

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**SEMESTER-V**

**Paper - VI (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)**

**INORGANIC CHEMISTRY**

**45 hrs (3 h / w)**

**UNIT-I**

**1. Reactivity of metal complexes:**

**4h**

Labile and inert complexes, ligand substitution reactions -  $SN^1$  and  $SN^2$  substitution reactions of square planar complexes - Trans effect and applications of trans effect.

**2. Bioinorganic chemistry:**

**4h**

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl<sup>-</sup>. Metalloporphyrins – Structure and functions of hemoglobin, Myoglobin and Chlorophyll.

**PHYSICAL CHEMISTRY**

**UNIT-II**

**1. Chemical kinetics**

**8h**

Rate of reaction - Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

**2. Photochemistry**

**5h**

Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Photosensitized reactions- energy transfer processes (simple example).

**ORGANIC CHEMISTRY**

**UNIT- III**

**Heterocyclic Compounds**

**7h**

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,- dicarbonyl compounds, Paul-Knorr synthesis.

Properties : Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

## UNIT-IV

### Carbohydrates

8h

Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).

(-) Fructose (ketohexose) - Evidence of 2 - ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula) - osazone formation from glucose and fructose – Definition of anomers with examples.

Interconversion of Monosaccharides: Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose).

## UNIT- V

### Amino acids and proteins

7h

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

### List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by Atkins
5. Text book of physical chemistry by S Glasstone
7. Instrumentation and Techniques by Chatwal and Anand
8. Essentials of nano chemistry by pradeep
9. A Textbook of Physical Chemistry by Puri and Sharma
10. Advanced physical chemistry by Gurudeep Raj

**SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS) PALAKOL, W.G. Dt.**  
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**DEPARTMENT OF CHEMISTRY**

**MODEL PAPER**

**THREE YEAR B.Sc. DEGREE EXAMINATIONS**

**SEMESTER –V**

**PAPER VI: INORGANIC, ORGANIC & PHYSICAL CHEMISTRY**

**Time: 3Hrs.**

**Max. Marks: 75**

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**PART-A**

Answer all Questions. Each carries **Ten** Marks

**5x10=50 Marks**

1. A) Discuss the ligand substitution reactions in metal complexes.

**(OR)**

B) Write the structure and functions of Hemoglobin.

2. A) What is first order reactions and Derive rate constant, time for half change.

**(OR)**

B) What is quantum yield and explain the photochemical reaction between  $\text{H}_2\text{-Cl}_2$  &  $\text{H}_2\text{-Br}_2$

3. A) Discuss electrophilic substitution reactions in Pyrrole, Furan & Thiophene.

**(OR)**

B) Write any one method for preparation Pyridine and Illustrate the substitution reactions of Pyridine.

4. A) Discuss the structure of glucose.

**(OR)**

B) What are Epimers give example and write about the formation of Glucosazone.

5. A) Give any three methods of preparation of Alanine

**(OR)**

B) Discuss the general reactions amino and carboxylgroup.

**PART-B**

Answer any **FIVE** of the following questions. Each carries **FIVE** marks.

**5x5=25 Marks**

6. Define Laible and inert complexes with suitable examples.

7. Explain the biological significance of Na and K

8. Define Order and Molecularity.

9. Write a note on Mutarotation.

10. What are the photosensitized reactions? Give one example.

11. Explain the nature of Pyrrole and Pyridine.

12. How to convert aldopentose (D-arabinose) to aldohexose (D-glucose, D-mannose)

13. Write note on Isoelectric point.

**LABORATORY COURSE – V**  
**Practical Paper – V Organic Chemistry**  
**(At the end of semester V)**

**30 hrs (3h / W)**

**Organic Qualitative Analysis:**

**50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives.

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic Primary Amines, Amides and Simple sugars.

**LABORATORY COURSE – VI**  
**Practical Paper – VI Physical Chemistry**  
**(At the end of semester V)**

**30 hrs (3h / W)**

**50M**

1. Determination of rate constant for acid catalyzed ester hydrolysis.
2. Determination of molecular status and partition coefficient of benzoic acid in Benzene and water.
3. Determination of Surface tension of liquid
4. Determination of Viscosity of liquid.
5. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.