Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: M.Sc.I
Sub Code: FCYC702

7th Semester Regular Examination: 2024-25
SUBJECT: Physical Chemistry-V
BRANCH(S): M.Sc.I (AC)
Time: 3 Hours
Max Marks: 70
Q.Code: R088

Answer Question No.1 (Part-I) which is compulsory, any five from rest (Part-II)
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Explain Zeroth law of thermodynamics.
b) Define three-component eutectic system with a suitable example.
c) Define Boltzman distribution formula.
d) Explain molecular partition functions.
e) Define electro capillary phenomena.
f) State the factors affecting conductivity.
g) Define the term polarization.
h) Define evolution reactions.
i) Explain the corrosion phenomena.
j) Explain Principle of equipartition of energy.

Part-II

Long Answer Type Questions (Answer Any five)

Q2 **a)** Derive the Debye-Hückel limiting law. **(5+5)**
b) Discuss activity and mean ionic activity coefficients of electrolytes.

Q3 **a)** Explain two component solids-liquids eutectic systems with a suitable example. **(5+5)**
b) Discuss the Gibbs free energy, entropy, and enthalpy of mixing.

Q4 **a)** Discuss the theories of the electrical double layers based on Helmholtz-Perrin, Guoy-Chapman, and Stern models. **(5+5)**
b) Discuss the translational, rotational, vibrational, and electronic partition functions of an ideal gas.

Q5 **a)** Explain the principle of equipartition of energy and its significances and limitations. **(5+5)**
b) Discuss the electrokinetic phenomena.

Q6 **a)** Explain the Butler-Volmer equation for one step and multistep electron transfer reactions. **(5+5)**

b) Discuss the corrosion and passivity of metals and coatings.

Q7 **a)** Schematically discuss the iron Pourbaix diagram. **(5+5)**

b) Explain significance of transfer coefficient-mechanism of the hydrogen evolution reaction and oxygen evolution reactions.

Q8 **a)** Discuss different types of corrosion protection methods. **(5+5)**

b) Discuss the significance of equilibrium exchange current density and symmetry factor in electrochemical kinetics.