltzman Law.	**07**
	(b)	Derive equation for flow thorough fluidized bed.	**07**

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