BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER : V**
BRANCH: CHEMISTRY **SESSION : MO/19**

SUBJECT: IMC5001 PHYSICAL CHEMISTRY

TIME: 3Hrs. **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	What is enantiotropy and polymorphism?	[2]
Q.1(b)	What is principle of formation of freezing mixtures? Name the freezing mixture in which -55.9^{o}C is attained. Explain Acetone-dry ice freezing mixture.	[4]
Q.1(c)	Draw the neat and clean phase diagram of sulphur system giving the name of all line curves and equilibrium between them. What is maximum no. of phases explain?	[6]
Q.2(a)	Explain the differences between phase diagram of water and CO_2 System.	[2]
Q.2(b)	If Henery's law applies to the solute, Raoult's law applies to solvent write possible definitions of Henery's law and Raoult's law.	[4]
Q.2(c)	Discuss the boiling point-composition curves of completely miscible binary solutions.	[6]
Q.3(a)	Thermodynamically derive Nernst equation.	[2]
Q.3(b)	Describe the methods of end point detection of potentiometric acid-base titration with principle.	[4]
Q.3(c)	Write down principle of concentration cell with the transport. Derive the relation.	[6]
Q.4(a)	What is P^{H} and P^{ka} , a zeo tropes?	[2]
Q.4(b)	Explain the methods of determination of P^{H} using quinhydrone electrode.	[4]
Q.4(c)	What is congruent m.p? Explain Zn-mg system phase diagram.	[6]
Q.5(a)	Explain why a glass electrode is preferred to quinhydrone electrode in measuring PH of a solution?	[2]
Q.5(b)	Discuss the electrochemical theory of corrosion.	[4]
Q.5(c)	What are different control methods of corrosion with principle. Explain the uses of sacrificial amode.	[6]
Q.6(a)	State the 3rd law of thermodynamics.	[2]
Q.6(b)	Explain the 3rd law on the basis of quantum theory and planck suggestion.	[4]
Q.6(c)	Explain variation of free energy with temp & pressure.	[6]
Q.7(a)	Define free-energy & Helmholtz work function.	[2]
Q.7(b)	Explain Nernst Heat theorem.	[4]
Q.7(c)	Show that entropy is not a suitable criterian for a spontaneity of a system. Explain it in terms of other state function.	[6]

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