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

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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
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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	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	100	03
			VIII-A-2	100	03
			VIII-A-3	100	03
			Practical	50	02
			Practical	50	02
			Project	50	02
	VI	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
			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 (AUTONOMOUS)-KAKINADA
III YEAR
SEMESTER -VI – General Electives
ELECTIVE Paper – VII-(A)
ANALYTICAL METHODS IN CHEMISTRY

45hrs (3h / w)

Quantitative analysis: 10h

a) Importance in various fields of science, steps involved in chemical analysis**.** Principles of volumetric analysis: Theories of acid-base, redox, complexometric, iodometric and precipitation titrations - choice of indicators for these titrations.

b) Principles of gravimetric analysis: precipitation, coagulation, peptization, co-precipitation, post precipitation, digestion, filtration and washing of precipitate, drying and ignition.

UNIT-II

Treatment of analytical data: **7h**

Types of errors, significant figures and its importance, accuracy - methods of expressing accuracy, error analysis and minimization of errors, precision - methods of expressing precision, standard deviation and confidence limit.

UNIT-III

Separation techniques in chemical analysis: 8h

Solvent extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism. Application - Determination of Iron (III)

Ion exchange: Introduction, action of ion exchange resins, separation of inorganic mixtures, applications, Solvent extraction: Principle and process,

UNIT – IV 10h

Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, R_f values, factors effecting R_f values.

Paper Chromatography: Principles, R_f values, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial. Two dimensional chromatography, applications.

UNIT -V 10h

Thin layer Chromatography (TLC): Advantages. Principles, factors effecting R_f values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications

HPLC: Basic principles and applications.

List of Reference Books for Analytical Methods in Chemistry

1. Analytical Chemistry by Skoog and Miller
2. A textbook of qualitative inorganic analysis by A.I. Vogel
3. Nanochemistry by Geoffrey Ozin and Andre Arsenault
4. Stereochemistry by D. Nasipuri
5. Organic Chemistry by Clayden

LABORATORY COURSE – VI

Practical Paper – VII-(A) (at the end of semester VI) 30hrs (2 h / W)

50M

1. Identification of amino acids by paper chromatography.
2. Determination of Zn using EDTA
3. Determination of Mg using EDTA

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper –VII A: ELECTIVE – A: ANALYTICAL METHODS IN 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
1	**Unit -I**	**2**	**2**	**4**	**30**
2	**Unit –II**	1	1	2	15
3	**Unit –III**	2	1	3	25
4	**Unit –IV**	2	2	4	30
5	**Unit -V**	**2**	**2**	**4**	**30**
	TOTAL	**9**	**8**	**17**	**130**

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper –VII A: ELECTIVE – A: ANALYTICAL METHODS IN CHEMISTRY

Duration: 2.30 hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. Describe the acid-base titrations.
2. Explain co-precipitation and post precipitation with suitable examples.
3. Discuss various types of errors.

Section-II

4. Write the principle and applications of solvent extraction.
5. Explain any two methods for solvent extraction.
6. Give the experimental procedure of paper chromatography. Write any two of its applications.

Section-III

7. Write the preparation of thin layer chromatography plates. Explain the principle and applications of thin layer chromatography.
8. Discuss about column chromatography.
9. What is chromatography? Briefly explain the classification of chromatography.

Section-IV

Answer any **four** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Discuss the complexometric titrations with examples.
11. Explain about precipitation and coagulation
12. Write about standard deviation.
13. How do you estimate Fe(III) using solvent extraction method?
14. Describe the development of chromatogram in paper chromatography.
15. What are the factors affecting Rf values?
16. What type of adsorbents and solvents used in thin layer chromatography?
17. Write the applications of high performance liquid chromatography.

P.R.GOVERNMENT COLLEGE (AUTONOMOUS)-KAKINADA
THIRD YEAR 2019-20

SEMESTER-VI

ELECTIVE PAPER – VII-(B): ENVIRONMENTAL CHEMISTRY

45 hrs (3 h / w)

UNIT-I

Introduction **9h**

Concept of Environmental chemistry-Scope and importance of environment in now adays – Nomenclature of environmental chemistry – Segments of environment - Natural resources – Renewable Resources – Solar and biomass energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydrological cycle.

UNIT-II

Air Pollution **9h**

Definition – Sources of air pollution – Classification of air pollution – Acid rain – Photochemical smog – Greenhouse effect – Formation and depletion of ozone – Bhopal gas disaster – Controlling methods of air pollution.

UNIT-III

Water pollution **9h**

Unique physical and chemical properties of water – water quality and criteria for finding of water quality – Dissolved oxygen – BOD, COD, Suspended solids, total dissolved solids, alkalinity – Hardness of water – Methods to convert temporary hard water into soft water – Methods to convert permanent hard water into soft water – eutrophication and its effects – principal wastage treatment – Industrial waste water treatment.

UNIT-IV

Chemical Toxicology **9h**

Toxic chemicals in the environment – effects of toxic chemicals – cyanide and its toxic effects – pesticides and its biochemical effects – toxicity of lead, mercury, arsenic and cadmium.

UNIT-V

Ecosystem and biodiversity **9h**

Ecosystem

Concepts – structure – Functions and types of ecosystem – Abiotic and biotic components – Energy flow and Energy dynamics of ecosystem – Food chains – Food web – Tropic levels – Biogeochemical cycles (carbon, nitrogen and phosphorus)

Biodiversity

Definition – level and types of biodiversity – concept - significance – magnitude and distribution of biodiversity – trends - biogeographically classification of India – biodiversity at national, global and regional level.

List of Reference books

1. Fundamentals of ecology by M.C.Dash
2. A Text book of Environmental chemistry by W. Moore and F.A. Moore
3. Environmental Chemistry by Samir k. Banerji

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper –VII B: ELECTIVE – B: ENVIRONMENTAL 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
1	**Unit -I**	**2**	**2**	**4**	**30**
2	**Unit –II**	2	2	4	30
3	**Unit –III**	2	1	3	25
4	**Unit –IV**	1	1	2	15
5	**Unit -V**	**2**	**2**	**4**	**30**
	TOTAL	**9**	**8**	**17**	**130**

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper –VII B: ELECTIVE – B: ENVIRONMENTAL CHEMISTRY

Duration: 2.30 hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section **4X10=40Marks**

Section-I

1. Explain the segments of the environment
2. Write about renewable energy sources.
3. What are the toxic effects of cyanide on the environment?

