



II Semester M.Sc. Degree Examination, June/July 2018  
(CBCS Scheme)  
CHEMISTRY  
C203 : Physical Chemistry – II

Time : 3 Hours

Max. Marks : 70

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

1. Answer any ten of the following questions : (2×10=20)
- What is de-Donder's inequality ?
  - Define apparent molar volume. Write the equation and explain the terms.
  - Give an example for each of the system :
    - 1 component 3 phases
    - 3 components 1 phase
  - The electronic partition function,  $Q_e = g_e$ . Justify.
  - Explain the concept of uncompensated heat.
  - Define Chemical potential and mention its significance.
  - What is meant by surface excess ?
  - Give the limitations of Stern model.
    - State and explain the electro-capillary Lipmann's equation.
    - What is electro catalysis ? How is it different from catalysis ?
  - Give the significance of thickness of the ionic atmosphere.
  - What is Helmholtz double layer theory ?
2. a) Derive Bose-Einstein statistical distribution equation.  
b) Define fugacity. How is fugacity determined by graphical method ? (5+5)
3. a) Derive Onsager's reciprocity relation.  
b) Give the physical significance of partial molar free energy. Obtain the expression  $\sum_i \mu_i dn_i = 0$ . (6+4)

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4. a) Derive the expression for vibrational partition function and further deduce the equation for its relationship with E, H, S and  $C_v$ .
- b) Calculate the rotational partition function of hydrogen gas at 300 K. ( $I = 4.59 \times 10^{-48} \text{ kg m}^2$ ). Calculate its rotational entropy. (6+4)
5. a) Derive the Debye-Huckel-Onsager conductance equation.
- b) State and explain the Debye-Huckel equation for appreciable concentration. (6+4)
6. a) Explain the terms "Bjerrum mode", "Ion association" and "Triple ions".
- b) Describe the thermodynamic aspects of electrified interface. (6+4)
7. a) How is polarographic technique used for qualitative and quantitative estimation of metal ions.
- b) Describe the quantum aspects of charge transfer at electrode solution interface. (5+5)
8. Write notes on :
- a) Electro kinetic phenomenon
- b) Principle of triangular diagram
- c) Concentration and activation over potential. (3+3+4)