P. R. GOVERNMENT COLLEGE (A) KAKINADA
(Affiliated to Adikavi Nannaya University)

DEPARTMENT OF CHEMISTRY

B. Sc Chemistry Syllabus under CBCS

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Board of Studies
2018-19

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

Recommended Composition of the Board of Studies of Chemistry

And it' s Functions of an Autonomous College

April-2018-19

I Composition

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

   Sri T. Vara Prasad, M.Sc., M.Phil, M.Ed (Ph.D)

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

   1. Sri D.Rama Rao, M.Sc., B. Ed., M.Phil.
   2. Sri V.Mallikarjuna Sarma,MSc, M.Phil,NET

3. **Two experts in the subject from outside the college to be nominated by the Academic Council**

   1. Dr. V .Sambasivarao, Lecturer in Chemistry, Arts College, Rajahmundry
   2. Dr. K . Jhansi Lakshmi, Lecturer in Chemistry, Ideal Degree College, Kakinada

4. **One expert to be nominated by the Vice-Chancellor from a panel of six recommended by the College Principal**

   1. Prof. K. Deepti, Adikavi Nannaya University, Rajahmundry

5. **One representative from industry/ Corporate Sector/ allied area relating to Placement.**

   1. 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.

   1. Sri. Nemani Ramam, M.Sc., M.Phil

II. Term.

The term of the nominated members shall be two years.

III. Meeting

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

IV. Functions

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

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

<u>Signatures of the members who attended the</u>

<u>Board of studies in Analytical Chemistry on 07.04.2018 at 2.00pm</u>

1. Sri T. Vara Prasad — Chairman & Lecturer in Charge

2. Dr. K. Deepti, — University representative
   Adikavi Nannaya University
   Rajamahendravaram

3. Ch. V. N. S. Vara Prasad, Managing partner, DAS Pharma Ltd, Kakinada

4. Dr. V. Sambasivarao, — Subject expert
   Lecturer in Chemistry,
   Govt. Arts College,
   Rajamahendravaram

5. Dr. K. Jhansi Lakshmi — Subject expert
   Lecturer in Chemistry,

Ideal Degree College, Kakinada

6. Sri. N. Ramam — Alumnus, Principal, Retd.
7. Sri D. Rama Rao — Member
8. Sri V. Mallikarjuna Sarma — Member

ACTION PLAN BOS MEETING -CHEMISTRY HELD ON 07 -04-2018.

1. Department activities for 2018-2019 academic year. Annexure I

Month	Activity proposed	Faculty member in charge
June-18	Departmental staff meeting to review results and class work allotment	T. Vara Prasad
	Preparation of curricular plans, time-tables etc.,	
	Remedial coaching classes for II & III year supplementary exams	
	Bridge classes for I year students	
July-18	Student awareness programmes on ragging& eve teasing - consequences , self-discipline, career guidance, higher education opportunities etc.,	T.Vara prasad
August-18	Conference on prospects in pharmaceutical industries	T. Vara Prasad

	Study tour / Field trips	
Sept-18	Ozone day	
Oct-18	MOLE Day	D.Ramarao
	Faculty development programme	V.Mallikarjuna sarma
Nov-18	11th National Education Day – Out reach Programme to nearby school	
Dec-18	World AIDS Day	
	Chemistry day & Chem fest	V.Mallikarjuna sarma
Jan-19	10 days coaching for PG entrance examinations in chemistry Study tour / Field trips	V.Mallikarjuna sarma
Feb-19	NATIONAL SCIENCE DAY	V.Mallikarjuna sarma
March-19	Consumer awareness day	T. Vara Prasad

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

(Mandatory for each Department)

i) Staff development programme
ii) Training in the use of HPLC
iii) Awareness on OZONE protection
iv) National Chemistry day
v) Chem. fest
vi) National Science day 2019
vii) Guest lectures
viii) National seminar in chemistry
ix) Training in Soil analysis
x) Training in water analysis
xi)

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 programmes, 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
3. Petrochemicals equipment 1.0 lakhs

5. **Plan for organizing subject oriented community outreach programmes & allocation of necessary funds. (Mandatory for each Department)**

i) Adoption of village Rs. 20,000

ii) Medical Awareness programmes Rs. 10,000

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

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

New courses to be proposed.

