Pithapur Rajah's Government College (Autonomous)
Kakinada

Affiliated to Adikavi Nannaya University

NAAC Accredited with "A" Grade (3.17 CGPA)

DEPARTMENT OF CHEMISTRY

B. Sc. Chemistry Syllabus
Under CBCS

Board of Studies
2020 – 21

TABLE OF CONTENTS

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

Recommended Composition of the Board of Studies of Chemistry

And it's Functions of an Autonomous College

June-2020-21

I Composition

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

   Dr. T. Vara Prasad, M.Sc., M.Ed., M.Phil., Ph.D.

2. **The entire faculty of each specialization.**

   1. Dr. D.Rama Rao, M.Sc., B. Ed., M.Phil., Ph.D.
   2. Sri V.Mallikarjuna Sarma,MSc, M.Phil,NET
   3. Dr.V.Narayana Rao M.Sc, Ph.D
   4. Sri U.Sai Krishna M.Sc,NET
   5. Sri. K Baburao M. Sc., M.Phil.
   6. Smt. S Swarna Latha M.Sc.

3. **ONE experts in the subject from outside the college to be nominated by the Academic Council**
   a. Dr. K. Jhansi Lakshmi, Principal, Ideal Degree College, Kakinada
4. **One expert to be nominated by the Vice-Chancellor from a panel of six recommended by The College Principal**
   a. Dr. K. Deepthi, Adikavi Nannaya University, Rajahmundry
5. **One representative from industry/ Corporate Sector/ allied area relating to Placement.**
   a. Dr. Ch. V. N. S. Vara Prasad, Managing partner, DAS Pharma Ltd, Kakinada
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.

a. Dr.K.Raghavachari M.Sc., M.Phil, Ph.D.

Term

The term of the nominated members shall be two years.

II. 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.

III. 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,

Minutes of board of studies (BOS) meeting 2020-21 on 20. 06. 2020 at 10.30 am

Agenda

- Online BOS.
- Approve Syllabus for III, IV, V and VI Semesters, Same Syllabus Will be Followed Intoto I and II Semester (I Year UG) After getting the APSHE Guidelines.
- Grant of Extra credits for Certain activities.
- Syllabus, Model Question Papers and Model Blue Prints for III, IV, V and VI Semesters.
- Internal and External Exams to be Assessed in the Ratio for III, IV, V and VI Semesters.
- Department action plan for 2020-21.
- Any Other Proposal with the Permission of the Chairman.

Resolutions:

The board of studies meeting was held online through Video Conference by Google Meet by the Chemistry Department on 20. 06. 2020 at 10.30 am under the chairmanship of Dr. T.Vara Prasad, in charge of the department. The principal, Dr. Chappidi Krishna, Dr.K.Deepthi, University Nominee., Dr. K. Jhansi Lakshmi, Head in Chemistry and Principal, Ideal College, 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, Hyderabad to the first year and second year and second year and final year students w.e.f. 2019-20.

2. Resolved to follow 60%-40% external and internal w.e.f. 2017-2018 admitted batch and it continued in second and third year.

3. It is resolved to allot 50 marks project work for final year students in chemistry preferably in cluster paper C - 3 practicals, w.e.f 2019-20 in accordance with APSCHE.

4. It is resolved to conduct departmental activities such as OZONE DAY, CHEM FEST, CHEMISTRY DAY and SCIENCE DAY.

5. It is resolved to offer Subject Electives and clusters A, B and C in the V and VI Semester Respectively as per the guidelines of AKNU

6. It is resolved to implement the recommended pedagogy for the first semester 2020-21

7. Resolved to conduct practical examinations semester wise.

8. It is resolved to organize guest lectures by eminent professors.

9. Resolved to implement pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.

10. It is resolved to maintain status quo for same question paper pattern in I, II, III years.

11. It is resolved to encourage students enroll in MOOCS Online Programmes and give extra credits for students after successful completion of the courses.

12. It is resolved that if there is any change in the syllabus in the first year as prescribed by APSCHE, Vijayawada in this academic year, the same syllabus will be adopted as such.

