

**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)**

M. Sc. (4th Semester) Regular Examinations, April - 2025

22CHPC401 - Physical Chemistry-III

(Chemistry)



Time: 3 hrs

Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A

(2 x 10 = 20 Marks)

Q.1. Answer **ALL** questions

- | | CO # | Blooms
Level |
|---|------|-----------------|
| a. Calculate the ionic strength of NaOH solution with a concentration of 5 mol/L. | CO1 | K2 |
| b. Given the electrochemical reaction shown, if the standard reduction potential of Ag^+/Ag is +0.80 V, and the standard reduction potential of Cu^{2+}/Cu is +0.34V, Find out E° of the cell. | CO2 | K2 |
| c. What do you mean by CMC? | CO3 | K1 |
| d. Determine the miller indices for a plane when the intercept along the axes are (2a,3b,2c). | CO4 | K2 |
| e. State and explain Debye-Huckel Onsager equation. | CO1 | K1 |
| f. Write the cell notation of
$\text{Zn} \longrightarrow \text{Zn}^{2+} + 2\text{e}^-$ $2\text{H}^+ + 2\text{e}^- \longrightarrow \text{H}_2$ | CO2 | K2 |
| g. What are the different applications of surfactant? | CO3 | K1 |
| h. State and explain Bragg's Equation? | CO4 | K2 |
| i. Discuss about solution pressure and osmotic pressure. | CO3 | K1 |
| j. Explain F- center formation. | CO4 | K2 |

PART – B

(10 x 5 = 50 Marks)

Answer **ANY FIVE** questions

- | | Marks | CO # | Blooms
Level |
|---|-------|------|-----------------|
| 2. a. Derive Lippmann's equation. | 5 | CO1 | K3 |
| b. Explain mean ionic activity coefficient of a solution. | 5 | CO1 | K2 |
| 3.a. Derive Nernst's equation . | 5 | CO2 | K2 |
| b. Calculate the EMF and standard Gibbs free energy change of the cell
$\text{Zn}/\text{Zn}^{2+} (0.1 \text{ M})//\text{Cu}^{2+} (0.1\text{M})/\text{Cu}$ at 298 K given that $E^\circ \text{ Zn}/\text{Zn}^{2+} = -0.76 \text{ V}$ and $E^\circ \text{ Cu}^{2+}/\text{Cu} = 0.34 \text{ V}$. | 5 | CO2 | K3 |
| 4. Derive and explain BET equation | 10 | CO3 | K3 |
| 5.a. Calculate the packing fraction in BCC and FCC. | 5 | CO4 | K3 |
| b. Differentiate between Schottky defect and Frankel defect. | 5 | CO4 | K1 |
| 6. a. Define Fuel cell , explain it's working principles and its applications. | 5 | CO2 | K2 |
| b. Define corrosion and explain the different types of corrosion. | 5 | CO2 | K1 |
| 7.a. Explain the characteristics of physical adsorption and chemical adsorption. | 5 | CO3 | K3 |
| b. State and explain Kelvin equation on surface adsorption. | 5 | CO3 | K3 |
| 8. a. Explain Bjerrum method. | 5 | CO1 | K2 |
| b. Explain Debye-Huckel limiting law with suitable example | 5 | CO1 | K3 |

End of Paper