

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: **07**
1. Entropy 2. Enthalpy 3. Internal heat
- (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: **07**
1. Heat capacity 2. Latent heat 3. Heat of reaction
- 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) State and Explain: **07**
1. Henry's law 2. Sievert's law
- (b) What do you mean by phase transformation? Explain effect of pressure on phase transformation. **07**