11. Resolved to submit proposals to conduct a faculty development program in instrumentation techiniques/ advanced topics with the assistance of the industry representatives and university representatives.

12. 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.

13. Resolved to change the syllabus components in semester **I** to Semester **II** and vice versa. Sly semester **III** to **IV** and vice versa on par with the affiliating university.

14. It is proposed to give 33.3% weightage competitive exam questions pertaining to the syllabus prescribed

- 20. Resolved to reduce the intake of B.Sc. MPC TM students from 60 to 30 w.e.f from 2019-20.
- 21. Resolved to increase the intake of B.Sc. MPC EM students from 30 to 60 w.e.f. from 2019-20
- Resolved to take girls students also for admissions into B.Sc. MCPC w.e.f. from 2019-20.

The Following Paper Setter Are Recommended..

1. Dr. G. Nagarjuna, SRR CVR GDC, Vijayawada.
2. Dr. B. Mallikarjun, Govt. College (A), Rajamahendravaram.
3. Dr. G. Venkatarao, GDC, Vijayawada
4. Shri B. Venkatarao, GDC, Ramachandrapuram
5. Dr. Ramachandra Rao, Y.N.College,Narasapuram
6. Dr. T. Narasimha Murthy, GDC, Mandapeta.
7. Smt. G. Tejaswini, SVD GDC (W), Nidadavole.
8. Dr. M. Trinadh, GDC (A), Rajahmundry.
9. Sri. M. Sudhakara Rao, ASNM Govt. College (A), Palakol.
10. Sri. V. Satyanarayana, Govt. Arts College, Rajahmundry.
11. Sri. V Rambabu, GDC, Perumallapuram
12. Sri V. Sanjeev Kumar, GDC, Mandapeta.
13. Dr. K. Ravindra Babu, Govt.Arts College, Rajahmundry.
14. Sri T. V. V. Satyanarayana, GDC, Ramachandrapuram
15. Sri V. Sridhar, GDC, Nidadavol

Signatures of the members who attended the

Board of studies in Chemistry on 20. 06. 2020 at 10.00am

Mode of Conduct of meeting: Online video conference through Google Meet

1. Dr. T. Vara Prasad	Chairman & Lecturer in Charge
2. Dr. K. Deepthi,	University representative Adikavi Nannaya University Rajamahendravaram.
3. Dr. Ch. V. N. S. Vara Prasad,	Managing partner, DAS Pharma Ltd, Kakinada
4. Dr. K. Jhansi Lakshmi	Subject expert Lecturer in Chemistry, Ideal Degree College, Kakinada
5. Dr. K. Raghavachari	Retired Head of the Chemistry Department
6. Sri D. Rama Rao	Member
7. Sri V. Mallikarjuna Sarma	Member
8. Dr.V.Narayana Rao	Member
9. Sri U.Sai Krishna	Member
10. Sri K. Babu Rao	Member
11. Smt. S. Swarna Latha	Member
12. M.S.T.B.V.Ratnam	Member
13. G. Rama Lakshmi	Member
14. G. Sandhya	Member
15. P. K. M. S. Devi	Member
16. M. Siva Sankar	Member
17. T. S. S. Lakshmi	Member
18. T. Pavan Kumar	Member
19. S. Vijaya Lakshmi	Member
20. B. S. V. A. L. Jyothi Sree	Member
21. K. N. S. Swami	Member

22. P. Sai Kalyani — Member

23. B. Vijaya Durga, II MPC TM (Regd. No. 2190214) — Student member

24. K. Pushpa Kumari, II MPC TM (Regd. No. 2190229) — Student Member

25. Surimilli Kishore Kumar, II MCCS (Regd. No. 2191320) — Student Member

26. Akula Mounika, II MPC EM (Regd. No. 2190103) — Student Member

27. Bandaru Srinivasu, II MPC EM (Regd. No. 2190104) — Student Member

Signatures of the members who attended the

Board of studies in Chemistry on 20. 06. 2020 at 10.00am

Mode of Conduct of meeting: Online video conference through Google Meet

NAME	SIGNATURE	CONTACT NO.
Dr. T. Vara Prasad		
Dr. K. Deepthi,		
Dr.Ch. V. N. S. Vara Prasad		
Dr. K. Jhansi Lakshmi		
Dr. K. Raghavachari		
Dr. D. Rama Rao		
Sri V. Mallikarjuna Sarma		
Dr.V. Narayana Rao		
Sri U.Sai Krishna		

