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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-III Examination-Dec.-2011

Subject code: 132102 **Date: 17/12/2011**

Subject Name: Metallurgical Thermodynamics

Time: 2.30 pm -5.00 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 the following: 1. Entropy 2. Enthalpy 3. Free Energy 4. Internal heat	**07**
	(b)	Derive the combined expression of 1^{st} and 2^{nd} laws of thermodynamics.	**07**
Q.2	**(a)**	What is system? Explain homogeneous and heterogeneous system.	**04**
	(b)	Give the significance of 1^{st} law of thermodynamics.	**03**
	(C)	Define isothermal and adiabatic processes. Give the expression of work done for both processes.	**07**
		OR	
	(C)	Calculate work of expansion of 1 mole of an ideal gas initially at 25^oC, the pressure being changes from 1 to 10 atm. pressure under (a) isothermal condition (b) adiabatic condition. (Given Cp = 7.0 $Cal.deg^{-1}$ $mole^{-1}$ and Cv = 5.0 $Cal.deg^{-1}$ mol^{-1})	**07**
Q.3	**(a)**	Derive Clausius-Clapeyron equation.	**07**
	(b)	Explain consequences of 3^{rd} law of thermodynamics.	**07**
		OR	
Q.3	**(a)**	Define specific heat at constant volume (Cv) and specific heat at constant pressure (Cp). Derive relationship between these.	**07**
	(b)	Define and explain: 1. Fugacity 2. Activity 3. Mole fraction.	**07**
Q.4	**(a)**	Write a note on Ellingham diagram and its importance. Give limitations of Ellingham diagram.	**07**
	(b)	Sate and Explain: 1. Raoult's law 2. Sievert's law	**07**
		OR	
Q.4	**(a)**	Explain homogeneous and heterogeneous reactions with steps involved in gas-solid reaction.	**07**
	(b)	Define Regular solutions. Differentiate between ideal solution and non-ideal solution.	**07**
Q.5	**(a)**	Derive phase rule. Mention its applications.	**07**
	(b)	Write a note on functions and composition of slag.	**07**
		OR	
Q.5	**(a)**	What do you mean by phase transformation? Explain effect of pressure on phase transformation.	**07**
	(b)	What is slag? Describe various sources of slag formation.	**07**

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