Section-II

4. Discuss in detail about air pollution.
5. Describe the Greenhouse effect.
6. What are the quality parameters of water?

Section-III

7. Give the methods to convert permanent hard water to soft water.
8. Describe the types of ecosystem.
9. Give detailed account on biodiversity.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Explain the importance of environment in now-a-days.
11. Write about hydrological cycle.
12. Short note on acid rains.
13. What is Bhopal gas disaster?
14. Give about the hardness of water.
15. Explain the toxicity of mercury.
16. What are the functions of eco system?
17. Discuss briefly about food chain.

LABORATORY COURSE – VI

Practical Paper – Elective VII B (at the end of semester VI) **30 hrs (2 h / W)**

1. Determination of carbonate and bicarbonate in water samples
2. Determination of hardness of water using EDTA
   a) Permanent hardness
   b) Temporary hardness
3. Determination of Acidity of water samples
4. Determination of Alkalinity of water samples
5. Determination of chlorides present in water samples

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper –VII B: ELECTIVE – B: ENVIRONMENTAL CHEMISTRY

Question bank

Essay questions

1. Explain different segments of environment.
2. Explain different renewable and non-renewable energy resources.
3. Write different source of air pollution and explain the effects of air pollution
4. What is acid rain how is it formed write equations ? what are its effects?
5. Explain formation and depletion of ozone layer. write the effects of ozone depletion.
6. What are the causes of temporary hardness write the methods to temporary hard water into soft water.
7. What are the causes of permanent hardness write the methods to permanent hard water into soft water.
8. Explain any four water quality parameters.
9. Explain the toxic effects of lead ,mercury and arsenic.
10. Write the types and functions of eco system.
11. Explain carbon and nitrogen cycles.
12. Explain bio diversity at regional, national and global level.

Short answer

1. Explain the terms with examples
   a) Pollutant b) contaminant
2. Explain the terms with examples
   a) Receptor
   b) sink
3. Reaction of atmospheric oxygen
4. Explain green house effect.
5. Explain Bhopal gas disaster.
6. What is utrophication write its effects.
7. Write the toxic effect of cyanides.
8. Write bio chemical effects of pesticides.
9. Explain food chain.
10. Explain biodiversity and write different types of biodiversity.
11. Write about significance of bio diversity.
12. Explain any two control methods of air pollutions.

SEMESTER-VI

ELECTIVE PAPER – VII-(C) GREEN CHEMISTRY

45 hrs (3 h / w)

UNIT-I **10h**

Green Chemistry: Introduction- Definition of green Chemistry, need of green chemistry, basic principles of green chemistry. Green synthesis- Evalution of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic). Organic reactions by Sonication method: apparatus required examples of sonochemical reactions (Heck, Hundsdiecker and Wittig reactions).

UNIT-II **10h**

Selection of solvent:i) Aqueous phase reactions ii) Reactions in ionic liquids, Heckreaction, Suzuki reactions, epoxidation. iii) Solid supported synthesis

Super critical CO_2: Preparation, properties and applications, (decaffeination, dry cleaning)

UNIT-III **10h**

Microwave and Ultrasound assisted green synthesis: Apparatus required, examples of MAOS (synthesis of fused anthro quinones, Leukart reductive amination of ketones) - Advantages and disadvantages of MAOS. Aldol condensation-Cannizzaro reaction- Diels-Alder reactions-Strecker's synthesis

UNIT-IV **5h**

Green catalysis: Heterogeneous catalysis, use of zeolites, silica, alumina, supported catalysis-biocatalysis: Enzymes, microbes Phase transfer catalysis (micellar/surfactant)

UNIT V **10h**

Examples of green synthesis / reactions and some real world cases: 1. Green synthesis of the following compounds: adipic acid , catechol , disodium imino di acetate (alternative Strecker's synthesis) 2. Microwave assisted reaction in water – Hoffmann elimination – methyl benzoate to benzoic acid – oxidation of toluene and alcohols – microwave assisted reactions in organic solvents. Diels-Alder reactions and decarboxylation reaction. 3. Ultrasound assisted reactions – sonochemical Simmons –Smith reaction(ultrasonic alternative to iodine)

Reference books: Vii-(C) Green Chemistry

1. Green Chemistry Theory and Practice. P.T.Anatas and J.C. Warner
2. Green Chemistry V.K. Ahluwalia Narosa, New Delhi.
3. Real world cases in Green Chemistry M.C. Cann and M.E. Connelly
4. Green Chemistry: Introductory Text M.Lancaster: Royal Society of Chemistry (London)
5. Green Chemistry: Introductory Text, M.Lancaster
6. Principles and practice of heterogeneous catalysis, Thomas J.M.,Thomas M.J., John Wiley
7. Green Chemistry: Environmental friendly alternatives R S Sanghli and M.M Srivastava, Narosa Publications

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper –VII C: ELECTIVE – C: GREEN CHEMISTRY

Weightage to content

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2	**Unit –II**	2	2	4	30
3	**Unit –III**	2	2	4	30
4	**Unit –IV**	1	1	2	15
5	**Unit -V**	**2**	**1**	**3**	**25**
	TOTAL	**9**	**8**	**23**	**130**

LABORATORY COURSE – VII
Practical Paper – Elective VII C (at the end of semester VI) 30 hrs (2 h/W)

1. Determination of specific reaction rate of hydrolysis for methyl acetate catalysed by hydrogen ion at room temperature**.**

2. Determination of molecular status and partition coefficient of benzoicacidin Benzene and water.

3. Surface tension and viscosity of liquids.

4. Adsorption of acetic acid on animal charcoal, verification of Freundlisch isotherm.

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper –VII C: ELECTIVE – C: GREEN CHEMISTRY

Duration: 2.30 hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section **4X10=40Marks**

Section-I

1. Explain the basic principles of green chemistry
2. Illustrate the sonication method with any two reactions
3. What are phase transfer catalysts? How do they function?

Section-II

4. Write about the reactions in ionic liquids.
5. Describe the preparation and properties of super critical carbon dioxide.
6. Explain the synthesis of fused anthroquinines by microwave assisted organic synthesis.

