November 2025
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 *from each unit.*

UNIT–I

1. (a) Describe in detail the general features of surfactants. 5
   (b) Derive adsorption isotherm at the liquid-gas interface 5
   (c) Write the effect of added electrolyte on the surface excess for ionic surfactants. 4

2. (a) Derive adsorption isotherm at the liquid-liquid interface 5
   (b) Discuss the hydrophobic and solvophobic interaction. 6
   (c) Write a short note on Krafft point. 3

UNIT–II

3. (a) Explain how micelles are formed from surfactants. 5
   (b) Show how CMC of mixed micelle are measured. 5
   (c) Discuss the temperature dependence of CMC. 4

4. (a) Explain the Rodenas treatment for mixed micelle. 6
   (b) Mention the factors that affect CMC of a surfactants. 5
   (c) Write notes on counter-ion binding constant. 3

UNIT–III

5. (a) Discuss solubilisation from the point of view of the phase rule. 6
   (b) Describe the conductance behaviour of microemulsions. 4
   (c) Briefly explain the reaction in micellar media. 4

6. (a) Explain the factors that determines extent of solubilisation. 6

(b) Describe the location of solubilisates in micelle. 4

(c) Write notes on reaction in microemulsion media. 4

UNIT–IV

7. (a) Discuss the distribution patterns of tetrahedral sites and octahedral sites in NaCl structure. 6

   (b) Discuss the features and number of ions present in zinc blende structure. 5

   (c) What are superalloys? Mention the various types of super alloys. 3

8. (a) Explain the structural elucidation and distribution of interstitial sites in $CdCl_2$ structure. 6

   (b) Write short notes on each of the following: 3×2=6

   (i) Packing in metals

   (ii) Packing efficiency of fcc

   (c) What is hcp structure? Cite one example. 2

UNIT–V

9. (a) Derive the formula for the calculation of magnetic moment. 5

   (b) Calculate magnetic moment of Fe^{2+}_{aq} ion. 4

   (c) What is polarisability? What are the factors which influences polarisability? 2+3=5

10. (a) Citing examples describe intrinsic and extrinsic semiconductors. 6

    (b) Discuss the dependence of magnetic properties on its size. 4

    (c) Write notes on bonding in solid based on its electronic properties. 4

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