

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III • EXAMINATION – SUMMER • 2014****Subject Code: 132102****Date: 28-05-2014****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) What do you mean by System in thermodynamics? Give different classification of system with suitable example. **07**
- (b) Differentiate between extensive and intensive properties. **07**
- Q.2** (a) State 1<sup>st</sup> Law of thermodynamics and explain concept of internal energy. Give significance of 1<sup>st</sup> Law of thermodynamics. **07**
- (b) Compare Reversible and irreversible 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 Zero<sup>th</sup> Law of thermodynamics, give its application & state 2<sup>nd</sup> Law of thermodynamics and explain concept of entropy. **07**
- OR**
- Q.3** (a) Explain Raoult's law and Sievert's law. **07**
- (b) i) State 3<sup>rd</sup> Law of thermodynamics and give Nernst Heat Theorm. **04**
- ii) If heat of combustion of carbon (C), hydrogen (H<sub>2</sub>) and ethane (C<sub>2</sub>H<sub>6</sub>) is -393, -286 and -1561 kJ/mol respectively than calculate heat of formation of benzene. **03**
- Q.4** (a) State Phase Rule and define each it's each term. Give its applications. **07**
- (b) Define Heat Capacity and derive relation  $C_p - C_v = R$ . **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 Free Energy? Explain concept of Gibb's Free Energy. **07**
- (b) Write note on Functions of slag. **07**
- OR**
- Q.5** (a) Write note on Ellingham Diagram. **07**
- (b) Discuss the Concept of basicity index. **07**

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