Roll No. ..... Total Pages : 3

322409

May 2026

B.Sc. (CHEMISTRY) IV SEMESTER

Physical Chemistry–IV (BCH–403)

Time : 3 Hours] [Maximum Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any **four** questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) Write limitations of Debye-Hückel-Onsager equation. (1.5)

   (b) What do you mean by an electromagnetic radiation? Write relationship between energy, frequency and wave-number of an electromagnetic radiation. (1.5)

   (c) Define Quantum yield in photochemistry and discuss examples of low and high quantum yields. (1.5)

   (d) State and explain Walden's rules. (1.5)

   (e) Differentiate molecularity and order of a reaction. (1.5)

(f) Write differential and integrated form of rate expressions for first order reactions. (1.5)

(g) State and explain Kohlrausch law of independent migration of ions. (1.5)

(h) Define threshold energy and activation energy in chemical kinetics. (1.5)

(i) Write a short note on chemiluminescence. (1.5)

(j) Explain specificity and selectivity for enzyme catalyzed reactions. (1.5)

PART–B

2. (a) State and explain Laws of photochemistry i.e Grotthus Draper law and Stark-Einstein law of photochemical equivalence in details. (10)

(b) Write short notes on :

(i) Opposing reactions.

(ii) Parallel reactions. (5)

3. (a) Discuss Michaelis-Menten enzyme catalysis mechanism and derive an expression for Michaelis-Menten constant and discuss various special cases also. (10)

(b) Discuss the role of photochemical reactions in biochemical processes. (5)

4. (a) Derive a mathematical expression for Arrhenius equation and discuss its applications. (7)

(b) Discuss experimental methods of the determination of rate laws. (8)

5. State and explain Lambert-Beer's law and derive the mathematical expression $A = \in .l.c$. Also discuss the limitations of Lambert-Beer's law. (15)

6. (a) Discuss the determination of transference numbers using Moving Boundary methods. (10)

(b) Discuss various applications of Faraday's laws of electrolysis. (5)

7. (a) Write short notes Wien effect, Debye-Falkenhagen effect. (5)

(b) Discuss applications of conductance measurement in: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water, (iii) solubility product of sparingly soluble salts. (10)