BMS COLLEGE FOR WOMEN AUTONOMOUS
BENGALURU-560004

END SEMESTER EXAMINATION – OCTOBER 2022
(CBCS)
M.Sc. in Chemistry- II Semester
Physical Chemistry-II

Course Code:MCH203T   **QP Code:21009**
Duration: 3 Hours   **Max marks: 70**

Instruction: Answer Question No. 1 and any FIVE of the remaining.

1. Answer any *TEN* questions   **(2×10 =20)**

a) What is de-Donder's inequality?

b) What are partial molar quantities? Give examples.

c) Mention the significance of partition function.

d) What are coupled and non-coupled reactions?

e) Calculate the molecular rotational partition function of N_2 gas at 25 ^{0}C, the moment of inertia
   of N_2 gas is 1.39×10^{-48} kg m^2.

f) Differentiate between canonical and micro-canonical ensembles.

g) Give the significance of ionic atmosphere.

h) Explain triple ion conductance minima.

i) How electrocatalysis is different from chemical catalysis?

j) Explain the need for expelling oxygen from polarographic cell before starting the reaction.

k) Give Ilkovic equation and mention the terms involved in it.

l) What is meant by surface excess?

2. a) Derive Gibbs Duhem equation.
   b) Explain the solubility method for determination of activity coefficient.
   c) Deduce equations for excess Gibbs free energy and excess entropy functions.   **(4+ 3+3)**

3. a) Derive Bose-Einstein statistical distribution equation.

  b) Obtain an expression for translational partition function. **(5+5)**

4. a) Explain the concept of uncompensated heat and relate it to various thermodynamic

    quantities.

  b) Deduce an expression for Onsager's reciprocity relations. **(5+5)**

5. a) Derive the Debye-Huckel-Onsager conductance equation.

  b) Describe the experimental technique to determine the interfacial tension as a function of

    applied potential across the interface. **(5+5)**

6. a) Discuss Gouy-Chapmann theory of structure of electrified interface and list out the

    limitations of the theory.

  b) Deduce Butler-Volmer equation. **(5+5)**

7. a) Explain the graphical method in determination of fugacity of real gas.

  b) Write note on concentration and activation over potential.

  c) Explain the entropy production in a closed system containing two phases. **(4+3+3)**

8. a) Write a note on semiconductor-solution interface.

  b) Deduce the relationship between partition function and equilibrium constant.

  c) Explain the Bjerrum's theory of ion association. **(4+3+3)**

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