Section-III

7. Write the green synthesis procedures for cannizaro reaction and aldol condensation.
8. How are adipic acid and catechol prepared by green synthesis?
9. Describe the green synthesis of Diels-Alder reaction and Hoffmann elimination.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. What is the need of green chemistry?
11. Write a note on atom economy reactions.
12. Write short notes on Heck reaction.
13. Write about solid supported synthesis.
14. Write the green synthetic procedure for the Diels-alder reaction
15. Write short notes on Bio catalysis.
16. How do you perform Strecker's synthesis by green synthesis method?
17. Discuss about Ultrasound assisted reactions.

CLUSTER ELECTIVES: Cluster Elective – I Analytical and Physical
SEMESTER-VI

PAPER – VIII-A-1: POLYMER CHEMISTRY

45 hrs (3 h / w)

UNIT-I **12h**

Introduction of polymers:

Basic definitions, degree of polymerization ,classification of polymers- Natural and Synthetic polymers, Organic and Inorganic polymers, Thermoplastic and Thermosetting polymers, Plastics, Elastomers , Fibers and Resins, Linear ,Branched and Cross Linked polymers, Addition polymers and Condensation Polymers, mechanism of polymerization. Free radical, ionic and Zeigler – Natta polymerization.

UNIT-II **10h**

Techniques of Polymerization : Bulk polymerization , solution polymerization , suspension and Emulsion polymerization.

Molecular weights of polymers: Number average and weight average molecular weights Determination of molecular weight of polymers by Viscometry , Osmometry and light scattering methods.

UNIT-III **6h**

Kinetics of Free radical polymerization, Glass Transition temperature(Tg) and Determination of Tg: Free volume theory, WLF equation, factors affecting glass transition temperature (Tg).

UNIT-IV **9h**

Polymer additives:

Introduction to plastic additives – fillers, Plasticizers and Softeners , Lubricants and Flow Promoters, Anti aging additives , Flame Retardants , Colourants , Blowing agents , Cross linking agents ,Photo stabilizers , Nucleating agents.

UNIT-V **8h**

Polymers and their applications:

Preparation and industrial applications of Polyethylene, Polyvinyl chloride, Teflon, Polyacrylonitrile, Terelene , Nylon6.6 silicones.

Reference Books:

1. Seymour, R.B. & Carraher, C.E. Polymer Chemistry: An Introduction, Marcel Dekker, Inc. New York, 1981.
2. Odian, G. Principles of Polymerization, 4th Ed. Wiley, 2004.
3. Billmeyer, F.W. Textbook of Polymer Science, 2nd Ed. Wiley Interscience, 1971.
4. Ghosh, P. Polymer Science & Technology, Tata McGraw-Hill Education, 1991.34
5. Lenz, R.W. Organic Chemistry of Synthetic High Polymers. Interscience Publishers, NewYork, 1967.

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-A-1: POLYMER CHEMISTRY

Duration: 2.30 hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section **4X10=40Marks**

Section-I

1. Give an account of classification of polymers.
2. Write the mechanism of free radical polymerization.
3. What is glass transition temperature? How is it measured?

Section-II

4. How is molecular weight of a polymer determined by viscometry?
5. Give an account on bulk and solution polymerization techniques.
6. Discuss the use of fillers and plasticizers in improving the properties of polymers.

Section-III

7. Write notes on flame retardants and cross linking agents.
8. Write the preparation and industrial applications of polythene and teflon.
9. Write the preparation and industrial applications of terelene and nylon-6,6.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. What are thermo plastics and thermo setting plastics?
11. Write about condensation polymerization.
12. Define number average and weight average molecular weights.
13. Write a note on emulsion polymerization.
14. Give the Williams-Landel-Ferry equation.
15. Illustrate the lubricants and flow promoters
16. Write the preparation and industrial applications of PVC
17. Write the preparation and industrial applications of PAN

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-A-1: POLYMER CHEMISTRY

Weightage to content

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2	**Unit –II**	**2**	**2**	**4**	**30**
3	**Unit –III**	1	1	2	15
4	**Unit –IV**	2	1	3	25
5	**Unit -V**	**2**	**2**	**4**	**30**
	TOTAL	**9**	**8**	**17**	**130**

SEMESTER-VI

PAPER – VIII-A-2: INSTRUMENTAL METHODS OF ANALYSIS

45 hrs (3 h / w)

UNIT – I

Introduction to spectroscopic methods of analysis: **4 h** Recap of the spectroscopic methods covered in detail in the core chemistry syllabus: Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental methods. Consideration of electromagnetic radiation.

UNIT – II

Molecular spectroscopy: **8h**

Infrared spectroscopy:

Interactions with molecules: absorption and scattering. Means of excitation (light sources), separation of spectrum (wavelength dispersion, time resolution), detection of the signal (heat, differential detection), interpretation of spectrum (qualitative, mixtures, resolution), advantages of Fourier Transform (FTIR). Samples and results expected. Applications: Issues of quality assurance and quality control, Special problems for portable instrumentation and rapid detection.

UNIT – III **10h**

UV-Visible/ Near IR – emission, absorption, fluorescence and photoaccoustic. Excitation sources (lasers, time resolution), wavelength dispersion (gratings, prisms, interference filters,laser, placement of sample relative to dispersion, resolution), Detection of signal (photocells, photomultipliers, diode arrays, sensitivity and S/N), Single and Double Beam instruments, Interpretation (quantification, mixtures, absorption vs. fluorescence and the use of time, photoaccoustic, fluorescent tags).

UNIT – IV

Separation techniques

Chromatography: Gas chromatography, liquid chromatography, supercritical fluids, Importance of column technology (packing, capillaries), Separation based on increasing number of factors (volatility, solubility, interactions with stationary phase, size, electrical field), Detection: simple vs. specific (gas and liquid), Detection as a means of further analysis (use of tags and coupling to IR and MS), Electrophoresis (plates and capillary) and use with DNA analysis. 46 Immunoassays and DNA techniques **8h**

Mass spectroscopy: Making the gaseous molecule into an ion (electron impact, chemical ionization), Making liquids and solids into ions (electrospray, electrical discharge, laser desorption, fast atom bombardment), Separation of ions on basis of mass to charge ratio, Magnetic, Time of flight, Electric quadrupole. Resolution, time and multiple separations, Detection and interpretation (how this is linked to excitation). **8h**

UNIT – V
Elemental analysis:10h

Mass spectrometry (electrical discharges).

Atomic spectroscopy: Atomic absorption, Atomic emission, and Atomic fluorescence. Excitation and getting sample into gas phase (flames, electrical discharges, plasmas), Wavelength separation and resolution (dependence on technique), Detection of radiation (simultaneous/scanning, signal noise), Interpretation (errors due to molecular and ionic species, matrix effects, other interferences).

