Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2142105 **Date: 03/06/2017**

Subject Name: Heat and Mass Transfer in Metallurgy

Time: 10:30 AM to 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	What is heat transfer?	
	2	What is fluid?	
	3	Explain Term Molar Density.	
	4	Explain Term Mole Fraction.	
	5	Explain Term Mass Fraction.	
	6	Explain Term Absorptivity.	
	7	Explain Term Reflectivity.	
	8	Explain Term Emissivity.	
	9	Explain Term Transmissivity.	
	10	What is mass transfer?	
	11	Define Viscosity	
	12	Unit of thermal diffusivity is _____	
	13	Thermal conductivity of wood depends on _____	
	14	The unit of overall coefficient of heat transfer is _____	
Q.2	**(a)**	Write types of heat transfer	**03**
	(b)	Give its example of fluid	**04**
	(c)	State law of conservation of mass and derive equation of mass balance in three dimensions.	**07**
		OR	
	(c)	Get Euler's equation from Navier stokes's equation and derive Bernoulli's equation from it.	**07**
Q.3	**(a)**	Explain dynamic and kinematic viscosity	**03**
	(b)	State Newton's law of viscosity	**04**
	(c)	Derive equation for heat conduction through composite wall.	**07**
		OR	
Q.3	**(a)**	Give correlation of heat transfer coefficient with Nusselt number.	**03**
	(b)	Define convective heat transfer. Explain the difference between free & forced convection with examples.	**04**
	(c)	Explain Plank's Law, Kirchoff's and Stefan Boltzman Law.	**07**
Q.4	**(a)**	What is newton's law of cooling?	**03**
	(b)	Give correlations of dimensionless numbers which play important role in natural & forced convections	**04**
	(c)	Discuss Black body radiation & lambert's law	**07**
		OR	
Q.4	**(a)**	What is Radiation?	**03**
	(b)	Explain different modes of mass transfer	**04**

	(c)	Derive equation for flow thorough fluidized bed.	**07**
Q.5	**(a)**	Define thermal conductivity (k).	**03**
	(b)	State Fourier's Law of heat conduction.	**04**
	(c)	Write in brief about Wein's distribution law and Lambert's law	**07**

OR

Q.5	**(a)**	What is dimensionless analysis?	**03**
	(b)	Derive equation to determine thermal conductivity of hollow sphere by Fourier's Law of heat conduction.	**04**
	(c)	Derive differential momentum balance equation.	**07**

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