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 DEGREE COLLEGE (A), KAKINADA
DEPARTMENT OF CHEMISTRY BOARD OF STUDIES: 2021-22

SECOND YEAR, SEMESTER– IV

Paper IV- INORGANIC, ORGANIC & PHYSICAL CHEMISTRY
60 h (4 h / w)

Course Outcomes:

1. To learn about the laws of absorption of light energy by molecules and subsequent photochemical reactions.
2. To understand the concept of quantum efficiency and mechanisms of photochemical reactions.

UNIT I:

Organ metallic Compounds:

Definition and classification of organometallic compounds on the basis of bond type, Concept of hapticity of organic ligands. Metal Carbonyls: 18 electron rule, electron count of mononuclear, poly nuclear and substituted metal carbonyls of 3d series. General methods of preparation of mono and binuclear carbonyls of 3d series. Pi-acceptor behavior of carbon monoxide.

Additional Input: Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies).

UNIT II:

Carbohydrates:

Occurrence, classification and their biological importance, Monosaccharides: Constitution and absolute configuration glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth Projection and Conformational Structures; Interconversions of aldoses and ketoses; Kiliani-Fischer synthesis and Ruff degradation.

Additional Input: Disaccharides– Elementary Treatment of Maltose, lactose and sucrose.

UNIT III:

Amino acids and proteins:

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 and valine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide 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).

Heterocyclic Compounds:

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

Additional Input: Structure and nomenclature of peptides and proteins.

UNIT IV:

Nitrogen Containing Functional Groups:

Preparation, properties and important reactions of nitro compounds, amines and diazonium salts.

1. Nitro hydrocarbons

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

2. Amines:

Introduction, classification, chirality in amines (pyramidal inversion), importance and general methods of preparation.

Properties: Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary amines using Hinsberg's Method and Nitrous Acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann- Bromamide Reaction, Carbylamine Reaction.

Additional Input: Hofmann-elimination reaction and Cope elimination.

UNIT V:

Photochemistry:

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 and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram. Photosensitized reactions- energy transfer processes (simple example).

Thermodynamics:

The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoff 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.

Additional Input: Entropy changes in spontaneous and equilibrium processes.

REFERENCE BOOKS:

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, Purdue Univ
4. 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 Arunbahl
9. A Text Book of Organic chemistry by I L FinarVol I
10. A Text Book of Organic chemistry by I L FinarVol II
11. Advanced physical chemistry by Gurudeep Raj

LABORATORY COURSE -IV **30hrs (2 h / w)**

Practical Paper-IV (At the end of Semester-IV)

(Paper-4) Organic Qualitative analysis Lab: 50 Marks

Course Outcomes:

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Determine melting and boiling points of organic compounds
3. Understand Application of concepts of different organic reactions studied in theory part of organic chemistry

Organic Qualitative analysis 50 M

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

P. R. GOVERNMENT COLLEGE, KAKINADA

MODEL PAPER FOR SEMESTER – IV (CHEMISTRY)

Paper IV (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)

Duration: 2hrs.30 Min **Max. Marks: 60**

PART- A

Answer any Four of the following questions. Each carries FIVE marks 4 X 5 = 20 Marks

1. Question from Unit –I
2. Question from Unit –II
3. Question from Unit –III
4. Question from Unit – III
5. Question from Unit –IV
6. Question from Unit – IV
7. Question from Unit – V
8. Question from Unit – V

PART- B

Answer ALL the questions. Each carries TEN marks 4 X 10 = 40 Marks

9. Question from Unit –I

   (OR)

   Question from Unit –I

10. Question from Unit –II

    (OR)

    Question from Unit – II

11. Question from Unit –III

    (OR)

    Question from Unit – IV

12. Question from Unit – V

    (OR)

    Question from Unit – V

WEIGHTAGE TO THE COURSE CONTENT

Second Year Semester - IV

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - IV

Sl. No.	COURSE CONTENT	ESSAY	SHORT	Total Marks
1	UNIT - I	2	1	25
2	UNIT - II	2	1	25
3	UNIT - III	1	2	20
4	UNIT - IV	1	2	20
5	UNIT - V	2	2	30
	Total	**8**	**8**	**120**

P.R. GOVERNMENT DEGREE COLLEGE (A), KAKINADA

DEPARTMENT OF CHEMISTRY BOARD OF STUDIES: 2021-22

SECOND YEAR, SEMESTER– IV

Paper: IV- Inorganic, Organic and Physical Chemistry

Question Bank

Unit-I

Essay Questions

1. What is Organ metallic Compounds? Explain the classification of organ metallic Compounds?
2. Write the preparation of mono and binuclear carbonyl Compounds?

