



Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET UNIVERSITY)

M.Sc. (Fourth Semester – Regular) Examinations, April – 2026

24MCYPC24001 – Physical Chemistry III

(Chemistry)

Time: 3 hrs

Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

- | | CO # | Blooms Level |
|---|------|--------------|
| a. What is the Z factor? Explain with an example. | CO1 | K2 |
| b. Write the equation for the activity of a solution. | CO2 | K2 |
| c. Predict the feasibility of the cell $\text{Zn}/\text{Zn}^{2+}_{(1\text{M})} \parallel \text{Cu}^{2+}_{(1\text{M})}/\text{Cu}$
$E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.76 \text{ V}$
$E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34 \text{ V}$ | CO3 | K2 |
| d. Differentiate between adsorption and absorption. | CO4 | K2 |
| e. What is F-center formation? | CO5 | K2 |

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

- | | Marks | CO # | Blooms Level |
|--|-------|------|--------------|
| 2. a. Describe Debye-Huckel theory for ion-ion interactions. | 8 | CO1 | K2 |
| b. Explain its significance in electrolyte solutions. | 2 | CO1 | K3 |
| (OR) | | | |
| c. What are electrolytes and how they are classified? | 5 | CO1 | K2 |
| d. Explain Bjerrum Method. | 5 | CO1 | K3 |
| 3.a. Describe the concept of activity and its relationship with activity coefficient. | 6 | CO2 | K2 |
| b. Calculate activity of K_2SO_4 and $\text{Al}_2(\text{SO}_4)_3$. | 4 | CO2 | K3 |
| (OR) | | | |
| c. State and explain Ohm's law. | 5 | CO2 | K2 |
| d. Derive how conductivity (K) is related to cell constant. | 5 | CO2 | K3 |
| 4.a. Discuss the application of cell potential in the calculation of pH. | 5 | CO3 | K3 |
| b. Briefly explain the fuel cell & its applications. | 5 | CO3 | K3 |
| (OR) | | | |
| c. Find the EMF of cell at 25°C $\text{Zn}/\text{Zn}^{2+}_{(0.1\text{M})} \parallel \text{Sn}^{2+}_{(0.001\text{M})}/\text{Sn(s)}$
$E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.76 \text{ V}$
$E^\circ_{\text{Sn}^{2+}/\text{Sn}} = -0.14 \text{ V}$ | 6 | CO3 | K2 |
| d. Discuss the types of Corrosion. | 4 | CO3 | K3 |
| 5.a. Explain the BET Theory of multilayer adsorption. | 8 | CO4 | K3 |
| b. What do you mean by surface-active agents. | 2 | CO4 | K2 |
| (OR) | | | |
| c. Give the equation for the activation energy of desorption. | 6 | CO4 | K2 |
| d. What is the effect of temperature on chemical adsorption? | 4 | CO4 | K3 |
| 6.a. Classify a unit cell based on the location of the lattice point. | 8 | CO5 | K3 |
| b. Draw the plane corresponding to the following M.I.
a. (0,1,1)
b. (1,0,1) | 2 | CO5 | K2 |
| (OR) | | | |
| c. Write notes on a conductor, a semiconductor, and an insulator with examples. | 6 | CO5 | K2 |
| d. What is the relationship between d, a, and r for BCC? | 4 | CO5 | K3 |

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