On line Video Conference Through Google Meet

Signatures of the members who attended the

Board of studies in Chemistry on 20-6-20 at 10.00am

1	Dr. T Vara Prasad	Chairman & Lecturer in Charge
2	Dr. K. Deepti,	University representative Adikavi Nannaya University Rajamahendravaram
3	Dr.Ch. V. N. S Vara Prasad,	Managing partner, DAS Pharma Ltd, Kakinada
4	Dr. K. Jhansi Lakshmi	Subject expert Lecturer in Chemistry, Ideal Degree College, Kakinada
5	Dr.K.Raghavachari	Retired Head of the Chemistry Department
6	Sri D. Rama Rao	Member
7	Sri V. Mallikarjuna Sarma	Member
8	Dr.V.Narayana Rao	Member
9	Sri U.Sai Krishna	Member
10	Dr.D.S.V.N.M.Rama Murthy	Member
11	Sri K.Babu Rao	Member 20/6/2020
12	Smt.S.Swarna Latha	Member
13	Miss. M.S.T.B.V.Ratnam	Member
14	Miss.G.Rama Lakshmi.	Member
15	Mr.B.V.Siva Kumar	Member
16	Miss.S.G.Kalyani	Member
17	G.Sandhya	Member
18	P.K.M.S.Devi	Member
19	J.Aruna Kalyani (MPC EM)	Student Member
20	Sankar Rao (MPC EM)	Student Member
21	A.Sravani Devi (MBC)	Student Member

ACTION PLAN BOS MEETING -CHEMISTRY HELD ON 20. 06. 2020.

1. Department activities for 2020-21 academic year. Annexure I

Month	Activity proposed	Faculty member in charge
July-20	Departmental staff meeting to review results and class work allotment	Dr.T. Vara Prasad
July - 20	Preparation of curricular plans, time-tables etc.,	All Faculty Members
Aug - 20	Remedial coaching classes for II & III year supplementary exams	All Faculty Members
	Bridge classes for I year students	All Faculty Members
Aug-20	Student awareness programmes on ragging& eve teasing - consequences , self- discipline, career guidance, higher education opportunities etc.,	All Faculty Members
August-20	Conference on prospects in pharmaceutical Industries	Dr.T. Vara Prasad
	Study tour / Field trips	
Sept-20	Ozone day	All Faculty Members
Oct-20	MOLE Day	Dr. D.Ramarao
	Faculty development program	V.Mallikarjuna Sarma
Nov-20	National Education Day – Outreach Program to nearby school	
Dec-20	World AIDS Day	All Faculty Members
	Chemistry day & Chem fest	V.Mallikarjuna Sarma
Jan-21	10 days coaching for PG entrance examinations in chemistry Study tour / Field trips	V.Mallikarjuna Sarma
Feb-21	NATIONAL SCIENCE DAY	All Faculty Members
March-21	Consumer awareness day	Dr.T. Vara Prasad

2. Organizing National/ State level seminars/Workshops/ Conferences/ Training programs etc., with topics and other details.

(Mandatory for each Department)

i) Staff development program
ii) Training in the use of HPLC
iii) Awareness on OZONE protection
iv) National Chemistry day
v) Chem. fest
vi) National Science day 2021
vii) Guest lectures
viii) National seminar in chemistry
ix) Training in Soil analysis
x) Training in water analysis

3. **Change of modules in the syllabus content.**

   Syllabus changed for first and second years as per university regulations. CBCS introduced for final year w.e.f. 2018-19.

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.

