

School of Basic Sciences

Master of Science in Chemistry
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem II - C1PK203B - Physical Chemistry-IIGeneral Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) What are the limitations of helmoltz-perin model? K1(3)
- 2) Explain the necessary conditions necessary for a molecules to be inferared active? K2(4)
- 3) Explain the heat capacity of a system at constant volume correponding to partition function is equal to 3R?
$$Q(T) = \left(\frac{KT}{hc}\right)^{\frac{3}{2}} (8\pi^3 kt/h^2)^{\frac{3}{2}}$$
 K2(6)
- 4) identify the importance of the Tafel slope in the context of corrosion studies and electrocatalysis. How can the Tafel slope be used to evaluate the performance of electrochemical systems? K3(6)
- 5) identify how electrical capictance of an interface varies in electrified double layer? K3(6)
- 6) identify the significance of the partition function in calculating thermodynamic properties of a system? K3(9)
- 7) illustrate the ionic cloud model/diffused charge model of the double layer? K3(9)
- 8) Analyse how capictance of a double layer varies with potentail according to Gouy Chapmaan model? K4(8)
- 9) Analyse and Explain the Helmholtz double layer theory and its significance in understanding electrified interfaces? K4(12)
- 10) Explain the factors influencing the thickness and composition of the Stern layer. How does the nature of the surface and the electrolyte solution affect the properties of the Stern layer? K5(10)
- 11) Illustrate the concept of a vibrational partition function in statistical K5(15)

thermodynamics. How is it related to the internal energy of a molecule?

OR

Explain role of Boltzmann's distribution in statistical mechanics?

K5(15)

12) Discuss selection rule for Infrared spectroscopy?

K6(12)

OR

Discuss the principle of Raman spectroscopy?

K6(12)