



II Semester M.Sc. Degree Examination, July 2017
(NS-2010-11 Scheme) (Repeaters)

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)
- What are partial molar quantities ? Give examples.
 - Define the terms 'phase' and 'variance' in the phase equation.
 - Differentiate between different types of ensembles.
 - Define partition function and explain its significance.
 - Show that the entropy is always produced in an irreversible process.
 - State Dulong and Petit's law and mention its limitations.
 - What are conductance minima ?
 - Give the advantage of a platinized platinum electrode over a plain platinum electrode.
 - Give the significance of $E_{\frac{1}{2}}$. How is it determined ?
 - Justify the statement that 'The process of corrosion is spontaneous in nature'.
 - Differentiate between metal-solution and semiconductor – solution interface.
 - Differentiate between activation and concentration over potential.
2. a) Derive Duhem-Margules equation.
b) Define the terms 'fugacity', 'activity' and 'activity coefficient'. Discuss the compressibility factor method for the determination of fugacity. (5+7)
3. a) Using Stirling approximation calculate $\ln N_A!$ where N_A is the Avogadro number.
b) Compare the important features of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.
c) Obtain an expression for the rotational partition function. (3+6+3)

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4. a) Discuss the salient features of the Einstein's theory of monatomic crystals. How did Debye modify it?
b) Explain the term 'microscopic reversibility' and deduce an expression for Onsager's reciprocity relations. (6+6)
5. a) Discuss the thermodynamics of the electrified interface.
b) Deduce Butler-Volmer equation related to multi electron systems. (6+6)
6. a) Give a brief account of the various forms of corrosion.
b) Explain the stern model of the electrical double layer.
c) Discuss the factors which influence the effectiveness of a hydrogen electrode. (4+4+4)
7. a) Write the Ilkovic equation, explain the terms involved and give its significance.
b) Explain the effect of light of semiconductor solution interfaces.
c) Discuss the quantum aspects of charge transfer at electrode solution interfaces. (3+3+6)

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