2023
M.Sc.
Third Semester
CORE – 10
CHEMISTRY
Course Code: MCHC 3.21
(Physical Chemistry - IV)

Total Mark: 70   *Pass Mark: 28*
Time: 3 hours

Answer <u>five</u> *questions, taking* <u>one</u> *from each unit.*

UNIT–I

1. (a) Explain the characteristic features of surfactants.   4
   (b) Briefly discuss hydrophile-lipophile balance (HLB). Mention the two different action of an emulsifier.   4
   (c) Derive the absorption isotherm for the liquid-liquid interface.   6

2. (a) Give an account on solvophobic interaction thermodynamically.   6
   (b) Write notes on the following: 2×2=4
       (i) Kraft point
       (ii) Role of counter-ion on micelle formation
   (c) Explain in detail the effect of added electrolytes on the surface excess of ionic surfactants.   4

UNIT–II

3. (a) Define micelles. Explain some of the most acceptable proposed structures of micelles. Mention three techniques for elucidating its shape and structures.   1+4+1=6
   (b) Write notes on the following: 2×2=4
       (i) Rubingh's treatment on non-ideal mixed micelles
       (ii) Affect of surfactants structure on cmc
   (c) Briefly explain the various types of mixed micelles and also its applications.   4

4. (a) What are mixed micelles? Show how to measure its cmc.   4

(b) What are counter-ions? How does counter-ions binding in mixed micelles affects its cmc? 5

(c) Discuss thermodynamic approach to cmc. 5

UNIT–III

5. (a) Briefly explain solubilisation and emulsification by surfactants. Suggest one mode in which they can be distinguished from one another. Mention the applications of solubilization in various fields.

3+1+3=7

(b) Elucidate the mechanism of reaction occurring in micro-emulsion media. 5

(c) How is hydrophile-lipophile balance (HLB) related to solubilisation and emulsification? 2

6. (a) Suggest and explain the method for determining the stability of an emulsion. 5

(b) Discuss a theory on conductance by micro emulsion. 5

(c) Explain in detail two factors which determine the extent of solubilisation. 4

UNIT–IV

7. (a) Taking a specific of AX-type of ionic solid, explain the packing of ions. Also find its coordination, radius ratio, number of each ion present and the type of close pack structure. 7

(b) Explain the structural elucidation and distribution of interstitial sites in ccp structure of $CdCl_2$ and NaCl. 7

8. (a) With a neat diagram, discuss the structural elucidation and distribution of interstitial sites in hcp structure of Wurtzite and Rutile.

7

(b) What are voids in crystal system? Distinguish between tetrahedral voids and octahedral voids. 5

(c) Write short note on the kind of packing in alloy. 2

UNIT–V

9. (a) Define magnetic moment. Deduce a relation for calculation of magnetic moment. 5

(b) Discuss the following: 3×3=9
   (i) Dependence of magnetic properties on size
   (ii) Dependence of dielectric properties on size
   (iii) Concept of ferro-electricity

10. (a) What is superconductivity? Explain super conductivity of a metal. 5
    (b) What are extrinsic semiconductors? Explain the fabrication of transistors. 5
    (c) Using energy band theory, distinguish between conductors, semiconductors and insulators. 4

_____