

FACULTY OF SCIENCE**M.Sc. II-Semester Examination, May / June 2018****Subject : Chemistry****Paper - III****Physical Chemistry****Time : 3 hours****Max. Marks : 80**

Note : Answer all questions from Part-A and Part-B. Each question carries 8 marks in Part-A and 12 marks in Part-B.

PART – A (4 x 8 = 32 Marks)*(Short Answer Type)*

- 1 a) Explain Raoult's law of vapour pressure.
b) Write about Boltzmann distribution law.
- 2 a) Explain E-type delayed fluorescence.
b) What is photosensitization? Explain with example.
- 3 a) Write the Schrodinger wave equation for Hydrogen atom in terms of spherical polar coordinates.
b) Give the physical picture of bonding and anti-bonding wave functions in H_2^+ system.
- 4 a) Explain the effect of temperature on extrinsic semi-conductors.
b) What is super conductivity? Explain different types of superconductors.

PART – B (4 x 12 = 48 Marks)*(Essay Answer Type)*

- 5 a) What is activity coefficient and explain its determination from vapour pressure measurement?
b) Derive Gibbs-Duhem equation and give its significance.
OR
c) Explain thermodynamic properties of ideally dilute solutions.
d) Write the expression for molecular partition function and factorise the molecular partition function.
- 6 a) What is quantum yield and derive the equation for phosphorescence quantum yield?
b) Discuss the kinetics of photo physical unimolecular reactions.
OR
c) Define the term "quenching". Derive Stern-Volmer equation.
d) Explain photochemical addition and isomerisation reactions with example.
- 7 a) Explain variation theorem and prove it.
b) Explain about secular equation and secular determinant by taking a suitable trial wave function.

OR

- c) Explain polar plots and boundary diagram.
 - d) Write the expression for wave function according to M O theory and V.B. theory for H_2 molecule.
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- a) Explain bond structure of metals, insulators and semi-conductors.
 - b) Describe the Photovoltaic effect.
- OR**
- c) Explain the BCS theory of super conductivity.
 - d) Discuss the crystal structure of $YBa_2Cu_3O_{7-x}$.

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