S.No.	New course proposed	Justification	Employability
1	Under graduate course in Industrial chemistry	There is dearth of skilled persons to operate various instruments like	Technical assistants, Quality

		uv visible spectrophotometer, Atomic absorption spectrophotometer, PH meter, flame photometer, rotavapour instrument, HPLC.GLC, distillation, etc which play as key role in any industry related to chemistry.	control managers, Plant supervisors etc.

8. **Any other programme 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 propose to give 33.3% weitage for competitive exam questions pertaining to the syllabus prescribed.

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

Chemistry:

1. Sri N. Lakshmana Rao, SKBR College, Amalapuram.
2. Dr. D. Madhava Sarma, GDC,Tadepalligudem
3. Dr. V. Sambasiva Rao, Govt.Arts College, Rajahmundry.
4. Dr. K. A.R.S.S.Prasad, VS Krishna College, Visakhapatnam.
5. Sri S.V. Ramana , Arts College, Rajahmundry
6. Sri Machi Raju, Arts College, RajahmundrY
7. Smt. C. Jyoti, St.Therisa college,Eluru.
8. P. Krishna kumar,S.K.B.R.College,Amalapuram.
9. Dr. G. Venkatarao,GDC,Vijayavada
10. Shri B.Venkatarao, GDC,Tadepalligudem
11. Dr.Ramchadarao,Y.N.College,Narasapuram

Department of Chemistry BOS Meeting Dt.07 -04-2018

Resolutions:

Meeting of Board of studies in chemistry is convened on 07-04-18 in the guest room of the College. The Principal Dr. Chappidi Krishna, Dr.K.Deepthi , University Nominee , Ch. V. N. S. Vara Prasad, Managing partner, DAS Pharma Ltd, Kakinada, Dr.V.Sambasiva Rao , Subject Expert, Govt. Degree College, Tuni, Dr. . Jhansi Lakshmi, Lecturer in Chemistry, Ideal College, Kakinada. , all members of the faculty of Chemistry and student representatives attended the meeting. 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 final year students w.e.f. 2018-19
2. Enhance the internal assessment component from 30% to 40% in theory to first year (admitted batch) extended to second year also.
3. It is resolved to allot project works for final year students who opt for project work in chemistry preferably industry based.
4. It is resolved to conduct departmental activities such as Ozone day, Chem fest, Chemistry day and Science day etc.
5. It is resolved to offer subject electives and skill based electives in the V and VI semesters respectively.
6. It is resolved to implement the recommended Pedagogy for the first semester 2018-19.
7. Resolved to conduct practical examinations semester wise.

   The following paper setters are recommended.

   i. Dr. V.Sambasiva Rao, Govt.Arts College, Rajahmundry.
   ii. K.A.R.S.S.Prasad, VS Krishna College, Visakhapatnam.
   iii. Sri S.V.Ramana , Arts College, Rajahmundry
   iv. Sri Machi Raju, Arts College, Rajahmundry.
   v. U. Satyanarayana, GDC, Tuni
   vi. R. Brahmaji, GDC, Ramachandrapuram
   vii. N. V. Sudhakar, GDC, Tuni
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. NEW COURSES:

    It is resolved to explore the possibility of introducing a new course in B.Sc Pharmaceuticals/Industrial Chemistry as Restructed course.

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

12. Resolve 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% weitage for competitive exam questions pertaining to the syllabus prescribed.

New Courses

15. It is resolved to explore the possibility of introducing a new course in bsc analytical chemistry ,maths,chemistry as per the Govt./CCE order w.e.f 2018-2019.
16. Resolved to submit proposals to conduct a faculty development programme in instrumentation techiniques/ advanced topics with the assistance of the industry representatives and university representatives.
17. 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.
18. .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.
19. it is proposed to give 33.3% weitage competitive exam questions pertaining to the syllabus prescribed

Special Features of Chemistry Department

20. In the cluster system 74 students opted chemistry projrcts andthey were submitted projects to our college under the guideance of eminemt lecturers.
21. NAAC team visited our college chemistry department on 08-09-2017 and chairman was commented **" chemistry department is very good"** in always.
22. CCB academic team visited our chemistry department on 21-03-2018 and team head was commented as **" chemistry department is excellent"** in always.

