21CHE4C12L

M.Sc. IV Semester Degree Examination, Sept./Oct. - 2024
CHEMISTRY
Thermodynamics
(NEP)

Time : 3 Hours   Maximum Marks : 70

Note :   *Answer* **any five** *of the following questions with Question No.* **1** *is* **compulsory** *and each question carries* **equal** *marks.*

1. (a) Discuss Nern'st heat theorem.   **5+5+4=14**
    (b) Discuss Maxwell's thermodynamic relations.
    (c) Write notes on :
         (i)   Spontaneous process
         (ii) Free energy change

2. (a) What is fugacity ? Explain graphical method for determination of fugacity.
    (b) Explain determination of activity coefficient by emf method.   **5+5+4=14**
    (c) Explain
         (i)   Partial molar heat content
         (ii) Partial molar free energy

3. (a) Discuss Bose-Einstein statistics.   **5+5+4=14**
    (b) What is partition function ? Explain vibrational partition function.
    (c) Explain Maxwell-Boltzmann distribution law.

4. (a) Deduce Gibbs-Duham equation.   **5+5+4=14**
    (b) Deduce Raoults Law for ebullioscopy.
    (c) Discuss :
         (i)   Partial molar volume
         (ii) Free energy

5. (a) Explain irreversible thermodynamics for biological systems.   **5+5+4=14**
    (b) Describe Onsagar's reciprocity relations.
    (c) Write a note on relation between forces and fluxes.

6. (a) Discuss rotational partition function and deduce a equation for it. **5+5+4=14**

(b) Explain determination of activity coefficient by solubility method.

(c) Describe Fermi-Dirac statistics.

7. (a) Deduce Duham-Margules equation. **5+5+4=14**

(b) Explain :

(i) Coupled reactions

(ii) Onsagar fomalism

(c) Discuss treatment of Le-Chateliers principle.

8. (a) Explain the relation between mole fraction and molality. **5+5+4=14**

(b) Give postulates of ensemble averaging.

(c) Explain :

(i) Cryoscopy

(ii) Entropy production and entropy flow

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