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

DEPARTMENT OF CHEMISTRY

B. Sc Chemistry Syllabus under CBCS

BOARD OF STUDIES

2019-20

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

Recommended Composition of the Board of Studies of Chemistry

And it's Functions of an Autonomous College

April-2019-20

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. Dr.V.Narayana Rao M.Sc, NET, Ph.D
   4. Sri U.Sai Krishna M.Sc,NET

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

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

II. Term.

The term of the nominated members shall be two years.

III. Meeting

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

IV. Functions

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

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

Signatures of the members who attended the

Board of studies in Chemistry on 01.04.2019 at 10.00am

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. 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
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

Signatures of the members who attended the

Board of studies in Chemistry on 01.04.2019 at 10.00am

1.	Dr. T. Vara Prasad	Chairman & Lecturer in Charge 1/4/19
2.	Dr. K. Deepti,	University representative 1/4/19 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 01/4/19
10.	Dr.D.S.V.N.M.Rama Murthy	Member 1/4/19
11.	Sri K.Babu Rao	Member 01/4/2019
12.	Smt.S.Swarna Latha	Member 1/4/2019
13.	Miss. M.S.T.B.V.Ratnam	Member 01/04/19
14.	Miss.G.Rama Lakshmi.	Member 01/04/19
15.	Mr.B.V.Siva Kumar	Member 01/04/19.
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 01 -04-2019.

1. Department activities for 2019-2020 academic year. Annexure I

Month	Activity proposed	Faculty member in charge
June-19	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-19	Student awareness programmes on ragging& eve teasing - consequences , self-discipline, career guidance, higher education opportunities etc.,	T.Vara prasad
August-19	Conference on prospects in pharmaceutical industries	T. Vara Prasad
	Study tour / Field trips	
Sept-19	Ozone day	
Oct-19	MOLE Day	D.Ramarao
	Faculty development programme	V.Mallikarjuna sarma
Nov-19	11th National Education Day – Out reach Programme to nearby school	
Dec-19	World AIDS Day	
	Chemistry day & Chem fest	V.Mallikarjuna sarma
Jan-20	10 days coaching for PG entrance examinations in chemistry Study tour / Field trips	V.Mallikarjuna sarma
Feb-20	NATIONAL SCIENCE DAY	V.Mallikarjuna sarma
March-20	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

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

   ----
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 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.	Technical assistants, Quality 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 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. 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

P.R.GOVT.COLLEGE (A),KAKINADA

DEPARTMENT OF CHEMISTRY,

Minutes of board of studies(BOS) meeting 2019-20 on 01-04-2019 at 10.30am

Resolutions:

The board of studies meeting chemistry department on 01-04-19 at 10.30 am in the guest room of the college 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 Lakshimi, Head in Chemistry, Ideal College, Kakinada., all members of the faculty of chemistry and student representatives attanded the meeting. agenda items are discussed and resolutions are made.

1. It is resolved to cotinue choice based credit system in the chemistry combination programmes as per the directions of the CCE, Hydreabad to the first year and second year and second year and final year students w.e.f. 2017-2018.

2. Resolved to follow 60%-40% extenrnal 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 accordance with APSCHE.

4. in the first year admitted batch w.e.f 2019-20 multiple choice questions and question bank prepared in the first year students only.

i) Mid examination –I follows online

ii)Mid examination –II follows offline

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

6. It Is Resolved to offer Subject Electives and clusters in the V and Vi Semester Respectively as per the guidelines of AKNU we adopted the folling syllabus

Elective paper -1

Cluster VIII C papers - 3 (C_1, C_2, C_3)

7. It is resolved to implement the recommended padagogy for the first semester 2018-2019

8. Resolved to conduct practical examinations semester wise.

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

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

11. It is resolved syllabus change for I , II, III elective, clusters as per the AKNU lines.

12. CBCS introduced for final years w.e.f. 2016-2017.

13. Introduced cluster system for final year w.e.f 2017-2018.

14. cluster theory paper C_3 introduced w.e.f 2019-20 in the place of project 150 marks.

15. project 50 marks in the place of cluster theory paper practicals w.e.f 2019-20

16. followed ratio 60:40 and it continued in third year.