Modern Lecture Methods & New Techniques

23. Power Point Presentation / LCD Teaching.
24. Virtual Class Teaching Methods.
25. Feedback on Teaching Performance.

SEMCLUSTER-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, coprecipitation, 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 mixtuers,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

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

MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper – VII A: ELECTIVE – A: ANALYTICAL METHODS IN CHEMISTRY

Duration: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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. Explain the action of ion exchange resins.
15. Describe the development of chromatogram in paper chromatography.
16. What are the factors affecting Rf values?
17. What type of adsorbents and solvents used in thin layer chromatography?
18. Write the applications of high performance liquid chromatography.

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Define the terms Drying and Ignition.

20. Define the term Confidence limit.
21. Mention any two factors which effect Solvent extraction.
22. Define R_f value.
23. How can you detect spots in column chromatography?

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 (4M)	Very short answer questions(2 M)	Total No. Of Questions from each Unit	Total No. of Marks allotted to each Unit
1	**Unit -I**	**2**	**2**	**1**	**5**	**30**
2	**Unit – II**	1	1	1	3	16
3	**Unit – III**	2	2	1	5	30
4	**Unit – IV**	2	2	1	5	30
5	**Unit -V**	**2**	**2**	**1**	**5**	**30**
	TOTAL	**9**	**9**	**5**	**23**	**136**

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 Hydological cycle.

UNIT-II

Air Pollution **9h**

Definition – Sources of air pollution – Classification of air pollution – Acid rain – Photochemical smog – Green house 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 - biogeographical 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

MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper – VII B: ELECTIVE – B: ENVIRONMENTAL CHEMISTRY

Duration: 3hrs. **Max. Marks: 70**

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 green house 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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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. Write short notes on suspended solids and total dissolved solids
16. Explain the toxicity of mercury.
17. What are the functions of eco system?
18. Discuss briefly about food chain.

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Write any two differences between thermal power and atomic energy.
20. Mention any two methods to control air pollution..
21. Define the term COD.
22. Write any two biochemical effects of pesticides.
23. Defernciate between biotic and abiotic components.

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 (4M)	Very short answer questions(2 M)	Total No. Of Questions from each Unit	Total No. of Marks allotted to each Unit
1	**Unit -I**	**2**	**2**	**1**	**5**	**30**
2	**Unit – II**	2	2	1	5	30
3	**Unit – III**	2	2	1	5	30
4	**Unit – IV**	1	1	1	3	16
5	**Unit -V**	**2**	**2**	**1**	**5**	**30**
	TOTAL	**9**	**9**	**5**	**23**	**136**

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 (acidity and alkalinity)
2. Determination of hardness of water using EDTA
   a) Permanent hardness
   b) Temporary hardness
3. Determination of Acidity
4. Determination of Alkalinity
5. Determination of chlorides in water samples

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:

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

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: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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. What are the advantages of microwave assisted organic synthesis?
15. Write the green synthetic procedure for the Diels-alder reaction
16. Write short notes on Bio catalysis.
17. How do you perform Strecker' s synthesis by green synthesis method?
18. Discuss about Ultrasound assisted reactions.

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Define green chemistry
20. Write the importance of Aqueous phase reactions.
21. Give any two examples of microwave assisted organic synthesis?
22. What is the use of Zeolites in heterogeneous catalysis?
23. Give any two examples of green synthesis?

