

**GOVERNMENT DEGREE COLLEGE,
NANDIKOTKUR
DEPARTMENT OF CHEMISTRY
GENERAL AND PHYSICAL CHEMISTRY
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UNIT-I: Stereochemistry of Carbon Compounds

Short Questions:

1. Define chiral molecules and explain the criteria for chirality.
2. What are enantiomers and diastereomers? Give examples.
3. Explain the difference between Fischer, Newman, and Saw-Horse projections.
4. What is optical activity? How is it measured?
5. Define specific rotation and optical rotation.
6. What are the symmetry elements in chiral molecules?
7. Give examples of optical isomerism in glyceraldehyde, lactic acid, and alanine.

Long Questions:

1. Explain the concept of optical isomerism with suitable examples, such as glyceraldehyde and tartaric acid.
2. Discuss the different molecular representations (Wedge, Fischer, Newman, Saw-Horse) and their applications.
3. Derive the conditions for chirality in molecules and explain the significance of these conditions using examples.
4. Explain the phenomenon of optical rotation, its measurement, and how it applies to chiral compounds.

UNIT II: Bioinorganic Chemistry

Short Questions:

1. What are metal ions, and why are they important in biological systems?

- 2.Explain the Na/K pump and its significance in biology.
- 3.Describe the role of carbonic anhydrase in the body.
- 4.What is the toxicity of heavy metals like Hg, Pb, Cd, and As? Explain the reasons.
- 5.What is the significance of chelating agents in medicine?
- 6.Explain the structure and function of hemoglobin and myoglobin.

Long Questions:

- 1.Discuss the role of metal ions in biological systems, including their classification and importance.
- 2.Explain the toxicity of mercury (Hg), lead (Pb), cadmium (Cd), and arsenic (As) in biological systems and their effects on health.
- 3.Describe the functioning of hemoglobin and myoglobin in the transfer and storage of oxygen and iron.
- 4.Discuss the use of cisplatin as an anti-cancer drug, including its mechanism of action and clinical applications.

UNIT III: Ionic Equilibrium

Short Questions:

- 1.Define electrolytes and differentiate between strong, moderate, and weak electrolytes.
- 2.What factors affect the degree of ionization of weak acids and bases?
- 3.Define the ionization constant and ionic product of water.
- 4.Explain the concept of the pH scale.
- 5.What are buffer solutions? Explain the Henderson equation.
- 6.What is the common ion effect? Give an example.
- 7.Explain the solubility product principle and its applications.

Long Questions:

- 1.Discuss the factors that affect the degree of ionization and explain its significance in ionic equilibrium.

2. Derive and explain the Henderson-Hasselbalch equation for buffer solutions and discuss their practical applications.
3. Explain the common ion effect and its application in the solubility of salts.
4. Derive the expression for the ionization constant of weak acids and bases and discuss its applications in determining pH.

UNIT IV: Chemical Kinetics-I

Short Questions:

1. Define reaction rate and discuss the factors affecting reaction rates.
2. What is the order and molecularity of a reaction? Explain with examples.
3. Define the half-life of a reaction.
4. What is the integrated rate equation for zero-order reactions?
5. Explain the significance of molecularity in chemical reactions.

Long Questions:

1. Explain the concept of reaction rates and discuss the effect of temperature, pressure, and catalysts on reaction rates.
2. Derive the integrated rate equations for zero, first, and second-order reactions and discuss how to determine the order of a reaction experimentally.
3. Define half-life and explain its relationship with reaction order in detail.

UNIT V: Chemical Kinetics-II

Short Questions:

1. What is activation energy and how is it calculated from the Arrhenius equation?
2. Explain the Collision theory of chemical reactions.
3. What is the concept of the activated complex in the Activated Complex theory?
4. Describe the factors affecting enzyme catalysis.
5. What is the Lock and Key model in enzyme catalysis?

6.State and explain the Michaelis-Menten equation.

Long Questions:

- 1.Explain the theories of reaction rates: Collision theory and Activated Complex theory. Compare both theories qualitatively.
- 2.Derive the Michaelis-Menten equation and discuss its significance in enzyme catalysis.
- 3.Discuss enzyme catalysis, including the factors affecting it and the role of inhibitors in the catalytic process.