

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024

Subject Code:3132105**Date:29-11-2024****Subject Name: Materials 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.
4. Simple and non-programmable scientific calculators are allowed.

		MARK
Q.1	(a) Application of Metallurgical Thermodynamics.	03
	(b) Explain different types of systems with example.	04
	(c) Explain reversible and irreversible changes.	07
Q.2	(a) Justify Energy is a state property.	03
	(b) Explain zeroth law of thermodynamics with its application.	04
	(c) State and Explain 1 st law thermodynamics.	07
	OR	
	(c) Prove $C_p - C_v = R$	07
Q.3	(a) Explain Enthalpy	03
	(b) Explain different forms of energy.	04
	(c) Explain Hess' law of thermodynamics.	07
	OR	
Q.3	(a) Explain Latent heat.	03
	(b) Explain Sievert's Law.	04
	(c) Explain Kirchhoff's law of thermodynamics.	07
Q.4	(a) Explain Enthalpy.	03
	(b) Explain Henry's law of solutions.	04
	(c) Explain 2 nd law of thermodynamics with respect to irreversible change.	07
	OR	
Q.4	(a) Convert 7ppm into percentage.	03
	(b) A brass contain 70 wt. % of Copper and rest of Zinc. Calculate atom %. Atomic weights of Cu and Zn are 63.54 and 65.38.	04
	(c) Explain 3 rd law of thermodynamics give importance of free energy.	07
Q.5	(a) Calculate standard entropy change for the following reaction at 25°C. $Cr_2O_3 (s) + 3C (s) = 2Cr + 3CO (g)$. Given $S^\circ_{298, Cr_2O_3(s)} = 81 \text{ J/K/mol}$, $S^\circ_{298, C(s)} = 7 \text{ J/K/mol}$, $S^\circ_{298, Cr(s)} = 24 \text{ J/k/mol}$, $S^\circ_{298, CO(g)} = 198 \text{ J/K/mol}$	03
	(b) Derive Gibb's Phase rule.	04
	(c) Discuss important features of Ellingham diagram	07
	OR	
Q.5	(a) Explain work in thermodynamics.	03
	(b) Explain simple eutectic system with applying Gibb's phase rule	04
	(c) Derive Gibb's Duhem equation.	07