P. R. GOVERNMENT COLLEGE, KAKINADA

SEMESTER – VI (CHEMISTRY)

Paper – VII C: ELECTIVE – C: GREEN CHEMISTRY

Weightage to content

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1	**Unit -I**	**2**	**2**	**1**	**5**	**30**
2	**Unit – II**	2	2	1	5	30
3	**Unit – III**	2	2	1	5	30
4	**Unit – IV**	1	1	1	3	16
5	**Unit -V**	**2**	**2**	**1**	**5**	**30**
	TOTAL	**9**	**9**	**5**	**23**	**136**

<u>CLUSTER ELECTIVES</u>: 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.

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MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-A-1: POLYMER CHEMISTRY

Duration: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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 colourants and photosensitizers.
16. Illustrate the lubricants and flow promoters
17. Write the preparation and industrial applications of PVC
18. Write the preparation and industrial applications of PAN

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Write a note on fibers.
20. Define suspension polymerization?
21. What are factors which can effect Glass Transition Temperature(T_g)?
22. what are blowing agents?
23. Write any two industrial applications of polyethylene.

P. R. GOVERNMENT COLLEGE, KAKINADA

SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-A-1: POLYMER CHEMISTRY

Weightage to content

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (4M)	Very short answer questions(2 M)	Total No. Of Questions from each Unit	Total No. of Marks allotted to each Unit
1	**Unit -I**	**2**	**2**	**1**	**5**	**30**
2	**Unit – II**	**2**	**2**	**1**	**5**	**30**
3	**Unit – III**	1	1	1	3	16
4	**Unit – IV**	2	2	1	5	30
5	**Unit -V**	**2**	**2**	**1**	**5**	**30**
	TOTAL	**9**	**9**	**5**	**23**	**136**

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**

X- ray analysis and electron spectroscopy (surface analysis)

Reference books:

1. Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.
2. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. *Instrumental Methods of Analysis*, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA, 1988.
3. P.W. Atkins: Physical Chemistry.
4. G.W. Castellan: Physical Chemistry.
5. C.N. Banwell: Fundamentals of Molecular Spectroscopy.
6. Brian Smith: Infrared Spectral Interpretations: A Systematic Approach.
7. W.J. Moore: Physical Chemistry

P. R. GOVERNMENT COLLEGE, KAKINADA

MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-A-2: INSTRUMENTAL METHODS OF ANALYSIS

Duration: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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?
18. Discuss the principle involved in voltametry.

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Treatment of analytical data.
20. Define absorption and scattering in IR spectroscopy?
21. Define fluorescent tags?
22. Define mass to charge ratio?
23. Define spin-spin coupling?

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**	**1**	**5**	**30**
3	**Unit – III**	**2**	**2**	**1**	**5**	**30**

4	**Unit – IV**	2	2	1	5	30
5	**Unit -V**	**2**	**2**	**1**	**5**	**30**
	TOTAL	**9**	**9**	**5**	**23**	**136**

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.

REFERENCE BOOKS :

1. Vogel-A text book of quantitative Inorganic analysis-ELBS,
2. F.D.Snell & F.M.Biffen-Commercial methods of analysis-D.B.Taraporavala & sons,
3. 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.,

4. Aanalytical Agricultrual Chemistry by S.L.Chopra & J.S.Kanwar – Kalyani Publishers

5. Quantitative analysis of drugs in pharmaceutical formulations by P.D.Sethi, CBS Publishers and Distributors, New Delhi
6. G.Ingram- Methods of organic elemental micro analysis- Chapman and Hall.,
7. H.Wincciam and Bobbles (Henry J)- Instrumental methods of analysis of food additives.,
8. H.Edward-The Chemical analysis of foods;practical treatise on the examination of food stuffs and the detection of adulterants,
9. The quantitative analysis of drugs- D.C.Garratt-Chapman & Hall.,
10. A text book of pharmaceutical analysis by K.A.Connors-Wiley-International.,
11. Comprehensive medicinal chemistry-Ed Corwin Hansch Vol 5,Pergamon Press.,