Short Answer Questions

1. Define 18 electron rule. Explain with example .
2. Write the Concept of hapticity of organic ligands.

Unit-II

Essay Questions

1. Explain
   a) Killiani fisher synthesis b) Ruff degradation
2. Explain Inter-conversion of
   a) aldohexose to ketohexose. b) Ketohexose to aldohexose.
3. Write about Constitution and absolute configuration glucose?

Short Answer Questions

1. Explain Mutarotation.
2. Define Epimers and Anomers and give examples.

Unit-III

Essay Questions

1. Explain the classifications of Amino Acids. Preparation of amino acids.
2. Write any two methods of Preparations of pyrrole, Furan and Thiophene?

Short Answer Questions

1. Explain electrophilic substitution reactions in furan?
2. Write about Diels Alder reaction in furan?
3. What are Essential and Non Essensital amino acids give examples?
4. Write about Zwitter ion?

Unit-IV

Essay Questions

1. Write the Preparation and properties of Nitroalkanes.
2. Write note on
   a) Nef b) Michael c) Mannich
3. Explain Hinsberg method of separation of primary, Secondary, Tertiary Amines.
4. Write about Hoffmann bromide reaction with mechanism.

Short Answer Questions

1. Explain Basic nature of amines.
2. Explain Tautomerism of nitroalkanes?
3. What is Carbylamines Reaction?
4. Explain Halogenation of nitrohydrocarbons?

Unit-V

Essay Questions

1. Explain Jablanski diagram of various processes occurring in Photo Chemistry?
2. What is Quantum yield? Explain Quantum yield of the reaction between H_2 and Cl_2?
3. State and explain first law of thermodynamics?
4. Derive Kirchhoff's equation.
5. What is Carnot cycle? Explain Efficiency of Heat Engine by Carnot cycle?

Short Answer Questions

1. Explain Laws of photochemistry?
2. Explain Fluorescence and Phosphorescence?
3. Explain Concept of Entropy?
4. Explain Joule Thomson Effect?

P.R. GOVERNMENT DEGREE COLLEGE (A), KAKINADA

DEPARTMENT OF CHEMISTRY BOARD OF STUDIES: 2021-22

SECOND YEAR, SEMESTER– IV

Paper V- (INORGANIC & PHYSICAL CHEMISTRY) 60 h (4 h / w)

INORGANIC CHEMISTRY

UNIT I:

Coordination Chemistry:

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy.

Additional Input: Comparison of CFSE for Octahedral and Tetrahedral complexes.

UNIT II:

1. Inorganic Reaction Mechanism:

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions -S_N1 and S_N2, Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications

2. Stability of metal complexes: Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method.

3. Bioinorganic Chemistry:

Metal ions present in biological systems, classification of elements according to their action in biological system. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cis-platin as an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin

Additional Input: Geochemical effect on the distribution of metals, Sodium / K – pump, Myoglobin.

PHYSICAL CHEMISTRY

UNIT-III:

Phase rule:

Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, freezing mixtures.

UNIT IV:

Electrochemistry:

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conduct metric titrations. Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal- metal ion, Glass electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation.

Additional Input: Applications of EMF measurements - Potentiometric titrations.

UNIT V:

Chemical Kinetics:

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.

Additional Input: Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions.

REFERENCE BOOKS:

1. Text book of physical chemistry by S Glasstone
2. Concise Inorganic Chemistry by J.D.Lee
3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
4. Advanced physical chemistry by Gurudeep Raj
5. Principles of physical chemistry by Prutton and Marron
6. Advanced physical chemistry by Bahl and Tuli
7. Inorganic Chemistry by J.E.Huheey
8. Basic Inorganic Chemistry by Cotton and Wilkinson
9. A textbook of qualitative inorganic analysis by A.I. Vogel
10. Atkins, P.W. & Paula, J.de Atkin's Physical Chemistry Ed., Oxford UniversityPress 10thEd(2014)
11. Castellan, G.W. Physical Chemistry, 4thEd .Narosa(2004)
12. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).