   1. Sophisticated version UV-Visible spectrophotometer- 5.0 lakhs
   2. 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. **Change in internal assessment exams for conducting II mid Semester by way of Project work/Assignment.**

   Not possible as the number of students is more. However it is proposed to give 33.3% weitage for competitive exam questions pertaining to the syllabus prescribed.

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

Chemistry:

1. Dr. G. Nagarjuna, SRR CVR GDC, Vijayawada.
2. Dr. B. Mallikarjun, Govt. College (A), Rajamahendravaram.
3. Dr. G. Venkatarao, GDC, Vijayawada
4. Shri B. Venkatarao, GDC, Ramachandrapuram
5. Dr. Ramachandra Rao, Y.N.College,Narasapuram
6. Dr. T. Narasimha Murthy, GDC, Mandapeta.
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14. Sri T. V. V. Satyanarayana, GDC, Ramachandrapuram
15. Sri V. Sridhar, GDC, Nidadavol

Structure of Chemistry Syllabus under CBCS

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

OBJECTIVES

- **Objectives**
  The students can obtain the knowledge in the following topics and come to know how chemistry is essential in daily life.

CO 1. Preparation, properties and applications of some special compounds of s and p block elements.

CO 2. Structural theory of Organic compounds.

CO 3. Preparation, properties and applications of alkenes, alkynes and cycloalkanes.

CO 4. Benzene structure and its reactivity.

CO 5. Identification of some cations and anions in the unknown salt.

- **By the end of II semester, each and every I degree chemistry student can obtain the knowledge in the following topics and come to know how chemistry is essential in daily life.**

CO 1. Features involved in gaseous state, liquid state and solid state and their applications.

CO 2. Importance of colloids and adsorption.

CO 3. Chemical bonding between molecules through M.O. theory.

CO 4. Identification of some cations and anions in the unknown mixture.

CO 5. Basic knowledge and Importance of of Stereochemistry.

- **By the end of III semester, each and every II degree chemistry student can attain the knowledge in the following topics and come to know their role in serving the society through chemistry.**

CO 1. Properties of d and f block elements.

CO 2. Boding nature of the metals.

CO 3. Preparation, properties and applications of halogen compounds, hydroxyl compounds, carbonyl Compounds and carboxylic acids.

CO 4. Importance and synthetic applications of active methylene compounds.

CO 5. Estimation of Fe (II) and Cu (II) in the unknown material through practical.

CO 6. Reactions of some functional groups like phenols, carboxylic acids, aldehydes, ketones, amines and Amides.

- **By the end of IV semester, each and every II degree chemistry student can attain the knowledge in the following topicss and come to know their role in serving the society through chemistry.**

CO 1. Different types of Electronic transitions present in Organic molecules..

CO 2. Identification of Functional groups using IR spectrum.

CO 3. Analysis of Cr and Mn using spectrophotometer.

CO 4. Structural identifications of organic compounds using H^1-NMR

CO 5. Different aspects of electrochemistry.

CO 6. Identification of functional group present in the given organic compound by IR spectral analysis.

CO 7. Importance of conductometric techniques by doing strength of acids and bases.

- **By the end of V semester, each and every III degree chemistry student can obtain the knowledge in the following topics and come to know how to serve the society by becoming a chemist.**

CO 1. Involved theories and properties of coordination compounds.

CO 2. Preparation and properties of nitrogen compounds.

CO 3. Importance, preparations, properties and medicinal uses of heterocyclic compounds.

CO 4. Structural elucidation of glucose and fructose.

CO 5. Importance of Amino acids and Proteins.

CO 5. Determination of Rate of the reactions through chemical kinetics.

CO 6. Some photochemical reactions photophysical processes.

CO 7. Importance of thermo dynamical aspects.

CO 8. Identification of functional group present in the given organic compound by following organic qualitative analysis.

CO 9. Determination of surface tension and viscosity of some liquids.

- **By the end of VI semester, each and every III degree chemistry student can get the knowledge in the following topics depending on their choice/interest and come to know how to serve the society by becoming a chemist.**

CO 1. Various types of instrumental techniques like IR and NMR spectroscopies.

