Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) - EXAMINATION - SUMMER 2017

Subject Code: 2132102

Subject Name: Metallurgical Thermodynamics Time: 10:30 AM to 01:00 PM

Total Marks: 70

MARKS

Date: 02/06/2017

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.

Q.1	1	Short Questions An isolated system enclosed by impermeable walls that does not permit neither exchanges of energy nor transfer of matter. True or False.	14 1
	2	What is an Intensive property?	1
	3	Explain heat capacity.	1
	4	Write an equation of 1 st law of thermodynamics in terms of enthalpy.	1
	5	When one of the components of a reaction undergoes allotropic transformation, fusion or evaporation within temperature range considered as	1
	6	Write a statement of zeroth of thermodynamics.	1
	7	$\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} = 0$ is applicable for which process.	1
	8	Define concept of fugacity.	1
	9	If no of phases in thermodynamic system is three then	1
		based on phase is system.	
	10	Element having lower position of line in Ellingham diagram is poor reducing agent. True or False.	1
	11	Sharp change in slope of line in Ellingham diagram indicates	1
	12	What do you meant by Point and Path function?	1
	13	What is free energy?	1
	14	Define Solution.	1
Q.2	(a)	Explain Quasi- static process.	03
	(b)	State & Define 1 st law of Thermodynamics & its significance.	04
	(c)	Explain Hess's law and Kirchhoff's law. OR	07
	(c)	With suitable example define and classify different types of systems.	07
Q.3	(a)	What is equilibrium? Explain Thermodynamic equilibrium.	03
	(b)	Define entropy and give its significance.	04
	(c)	Define Specific heat and derive relationship $C_p - C_v = R$.	07
		OR	
Q.3	(a)	Entropy is state property. Explain.	03
	(b)	Write a short note on Von't Hoff equation.	04
	(c)	Derive combined equation of 1st and 2nd Law of thermodynamics in terms of internal energy, enthalpy and free energy.	07

Q.4	(a)	Write formula for Mol fraction and give definition of	03
		Molality, Molarity and Normality.	
	(b)	Define Atom fraction. Write conversion from weight % to	04
		atom % or vice-versa.	
	(c)	Explain Raoult's law and Henry's law.	07
		OR	
Q.4	(a)	Explain 1wt % Standard State.	03
	(b)	Write a short note on Sievert's law.	04
	(c)	What is free energy? Derive equation for Gibb's free energy.	07
Q.5	(a)	Draw free energy - composition diagram for Isomorphous system at various phases.	03
	(b)	Explain the differences between a liquidus line and solidus line.	04
	(c)	State & explain Ellingham diagram for various metal oxides?	07
		OR	
0.5	(a)	Explain the function of slag.	03
·	(b)	Explain basicity index with suitable example.	04
	(c)	Briefly explain thermodynamics of Slag – Metal reaction.	07