NMR spectroscopy: **P**rinciple, Instrumentation, Factors affecting chemical shift, Spin coupling, Applications. **4h**

Electroanalytical Methods: Potentiometry & Voltammetry **4h**

Radiochemical Methods

4h

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-A-2: INSTRUMENTAL METHODS OF ANALYSIS

Weightage to content

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2	**Unit –II**	**2**	**2**	**4**	**30**
3	**Unit –III**	**2**	**2**	**4**	**30**
4	**Unit –IV**	2	2	4	30
5	**Unit -V**	**2**	**1**	**3**	**25**
	TOTAL	**9**	**8**	**17**	**130**

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-A-2: INSTRUMENTAL METHODS OF ANALYSIS

Duration: 2.30 hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. Write about classification of analytical methods.
2. Describe the absorption and scattering behavior of molecules.
3. Write the applications of IR spectroscopy.

Section-II

4. Give detailed account on photocells, photo multipliers and diode-array detectors.
5. How do you differentiate absorption and fluorescence?
6. Discuss the principle and uses of gas-liquid chromatography

Section-III

7. Explain the principle of mass spectrometry.
8. Describe the various activities involved in AAS analysis. AAS
9. Explain the principle and instrumentation of NMR spectroscopy.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Explain about significant figures with examples.
11. What are the advantages of FTIR?
12. Write applications of ir spectroscopy in quality assurance and quality control
13. Discuss the various techniques of wavelength dispersion.
14. How double beam instruments are superior to single beam instruments?
15. What is electrophoresis? How is it used in DNA analysis?
16. Describe the procedure for column packing.
17. What are the factors affecting chemical shift?

SEMESTER-VI

PAPER – VIII-A-3 : ANALYSIS OF DRUGS, FOODS , DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS

45 hrs (3 h / w)

UNIT- I

Analysis of the following drugs and pharmaceuticals preparations: (Knowledge of molecular formula, structure and analysis) Analysis of anlgesics and antipyretics like aspirin and paracetamol Analysis of antimalerials like choloroquine .
Analysis of drugs in the treatment of infections and infestations :Amoxycillin., chloramphenicol, metronidazole, penicillin, tetracycline, cephalexin(cefalexin).
Anti tuberculous drug- isoniazid.

UNIT - II

Analysis of the following drugs and pharmaceuticals preparations: (Knowledge of molecular formula, structure and analysis)
Analysis of antihistamine drugs and sedatives like: allegra, zyrtec(citirizine), alprazolam, trazodone, lorazepem, ambien(zolpidem), diazepam,

UNIT - III

Analysis of anti epileptic and anti convulsant drugs like phenobarbital and phenacemide.
Analysis of drugs used in case of cardiovascular drugs:atenolol, norvasc(amlodipine), Analysis of lipitor(atorvastatin) a drug for the preventin of productin of cholesterol.
Analysis of diuretics like: furosemide (Lasix), triamterene
Analysis of prevacid(lansoprazole) a drug used for the prevention of production of acids in stomach.

UNIT - IV

Analysis of Milk and milk products: Acidity, total solids, fat, total nitrogen, protenines,lactose, phosphate activity, casein, choride. Analysis of food materials- Preservatives: Sodium carbonate, sodium benzoate sorbic acid Coloring matters, - Briliant blue FCF, fast green FCF, tertrazine, erytrhosine , sunset yellow FCF.
Flavoring agents - Vanilla , diacetyl, isoamyl acetate, limonene, ethylpropionate , allyl hexanoate and Adulterants in rice and wheat, wheat floo0r, sago,coconut oil, coffee powder, tea powder, milk..

UNIT - V

Clinical analysis of blood:Composition of blood,clinical analysis,trace elements in the body.Estimation of blood chlolesterol,glucose,enzymes,RBC & WBC ,Blood gas analyser.

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-A-3:
ANALYSIS OF DRUGS, FOODS, DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS

Weightage to content

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3	**Unit –III**	2	1	3	25
4	**Unit –IV**	2	2	4	30
5	**Unit -V**	1	1	2	15
	TOTAL	**9**	**8**	**17**	**130**

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-A-3: ANALYSIS OF DRUGS, FOODS, DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS

Duration: 2.30 hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. How do you prepare and analyze chloroquine?
2. How do you prepare and analyze aspirin?
3. Write the preparation and analysis of allegra.

Section-II

4. Write the preparation and analysis of diazepam.
5. Describe the analysis of any one cardiovascular drug.
6. Describe the analysis of Lasix

Section-III

7. Give an account of analysis of milk with respect to fat casein.
8. Explain the procedure for the estimation of any two coloring agents
9. Give in detail the estimation of cholesterol and glucose of blood.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Define analgesics and antipyretics
11. Write the preparation method of chloramphenicol.
12. Write the analysis of any one of the antihistamine drugs.
13. Write the analysis of zyrtec
14. How is lansoprazole estimated?
15. What are flavoring agents? Give examples.
16. How are wheat and wheat flour adulterated?
17. How do you estimate the glucose in the blood?

I. LABORATORY COURSE – VIII

Practical Paper – VIII-A-1: (at the end of semester VI) 30 hrs (2 h / W)

1. Preparation of Aspirin
2. Preparation of Paracetamol
3. Preparation of Acetanilide
4. Preparation of Barbutiric Acid
5. Preparation of Phenyl Azo β-naphthol

II. LABORATORY COURSE – VIII Practical Paper – VIII-A-2 (at the end of semester VI)

30 hrs (2 h / W)

Green procedure for organic qualitative analysis: Detection of N, S andhalogens 2.Acetylation of 1^0 amine by green method: Preparation of acetanilide

3. Rearrangement reaction in green conditions: Benzil-Benzilic acid rearrangement
4. Electrophilic aromatic substitution reaction: Nitration of phenol
5. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
6. Green oxidation reaction: Synthesis of adipic acid
7. Green procedure for Diels Alder reaction between furan and maleic anhydride

VII-A-3 Practical:- Project Work

Cluster Elective –II

Fuels and Industrial Inorganic materials

PAPER – VIII-B-1 : FUEL CHEMISTRY AND BATTERIES

45 hrs (3 h / w)

UNIT –I **12h**

Review of energy sources (renewable and non-renewable) – classification of fuels and their calorific value. Coal: Uses of Coal (fuel and non fuel) in various industries , its composition , carbonization of coal - coal gas , producer gas and water gas – composition and uses – fractionation of coal tar – uses of coal tar based chemicals , requisites of a good metallurgical coke , coal gasification (Hydro gasification and catalytic gasification) coal liquefaction and solvent refining.

