

I Semester M.Sc. Degree Examination, July/August-2019**(SLM Scheme)****CHEMISTRY****Physical Chemistry - I (Course - III)****Time : 3 Hours****Max. Marks : 80****Instruction :** Answer any eight questions from part-I and any four full questions from part-II**PART - I****[8 × 2 = 16]**

- Q1)** a) Distinguish between Eigen function and Eigen value.
b) Define commuting operator with an example.
c) What is consecutive reaction? Give an example.
d) Molecularity of a reaction is not greater than 3 give reason.
e) What is meant by photosensitizer? Give an example.
f) The quantum yield of photochemical formation of HCl is very high compare to HBr give reason.
g) Distinguish between primary and secondary photochemical process.
h) The rate constant for zero order reaction is $4 \times 10^{-3} \text{ mol lit}^{-1} \text{ min}^{-1}$. If the concentration of the reactant at 40th minute is 0.005M. calculate the initial concentration of the reactant.
i) State Heisenberg uncertainty principle and give its significance.
j) Define chemical potential and give its significance.

PART - II

- Q2)** a) Discuss wave particle duality of material particles.
b) State the postulates of quantum mechanics.
c) Formulate the time independent Schrödinger equation and explain its significance.

[6+6+4 = 16]

- Q3)** a) Discuss the experimental method of determination of total order of reaction with an example.
b) Explain the postulates of activated complex theory and its application in the calculation of energy of activation.
c) What are primary and secondary salt effects? Explain.

[6+6+4 = 16]

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- Q4)** a) Draw Jablonsky diagram and explain its significance.
b) Write a brief notes on i) Phosphorescence ii) chemiluminescence and iii) oscillators.
c) Explain Uranyl oxalate actinometer and its application in the determination of intensity of light

[6+6+4=16]

- Q5)** a) Describe the determination of partial molar volume by intercept method.
b) Deduce any three Max Well's relations.
c) Show that $C_p - C_v = R$.

[6+6+4=16]

- Q6)** a) Discuss the influence of pressure and volume change on the rate of reaction.
b) Write the quantitative application of Beer's law for the estimation of CuSO_4 using colorimeter.
c) Explain Nerst heat theorem and give its significance.

[6+4+6=16]

- Q7)** a) Explain the determination of absolute entropies using third law of thermodynamics.
b) Describe briefly on quenching of fluorescence.
c) What are side reactions? Deduce the rate expression for side reaction.

[6+4+6=16]