LABORATORY COURSE -IV 30hrs (2 h / w)

Practical Paper-V (At the end of Semester-IV)

(Paper-5) Conductometric and Potentiometric Titrimetry Lab : 50 Marks

Course Outcomes:

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Apply concepts of electrochemistry in experiments
3. Be familiar with electro analytical methods and techniques in analytical chemistry which study an analyte by measuring the potential (volts) and/or current (amperes) in an electrochemical cell containing the analyte

Conductometric and Potentiometric Titrimetry 50 M

1. **Conductometric titration**- Determination of concentration of HCl solution using standard NaOH solution.
2. **Conductometric titration**- Determination of concentration of CH_3COOH Solution using standard NaOH solution.
3. **Conductometric titration**- Determination of concentration of CH_3COOH and HCl in a mixture using standard NaOH solution.
4. **Potentiometric titration**- Determination of Fe (II) using standard $K_2Cr_2O_7$ solution.
5. Determination of rate constant for acid catalyzed ester hydrolysis.

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – IV (CHEMISTRY)
Paper V (INORGANIC & PHYSICAL CHEMISTRY)

Duration: 2hrs.30 Min **Max. Marks: 60**

PART- A

Answer any Four of the following questions. Each carries FIVE marks 4 X 5 = 20 Marks

1. Question from Unit –I
2. Question from Unit –II
3. Question from Unit –II
4. Question from Unit – III
5. Question from Unit –IV
6. Question from Unit – IV
7. Question from Unit – V
8. Question from Unit – V

PART- B

Answer ALL the questions. Each carries TEN marks 4 X 10 = 40 Marks

9. Question from Unit –I
   (OR)

   Question from Unit –I

10. Question from Unit –II
    (OR)

    Question from Unit – II

11. Question from Unit –III
    (OR)

    Question from Unit – IV

12. Question from Unit – V
    (OR)

    Question from Unit – V

WEIGHTAGE TO THE COURSE CONTENT

Second Year Semester - IV

INORGANIC AND PHYSICAL CHEMISTRY - V

Sl. No.	COURSE CONTENT	ESSAY	SHORT	TOTAL MARKS
1	UNIT - I	2	1	25
2	UNIT - II	2	2	30
3	UNIT - III	1	1	15
4	UNIT - IV	1	2	20
5	UNIT - V	2	2	30
Total		**8**	**8**	**120**

P.R. GOVERNMENT DEGREE COLLEGE (A), KAKINADA

DEPARTMENT OF CHEMISTRY BOARD OF STUDIES: 2021-22

SECOND YEAR, SEMESTER– IV

Paper: V- Inorganic and Physical Chemistry

Question Bank

Unit-I

Essay Questions

1. Explain the Geometry and Magnetic Properties of any two of the following

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

d) [Ni(CO)4] e)$[Cu(NH_3)_4]^{+2}$ f) $[COF_6]^{-3}$

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, complexes?
3. Explain Crystal Field theory in Tetrahedral and Square Planar Complexes?
4. Explain the different types of Structural isomerism exhibited by complexes with examples?

Short Answer Questions

1. Explain High spin and Low spin complexes with examples.
2. What is a chelating? Give two examples.
3. What is meant by CFSE? Give two examples?
4. Define Stereoisomerism? Give two examples

Unit-II

Essay Questions

1. Explain determination of composition of complex by job's method.
2. Explain the factors affecting the stability of complexes.
3. Explain the mechanism of ligand substitution reactions with examples.
4. Explain the structure and function of Hemoglobin?

Short Answer Questions

1. What is Trans effect? Write its applications?
2. What are labile and inert complexes? Give examples.
3. Write the toxicity of Pb and Hg?

Unit-III

Essay Questions

1. State Phase rule and explain the terms involved in phase rule?
2. Explain the phase diagram of Pb-Ag system?

Short Answer Questions

1. Write notes on freezing mixtures?
2. What is congruent and incongruent melting point-Give one example each?

Unit-IV

Essay Questions

1. Define transport number? Determine the Trans port number by Hittorf's method.
2. Explain the Debye-Huckel-Onsager equation for strong electrolytes.
3. Explain about Conductometric titrations? with examples

Short Answer Questions

1. State and explain Nernest equation.
2. Explain Kohlrausch's law of independent migration of ions.
3. Define Molar Conductance and specific conductance
4. Define Equivalent conductance Explain variation of equivalent conductance with dilution.

Unit-V

Essay Questions

1. Define First order reaction? Derive rate Constant of First order reaction. Write the units.

2. Define Second order reaction? Derive rate Constant of Second order reaction. Write the units.

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

Short Answer Questions

1. Write about Zero order reaction.
2. Write about Half-life period of first order reaction?
3. Define molecularity and order of reaction and write the differences of them.
4. Write any three factors effecting the rate of reaction