UNIT-II **6h**

Petroleum and petrol chemical industry:
Composition of crude petroleum , refining and different types of petroleum products and their applications.

UNIT-III **10h**

Fractional distillation (principle and process) , cracking (Thermal and catalytic cracking). Reforming petroleum and non petroleum fuels (LPG , CNG , LNG , biogas)
,fuels derived from biomass , fuel from waste , synthetic fuels (gaseous and liquids) , clear fuels , petro chemicals : vinyl acetate , propylene oxide , isoprene , butadiene , toluene and its derivative xylene.

UNIT-IV **10h**

Lubricants:
Classification of lubricants , lubricating oils(conducting and non conducting) , solid and semi solid lubricants , synthetic lubricants. Properties of lubricants (viscosity index , cloud point , pore point) and their determination.

UNIT-V **7h**

Batteries:

Primary and secondary batteries, battery components and their role, Characteristics of Battery. Working of following batteries: Pb acid, Li-Battery, Solid state electrolyte battery. Fuel cells, Solar cell and polymer cell.

Reference books:

1. E.Stochi : Industrial chemistry , Vol-1,Ellis Horwood Ltd.UK
2. P.C.Jain , M.Jain: Engineering chemistry, Dhanpat Rai &sons , Delhi.
3. B.K.Sharma: Industrial Chemistry , Goel Publishing house , Meerut

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-B-1: FUEL CHEMISTRY AND BATTERIES
Duration: 2.30hrs. Max. Marks: 60

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. Give in detail about renewable and non–renewable energy sources.
2. Write about the composition and uses of producer gas and water gas
3. Explain the composition of the crude petroleum.

Section-II

4. Discuss about fractional distillation.
5. Write about the non-petroleum fuels
6. Explain the classification of lubricants.

Section-III

7. What are the properties of lubricants?

8. Write about the primary and secondary batteries.
9. Write about the working of the following batteries:
   a. Pb acid ii) Li-Battery

Section-IV

Answer any **FOUR** uestions. Each question carries **FIVE** marks. **4X5=20Marks**

10. What are the uses of coal in various industries?
11. Discuss the gasification of coal.
12. Write the applications of different petroleum products.
13. Short note on cracking
14. Write about synthetic fuels.
15. What are conducting and non-conducting lubricating oils?
16. Explain the classification of lubricants.
17. Write short notes on Fuel cells.

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-B-1: FUEL CHEMISTRY AND BATTERIES

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	TOTAL	**9**	**8**	**17**	**130**

SEMESTER-VI

PAPER – VIII-B-2:

INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

45 hrs (3 h / w)

UNIT - I

Recapitulation of *s*- and *p*-Block Elements **8h**

Periodicity in *s*- and *p*-block elements with respectto electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling, Mulliken, and Alfred - Rochow scales). Allotropy in C, S, and P. Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.

UNIT – II **15h**

Silicate Industries

Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

Ceramics: Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibre.

Cements*:* Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

UNIT – III **8h**

Fertilizers:

Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate.

UNIT – IV **8h**

Surface Coatings:

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, Vehicle, modified oils, Pigments, toners and lakes pigments, Fillers, Thinners, Enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings (electrolytic and electroless), metal spraying and anodizing.

UNIT – V **6h**

Alloys:

Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demanganization, desulphurization dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.

Chemical explosives:

Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX). Introduction to rocket propellants.

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-B-2: INORGANIC
MATERIALS OF INDUSTRIAL IMPORTANCE

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
1	**Unit -I**	2	2	4	30
2	**Unit –II**	2	2	4	30
3	**Unit –III**	1	1	2	15
4	**Unit –IV**	2	1	3	25
5	**Unit -V**	2	2	4	30
	TOTAL	**9**	**8**	**17**	**130**

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-B-2: INORGANIC
MATERIALS OF INDUSTRIAL IMPORTANCE

Duration:2.30hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. Describe the anomalous behavior of lithium and boron.
2. Discuss the unusual oxidation states of carbon and nitrogen.
3. Give the composition and properties of coloured glass and photosensitized glass.

Section-II

4. Explain the manufacturing of cement and its setting process.
5. Write about the manufacturing of any two phosphorous fertilizers.
6. Discuss in detail the special paints.

Section-III

7. Explain about metallic coatings.
8. Give the process of manufacturing of steel.
9. Write the preparation and explosive properties of RDX.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Explain the Pauling scale of electronegativity.
11. Write about diagonal relationship.
12. Discuss the classification of glasses.
13. Quick setting cements.
14. Describe the manufacturing of urea.
15. What are emulsifying agents? Give examples.
16. Write note on non-ferrous alloys.
17. Explain the properties of steels.

SEMESTER-VI

SEMESTER-VI

PAPER – VIII-B-3:

ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS

45 hrs (3 h / w)

UNIT-I

Analysis of soaps: moisture and volatile matter, combined alkali, total fatty matter, free alkali, total fatty acid, sodium silicate and chlorides.

Analysis of paints :Vehicle and pigments ,Barium Sulphate ,total lead, lead chromate, iron pigments, zinc chromate

UNIT- II

Analysis of oils: saponification value, iodine value, acid value, ester value, bromine value, acetyl value.

Analysis of industrial solvents like benzene, acetone, methanol and acetic acid. Determination of methoxyl and N-methyl groups.,

UNIT-III

Analysis of fertilizers: urea, NPK fertilizer, super phosphate, Analysis of DDT, BHC, endrin, endosulfone, malathion, parathion. Analysis of starch, sugars, cellulose and paper,

UNIT -IV

Gas analysis: carbon dioxide, carbon monoxide, oxygen, hydrogen, saturated hydro carbon, unsaturated hydrocarbons, nitrogen, octane number, cetane number Analysis of Fuel gases like: water gas, producer gas, kerosene (oil) gas.

Ultimate analysis: carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur.

UNIT - V

Analysis of Complex materials:

Analysis of cement- loss on ignition, insoluble residue, total silica, sesquioxides, lime, magnesia, ferric oxide, sulphuric anhydride.

