PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS)

KAKINADA - 533 001, EAST GODAVARI, A.P.

Affiliated to Adikavi Nannaya University

NAAC Accredited with "A" Grade (3.17 CGPA)

BOARD OF STUDIES OF CHEMISTRY

B.Sc. Chemistry Under CBCS

Meeting Minutes/Resolutions

2021-22

Convened on 02 December 2021

DEPARTMENT OF CHEMISTRY

P. R. GOVT. COLLEGE (Autonomous)

Opp. Mc Laurin High School, Raja Ram Mohan Roy Road, Kakinada

www.prgc.ac.in; e-mail: chemistry_dept@prgc.ac.in

P. R. Govt. College (A), Kakinada

Recommended Composition and Functions of the Board of Studies of Chemistry: 2021-22

I Composition

1. **Head of the Department concerned (Chairman):**

   Dr. D. Rama Rao, M.Sc., B. Ed., M. Phil., Ph.D.

2. **The entire faculty of each specialization.**
   1. Dr. D. Chenna Rao
   2. V. Sanjeeva Kumar
   3. T. V. V. Satyanarayana
   4. P. Vijay Kumar
   5. V. Rambabu
   6. G. Pavani
   7. Dr. T. Uma Maheswara Rao
   8. Dr. N. Bujji Babu
   9. Dr. Ch. Praveen
   10. V. Venkateswara Rao
3. **One expert in the subject from outside the college to be nominated by the Academic Council**

   Sri. V. Mallikarjuna Sarma, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada.
4. **One expert to be nominated by the Vice-Chancellor from a panel of six recommended by the College Principal**

   Dr. K. Jhansi Lakshmi, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada.
5. **One representative from industry/ Corporate Sector/ allied area relating to Placement.**

   Dr. B. Ramesh Babu, Founder & M.D., BogaR laboratories, Peddapuram.
   Ph: 9701712028.
6. **One postgraduate meritorious alumnus to be nominated by the Principal. The chairman, Board of Studies, may with the approval of the Principal of the College, Co-opt.**

   K.N.S. Swamy, M.Sc., APSET (Student Alumni Member)

II. Term

The term of the nominated members shall be two years.

III. Meeting

The Principal of the College shall draw the schedule for meeting of the Board of Studies for different Departments. The meeting may be scheduled as and when necessary but at least once in a year.

IV. Functions

The Board of Studies of a Department in the College shall:

a) Prepare syllabus and various courses keeping in view the objectives of the College interest of the stakeholders and national requirement for consideration and approval of the Academic Council.
b) Suggest methodologies for innovative teaching and evaluation techniques.
c) Suggest panel of names to the Academic Council for appointment of examiners.
d) Coordinate research, Teaching, Extension and other academic activities in the Department/ College.

P.R. GOVT.COLLEGE (A) KAKINADA
DEPARTMENT OF CHEMISTRY

Meeting of Board of Studies in Chemistry is convened on 02 December 2021 through offline at P.R. Govt. College (A), Kakinada, at 3.00 PM.

Venue: Conference Hall, Dt: 02-12-2021, Thursday – 3.00 PM.

The Principal Dr. B.V. Tirupanyam, Chairman, Dr. D. Rama Rao, University Nominee, Dr. K. Jhansi Lakshmi, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada, Industrialist Dr. B. Ramesh Babu, Founder & M.D., BogaR laboratories, Peddapuram, Subject Expert Sri. V. Mallikarjuna Sarma, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada, all the faculty members of Chemistry Department and student alumni attended the meeting.

Agenda:

- To discuss the Semester System and Choice Based Credit System (CBCS) being implemented for the past 06 years, i.e., w.e.f. 2015-16.
- To discuss and approve the Continuation/Modifications of the syllabus for the Odd & Even Semesters of I, II & III Years for 2021-22.
- Grant of Extra credits for Online SWAYAM MOOCs etc.
- Syllabus, Model Question Papers and Model Blue Prints for I, II, III, IV, V and VI Semesters.
- Teaching learning methodology by 60:40 (External: Internal) ratio for the present II- and III-Year Students and 50:50 (External: Internal) ratio I Year Students w.e.f. 2021-22.
- Panel of paper setters and examiners.
- Proposals for Community Service Projects/Extension activities for the benefit of the society.
- Department action plan for 2021-22.
- To discuss and resolve the minor modifications/refinement if any, in the cluster electives CI, CII & CIII as majority of the students opting this cluster as their choice.
- Any Other Proposal with the Permission of the Chairman.

