2021
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 five *questions, taking one form each unit.*

UNIT–I

1. (a) Derive Gibb's adsorption isotherm equation. 6
   (b) Explain the structural features and behaviour of surfactants. 4
   (c) Define Kraft temperature. Relate it with surfactants solution. 4

2. (a) Give an account on the adsorption at the solid-liquid interface. 5
   (b) Explain the formation of 3×2=6
   (i) hydrophobic interaction
   (ii) hydrophilic interaction for surfactants
   (c) Explain briefly how added electrolytes affects the surface excess of ionic surfactants. 3

UNIT–II

3. (a) Define CMC. Suggest a method for measuring CMC and conductive behaviour of ionic micellar solution. 5
   (b) Briefly explain counter-ion and discuss in detail counter-ion binding on CMC. 2+4=6
   (c) How does temperature affects CMC of a surfactants? 3

4. (a) Define mixed micelles. Show how CMC of mixed micelles are measured. 4
   (b) Explain thermodynamics of micellisation. 6
   (c) Describe the shape and structure of micelles. 4

UNIT–III

5. a) Write short notes on: 3×2=6
   (i) coalescence
   (ii) creaming and sedimentation
   (iii) flocculation
   (b) Give a detail account of conductance behaviour of microemulsions with examples. 6
   (c) Mention two roles of emulsifiers. 2

6. (a) Give a detail mechanism of emulsification of oil and water. 5
   (b) Discuss how chemical reactivity behaves in microemulsions. 5
   (c) Give an account for solvolytic reactions. 4

UNIT–IV

7. (a) Explain the structural elucidation and distribution of interstitial sites in
   (i) AX types
   (ii) AX_2 with relevant example. 7×2=14

8. (a) Write a short essay on crystalline arrangement in alloys. 5
   (b) Explain the structural features of tetrahedral and octahedral voids. 5
   (c) Show how to calculate the packing fraction of a ccp unit cell. 4

UNIT–V

9. (a) Explain how materials are classified. 4
   (b) Discuss ferro and antiferromagnetic ordering. 6
   (c) Write notes on: 2×2=4
   (i) pyroelectricity
   (ii) piezoelectricity

10. (a) What are dielectric materials? Briefly explain the concept of dielectric constant. 6
   (b) Explain intrinsic and extrinsic semiconductors. 6
   (c) Write short notes on: 2
   (i) insulators
   (ii) superconductors