Analysis of glasses - Determination of silica, sulphuur, barium, arsenic, antimony, total R_2O_3, calcium, magnesium, total alkalis, aluminum, chloride, fluoride

List of Reference Books:

1. Vogel - A text book of quantitative Inorganic analysis-ELBS,.
2. H. H. Willard and H. Deal- Advanced quantitative analysis- Van Nostrand Co.
3. F. D. Snell & F. M. Biffen-Commercial methods of analysis-D. B. Taraporavala & sons.
4. J. J. Elving and I. M. Kolthoff- Chemical analysis - A series of monographs on analytical chemistry and its applications -- Inter Science- Vol I to VII.
5. G. Z. Weig - Analytical methods for pesticides, plant growth regulators and food additives - Vols I to VII.
6. Aanalytical Agricultrual Chemistry by S. L. Chopra & J. S. Kanwar -- Kalyani Publishers
7. Mannual of soil, plant, water and fertilizer analysis, R. M. Upadhyay and N.L Sharma, Kalyani Publishers

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-B-3: ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS

Duration: 2.30 hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. How do you analyze lead chromate and zinc chromate present in paints?
2. How do you determine the total fatty matter and free alkali of soaps?
3. Describe the analysis of benzene.

Section-II

4. Discuss the analysis of urea and DDT.
5. Discuss the analysis of starch and paper.
6. Write about octane number and cetane number.

Section-III

7. How are water gas and producer gas analyzed?
8. Give in detail the determination of magnesia and ferric oxide present in cements.
9. Give in detail the determination of calcium and magnesium present in glasses.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. How do you determine the moisture in soaps?
11. Give the procedure for the determination of total lead in paints.
12. Write a note on saponification value.
13. Explain the analysis of BHC.
14. Write the analysis of sugars.
15. How carbon monoxide is analyzed in gases?
16. Explain the determination process of nitrogen in gases.
17. Describe the determination of lime in cement.

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-B-3: ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS

Weightage to content

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2	**Unit –II**	1	1	2	15
3	**Unit –III**	**2**	**2**	**4**	**30**
4	**Unit –IV**	2	2	4	30
5	**Unit -V**	**2**	**1**	**3**	**25**
	TOTAL	**9**	**8**	**17**	**130**

Cluster Elective –III

PAPER – VIII-C-1: ORGANIC SPECTROSCOPIC TECHNIQUES

45 hrs (3 h / w)

UNIT-I **10h**

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

Nuclear spin, Principles of NMR Magnetic moment and Spin angular momentum. Larmour Frequency. Instrumentation. Relaxation- spin-spin & spin lattice relaxation. Chemical shifts, Shielding and Deshielding mechanism-Factors influencing Chemical shift. Spin-Spin interactions- AX, AX_2 and AB types. Vicinal, Geminal and Long range coupling- Factors influencing coupling constants.

UNIT – II **5h**

Spin decoupling, Spin tickling, Deuterium exchange, Chemical shift reagents and Nuclear over Hauser effect. Applications in Medical diagnostics, Reaction kinetics and mechanically induced dynamic nuclear polarization. FT NMR and its Advantages.

UNIT-III **10h**

UV & VISIBLE SPECTROSCOPY

Electronic spectra of diatomic molecules. The Born - Oppenheimer approximation. Vibrational coarse structure: Intensity of Vibrational-electronic spectra: The Franck-Condon principle. Rotational fine structure of electronic vibration transitions. Electronic structure of diatomic molecules.

Types of transitions, Chromophores, Conjugated dienes, trienes and polyenes, unsaturated carbonyl compounds-Woodward – Fieser rules.

UNIT-IV **5h**

Chemical analysis by Electronic Spectroscopy – Beer-Lambert's Law. Deviation from Beer's law. Quantitative determination of metal ions (Mn^{+2}, Fe^{+2}, NO_2^-,). Simultaneous determination of Chromium and Manganese in a mixture

UNIT-V **15h**

Electron Spin Resonance Spectroscopy

Basic Principles, Theory of ESR, Comparison of NMR & ESR. Instrumentation, Factors affecting the 'g' value, determination of 'g' value. Hyper fine splitting concept and splitting patterns, Zero field splitting and Kramer degeneracy.

Applications: - Detection of free radicals; ESR spectra of (a) Methyl radical ($CH_3^{\cdot}$), (b) Benzene anion ($C_6H_6^-$) (c) $CH_2.CH_3$ (ETHYL RADICAL)

List of Reference Books:

1. Electron Spin Resonance Elementary Theory and Practical Applications- John E. Wertz and James R. Bolton, Chapman and Hall, 1986.
2. Spectroscopic Identification of organic compounds – Silverstein, Basseler and Morril.
3. Organic Spectroscopy- William Kemp.
4. Fundamentals of Molecular Spectroscopy- C.N.Banwell and E.A. Mc cash 4th Edition, Tata Mc Graw Hill Publishing Co., Ltd. 1994
5. NMR, NQR, EPR and MÖssbauer Spectroscopy in inorganic chemistry – R.V Parish, Ellis, Harwood.
6. Instrumental Methods of Chemical Analysis- H.Kaur, Pragathi Prakashan, 2003.
7. Analytical spectroscopy – Kamlesh Bansal, Campus books, 2008.
8. Structural Inorganic Chemistry MÖssbauer Spectroscopy – Bhide.
9. Principle of MÖssbauer Spectroscopy – T.C. Gibb, Chapman, and Hall, Landon 1976.

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-C-1: ORGANIC SPECTROSCOPIC TECHNIQUES

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1	**Unit -I**	**2**	**1**	**3**	**25**
2	**Unit –II**	1	1	2	15
3	**Unit –III**	**2**	**2**	**4**	**30**
4	**Unit –IV**	1	2	3	20
5	**Unit -V**	**3**	**2**	**5**	**40**
	TOTAL	**9**	**8**	**17**	**130**

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-C-1: ORGANIC SPECTROSCOPIC TECHNIQUES

Duration: 2.30hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. i. Which type of atoms exhibit nuclear magnetic resonance?
   ii. Write the principle involved in NMR spectroscopy.
2. Define chemical shift. What are the factors influencing chemical shift?
3. Discuss in detail the Nuclear Over Hauser effect

Section-II

4. Write about Born-oppenheimer approximation.
5. What are the Woodward-Fieser rules of UV-Visible spectroscopy?
6. How is Beer-Lambert's law useful in quantitative determination of Mn(II) and Fe(II)?