Resolutions:

The Board of Studies meeting was convened by the Chemistry Department on 02.12.2021 at 3.00 pm under the chairmanship of Dr. D. Rama Rao, In-charge of the department. Dr. K. Jhansi Lakshmi, University Nominee., Sri. V. Mallikarjuna Sarma, Lecturer in Chemistry, ASD Degree College for Women's, Kakinada and all members of the faculty of Chemistry and student representatives attended the meeting. The following agenda items are discussed and resolutions are made.

1. It is resolved to continue choice-based credit system in the chemistry combination programmes as per the directions of the CCE, Vijayawada to the first year, second year and final year students for the academic year 2021-22.
2. Resolved to follow 50%-50% external and internal pattern of evaluation w. e. f. 2021-2022 admitted batch and it will be continued in second and third year consecutively.
3. Resolved to follow 60%-40% external and internal for 2018-2019 and 2019-2020 admitted batch and the same is continued in second and third year.
4. It is resolved to allocate 50 marks for project work for final year students of chemistry in cluster paper C - 3 practicals, w.e.f 2021-22 in accordance with APSCHE.
5. It is resolved to conduct Departmental activities such as OZONE DAY, CHEM FEST, CHEMISTRY DAY, SCIENCE DAY etc.
6. It is resolved to offer Subject Electives and clusters A, B and C in the VI Semester as per the guidelines of AKNU
7. It is resolved to implement the recommended pedagogy for the first semester 2021-22
8. Resolved to conduct practical examinations semester wise.
9. It is resolved to organize guest lectures by eminent professors.
10. Resolved to implement no pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.
11. It is resolved to maintain status quo for question paper pattern in I, II, III years.
12. It is resolved to encourage students enroll in MOOCS Online Programmes and give extra credits for students after successful completion of the courses.
13. Resolved to submit proposals to conduct a faculty development program in instrumentation techniques/ advanced topics with the assistance of the industry representatives and university representatives.
14. Resolved to assist the orphan children of below two years age being taken by

department of women and child welfare as an extension activity with the funds contributed by the faculty members of the Department.

15. Resolved that the syllabus/ workload distribution to the individual lecturers is either as Paper wise or as Track wise.

Signatures of the members who attended the Board of studies in Chemistry

On 02nd December 2021

Mode of Conduct of meeting: Offline

1. Dr. D. Rama Rao	Chairman & Lecturer in Charge
2. Dr. K. Jhansi Lakshmi,	University representative ASD Govt. Degree College for Women (Autonomous), Kakinada..
3. Dr. B. Ramesh Babu,	Founder & M.D., BogaR laboratories, Peddapuram. Ph: 9701712028.
4. Sri. V. Mallikarjuna Sarma	Subject expert Lecturer in Chemistry, ASD Degree College for Women's, Kakinada
5. Dr. D. Chenna Rao	Member
6. V. Sanjeeva Kumar	Member
7. T. V. V. Satyanarayana	Member
8. P. Vijay Kumar	Member
9. V. Ram babu	Member
10. G. Pavani	Member
11. Dr. T. Uma Maheswara Rao	Member
12. Dr. N. Bujji Babu	Member
13. Dr. Ch. Praveen	Member
14. V. Venkateswara Rao	Member
15. K.N.S. Swamy	Student Alumni Member

Signatures of the members who attended the

Board of studies in Chemistry on 02.12.2021 at 3.00pm

Mode of Conduct of meeting: Offline

NAME	SIGNATURE	CONTACT NO.
Dr. D. Rama Rao		
Dr. K. Jhansi Lakshmi		9441236409
Dr. B. Ramesh Babu		9701712028
Sri. V. Mallikarjuna Sarma		9676822550
Dr. D. Chenna Rao		9560740108
V. Sanjeeva Kumar		9849324966
T. V. V. Satyanarayana		9490876913
P. Vijay Kumar		9652023082
V. Ram babu		9948485537
G. Pavani		9701877823
Dr. T. Uma Maheswara Rao		9247714077
Dr. N. Bujji Babu		9441394792
Dr. Ch. Praveen		9491185518
V. Venkateswara Rao		9885165588
K.N.S. Swamy		9908900962

ACTION PLAN BOS MEETING -CHEMISTRY HELD ON 02.12.2021.