CO 2. Different aspects of Environmental Chemistry.

CO 3. Importance of green chemistry.

CO 4. Analyses of drugs, dairy products

CO 6. Importance of petrochemicals.

CO 7. Preparation of some organic compounds.

CO 8. Synthesis of organic compounds using green synthesis.

CO 9. Hands on experience in operating colorimeters, pH meters and potentiometers.

CO 10. Submission of a project work.

OUT COMES

After completion of B.Sc. course the students will be able to:

1. Acquire comprehensive knowledge in physical inorganic and organic chemistry.
2. Acquire experimental skills in chemical analysis.
3. Apply their knowledge and understanding in new situations.
4. Have industrial exposure by visiting nearby industry plants.
5. Achieve good ranks in PG entrance examinations.
6. Acquire employable skills and become industry ready persons.
7. Get motivation for research by carrying out projects.
8. Gain leader ship quality by participation in extension programs and group projects etc

P. R. GOVERNMENT COLLEGE, KAKINADA

SYLLABUS FOR SEMESTER – II (CHEMISTRY)

Paper II (Organic & General Chemistry) 60 hrs. (4h/w)

Course outcomes:

At the end of the course, the student will be able to;

1. Understandand explain the differential behavior of organic compounds based on fundamental concepts learnt.
2. Formulate theme chanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
3. Learn and identify many organic reaction mechanisms including FreeRadical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
4. Correlate and describe the stereochemical properties of organic compounds and reactions.

ORGANIC CHEMISTRY **36h**

UNIT-I

Recapitulation of Basics of Organic Chemistry

Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes) **12h**

General methods of preparation of alkanes- Wurtz and WurtzFittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties, Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of monosubstituted cyclohexane.

UNIT-II

Carbon-Carbon pi Bonds (Alkenes and Alkynes) **12h**

General methods of preparation, physical and chemical properties. Mechanism ofE1,E2,E1cbreactions,Saytzeff and Hoffmann eliminations,Electrophilic Additions, mechanism(Markownikoff/Antimarkownik of addition) with suitableexamples,,*syn*and*anti*-addition; addition of H_2,X_2,HX. oxymercuration-

demercuration, hydroboration-oxidation, ozonolysis, hydroxylation, Diels Alderreaction,1,2-and1,4-additionreactionsinconjugateddienes.

Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.

UNIT-III

Benzene and its reactivity **12h**

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropyliumcation)

Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel- Craft's alkylation and acylation. Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO_2 and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups

(ii) Halogens

(Explanation by taking minimum of one example from each type)

GENERAL CHEMISTRY **24 h**

UNIT-IV

1. Surface chemistry and chemical bonding

Surface chemistry **6h**

Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids,Protection of Colloids, Gold number.

Adsorption-Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.

2. Chemical Bonding **6h**

Valence bond theory, hybridization, VB theory as applied toClF_3**,**$Ni(CO)_4$**,** Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N_2, O_2, CO and NO).

3. HSAB **2h**

Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.

UNIT-V

Stereochemistry of carbon compounds **10h**

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.

Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

D,L, R,S and E,Z- configuration with examples.

Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)

Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Worksheets and Quizzes Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

List of Reference

Books Theory:

Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).

Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.

Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

Practical:

Ahluwalia, V.K. &Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
Ahluwalia, V.K. &Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

Additional Resources:

Solomons, T. W. G.; Fryhle, C. B. &Snyder, S. A. Organic Chemistry, 12th Edition, Wiley.
Bruice, P. Y. Organic Chemistry, Eighth Edition, Pearson.
Clayden, J.; Greeves, N.&Warren, S. Organic Chemistry, Oxford.
Nasipuri, D. Stereochemistry of Organic Compounds: Principles and Applications, Third Edition, NewAge International.
Gunstone, F. D. Guidebook to Stereochemistry, Prentice Hall Press, 1975.

