



II Semester M.Sc. Examination, June 2016
(2010 – 11 & Onwards) (NS)
CHEMISTRY
C – 203 : Physical Chemistry – II

Time : 3 Hours

Max. Marks : 80

Instruction : Answer question number 1 and **any five** of the remaining.

1. Answer **any ten** of the following. **(10×2=20)**
- a) Explain the term fugacity.
 - b) Mention the postulates of ensemble averaging.
 - c) Explain partial molar heat content and give its significance.
 - d) Mention Dulong and Petit's law.
 - e) What is microscopic reversibility ?
 - f) Explain activation overpotential.
 - g) Give the Lippmann capillary equation and give its significance.
 - h) What is half wave potential and give its significance ?
 - i) Give the limitations of Helmholtz model.
 - j) Write the Tafel equation and give its significance.
 - k) Mention any two applications of partition function.
 - l) Show pictorially, the double layers at the semiconductor-electrolyte interface.
2. a) Define partial molar volume and give the method of its determination.
b) Derive phase rule from the concept of chemical potential.
c) Explain the method of determination of activity coefficient from solubility method. **(4+4+4=12)**
3. a) Discuss the Debye's theory of heat capacity of solids.
b) Derive an expression for translational partition function. **(7+5=12)**



4. a) Derive Sackur-Tetrode equation.
- b) Calculate the vibrational partition function for H_2 at 300 K. The vibrational frequency is 4654 cm^{-1} .
- c) Distinguish canonical and grand canonical ensembles. **(6+3+3=12)**
5. a) Give any two methods for the prevention of corrosion.
- b) Derive Debye-Huckel-Onsager conductance equation and extend it to triple ion formation. **(4+8=12)**
6. a) Under what conditions do electrons tunnel between the electrode and ions in a solution.
- b) Write the Ilkovic equation and explain how polarographic technique is useful in both qualitative and quantitative estimation. **(7+5=12)**
7. a) Derive Butler-Volmer equation and give its significance.
- b) Discuss the Stern model for the theory of electrical double layer. **(6+6=12)**
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