22CHU624

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Sixth Semester)

Branch – **CHEMISTRY**

PHYSICAL CHEMISTRY – II

Time: Three Hours | Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. A reaction is first order w.r.t the reactant 'A'. If [A] triples, then rate of the reaction
   (i) Doubled (ii) Tripled
   (iii) Unchanged (iv) Increases nine times

2. Arrehenius equation gives the relationship between rate constant and
   (i) Concentration (ii) Activation energy
   (iii) Volume (iv) Pressure

3. The dipole moment of a polar molecule is given as
   (i) q . r (ii) q/r
   (iii) q + r (iv) q - r

4. What is the number of phases and components present in the following reaction?
   $MgCO_{3(s)} \leftrightarrow MgO_{(s)} + CO_{2(g)}$
   (i) 3 and 2 (ii) 1 and 3
   (iii) 2 and 3 (iv) 3 and 1

5. Every subgroup of an Abelian group is not
   (i) Cyclic (ii) Abelian
   (iii) Normal (iv) None of the above

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a. Define order and molecularity. Give any three differences between them.
OR
b. Explain with examples (i) Consecutive reactions (ii) Parallel reactions and (iii) Reversible reactions.

7 a. Explain the postulates of collision theory of gases.
OR
b. State (i) Grothus Draper Law and (ii) Stark-Einstein law of photochemical equivalence.

8 a. Explain polarizability and dipole moment by taking suitable examples.
OR
b. Distinguish between paramagnetic, diamagnetic and ferromagnetic substances with suitable examples.

9 a. Explain (i) Phase, (ii) Components and (iii) Degree of freedom.
OR
b. With the help of a neat phase diagram, explain the different curves and regions in water (one component) system.

Cont...

10 a. State any six properties of a group in group theory.

OR

b. What do you mean by the term Commutator in quantum mechanics? Explain with suitable example eigen value and eigen function.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a. (i) Derive the rate constant for (i) first order and (ii) second order reaction. (4 marks)

(ii) Explain pseudo unimolecular reaction with suitable example. (2 marks)

OR

b. Discuss in detail (i) Half life method (ii) Graphical method (iii) Differential method and (iv) Integral rate equation method for the determination of order of a reaction.

12 a. Discuss the salient features of Absolute Reaction Rate Theory (ARRT) and based on ARRT, derive an expression for the rate constant of a bimolecular reaction.

OR

b. With the help of a neat Jablonski diagram explain the various photophysical processes.

13 a. Explain any four applications of dipole moment with suitable examples.

OR

b. Define magnetic permeability and magnetic susceptibility. Explain the measurement of magnetic susceptibility by Guoy's method.

14 a. Explain the different types of two component system. With a neat phase diagram, explain the salient features of Pb-Ag system.

OR

b. Distinguish between compounds with congruent and incongruent melting point. With a neat diagram, explain the various parts of $FeCl_3$ system.

15 a. Construct the group multiplication table for C_{2v} point group.

OR

b. Differentiate between ψ and ψ^2. Discover the algebra (addition, subtraction and multiplication) of operators with appropriate examples.

Z-Z-Z END