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

List of Reference Books

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

6. Aanalytical Agricultrual Chemistry by S.L.Chopra & J.S.Kanwar – Kalyani Publishers

7. Quantitative analysis of drugs in pharmaceutical formulations by P.D.Sethi, CBS Publishers and Distributors, New Delhi
8. G.Ingram- Methods of organic elemental micro analysis- Chapman and Hall.,
9. H.Wincciam and Bobbles (Henry J)- Instrumental methods of analysis of food additives.,
10. H.Edward-The Chemical analysis of foods;practical treatise on the examination of food stuffs and the detection of adulterants,
11. The quantitative analysis of drugs- D.C.Garratt-Chapman & Hall.,
12. A text book of pharmaceutical analysis by K.A.Connors-Wiley-International.,
13. Comprehensive medicinal chemistry-Ed Corwin Hansch Vol 5,Pergamon Press.,

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MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-A-3: ANALYSIS OF DRUGS, FOODS, DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS

Duration: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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. Write the analysis of any anti epileptic drugs.
16. What are flavoring agents? Give examples.
17. How are wheat and wheat flour adulterated?
18. How do you estimate the glucose in the blood?

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Write the formula for any anti analgesic drug.
20. Write the structure of any antihistamine drugs
21. What are anti convulsant drugs?
22. How coffee powder adulterated?
23. What are the trace elements present in blood?

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

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (4M)	Very short answer questions(2 M)	Total No. Of Questions from each Unit	Total No. of Marks allotted to each Unit

1	**Unit -I**	**2**	**2**	**1**	**5**	**30**
2	**Unit – II**	2	2	1	5	30
3	**Unit – III**	2	2	1	5	30
4	**Unit – IV**	2	2	1	5	30
5	**Unit -V**	1	1	1	3	16
	TOTAL	**9**	**9**	**5**	**23**	**136**

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.

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MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-B-1: FUEL CHEMISTRY AND BATTERIES

Duration: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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.
18. Write the characteristics of batteries.

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Write the uses of coal tar.
20. Write the different types petroleum products.
21. Write the preparation of vinyl acetate.
22. Define viscosity index
23. Write a note on solar cells.

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

Weightage to content

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5	**Unit -V**	2	2	1	5	30
	TOTAL	**9**	**9**	**5**	**23**	**136**

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 respect to 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.

Reference Books:

- E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
- R. M. Felder, R. W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.

- W. D. Kingery, H. K. Bowen, D. R. Uhlmann: *Introduction to Ceramics,* Wiley Publishers, New Delhi.
- J. A. Kent: Riegel' s *Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
- P. C. Jain & M. Jain: *Engineering Chemistry,* Dhanpat Rai & Sons, Delhi.
- R. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering Chemistry,* Vikas Publications, New Delhi.
- B. K. Sharma: *Engineering Chemistry*, Goel Publishing House, Meerut

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MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-B-2: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

Duration: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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 short note on oil paint and vehicle oil.
17. Write note on non-ferrous alloys.
18. Explain the properties of steels.

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Define allotropy give example
20. What are ceramics?
21. Define mixed fertilizers.
22. What is the use of fillers?
23. Write the composition of steel.

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

Weightage to content

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5	**Unit -V**	2	2	1	5	30
	TOTAL	**9**	**9**	**5**	**23**	**136**

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 residu, total silica, sesqui oxides, lime, magnesia, ferric oxide, sulphuric anhydrid.
Analysis of glasses - Determinaiton of silica, sulphuur, barium, arsinic, antimony, total R_2O_3, calcium, magnesium, total alkalies,aluminium,chloride,floride

SUGGESTED BOOKS:

elcher-Standard methods of analysis,
ogel-A text book of quantitative Inorganic analysis-ELBS, 3.H.H.Willard and H.Deal-Advanced quantitative analysis- Van Nostrand Co,
4.F.D.Snell & F.M.Biffen-Commercial methods of analysis-D.B.Taraporavala & sons,
5.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., 6.G.Z.Weig - Analytical methods for pesticides,plant growth regulators and food additives - Vols I to VII,
7. Aanalytical Agricultrual Chemistry by S.L.Chopra & J.S.Kanwar – Kalyani Publishers
8. 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: 3hrs. **Max. Marks: 70**

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 **FIVE** questions. Each question carries **FOUR** marks. **5X4=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.
18. Describe the determination of silica in glass.

