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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 3132105

Date: 30/11/2019

Subject Name: Materials Thermodynamics

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

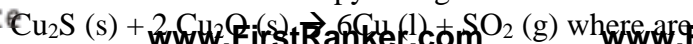
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

	Marks
Q.1 (a) Define system and give example.	03
(b) Classify system and explain with suitable example.	04
(c) Derive combined equation of 1 st and 2 nd law of thermodynamics in terms of internal energy, enthalpy and free energy.	07
Q.2 (a) Which equation rules the state of system? State it.	03
(b) Compare extensive and intensive properties.	04
(c) Apply Hess law and importance with suitable example.	07
OR	
(c) State 1 st law of thermodynamics give its significance. Explain concept proposed by it.	07
Q.3 (a) Based on which law temperature measuring equipment are designed? State it.	03
(b) Prove that $C_p > C_v$.	04
(c) Interpret Kirchoff's law and importance with suitable example.	07
OR	
Q.3 (a) Define Specific Heat (C).	03
(b) Define C_p and C_v .	04
(c) Derive relationship $C_p - C_v = R$.	07
Q.4 (a) Identify enthalpy (H) and Heat (q).	03
(b) What is equilibrium? Explain different equilibrium.	04
(c) What is concept of free energy? Relate different type of free energy.	07
OR	
Q.4 (a) Interpret activity and fugacity.	03
(b) Examine possibility to pass on heat from lower temperature to higher temperature. Defend your answer.	04
(c) Contrast Raoult's, Henry's and Sievert's law.	07
Q.5 (a) What is solution and ideal solution?	03
(b) Explain concept of entropy and 3 rd law of thermodynamics.	04
(c) Demonstrate use of Ellingham diagram in metallurgy and discuss important characteristics.	07
OR	
Q.5 (a) Calculate free energy change at 500 K for following reaction: $\text{CuO (s)} + \text{H}_2 \text{ (g)} \rightarrow \text{Cu (s)} + \text{H}_2\text{O (g)}$ $\Delta H_{500}^\circ = -87 \text{ kJ/mol}$ and $\Delta S_{500}^\circ = 47 \text{ J/K/mol}$.	03

(b) Calculate standard enthalpy change for

04



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	Cu ₂ S (s)	Cu ₂ O (s)	Cu (l)	SO ₂ (g)
ΔH_f° 1523K kJ/mol	-86.7	-176.4	0	-278.4

- (c) Brass contains 70% Cu, 30% Zn with atomic weight 63.54 and 65.38 respectively. Calculate the composition of brass in atom %. Also calculate the atom fractions of Cu and Zn in above brass.

07

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