2022
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) What are surfactants and how are they classified? 4
   (b) Explain the role of hydrocarbon chain in surfactants. 4
   (c) Give an account on hydrophobic interaction thermodynamically. 6

2. (a) What are the factors that govern the adsorption of surfactants at the solid-liquid interface? 3
   (b) Derive the adsorption isotherms at the liquid-solid interface. 5
   (c) Establish the Gibb's adsorption isotherm equation. 6

UNIT–II

3. (a) What is CMC and how it is measured? 4
   (b) Explain the following terms: 3×2=6
      (i) Rubingh treatment
      (ii) Rodenas treatment
   (c) Write a note on micelle formation by surfactants. 4

4. (a) What are the factors that affect CMC? 2
   (b) Explain micellization in terms of thermodynamics. 6
   (c) Derive the Clints equation for CMC. 6

UNIT–III

5. (a) Write a note on the description of micro emulsions using phase diagram. 5
   (b) Discuss the theories of emulsion formation. 6
   (c) Explain the factors affecting solubilisation. 3

6. (a) What are the factors which determines the stability of emulsions? 4
   (b) How are emulsions prepared? 3
   (c) Write a note on predicting the different types of micro emulsions. 2
   (d) Discuss the reactions occurring in micellar media. 5

UNIT–IV

7. Explain the structural elucidation and distribution of interstitial sites in hcp structures of the following: 7×2=14
   (a) Wurtzite (ZnS)
   (b) Rutile (TiO_2)

8. (a) Define the following terms: 7
      (i) Cubic-close packing
      (ii) Hexagonal close packing
      (iii) Packing of ions
   (b) Discuss the ccp structure of NaCl. 7

UNIT–V

9. (a) Define dielectric constant and dielectric loss. 3
   (b) Explain in detail magnetic domains and hysteresis. 6
   (c) Discuss the origin of bands. 5

10. (a) Explain the band theory. 5
    (b) Write a note on p-n junction. 5
    (c) Calculate magnetic moment μ_s for the following ions: 2×2=4
      (i) V^{4+}
      (ii) Fe^{3+}
