

**18AA1853**

**M. Sc. EXAMINATION, 2020**

(First Semester)

(C Scheme) (Re-appear Only)

CHEMISTRY

CH505C

Physical Chemistry-I

Thermodynamics and Electrochemistry

*Time : 3 Hours*]

[*Maximum Marks : 75*

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Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

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**Note :** Attempt *Five* questions in all. Select *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. Define third law of thermodynamics. Also explain Nernst heat theorem. How absolute entropy of liquid can be determined and the concept of unattainability of absolute zero ? **15**
2. (a) Explain the phase diagram of system forming solid compounds forming incongruent melting point. **8**  
(b) What is law of mass action ? Derive it thermodynamically. **7**

## Unit II

3. Explain the term partial molar quantities and the chemical potential. Derive an expression for chemical potential and also discuss its variation with temperature and pressure. **15**
4. (a) Explain the concept of escaping tendency and the chemical potential. **7**  
(b) Derive  $n_1 d\mu_1 + n_2 d\mu_2 = 0$  and write its applications. **8**

## Unit III

5. (a) Explain the Debye-Huckel-Onsager treatment for aqueous solution and its limitations. **10**  
(b) What will be the effect of solvent on the mobility at the infinite dilution. **5**
6. Define the term Ion-Ion interactions. Calculate the potential and the excess charge density near the central ion using Debye-Huckel theory. Also explain Debye-Huckel reciprocal length ? **15**

## Unit IV

7. (a) Derive Stokes-Einstein relation and discuss its significance and the limitations. **8**  
(b) Explain the term Ionic drift movement under the influence of an electric field. **7**
8. (a) Explain the concept of ionic velocity and explain how is it related with current density. **8**  
(b) Derive Rate-process approach to ionic migration and discuss its results. **7**