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Define combined alkali.
20. How can you determine acid value in oils?
21. Write the preparation of endrin.
22. What are saturated hydrocarbons?
23. How can you analyze aluminium present in glasses?

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	1	3	16
3	**Unit – III**	**2**	**2**	**1**	**5**	**30**
4	**Unit – IV**	2	2	1	5	30
5	**Unit -V**	**2**	**2**	**1**	**5**	**30**
	TOTAL	**9**	**9**	**5**	**23**	**136**

I. LABORATORY COURSE – VIII

Practical Paper – VIII-B-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-B-2: (at the end of semester VI)

30 hrs (2 h / W)

1. Green procedure for organic qualitative analysis: Detection of N, S and halogens

   2.Acetylation of 1^0 amine by green method: Preparation of acetanilide
2. Rearrangement reaction in green conditions: Benzil-Benzilic acid rearrangement
3. Electrophilic aromatic substitution reaction: Nitration of phenol
4. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
5. Green oxidation reaction: Synthesis of adipic acid
6. Green procedure for Diels Alder reaction between furan and maleic anhydride

VII-B-3 Practical:- Project Work / Intern Ship

Cluster Elective – III ORGANIC

PAPER – VIII-C-1 : ORGANIC SPECTROSCOPIC TECHNIQUES

45 hrs (3 h / w)

UNIT-I **10h**

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

Nuclear spin, Principles of NMR-Classical and Quantum Mechanical methods, Magnetic moment and Spin angular momentum. Larmour Frequency. Instrumentation. Relaxation-spin-spin & spin lattice relaxation. Shielding constants, 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 overhauser 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: Bond association and Bond sequence. 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**

Electronic spectra of polyatomic molecules. 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^-, Pb^{+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. Instrumentaion, Factors affecting the ' g' value, determination of ' g' value. Isotropic and Anisotropic constants. Splitting hyper fine splitting coupling constants. Line width, Zero field splitting and Kramer degeneracy. Crystal field splitting, Crystal field effects.

Applications:- Detection of free radicals; ESR spectra of (a) Methyl radical ($CH_3^{\cdot}$), (b) Benzene anion ($C_6H_6^-$) (c) Isoquinine (d) $[Cu(H_2O)_6]^{+2}$ (e) $[Fe(CN)_5NO]^{-3}$ (f)

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. Physical Methods in Inorganic Chemistry – R.S.Drago, Saunders Publications.
6. Application of MÖssbauer Spectroscopy – Green Mood.
7. NMR, NQR, EPR and MÖssbauer Spectroscopy in inorganic chemistry – R.V Parish, Ellis, Harwood.
8. Instrumental Methods of Chemical Analysis- H.Kaur, Pragathi Prakashan, 2003.
9. Instrumental Methods of Analysis, 7th Edition – Willard, Merrit, Dean, Settle, CBS Publications, 1986.
10. Molecular Structure and Spectroscopy – G. Aruldhas, Prentice Hall of India Pvt.Ltd, New Delhi, 2001.
11. MÖssbauer Spectroscopy – N.N. Green Wood and T.C. Gibb, Chapman, and Hall, Landon 1971.
12. Coordination Chemistry: Experimental Methods- K. Burger, London Butter Worths, 1973.
13. Analytical spectroscopy – Kamlesh Bansal, Campus books, 2008.
14. Structural Inorganic Chemistry MÖssbauer Spectroscopy – Bhide.
15. Principle of MÖssbauer Spectroscopy – T.C. Gibb, Chapman, and Hall, Landon 1976.

P. R. GOVERNMENT COLLEGE, KAKINADA

MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-C-1: ORGANIC SPECTROSCOPIC TECHNIQUES

Duration: 3hrs. **Max. Marks: 70**

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 nOe.

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. Give the experimental procedure of simultaneous determination of chromium and manganese in a mixture using Beer-Lambert' s law.
8. Explain the principle and experimental techniques involved in ESR studies.
9. Write notes on ' g' value and hyperfine structure.