P. R. GOVERNMENT COLLEGE, KAKINADA

SYLLABUS FOR SEMESTER – II (CHEMISTRY)

Paper II (Physical & General Chemistry)

Weightage to content

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (5M)	Total No. Of Questions from each Unit	Total No. of Marks allotted to each Unit
	Organic Chemistry				
1	Unit - I	1	1	2	15
2	Unit - II	1	2	3	20
3	Unit - III	2	1	3	25
	General Chemistry				
4	Unit - IV	2	2	4	35
5	Unit - V	2	2	4	25
	TOTAL	**8**	**8**	**16**	**120**

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

Practical-II Volumetric Analysis

(At the end of Semester-II)

Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria
3. Learn and identify the concepts of a standard solutions, primary and secondary standards
4. Facilitate the learner to make solutions of various molar concentrations. This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

Volumetric analysis **50 M**

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of Fe (II) using $KMnO_4$ with oxalic acid as primary standard.

3. Determination of Cu (II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.
4. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – II (CHEMISTRY)
Paper II (Physical & General Chemistry)

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

PART- A 4 X 5 = 20 Marks

Answer any Four of the following questions. Each carries FIVE 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 4 X 10 = 40 Marks

Answer ALL the questions. Each carries TEN 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 –IV (OR)
    Question from Unit – IV
12. Question from Unit – V (OR)
    Question from Unit – V

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER-II
CHEMISTRY Course-I: ORGANIC & GENERAL CHEMISTRY
Question bank

Unit – I

ESSAY QUESTIONS

1. Write any two preparation methods of alkanes and Explain Halogenation of alkanes?
2. Explain Baeyer Strain Theory?
3. Draw the conformations of Cyclohexane and explain their stability by drawing energy profile diagram?

SHORT ANSWER QUESTIONS

1. Write different conformations of n-butane. Explain their relative stability.
2. Explain concept of relative reactivity v/s selectivity in halogenation of alkanes?
3. Explain Conformations of mono substituted cyclohexane.

Unit – II

ESSAY QUESTIONS

1. Write any two preparation methods and three chemical properties of alkenes?
2. Explain the mechanism of Markonikoff and Anti-Markonikoff addition of HBr to alkene?
3. Explain mechanism of E1 and E2 with suitable examples?

SHORT ANSWER QUESTIONS

1. Explain about Diel's – Alder reactions with examples?
2. Explain briefly Ozonolysis of alkenes?
3. Explain 1,2- & 1,4- addition reactions of conjugated dienes?
4. Explain the acidity of 1-alkynes?

Unit – III

SHORT ANSWER QUESTIONS

1. Define Huckel rule of aromatic compounds and explain with one example?
2. What are Benzenoid and non-Benzenoid aromatic compounds? Give examples?
3. Explain the mechanisms of Nitration of Benzene?
4. Explain the mechanisms of Friedel-Craft's alkylation of Benzene
5. Explain the orientation effect of Methoxy group on mono substituted benzene

Unit – IV

ESSAY QUESTIONS

1. Derive Langmuir adsorption isotherm.
2. Draw the Molecular Orbital Energy diagram of N_2 and CO molecules and explain their bond order and magnetic behavior?
3. Draw the Molecular Orbital Energy diagram of O_2 and NO molecules and explain their bond order and magnetic behavior?

SHORT ANSWER QUESTIONS

1. Write the difference between Physical adsorption and Chemical adsorption.
2. Explain applications of adsorption.
3. Explain the structure of Ni $(CO)_4$ by Valence Bond theory?
4. Explain HSAB principle with examples?

Unit – V

ESSAY QUESTIONS

1. Explain Cahn Ingold and Prelog rules for assigning R, S configuration to optically active molecules with examples
2. Define optical isomerism. Explain the optical isomerism in Lactic acid and tartaric acid.
3. Explain Cahn Ingold and Prelog rules for assigning E - Z configuration with examples.

SHORT ANSWER QUESTIONS

1. Draw Wedge and Fischer molecular representations with an example.
2. Define Optical activity and Specific rotation?
3. Explain D, L – Nomenclature with example?
4. Define Enantiomers and Diastereomers and give one example for each.