

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III (OLD) EXAMINATION – WINTER 2018****Subject Code:132102****Date:05/12/2018****Subject Name:Metallurgical Thermodynamics****Time:10:30 AM TO 01:00 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) Derive Gibb's Phase Rule and explain its importance. **07**  
(b) Explain the combined expression the 1<sup>st</sup> law and 2<sup>nd</sup> law of Thermodynamics. **07**
- Q.2** (a) Define & explain types of systems. **07**  
(b) Compare extensive and intensive properties and explain different types of equilibrium. **07**
- OR**
- (b) Explain briefly: 1. Entropy 2. Enthalpy 3. Free Energy 4. Internal heat **07**
- Q.3** (a) Prove that  $C_p$  is greater than  $C_v$ . **07**  
(b) Differentiate Hess' law and Kirchhoff's law. **07**
- OR**
- Q.3** (a) Derive Clausius-Clapeyron equation. **07**  
(b) Write a note on Ellingham diagram and its importance. Give limitations of Ellingham diagram. **07**
- Q.4** (a) What is slag? Describe various sources of slag formation. **07**  
(b) Explain Raoult's Law and Sievert's Law. **07**
- OR**
- Q.4** (a) Define free energy and explain Helmholtz and Gibb's Free Energy. **07**  
(b) Write short note on Quasistatic process. **07**
- Q.5** (a) Explain the concept of Basicity Index **07**  
(b) Derive Gibb's- Duhem equations. **07**
- OR**
- Q.5** (a) Derive Van't Hoff equation. **07**  
(b) What do you mean by phase transformation? Explain effect of pressure on phase transformation. **07**

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