Section-IV

Answer any **FIVE** questions. Each question carries **FOUR** marks. **5X4=20Marks**

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

Section-V

Answer **all** the following questions. Each question carries **two** marks **5X2=10Marks**

19. Define shielding constant.
20. What is spin tickling?
21. Define chromophore with example.
22. Write any two deviations of beer' s lamberts law
23. Write about isotropic constants?

P. R. GOVERNMENT COLLEGE, KAKINADA

SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-C-1: ORGANIC SPECTROSCOPIC TECHNIQUES

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2	**Unit – II**	1	1	1	3	16
3	**Unit – III**	**2**	**2**	**1**	**5**	**30**
4	**Unit – IV**	2	2	1	5	30
5	**Unit -V**	**2**	**2**	**1**	**5**	**30**
	TOTAL	**9**	**9**	**5**	**23**	**136**

Cluster Elective – III ORGANIC

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

Norrisch cleavages, type I : Mechanism, acyclic cyclicdiones, influence of sensitizer, photo Fries rearrangement. Norrisch type II cleavage : Mechanism and stereochemistry, type II

reactions of esters : 1: 2 diketones, photo decarboxylation., Di - π methane rearrangement, Photochemistry – of conjugated dienes, 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,ketal and carbonate formation, (3) Protection of carboxylic acids – ester formation, benzyl and t– butyl esters, (4) Protection of amines
– acetylation, benzoylation, benzyloxy carbonyl, triphenyl methyl groups and fmoc, (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. Use of dithioacetals – Umpolung, phase transfercatalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction.

UNIT – V : NEW SYNTHETIC REACTIONS

Baylis– Hillman reaction, RCM olefm metathesis, Grubb catalyst, Mukayama aldol 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.

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.
12. Tandem Organic Reactions by Tse– Lok Ho.

P. R. GOVERNMENT COLLEGE, KAKINADA

MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-C-2: ADVANCED ORGANIC REACTIONS

Duration: 3hrs. **Max. Marks: 70**

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)Umpolung ii) Phase transfer catalysis
9. Illustrate the following reactions:
   Baylis-Hillman reaction ii) Heck reaction

Section-IV

Answer any **FIVE** questions. Each question carries **FOUR** marks.

5X4=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. Write about photo decarboxylation.
14. Give a brief account on the protection of carboxylic acids by ester formation.
15. How does carbonate formation protect diols?
16. Write about Robinson annulation.
17. What is Stork-enamine reaction?
18. Explain the Mukayama aldol reaction.

Section-V

Answer **all** the following questions. Each question carries **two** marks

X2=10Marks

19. Define photo reduction.
20. Give an example of norrish type-II rearrangement
21. What are protecting groups?
22. What is Shapiro reaction?
23. What is stille coupling reaction?

P. R. GOVERNMENT COLLEGE, KAKINADA

SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-C-2: ADVANCED ORGANIC REACTIONS

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	TOTAL	**9**	**9**	**5**	**23**	**136**

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. Chemotheraputic Drugs

l.Sulphadrugs(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

Pharmacodynamic Drugs: 8h

1. Antiasthma Drugs (Solbutamol) 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& Pharmacotherapeutics R.S Satoshkar & S.D.Bhandenkar

6.Medicinal Chemistry by Kadametal P-I & P.II

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MODEL PAPER FOR SEMESTER – VI (CHEMISTRY)

Paper - VIII : CLUSTER-C-3: PHARMACEUTICAL & MEDICINAL CHEMISTRY

Duration: 3hrs. Max. Marks: 70

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 **FIVE** questions. Each question carries **FOUR** marks.

5X4=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. Define hypnotics and antipyretics.
16. What are known as pharmacodynamic drugs?
17. Write notes on retro virus.
18. Explain replication in human body

Section-V

Answer **all** the following questions. Each question carries **two** marks

5X2=10Marks

19. Define pharmacodynamics.
20. Write the structure of paracetamol.
21. Write the structure of levodopa.
22. Define antianginals.
23. Write the name of drug used in treatment of HIV.

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

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