1. **Department activities for 2021-22 academic year.**

Annexure- I

Month	Activity proposed	Faculty member in charge
July-21	Departmental staff meeting to review results and class work allotment	Dr. D. Rama Rao
July - 21	Preparation of curricular plans, time-tables etc.,	All Faculty Members
Aug - 21	Remedial coaching classes for II & III year supplementary exams	All Faculty Members
Sept-21	Ozone day	All Faculty Members
Nov-21	National Education Day – Outreach Program to nearby school	All Faculty Members
	Student awareness programmes on ragging& eve teasing - consequences , self- discipline, career guidance, higher education opportunities etc.,	All Faculty Members
	Bridge classes for I year students	All Faculty Members
Dec-21	World AIDS Day	All Faculty Members
	Chemistry day & Chem fest	All Faculty Members
Jan-21	10 days coaching for PG entrance examinations in chemistry Study tour / Field trips	All Faculty Members
Feb-21	NATIONAL SCIENCE DAY	All Faculty Members
March-21	Consumer awareness day	Dr. D. Rama Rao

2. **Organizing National/ State level seminars/Workshops/ Conferences/ Training programs etc., with topics and other details.**
(Mandatory for each Department)

i) Faculty Development Program
ii) Student Training Programme in TLC/Column Chromatography
iii) Awareness on OZONE protection
iv) National Chemistry day
v) National Science day 2021
vi) Guest Lectures
vii) National seminar in chemistry
viii) Training in Soil analysis
ix) Training in water analysis

3. **Change of modules in the syllabus content.**
Syllabus changed for first, second and final years as per university regulations and CBCS pattern.

4. **Plan for utilization of funds for Autonomous/CPE/other grants available for arranging guest lectures, faculty improvement programs, study tours, equipping laboratories, reference books& other necessary teaching-learning material with ICT enabled teaching.**

I. Study visits to: **Rs, 50,000**

1. Visakha Steel Plant, Visakhapatnam
2. Hetero Laboratories, Nakkapally
3. Dr. Reddy's Laboratories, Yanam.
4. National Institute of Hydrololgy, Kakinada.
5. SAR Chandra Environ Solutions, Kakinada.
6. ONGC mini refinery, Tatipaka.
7. Soil analysis laboratory, Samalkot.
8. IICT,HYD
9. Venky parenterals, Yanam

II. Purchase of Equipment

1. Sophisticated version UV-Visible spectrophotometer- 5.0 lakhs
2. Rotavapour 4.0 lakhs
3. Other equipment 1.0 lakhs

5. **Plan for organizing subject oriented community outreach programs & allocation of necessary funds. (Mandatory for each Department)**
   i) Adoption of village Rs. 20,000
   ii) Medical Awareness programs Rs. 10,000

6. **Instituting of new medals/incentives/prizes etc., from alumni, philanthropists, parents, faculty etc., - Strategies to be recommended**

7. **Introduction of new programs –PG/UG/Diploma and certificate courses.**

8. **Any other program that enhances the learning capacity of students and their employable & knowledge skills.**
   Training in the use of instruments like AAS, UV-Vis, HPLC, flame photometer, uranium analyzer, soil and water analysis projects, air quality projects.

9. **Proposed panel of examiners/paper setters & other experts/nominees for BOS deliberations.**

Chemistry:

1. Sri. V. Mallikarjuna Sarma, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada.
2. Dr. V. Narayana Rao, Lecturer in Chemistry, GDC, Perumallapuram.
3. Dr. T. Narasimha Murthy, Lecturer in Chemistry Govt. Arts College, Rajamahendravaram.
4. Dr. P. Siva Kumar, Lecturer in Chemistry, Govt. Arts College, Rajamahendravaram.
5. Sri. U. Sai Krishna, Lecturer in Chemistry, Govt. Arts College, Rajamahendravaram
6. Sri. K. Anand, Lecturer in Chemistry, GDC, Pithapuram.

