

- (c) How do Photochemical reactions differ from Thermochemical reactions ? 2

Section B

6. (a) Derive thermodynamically the relation :

$$\Delta T_f = K_f \times m$$

where m is the molality of the solution.

4

- (b) Why do we observe abnormal molecular masses of solute in certain cases when determined by studying colligative properties ? 2

7. (a) Define Osmotic pressure. Explain Berkeley and Hartley method for determination of osmotic pressure. 3

- (b) Explain why equimolar solutions of KCl and glucose do not have the same boiling point. 1

- (c) State and explain Raoult's law. 2

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Roll No.

Exam Code : J-21

Subject Code—54015

B. Sc. (III) EXAMINATION

(Batch 2017) (Re-appear)

(Sixth Semester)

CHEMISTRY

CH-305 Paper XIX

Physical Chemistry

Time : 3 Hours

Maximum Marks : 32

Note : Attempt *Five* questions in all. Q. No. 1 is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) What is meant by Thermodynamic probability ? Illustrate with an example. 2
- (b) What happens to quantum yield of HCl if the vessel contains small traces of oxygen ? 1

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- (c) Why is camphor preferred as a solvent for measuring the molecular mass by Rast method ? 1
- (d) State First law of Photochemistry. 1
- (e) What is Reverse Osmosis ? Give its importance. 1
- (f) How are bivariant, univariant and non-variant systems represented in a phase diagram ? 1
- (g) How is super cooled water an example of metastable equilibrium ? 1

Section A

- 2. (a) Prove that the complete partition function for a system is the product of translational, rotational, vibrational and electronic partition functions. 3
- (b) Define partition function. Discuss its importance in Statistical Thermodynamics. 3
- 3. (a) Derive an expression for translational partition function of a particle. 3

- (b) What is Statistical Mechanics ? What are the two main points of difference between classical statistical mechanics and quantum statistical mechanics ? 3

- 4. (a) Draw Jablonski diagram. Discuss the radiative and non-radiative transitions, fluorescence, phosphorescence, IC and ISC. 4
- (b) What do you understand by 'Quantum Yield' of a photochemical reaction ? Why some reaction have very high quantum yield whereas some others have very low value ? 2
- 5. (a) Explain the term 'Photosensitization' by giving three suitable examples. 2
- (b) A certain system absorbs 3.0×10^{18} quanta of light per second. At the end of 20 minutes, it is observed that 0.003 mole of the irradiated substance has reacted. What is the quantum efficiency of the process ? 2

8. (a) Draw lead silver phase diagram and explain 'Pattinsons Process' for desilverisation of lead. 4
- (b) Define the following terms :
(i) Eutectic Point
(ii) Peritectic Point. 2
9. (a) Define Gibbs phase rule. How can you derive it thermodynamically ? 3
- (b) Explain why fusion curve of ice has a negative slope whereas sublimation curve has a positive slope in the phase diagram of water ? 2
- (c) Calculate the degrees of freedom of Pb-Ag system at the eutectic point. 1