Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–III EXAMINATION – WINTER 2025
Subject Code:3132105   **Date:15-12-2025**
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)**	Explain Chemical thermodynamics and Metallurgical thermodynamics.	**03**
	(b)	Explain Thermodynamic Equilibrium.	**04**
	(c)	Differentiate Extensive Properties and Intensive Properties.	**07**
Q.2	**(a)**	Explain latent heat.	**03**
	(b)	Explain different forms of energy.	**04**
	(c)	Prove Cp-Cv = R.	**07**
		OR	
	(c)	State and Explain 1st law thermodynamics.	**07**
Q.3	**(a)**	Explain specific heat.	**03**
	(b)	Justify-Energy is a state property.	**04**
	(c)	Explain Kirchhoff's law of thermodynamics.	**07**
		OR	
Q.3	**(a)**	Explain zeroth law of thermodynamics.	**03**
	(b)	Explain Roult's law of solutions for Ideal and Non-Ideal solutions.	**04**
	(c)	Explain Hess's law of thermodynamics.	**07**
Q.4	**(a)**	Explain Enthalpy.	**03**
	(b)	Explain Henry's law of solutions.	**04**
	(c)	Explain 2nd law of thermodynamics with respect to irreversible change.	**07**
		OR	
Q.4	**(a)**	Convert 5ppm into percentage.	**03**
	(b)	A brass contain 60 wt. % of Copper and rest of Zinc. Calculate atom %. Atomic weights of Cu and Zn are 63.54 and 65.38.	**04**
	(c)	Explain Gibbs Free Energy and Explain 3rd law of thermodynamics.	**07**
Q.5	**(a)**	Calculate change of free energy for the following reduction reaction at 500 K. CuO (s) + H_2 (g) = Cu (s) + H_2 (g). Given $\Delta H°_{500}$ =88 kJ/mol and $\Delta S°_{500}$ =88 kJ/mol.	**03**
	(b)	At Triple point in water vapor diagram, find the degree of freedom.	**04**
	(c)	Derive Gibb's Duhem equation	**07**
		OR	
Q.5	**(a)**	Justify – Entropy of irreversible reaction is higher.	**03**
	(b)	Explain simple eutectic system with applying Gibb's phase rule	**04**
	(c)	Discuss important features of Ellingham diagram	**07**

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