Structure of Chemistry Syllabus under CBCS

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
I	I	I	Inorganic and Physical Chemistry	100 (50:50)	04
			Practical – I	50	01
	II	II	Organic and General Chemistry	100 (50:50)	04
			Practical – II	50	01
II	III	III	Spectroscopy and Physical Chemistry	100 (60:40)	04
			Practical – III	50	01
	IV	IV	Inorganic, Organic and Physical Chemistry	100 (60:40)	04
			Practical – IV	50	01
	IV	V	Inorganic and Physical Chemistry	100 (60:40)	04
			Practical – V	50	01
III	V	V	Inorganic, Organic and Physical Chemistry	100 (60:40)	03
			Practical – V	50	02
		VI	Inorganic, Organic and Physical Chemistry	100 (60:40)	03
			Practical – VI	50	02
	* Any one Paper from VII A,B and C	VII (A)*	Elective	100	03
			Practical - VII A	50	02
		VII (B)*	Elective	100	03
			Practical - VII B	50	02
		VII (C)*	Elective	100	03
			Practical - VII C	50	02
	** Any one cluster from VIII, A, B and C	VIII (A)**	**Cluster Electives - I :** VIII-A-1 VIII-A-2 VIII-A-3 Practical Practical Project	 100 100 100 50 50 50	 03 03 03 02 02 02
		VIII (B)**	**Cluster Electives - II ::** VIII-B-1 VIII-B-2 VIII-B-3 Practical Practical Project	 100 100 100 50 50 50	 03 03 03 02 02 02

		VIII (C)**	**Cluster Electives - III ::** VIII-C-1 VIII-C-2 VIII-C-3 Practical Practical Project	 100 100 100 50 50 50	 03 03 03 02 02 02

Allotment of Extra credits guidelines

Sl.No.	Activity	Details of achievement	Credits
1	MOOC Course	*SWAYAM/NPTEL/CEC etc., (Course Completion certificate with credits should be produced for the claim of extra credits)*	*Total credits achieved will be considered*
2	NCC	*B CERTIFICATE*	2
		Participation in National Camp after 'B' certificate	3
		C CERTIFICATE	4
		Adventure camp/RD parade along with 'B'	5
		Failed in B certificate Examination	1
3	Sports	*Intercollegiate selection*	2
		South zone selection	3
		All India participation	4
		Winning medals in all India competitions	5
4	NSS	*40% attendance in regular NSS activities*	1
		50% attendance with Community Service	2
		Conduct of survey/Youth exchange/RD	3
5	JKC	*Enrollment and training*	1
		Campus recruitment local level	2
		MNCs/reputed companies	3
6	Community service	*Participation in community service by departments (outreach programmes)*	2
7	Cultural activity	*Winning medals at state level-2,* *District level-1*	2 1
8	COP/Add on Course	*Pass in Certificate Exam-1,* *Diploma-2*	1 2
9	Support services	*Lead India, Health club, RRC and Eco Club etc., participation in various programmes*	1

P.R.GOVERNMENT COLLEGE (AUTONOMOUS)-KAKINADA
III YEAR: SEMESTER-V
Paper – V: (INORGANIC, PHYSICAL & ORGANIC CHEMISTRY)

OBJECTIVES:

1. Gains knowledge crystal field splitting energies.
2. Knowledge of spectral data of complexes.
3. Synthesis of Heterocyclic compounds.
4. Applications of Thermodynamics'.

45 hrs (3 h / w)

INORGANIC CHEMISTRY

UNIT – I

Coordination Chemistry: 8h

IUPAC nomenclature - bonding theories - Review of Werner's theory and Sedgwick's concept of EAN rule, - Valence bond theory - geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal filed theory - splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes - low spin and high spin complexes - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

UNIT-II

1. Spectral and magnetic properties of metal complexes: 4h

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouy method.

ORGANIC CHEMISTRY

UNIT- III

Nitro hydrocarbons: 3h

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitro alkanes leading to aci and keto form, Preparation of Nitro alkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

UNIT – IV

Nitrogen compounds: 10h

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). Reduction of Amides and Schmidt reaction.

Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.

Heterocyclic Compounds: **8h**

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

PHYSICAL CHEMISTRY

UNIT- V

Thermodynamics: **12h**

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule-Thomson effect- coefficient. Calculation of w, for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation - Kirchhoff s equation. Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes.

List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by
5. Text book of physical chemistry by S Glasstone
6. Concise Inorganic Chemistry by J.D.Lee
7. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
8. A Text Book of Organic Chemistry by Bahl and Arun bahl
9. A Text Book of Organic chemistry by I L Finar Vol I
10. Advanced physical chemistry by Gurudeep Raj

Weightage to Content
Semester-V
Paper-V

S.No	Course Content	Long Answer	Short Answer(SA)	Total marks
Inorganic Chemistry				
1	Coordination Chemistry	3	2	40
2	Spectral and magnetic Properties		1	5
Organic Chemistry				
1	Nitro hydro Carbons	1		10
2	Nitrogen Compounds	1	1	15
3	Heterocyclic compounds	1	1	15
Physical Chemistry				
1	Thermodynamics	3	3	45
	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-V

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

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

SECTION-I 4x10=40M

1. Write the salient features of Crystal field theory and explain the crystal field splitting of d-orbitals in octahedral complexes.

