

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III(New) • EXAMINATION – WINTER 2016****Subject Code:2132102****Date:04/01/2017****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.

		MARKS
<b>Q.1</b>	<b>Short Questions</b>	<b>14</b>
1	Ellingham diagram is _____ vs temperature.	1
2	Internal energy can not be measured an absolute terms. True/False	1
3	Give equation of state.	1
4	Phase is homogenous part of system. True/False	1
5	Enthaply of substance do not change with temperature. True/False	1
6	Energy can be transferred from low temperature to high temperature without any aid. True/False	1
7	Entropy is function of temperature. True/False	1
8	Thermodynamics can give idea about rate of reaction. True/False	1
9	Degree of freedom for non variant point in phase diagram is ____ .	1
10	Isobaric process involve constant _____ .	1
11	Temperature is system is extensive property. True/False	1
12	For any reaction at given temperature $dG = dG_{PROD} + dG_{REACTANT}$ . True/False	1
13	Partial pressure of substance is not proportional to mole fraction. True/False	1
14	Theoretically entropy of a substance can be zero at _____ temperature.	1
<b>Q.2</b>	(a) Differentiate between extensive and intensive properties.	<b>03</b>
	(b) In terms of thermodynamics define system and give different classification of system with suitable examples.	<b>04</b>
	(c) Briefly explain different type of thermodynamic processes.	<b>07</b>
	<b>OR</b>	
	(c) Write brief note on functions of slag and basicity.	<b>07</b>
<b>Q.3</b>	(a) Derive equation for 1 <sup>st</sup> law of thermodynamics in terms of enthalpy.	<b>03</b>
	(b) State phase rule and explain its each term.	<b>04</b>
	(c) State 1 <sup>st</sup> law of thermodynamics, give its significance. Also explain thermodynamic processes in reference of 1 <sup>st</sup> Law.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Prove that $C_P > C_V$ .	<b>03</b>
	(b) Explain temperature composition diagram for binary alloy system.	<b>04</b>
	(c) With suitable example explain Hess' law and its features.	<b>07</b>
<b>Q.4</b>	(a) Explain internal energy and enthalpy.	<b>03</b>
	(b) State 0 <sup>th</sup> and 2 <sup>nd</sup> law of thermodynamics.	<b>04</b>
	(c) Explain thermodynamic solution and differentiate between ideal and non ideal solutions.	<b>07</b>

**OR**

- Q.4** (a) Explain entropy and Gibb's free energy concept. **03**  
(b) Explain Siver's and Raoult's law. **04**  
(c) Derive combined expression of 1<sup>st</sup> and 2<sup>nd</sup> law of thermodynamics in terms of internal energy, enthalpy, Helmholtz free energy and Gibb's free energy. **07**
- Q.5** (a) If heat of combustion of carbon and carbon monoxide to form carbon monoxide and carbon dioxide is -64 and -32 Kcal/mol. Calculate heat of combustion of carbon to form carbon dioxide. **03**  
(b) Explain equilibrium and its types. **04**  
(c) Derive relationship  $C_P - C_V = R$ . **07**

**OR**

- Q.5** (a) Explain objectives, advantages and limitations of thermodynamics. **03**  
(b) Explain fugacity, activity and mole fraction. **04**  
(c) Discuss important features of Ellingham diagram. **07**

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