Section-III

7. Explain principle and theory of esr spectroscopy
8. Explain about the experimental techniques involved in ESR studies.
9. Write notes on 'g' value and hyperfine structure.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Describe the factors influencing the coupling constant.
11. Explain about spin decoupling.
12. Write about Franck-Condon principle.
13. What are the different types of electronic transitions?
14. State and explain Beer-Lambert law.
15. Write the quantitative determination of any metal ions.
16. How ESR studies are useful to study the structure of free radicals?
17. How ESR studies are useful to study the structure of benzene anion?

III B.SC CHEMISTRY –PAPER VIII-C-1
ORGANIC SPECTROSCOPIC TECHNIQUES.
QUESTION BANK

ESSAY QUESTIONS: 10M

1. What is the principle of NMR Spectroscopy?
2. Define chemical shift. What are the factors influencing chemical shift.
3. Explain 1) Spin-spin coupling 2) coupling constant-Factors
4. Discuss 1) Born-Oppenheimer approximation 2) Frank- Condon principle.
5. What are the Woodward-fieser rules of UV-Visible Spectroscopy.
6. What is Beer-lamberts law. Write its limitations. How is Beer-Lambert's law useful in quantitative determination of Mn (II) and Fe (II).
7. Give the experimental procedure of simultaneous determination of chromium and manganese in a mixture using Beer-lamberts law.
8. Explain the principle and theory involved ESR Spectroscopy.
9. Write about the experimental techniques involved in ESR Spectroscopy
9. Write about hyperfine splitting and explain the hyperfine splitting pattern of CH_3 radical

10 Explain about the hyperfine splitting lines appear for the following species,

a) $.C_6H_6^-$ (Benzene anion) b) $.CH_3CH_2$ (ethyl radical)

11. Write about the following, a). g – Factor b). Hyperfine splitting

SHORT ANSWERS 5M

11. Discuss about a) Shielding effect b) de-shielding
12. Write about a) spin- spin relaxation b) spin decoupling
13. Explain about a) Spin tricling b) spin hamiltoniun
14. Write about larmour frequency
15. Write short note on nuclear overhauser effect
16. What are the different types of electronic transitions?
17. What is FT nmr? What are the advantages of FT in NMR?
18. How is Beer-Lambert's law useful in quantitative determination of No_2^-
19. Discuss define Chromophore
20. Write comparisons between NMR & ESR?
21. Explain Zero field splitting in ESR spectroscopy
22. Write about Kramer's degeneracy in ESR spectroscopy
23. Write the Principle involved in esr spectroscopy
24, Write a short note on g factor.

Cluster Elective –III

PAPER – VIII-C-2: ADVANCED ORGANIC REACTIONS.

45 hrs (3 h / w)

UNIT – I

ORGANIC PHOTOCHEMISTRY

Organic photochemistry: Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer. Energies properties and reaction of singlet and triplet states of and transitions.

Photochemical reactions: (a) Photoreduction, mechanism, influence of temperature, solvent, nature of hydrogen donors, structure of substrates on the course of photo reduction,

UNIT – II

ORGNAIC PHOTOCHEMISTRY

Norrish cleavages, type I: Mechanism, acyclic cyclic diones, influence of sensitizer, photo Fries rearrangement. Norrish type II cleavage: Mechanism and stereochemistry, type II reactions of esters: 1: 2 diketones, photo decarboxylation, Di - π methane rearrangement, Decomposition of nitrites – Barton reaction.

UNIT – III

PROTECTING GROUPS AND ORGANIC REACTIONS

Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal and ,ketal , (3) Protection of carboxylic acids – ester formation, benzyl and t–butyl esters, (4) Protection of amines

– Acetylation, benzoylation, benzyloxy carbonyl, triphenyl methyl groups, (5) Protection of carbonyl groups – acetal, ketal, 1, 2–glycols and 1, 2–dithioglycols formation.

UNIT – IV

Synthetic reactions: Mannich reaction – Mannich bases – Robinson annulations. The Shapiro reaction, Stork–enamine reaction. Phase transfercatalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction.

UNIT –V: NEW SYNTHETIC REACTIONS

Baylis–Hillman reaction, Mitsunobu reaction, McMurrey reaction, Julia–Lythgoe olefination, and Peterson's stereoselective olefination, Heck reaction, Suziki coupling, Stille coupling and Sonogishira coupling, Buchwald–Hartwig coupling. Ugi reaction, Click reaction.

List of Recommended Books

1. Molecular reactions and Photochemistry by Charles Dupey and O.L. Chapman.
2. Molecular Photochemistry by Turru.
3. Importance of antibonding orbitals by Jaffe and Orchin.
4. Text Book of Organic Chemistry by Cram,. Hammand and Henrickson.
5. Some modern methods of organic synthesis by W. Carruthers.
6. Guide Book to Organic Synthesis by R.K. Meckie, D.M. Smith and R.A. Atken.
7. Organic Synthesis by O.House.
8. Organic synthesis by Michael B. Smith.
9. Organic Chemistry Claydon and others 2005.
10. Name Reactions by Jie Jack Li
11. Reagents in Organic synthesis by B.P. Mundy and others.

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-C-2: ADVANCED ORGANIC REACTIONS

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
1	**Unit -I**	**2**	**2**	**4**	**30**
2	**Unit –II**	**2**	**1**	**3**	**25**
3	**Unit –III**	**2**	**2**	**4**	**30**
4	**Unit –IV**	2	2	4	30
5	**Unit -V**	1	1	2	15
	TOTAL	**9**	**8**	**17**	**130**

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-C-2: ADVANCED ORGANIC REACTIONS

Duration: 2.30 hrs. Max. Marks: 60

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section **4X10=40Marks**

Section-I

1. Write the mechanism of photo reduction reaction? How it is affected by temperature and solvent?
2. Explain the following:
   i) Singlet and triplet states ii) Jablonski diagram
3. Discuss the Norrish type-I cleavage with an example.

Section-II

4. What do you know about the following:
   i)Di-π methane rearrangement ii) Barton reaction
5. Give a detailed account on the protection of carbonyl groups.
6. How amine group is protected by acylation and benzoylation.