2. Explain the Formation of $[Fe(CN)_6]^{4-}$ and $[Fe(CN)_6]^{3-}$ on the basis of Valence bond theory.

3. Explain about the optical isomerism in complex compounds having coordination numbers 4 and 6.

SECTION-II

4. Write note on

   a) Nef reaction b) Michael reaction c) Mannich reaction

5. What are Amines? How the primary amines are prepared. Give the separation of amines by Hinsberg Method.

6. Give any two methods of preparation of Pyrrole. Explain why electrophilic substitution in Furan takes place at 2-position rather than 3-position.

SECTION-III

7. State and explain 1st law of thermodynamics

8. Derive Kirchhoff's equation and mention its units.

9. Show that PV^r = Constant

SECTION-IV

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

10. Explain the factors affecting crystal field splitting energy.
11. Explain EAN rule with two examples.

12 What are low spin and high spin complexes- Give examples.

13 How is furan prepared? Give its Diel's – Alder reaction.

14. Write about alkylation and acylation reactions of aniline
15. Prove that C_p-C_v=R
16. Write about Entropy
17. State and explain Joule- Thomson Effect
18. Discuss Chichibabin reaction.

DEPARTMENT OF CHEMISTRY SEMESTER-V

PAPER-III

QUESTION BANK

ESSAY QUESTIONS:

1. Explain the Geometry and Magnetic Properties of

a) $[Co(NH_3)_6]^{+3}$ b) $[Fe(CN)_6]^{+3}$ C) $[Fe(CN)_6]^{-3}$ d) $[Cr(NH_3)_6]^{+3}$ e) $[Fe(CN)_6]^{-4}$

f) $[Zn(NH_3)_6]^{+2}$ g) $[Ni(CO)_4]$ h) $[Cu(NH_3)_4]^{+2}$ i) $[Ni(CN)_4]^{-2}$ J) $[CO F_6]^{-3}$

Complex compounds based on valence Bond theory.

2. Discuss the salient features of crystal field theory. Explain the Crystal field splitting of d- orbitals in Octahedral, Tetrahedral and Square planar complexes.

3. Describe the geometrical isomerism in compounds with coordination number 4 & 6

4. Explain the different types of Structural isomerism exhibited by complexes with examples.

5. Preparation and properties of Nitro alkanes.

6. Write note on

a) Nef b) Michael C) Mannich d) Schmidt e) Gabriel phthalamide reaction.

7. Explain Hinsberg method of separation of primary, Secondary, Tertiary Amines.

8. Write about Hoffmann bromide reaction with mechanism.

9. Preparations and properties of Amines.

10. Preparations and properties of pyrrole, Furan, Thiophene

11. State and explain first law of thermodynamics.

12. State and explain Second law of thermodynamics.

13. Explain Joule- Thomson effect

14. Show that PV^r constant

15. Derive Kirchhoff's equation. Mention its applications.

16. Explain Carnot cycle.

17. Show that $C_P-C_V=R$

SHORT ANSWERS:

1. Explain Werner theory of complex compounds.
2. Effective atomic number (EAN)
3. Explain High spin and Low spin complexes with examples.
4. What is a chelating? Give two examples.
5. What is meant by crystal field stabilization energy?
6. Explain the electronic absorption spectrum of $[Ti(H_2O)_6]^{3+}$ ion
7. Preparation of Pyrrole, Furan, Thiophene (Paul-knorr synthesis)
8. Explain why electrophilic substitution reaction in furan takes place 2-position rather than 3-position.
9. Discuss the aromatic character of pyrrole, Furan, Thiophene
10. Write about a) Diels-Alder reaction b) Chichibabin reaction
11. Acidic and basic nature of pyrrole
12. Basic nature of pyridine.
13. Explain why pyridine is more basic than pyrrole.
14. Basic nature of amines.
15. Write about the concept of Entropy
16. Write briefly about enthalpy.
17. Explain the concept of internal energy.
18. Carbyl amine test.
19. Furan exhibits acidity. Why?
20. Explain Diazotization reaction.

LABORATORY COURSE – V

Practical Paper – V Organic Chemistry(at the end of semester V)

30 hrs (2 h / 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 PrimaryAmines, Amides and Simple sugars.

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^-.

Metallo porphyrins – 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
Semester-V
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 thedetermination 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.