Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2015

Subject code: 132102 **Date:02/06/2015**

Subject Name: Metallurgical Thermodynamics

Time : 02.30pm-05.00pm **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 system? List different types of system. Differentiate between homogeneous and heterogeneous system.	**07**
	(b)	State the second law of thermodynamics. Derive the combined expression of 1st and 2nd laws of thermodynamics.	**07**
Q.2	**(a)**	State 1st Law of Thermodynamics & Give its Significance.	**03**
	(b)	State and explain the Hess's law.	**04**
	(c)	Define isothermal and adiabatic processes. Give the expression of work done for both processes.	**07**
		OR	
	(c)	Define and explain the following: 1. Internal energy 2. Heat of formation 3. Latent heat	**07**
Q.3	**(a)**	State and explain Zeroth law of thermodynamics.	**03**
	(b)	Calculate the free energy change for the process at 25^0C, $CO+1/2\ O_2 = CO_2$ Given: heat of reaction is -67,360 cals and entropy change is -20.7 e.u.	**04**
	(c)	Define and explain: 1. Fugacity 2. Activity 3. Mole fraction.	**07**
		OR	
Q.3	**(a)**	Derive Clausius-Clapeyron equation.	**07**
	(b)	Define specific heat at constant volume (Cv) and specific heat at constant pressure (Cp). Derive relationship between these.	**07**
Q.4	**(a)**	What are Ellingham diagrams? Explain how Ellingham diagrams can be useful in the extractive metallurgical process.	**07**
	(b)	Sate and Explain: 1. Raoult's law 2. Henry's law	**07**
		OR	
Q.4	**(a)**	Explain homogeneous & heterogeneous reactions with steps involved in gas-solid reaction.	**07**
Q.4	**(b)**	Define Regular solutions. Differentiate between ideal solution and non-ideal solution.	**07**
Q.5	**(a)**	What is 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)**	What do you mean by phase transformation? Explain effect of pressure on phase transformation.	**07**
	(b)	Write a note on functions and composition of slag.	**07**

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