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M.Sc. 1st Semester (NEW/ATKT) Chemistry Examination December, 2017

PHYSICAL CHEMISTRY - I

Paper : MCH-403

Time Allowed : Three Hours] ***[Maximum Marks : 85***

Note : Attempt all questions.

Section - A
(Objective Type Questions)

 5×2=10

Q.1. Choose the correct answer.

i) According to de Broglie the material particles also passes.
   (a) wave properties
   (b) corpuscular properties
   (c) quantum properties
   (d) sound properties

ii) Huckels molecular orbital theory applied to
   (a) only aliphatic compounds
   (b) hydrogen molecule
   (c) unsaturated organic compounds
   (d) none of these

iii) The symbols L and S have been used for orbital and spin momentum and J for the
   (a) Resultant of L + S
   (b) Resultant of L – S
   (c) L or S
   (d) Rotation

iv) Chemical potential is
   (a) External property
   (b) Internal property
   (c) Extensive properties
   (d) Intensive properties

v) In an uniform ensemble the density in phase space is
   (a) linearly variable (b) constant
   (c) unity (d) infinity

Section - B
(Short Answer Type Questions)

 5×5=25

Q.2. What do you mean by on dimensional simple harmonic oscillator.

OR

Give any four postulates of quantum mechanics.

Q.3. Write down the Huckel secular equation and solve it for butadiene.

OR

What are approximation methods.

Q.4. Explain classical and quantum mechanical concept of angular momentum.

OR

Write a note on pauli exclusion principle.

Q.5. Discuss about the partial Molar quantity.

OR

What do you mean by activity and activity coefficient.

Q.6. Write postulates of ensemble averaging.

OR

Discuss the relation between entropy and partition function.

Section - C

(Long Answer Type Questions)

5×10=50

Q.7. Discuss Schrodinger wave equation and derive if for Helium atom.

OR

Write notes on following:

i) Postulates of quantum mechanics.

ii) Harmonic Oscillator.

Q.8. Write a note on Linear variation principle.

OR

Explain Huckel theory of conjugated system.

Q.9. What is angular momentum? Write a note on Ladder operators for angular momentum.

OR

What do you understand by spin and anti symmetry? Explain in the light of pauli's principle.

Q.10. Explain the following:

i) Phase rule for three component system.

ii) Fugacity

OR

Describe the methods for determining the partial molar properties.

Q.11. Define the term partition function. Derive an expression for rotational partition function of diatomic molecule.

OR

Explain the following:

i) Fermi-Dirac statistics

ii) Electronic partition functions