Section-III

7. Write note on the following:
   i) Mannich reaction ii) Wittig reaction
8. Write a note on the following:
   i) use of benzyl trialkyl ammonium halides ii) Phase transfer catalysis
9. Illustrate the following reactions:
   Baylis-Hillman reaction ii) Heck reaction

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Write notes on inter-system crossing.
11. Explain the nature of hydrogen donars in photochemical reactions
12. Explain about Photo Fries rearrangement.
13. Give a brief account on the protection of carboxylic acids by ester formation.
14. How does carbonate formation protect diols?
15. Write about Robinson annulation.
16. What is Stork-enamine reaction?
17. Write about Buchwald–Hartwig coupling

Cluster Elective –III

PAPER – VIII-C-2 : ADVANCED ORGANIC REACTIONS

Question bank

ESSAYS

1. Write the mechanism of photo reduction reaction explain the influence of temperature & solvent on photo reduction reaction

2. Explain intersystem crossing energy transfer process by Jablonski diagram

3. Write and Explain the mechanism of Norrish type-I and Norrish type –II reactions

4. Write and explain the mechanism of di- π methane rearrangement and Barton reaction

5. What are protecting groups? Write different methods of preparation of alcohols

6. What are protecting groups write different methods of preparation of amines

7. What are protecting groups? Write different methods of preparation of carbonyl groups

8. Explain the following 1) Mannich reaction 2.) Stork- enamine reaction

9. Explain the following 1) Mcmurrey reaction 2.) Heck reaction

10. Explain the following 1). UGI reaction 2). Click reaction

Short answer questions

1.) Write Barton reaction with mechanism

2.) Norrish type-2 reactions of 1, 2 - di ketones

3. Explain Photo decarboxylation reaction.

3.) What are protecting groups explain with one example

4.) Shapiro reaction

5.) Mitsunobu reaction

6.) Photo fries rearrangement

7.) What are phase transfer catalyst? Explain the use of benzyl tri alkyl ammonium halides as phase transfer catalyst

8.) Suzuki coupling reactions

Cluster Elective –III ORGANIC

PAPER – VIII-C-3: PHARMACEUTICAL AND MEDICINAL CHEMISTRY

45 hrs (3 h / w)

UNIT-I **8h**

Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors - brief treartment) Metabolites and Anti metabolites.

UNIT-II

Drugs: **8h**

Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each, Administration of drugs

UNIT-III

Synthesis and therapeutic activity of the compounds:

12h

a) Chemotherapeutic Drugs

1. Sulpha drugs (Sulphamethoxazole) 2.Antibiotics - β-Lactam Antibiotics, Macrolide Antibiotics, 3. Anti-malarial Drugs(chloroquine)

b) Psycho therapeutic Drugs:

1. Anti-pyretics (Paracetamol) 2.Hypnotics, 3.Tranquilizers(Diazepam) 4.Levodopa

UNIT-IV

Pharmacodynamics Drugs: **8h**

1. Antiasthma Drugs (Salbutamol) 3. Antianginals (Glycerol Trinitrate)

4. Diuretics (Frusemide)

UNIT-V

HIV-AIDS: **9h**

Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, prevention of AIDS, Drugs available - examples with structures: PIS: Indivanir (crixivan), Nelfinavir (Viracept).

List of Reference Books:

1. Medicinal Chemistry by Dr. B. V. Ramana
2. Synthetic Drugs by O. D. Tyagi & M. Yadav
3. Medicinal Chemistry by Ashutoshkar
4. Medicinal Chemistry by P. Parimoo
5. Pharmacology& Pharmaco therapeutics R. S Satoshkar & S. D. Bhandenkar
6. Medicinal Chemistry by Kadametal P-I & P – II

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-C-3: PHARMACEUTICAL & MEDICINAL CHEMISTRY

Duration: 2.30hrs. **Max. Marks: 60**

Answer any **FOUR** questions choosing **AT LEAST ONE** question from each section

4X10=40Marks

Section-I

1. Give a detailed account on pharmacodynamics and pharmacokinetics.
2. Explain the following terms with suitable examples.
   i). Metabolites ii) Anti-metabolites
3. How drugs are classified according to their structure?

Section-II

4. Discuss the classification of drugs based on therapeutic activity.
5. Write about the synthesis of chloroquin.
6. Write about the synthesis and therapeutic activity of Paracetamol.

Section-III

7. Write about the synthesis of solbutamol.
8. What do you know about CD-4 and CD-8 cells?
9. What are the drugs available for prevention of AIDS? Give their structures.

Section-IV

Answer any **FOUR** questions. Each question carries **FIVE** marks. **4X5=20Marks**

10. Define pharmacy and pharmacology.
11. Define pharmacophore and give two examples.
12. Write the clinical, generic and trade names of paracetamol.
13. Describe the types of administration of drugs.
14. Write about the therapeutic activity of chloroquine.
15. Write the preparation method and uses of antiuritics.
16. Define hypnotics and antipyretics.
17. Write notes on retro virus.

Paper - VIII : CLUSTER-C-3:

PHARMACEUTICAL & MEDICINAL CHEMISTRY

Questionbank

Essayquestions(10M)

1. Explain metabolites and antimetabolites with an example each
2. Explain ADME in pharmacokinetics.
3. Explain the classification of drugs based on structure.
4. Explain the classification of drugs based on therapeutic activity.
5. Write the synthesis and therapeutic activity of sulphamethoxazole
6. Write the synthesis and therapeutic activity of chloroquine
7. Write the synthesis and therapeutic activity of paracetamol
8. Write the synthesis and therapeutic activity of diazepam
9. Write the synthesis and therapeutic activity of solbutamol
10. Write the synthesis and the rapeutic activity of glycerol tri nitrate.
11. Write the synthesis and therapeutic activity of frusemide.
12. Explain CD-4cells and CD-8 cells.
13. Write the synthesis and therapeutic activity of β- lactum

Shortanswerquestions(5M)

1. Explain the terms pharma cyand pharmacology.
2. Explain Pharmacophore with two examples.
3. Explain chemical name, generic name and trade name with examples.
4. Write different types of dosage forms based on a) physical state b) route of admistration
5. Write short note on antibiotics
6. Write short notes on antipyretics
7. What are hypnotics and tranquilizers give examples
8. Write about methods of prevention of AIDS.
9. Write the structures of drugs a) indivanir b) Nelfinavir.
10. Briefly explain pharmacokinetics
11. Write short note on administration on drugs
12. Write the investigations available for HIV-AIDS
13. Write the prevention methods available for HIV-AIDS

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – VI (CHEMISTRY)
Paper - VIII : CLUSTER-C-3: PHARMACEUTICAL & MEDICINAL CHEMISTRY

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4	**Unit –IV**	1	1	2	15
5	**Unit -V**	**2**	**1**	**4**	**25**
	TOTAL	**9**	**8**	**17**	**130**