Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) • EXAMINATION – WINTER 2016

Subject Code:2142105 Date:21/11/2016

Subject Name:Heat and Mass Transfer in Metallurgy

Time:02:30 PM to 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Mass transfer can occur with convection. True/False	1
	2	Radiative heat transfer is less effective at high temperature. True/False	1
	3	Ceiling transfer heat by _____ mode.	1
	4	State example of conductive heat transfer.	1
	5	Bernoulli's equation is _____ balance equation. a. Temperature b. Energy c. Stress d. Pseudoplastic	1
	6	Viscosity of substance is ratio of shear stress to _____ .	1
	7	Specific weight of substance is _____ x _____ .	1
	8	Discharge through pipe is given by velocity of fluid x _____ .	1
	9	Density of water is _____ kg/m^3.	1
	10	LPG is compressible fluid. True/False	1
	11	Air is ideal fluid. True/False	1
	12	If for a system pressure energy is constant than potential energy will be converted to _____ .	1
	13	White body reflects all the radiation. True/False	1
	14	Calculate discharge through a pipe of 10 cm^2 cross sectional area and 1 cm/sec velocity.	1
Q.2	**(a)**	State Newton's Law of Viscosity and classify fluid.	**03**
	(b)	Explain emissive power, emissivity, gray body and white body in terms of radiative heat transfer.	**04**
	(c)	Derive equation of viscosity measurement by stoke' method.	**07**
		OR	
	(c)	What are different methods to describe fluid flows? Explain different type of fluid flows.	**07**
Q.3	**(a)**	Density of iron is 8 g/cc. Calculate its specific weight.	**03**
	(b)	Explain any four fluid properties with their units.	**04**
	(c)	Derive differential momentum balance equation.	**07**
		OR	
Q.3	**(a)**	Considering one dimensional steady state conductive heat flow derive equation of thermal resistance.	**03**
	(b)	Differentiate between free and forced convection?	**04**
	(c)	Derive generalized mass diffusion equation.	**07**
Q.4	**(a)**	State Newton law of cooling and derive unit of convectivity.	**03**
	(b)	Explain pseudo steady diffusion.	**04**
	(c)	Derive general equation of heat conduction in rectangular coordinate system.	**07**
		OR	

Q.4	**(a)**	Explain plank law for radiation.	**03**
	(b)	What are different modes of heat transfer? Briefly explain them with example.	**04**
	(c)	State Newton's second law of motion and derive Bernoulli's equation from differential momentum balance equation.	**07**
Q.5	**(a)**	Briefly explain different modes of mass transfer.	**03**
	(b)	State Fourier law of heat conduction and derive unit of conductivity.	**04**
	(c)	Derive relation for heat transfer between two bodies by radiation.	**07**

OR

Q.5	**(a)**	Briefly explain laws of diffusion.	**03**
	(b)	Discuss Kirkindal effect.	**04**
	(c)	Derive Hagen-Poiseulle equation for incompressible fluid flowing laminar through pipe.	**07**

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