Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER 2013

Subject Code: 132102 **Date: 29-05-2013**

Subject Name: Metallurgical Thermodynamics

Time: 02.30 pm - 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.**

Q.1	**(a)**	Define and explain the following: 1. Entropy 2. Enthalpy 3. Internal heat	**07**
	(b)	State 1st Law of Thermodynamics and derive the combined expression of 1st and 2nd laws of thermodynamics.	**07**
Q.2	**(a)**	Describe the differences between a liquidus line and solidus line. Explain how the solidus and liquidus lines are obtained for eutectic system.	**07**
	(b)	Define isothermal and adiabatic processes. Give the expression of work done for both processes.	**07**
		OR	
	(b)	Define and explain the following: **1.** Heat capacity 2. Latent heat 3 .Heat of reaction	**07**
Q.3	**(a)**	What is system? Differentiate between Homogeneous and heterogeneous systems.	**07**
	(b)	Define specific heat at constant volume (Cv) and specific heat at constant pressure (Cp). Derive relationship between these.	**07**
		OR	
Q.3	**(a)**	Derive Clausius-Clapeyron equation.	**07**
	(b)	Give the importance of equilibrium constant. Explain how this can be calculated from standard free energy changes.	**07**
Q.4	**(a)**	What are Ellingham diagrams? Explain how these can be useful in the extractive metallurgical process.	**07**
	(b)	Define slag. Describe various sources of slag formation.	**07**
		OR	
Q.4	**(a)**	Explain homogeneous and heterogeneous reactions with steps involved in gas-solid reaction.	**07**
	(b)	What is slag composition? Explain by using examples. Discuss briefly the kinetics of Slag- metal reaction.	**07**
Q.5	**(a)**	Define Regular solutions. Differentiate between ideal solution and non-ideal solution.	**07**
	(b)	What is Gibb's phase rule? Explain the importance of phase rule. Derive Gibb's phase rule.	**07**
		OR	
Q.5	**(a)**	Sate and Explain: 1. Henry's law 2. Sievert's law	**07**
	(b)	What do you mean by phase transformation? Explain effect of pressure on phase transformation.	**07**

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