GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 2132102   **Date: 30/11/2019**
Subject Name: Metallurgical Thermodynamics
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.

Q.1	**(a)**	Give applications of thermodynamics.	**03**
	(b)	Explain system and surroundings.	**04**
	(c)	With proper example prove that Energy, a state property.	**07**
Q.2	**(a)**	Explain and state types of equilibrium.	**03**
	(b)	State zeroth law of thermodynamics and give its importance.	**04**
	(c)	State 1st and 2nd Law of thermodynamics and give its significance.	**07**
		OR	
	(c)	Define Specific heat and derive relationship $C_p - C_v = R$.	**07**
Q.3	**(a)**	Explain Van't Hoff equation.	**03**
	(b)	Explain Quasi- static process.	**04**
	(c)	Compare and contrast Hess' law and Kirchhoff's law.	**07**
		OR	
Q.3	**(a)**	What are functions of slag?	**03**
	(b)	Explain the concept of basicity index.	**04**
	(c)	What is free energy? Derive equation for Gibb's free energy.	**07**
Q.4	**(a)**	Define fugacity.	**03**
	(b)	Write a short note on Clausius-Clapeyron equation.	**04**
	(c)	State & explain Ellingham diagram for various metal oxides?	**07**
		OR	
Q.4	**(a)**	Explain heat of formation with example.	**03**
	(b)	Explain reversible and irreversible changes.	**04**
	(c)	Explain Raoult's law and Henry's law.	**07**
Q.5	**(a)**	Write formula for Mol fraction and give definition of Molality, Molarity and Normality.	**03**
	(b)	Define Atom fraction. Write conversion from weight % to atom % or vice-versa.	**04**
	(c)	Briefly explain thermodynamics of Slag – Metal reaction.	**07**
		OR	
Q.5	**(a)**	Explain 1wt % Standard State.	**03**
	(b)	Calculate the standard enthalpy change for the following reaction at 1523K. Cu_2S (s) + 2Cu_2O (s) = 6 Cu (l) + SO_2 (g) Given the value of standard enthalpy change of formation at 1523K. $\Delta H°f$,1523 kJ/mol Cu_2S (s) = -86.7; Cu_2O (s) = -176.4; SO_2 (g) = -278.4	**04**
	(c)	State & derive Maxwell's equation from combined statement of first & second law.	**07**

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