



II Semester M.Sc. Examination, June 2015
(CBCS)
CHEMISTRY
C-203 : Physical Chemistry – II

Time : 3 Hours

Max. Marks : 70

Instruction : Answer question no. 1 and **any five** of the remaining questions.

1. Answer **any ten** of the following : **(2×10=20)**
- a) List the types of ensembles and differentiate between them.
 - b) How does an absolute invariant point appear ?
 - c) State the basic principles of compressibility method of determining fugacity.
 - d) Show that entropy is always produced in an irreversible reaction.
 - e) With suitable distinguish between coupled and non coupled reactions.
 - f) Evaluate the mean activity coefficient of the 0.001/molal aqueous solution of BaCl_2 .
 - g) How do you account for the presence conductance minima ?
 - h) Give the physical significance of electrocapillary maxima.
 - i) Comment on the term surface excess.
 - j) Explain the necessity of expelling oxygen from polarographic cell before starting the reaction.
 - k) What is electrocatalysis and state how does it different from classical catalysis ?
 - l) Give the essence of the double layer at semiconductor-solution interface.
2. a) Explain the term partial molar volume and its experimental determination.
b) Deduce an expression for the translational partition function. Calculate the translational partition function for 1 mole of oxygen at 1 atm, pressure and 25°C , assuming the gas to be behave ideally. **(4+6)**
3. a) Explain the EMF method of determination of activity coefficient.
b) Compare Bose-Einstein and Fermi-Dirac statistics with Maxwell-Boltzmann statistics. Give an example for each. **(5+5)**

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4. a) What are Onsager's reciprocal relations and show that it is applicable in the case of study electrokinetic phenomena ?
b) Discuss the transformation of the generalised fluxes and forces with a special reference to chemical reaction. **(5+5)**
5. a) Deduce an expression for ionic atmosphere.
b) Discuss the thermodynamics of electrified interface. **(5+5)**
6. a) Write Debye-Huckel-Onsager equation of conductivity and explain its relation to ion-solvent interaction.
b) Explain the method of determination of interfacial tension of an electrified interface.
c) Comment on the Bjerrum theory of ion association. **(4+3+3)**
7. a) Discuss the Helmholtz theory of electrified interface.
b) What is an overpotential ? Differentiate between different types of overpotentials. **(5+5)**
8. a) Obtain an expression for the relation between partition function and equilibrium constant.
b) Discuss the quantitative estimation of metal ions polarographically. **(5+5)**
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