P.R.GOVERNMENT COLLEGE (AUTONOMOUS)-KAKINADA
THIRD YEAR 2019-20
SEMESTER-V
Paper - VI (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)

OBJECTIVES:

1. Gains knowledge Labile and Inert complexes
2. Knowledge of Biological significance of inorganic elements.
3. Structure of Carbohydrates.
4. Synthesis of Amino acids.

45 hrs (3 h / w)

INORGANIC CHEMISTRY

UNIT-I

1. Reactivity of metal complexes: 4h

Labile and inert complexes, ligand substitution reactions - SN1 and SN2, substitution reactions of Square planar complexes - Trans effect and applications of Trans effect.

2. Stability of metal complexes: 4h

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, Chelate effect, determination of composition of complex by Job's method and mole ratio method.

3. Bioinorganic chemistry: 4h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl^-.

Metalloporphyrins – Structure and functions of hemoglobin, and Chlorophyll.

ORGANIC CHEMISTRY

UNIT-II

Carbohydrates: 10h

Mono saccharides: (+) Glucose (aldohexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and muta rotation) - 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)

Amino acids and proteins **9h**

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.

PHYSICAL CHEMISTRY

UNIT-III

1. Chemical kinetics **8h**

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

2. Photochemistry **6h**

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, and Photosensitized reactions- energy transfer processes (simple example) – Jablonski diagram

List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
4. Advanced Physical Chemistry by Atkins
6. Instrumentation and Techniques by Chatwal and Anand
8. A Textbook of Physical Chemistry by Puri and Sharma
9. Advanced physical chemistry by Gurudeep Raj

Weightage to Content
Fifth semester
Paper -VI

S.No	Course Content	Long Answer	Short Answer(SA)	Total marks
	Inorganic Chemistry			
1	Reactivity of Metal Complex	1	1	15
2	Stability of metal complexes	1	1	15
3	Bio inorganic Chemistry	1	1	15
	Organic Chemistry			
1	Carbohydrates	2	1	25
2	Amino Acids	1	1	15
	Physical Chemistry			
1	Chemical Kinetics	2	2	30
2	Photo Chemistry	1	1	15
	Total	**9**	**8**	**130**

P.R.COLLEGE (A), KAKINADA

III YEAR BSC-(Examination at the end of V semester) model paper

(Inorganic, Organic & Physical chemistry)

Paper-VI

Time: 2 1/2Hrs **Max.Marks:60M**

Answer any **FOUR** questions choosing at least one question from each section

SECTION-I **4x10=40M**

1. Explain SN^1 and SN^2 substitution reactions in octahedral complexes.
2. Explain determination of the composition of metal complexes by job's method.
3. i). Explain the biological signification of Na, K

   ii). Explain the Structure of Chlorophyll

SECTION-II

4. Establish the Open chain structure of Glucose with relevant chemical equations.
5. Explain

   i) Killiani-Fischer synthesis ii) Ruff degradation

6. What are Amino Acids. Write the preparation of α −amino acids from

   i) Streckers synthesis ii) Malonic ester synthesis iii) Gabriel phthalamide synthesis

SECTION-III

7. a) Derive the rate constant for first order reaction.

   b) The rate constant for the certain first order reaction is $1x10^{-5\ sec-1}$. Calculate the time taken for the 20% completion of the reaction.

8. Define the terms 'order' and 'molecularity'. Explain any two methods for the determination of order of a reaction.
9. What is meant by quantum yield? State and explain laws of photochemistry.

SECTION-IV

Answer any **Five** questions 4x5=20M

10. Explain Chelate effect.
11. What is trans effect. Write any two applications of Trans effect.
12. Explain muta rotation of Glucose.
13. Explain the formation of Glucozone.
14. Write a note on Isoelectric point.
15. Write about the effect of temperature on rate of a reaction.
16. Discuss about Zero order reaction.
17. Explain Jablonski diagram.
18. What are labile and inert complexes? Give examples?

PAPER-VI

QUESTION BANK

ESSAY QUESTIONS

1. Explain determination of composition of complex by job's method and mole ratio method.

2. Explain the factors effecting the stability of complexes.

3. Discuss the mechanism of SN^1 and SN^2 reactions in coordination complexes with examples in Octahedral complexes.

4. Explain the mechanism of ligand substitution reactions of square planar complexes.

5. Explain the structure and function of Hemoglobin and chlorophyll

6. Explain open chain and ring structure of Glucose.

7. Explain 1) Killiani fisher synthesis 2) Ruff degradation 3) Glucose to Fructose

4) Fructose to Glucose

8. Explain the classifications of Amino Acids. Preparations and properties of amino acids.

9. Derive First order equation.

10. Derive second order equation.

11. Define order of a reaction. Explain any three methods for the determination of order of a reaction.

12. Explain Jablanski diagram of various processes occurring in the excited state.

13. What is quantum yield? Explain quantum yield of the reaction between H_2 and Cl_2

14. What is quantum yield? Explain quantum yield of the reaction between H_2 and Br_2

Short Answers

1. Trans effect and its applications.

2. Chelating effect. Give example.

3. What are labile and Inert complexes. Give examples.

4. What is spectrochemical series? Explain.

5. Explain the absorption spectrum of $[Ti(H_2O)_6]^{+3}$ Ion

6. What are essential elements and importance of Na and K in biological systems.

7. Peptide bond.

8. Isoelectric point.

9. Zwitter ion.

10. Essential Amino acids.

11. Mutarotation.

12. Epimers and Anomers.

13. Lobry de bruyn van ekenstein rearrangement.

14. Osazones.

15. Write about Zero order reaction

16. Write about Half-life period

17. Define molecularity and order of a reaction.

18. Quantum yield.

19. Photo sensitization.

20. Fluorescence, Phosphorescence, chemiluminiscence.

21. What are the metallophorphyrine.

23. Streicker synthesis.

24. Effect of temperature on rate of a reaction.

LABORATORY COURSE – VI

Practical Paper – VI Physical Chemistry

(at the end of semester V) 30 hrs (2 h/W)

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 Freundlisch isotherm.