

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-III EXAMINATION – WINTER 2015**

**Subject Code:132102****Date:23/12/2015****Subject Name: Metallurgical Thermodynamics****Time: 2:30pm to 5:00pm****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) Differentiate between extensive and intensive properties. **07**  
(b) State 0<sup>th</sup> and 1<sup>st</sup> Law of thermodynamics. Explain concept of internal energy and give significance of 1<sup>st</sup> Law of thermodynamics. **07**
- Q.2** (a) What is System and surrounding in thermodynamics? Classify of system with suitable example. **07**  
(b) Write note on quasistatic process. **07**
- OR**
- (b) Derive combined expression of 1<sup>st</sup> and 2<sup>nd</sup> Law of thermodynamics in terms of enthalpy and free energy. **07**
- Q.3** (a) Explain Hess' Law and Krichoff's Law. **07**  
(b) State 2<sup>nd</sup> and 3<sup>rd</sup> Law of thermodynamics and explain concept of entropy. **07**
- OR**
- Q.3** (a) Explain Raoult's law and Sievert's law. **07**  
(b) Compare reversible and irreversible processes. **07**
- Q.4** (a) What is Free Energy? Explain concept of Gibb's Free Energy. **07**  
(b) What information is sought from Ellingham Diagram? Use suitable example wherever required. **07**
- OR**
- Q.4** (a) Explain fugacity, activity and mole fraction. **07**  
(b) What is equilibrium? Explain different types of equilibrium. **07**
- Q.5** (a) What is Gibb's Phase Rule and explain terms if possible with suitable example. List its applications. **07**  
(b) What is meant by Heat Capacity, give its unit and derive  $C_p - C_v = R$ . **07**
- OR**
- Q.5** (a) Write note on Functions of slag. **07**  
(b) Discuss the Concept of basicity index. **07**

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