Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(OLD) • EXAMINATION – WINTER 2016

Subject Code:132102 **Date:09/01/2017**

Subject Name:Metallurgical Thermodynamics

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.**

Q.1	**(a)**	Define and explain the following: 1. Entropy 2. Enthalpy 3. Internal heat	**07**
	(b)	State and Explain Raoult's law and Sievert's law.	**07**
Q.2	**(a)**	What is system? Explain homogeneous and heterogeneous system.	**07**
	(b)	Define isothermal and adiabatic processes. Give the expression of work done for both processes.	**07**
		OR	
	(b)	Explain the Heat of reaction, Heat of formation and Heat of Transition.	**07**
Q.3	**(a)**	Derive the combined expression of 1st and 2nd laws of thermodynamics.	**07**
	(b)	Explain the importance of equilibrium constant & how this can be calculated from standard free energy changes?	**07**
		OR	
Q.3	**(a)**	Derive Clausius-Clapeyron equation.	**07**
	(b)	Explain consequences of 3rd law of thermodynamics.	**07**
Q.4	**(a)**	Explain how Ellingham diagrams can be useful in the extractive metallurgical process.	**07**
	(b)	Define Regular solutions. Differentiate between ideal solution and non-ideal solution.	**07**
		OR	
Q.4	**(a)**	Explain homogeneous and heterogeneous reactions with steps involved in gas-solid reaction.	**07**
	(b)	Derive Gibb's- Duhem equations.	**07**
Q.5	**(a)**	What is Gibb's phase rule? Explain the importance of phase rule. Derive Gibb's phase rule.	**07**
	(b)	What is slag? Describe various sources of slag formation.	**07**
		OR	
Q.5	**(a)**	Describe the Effect of pressure on phase equilibria.	**07**
	(b)	Write a note on functions and composition of slag.	**07**

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