17.it is resolved that B.Voc Pharmaceutical Chemistry course is restructured in B.Sc professional (Pharmaceutical chemistry) w.e.f 201-20. The proposal is put followed to academic council and general body meeting.

18. It is advised to allocate only 50 marks for project in VI semester(cluster VIII-C_3)

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

The Following Paper Setter Are Recommended.

1). Dr. V. Sambasiva Rao, Govt,Arts College, Rajahmundry.

2). Dr.K.A.R.S.S. Prasad, VS Krishna College,Visakhapatnam.

3). Sri S.V. Ramana, Arts College, Rajahmundry.

4). Sri Machi Raju, Arts College, Rajahmundry.

5). Sri U. Satyanarayana , GDC, Tuni.

6). Sri R. Brahmaji, GDC, Ramachandrapuram.

7). Sri N.V. Sudhakar, GDC, Tuni.

New Courses

20. 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.

21. 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.

22. 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.

23.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.

24. it is proposed to give 33.3% weitage competitive exam questions pertaining to the syllabus prescribed

25. Resolved to reduce the intake of Bsc MPC TM students from 60 to 30 w.e.f from 2019-20.

26. Resolved to increase the intake of Bsc MPC EM students from 30 to 60 w.e.f. from 2019-20.

27. Resolved to take girls students also for admissions into Bsc MCPc w.e.f. from 2019-20.

Special Features of Chemistry Department

1. In the cluster system 85 students opted chemistry projects and they submitted projects to our college under the guideance of eminemt lecturers.

2.NAAC team visited our college chemistry department on 08-09-2017 and chairman commented **"chemistry department is very good"** in always.

3. CCB academic team visited our chemistry department on 21-03-2018 and team head was commented as **“ chemistry department is excellent”** always.

Modern Lecture Methods & New Techniquis

4.Power Point Presentation / LCD Teaching.

5.Virtual Class Teaching Methods.

6.Feedback on Teching Performance.

P.R.GOVERNMENT COLLEGE(A), KAKINADA

B.Sc. Chemistry Syllabus under CBCS

Structure of Chemistry Syllabus Under CBCS

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

OBJECTIVES

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

1. Preparation, properties and applications of some special compounds of s and p block elements.
2. Structural theory of Organic compounds.
3. Preparation, properties and applications of alkenes, alkynes and cycloalkanes.
4. Benzene structure and its reactivity.
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.**

1. Features involved in gaseous state, liquid state and solid state and their applications.
2. Importance of colloids and adsorption.
3. Chemical bonding between molecules through M.O. theory.
4. Identification of some cations and anions in the unknown mixture.
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 topicss and come to know their role in serving the society through chemistry.**

1. Properties of d and f block elements.
2. Boding nature of the metals.
3. Preparation, properties and applications of halogen compounds, hydroxyl compounds, carbonyl Compounds and carboxylic acids.
4. Importance and synthetic applications of active methylene compounds.
5. Estimation of Fe (II) and Cu (II) in the unknown material through practical.
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.**

1. Different types of Electronic transitions present in Organic molecules..
2. Identification of Functional groups using IR spectrum.
3. Analysis of Cr and Mn using spectrophotometer.
4. Structural identifications of organic compounds using H^1-NMR
5. Different aspects of electrochemistry.
6. Identification of functional group present in the given organic compound by IR spectral analysis.
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.**

1. Involved theories and properties of coordination compounds.
2. Preparation and properties of nitrogen compounds.
3. Importance, preparations, properties and medicinal uses of heterocyclic compounds.
4. Structural elucidation of glucose and fructose.
5. Importance of Amino acids and Proteins.
5. Determination of Rate of the reactions through chemical kinetics.
6. Some photochemical reactions photophysical processes.
7. Importance of thermodynamical aspects.
8. Identification of functional group present in the given organic compound by following organic qualitative analysis.
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.**

1. Various types of instrumental techniques like IR and NMR spectroscopies.
2. Different aspects of Environmental Chemistry.
3. Importance of green chemistry.
4. Analyses of drugs, dairy products
6. Importance of petrochemicals.
7. Preparation of some organic compounds.
8. Synthesis of organic compounds using green synthesis.

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

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 near by 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 programmes and group projects etc.

P.R.GOVERNMENT COLLEGE (AUTONOMOUS)-KAKINADA

SECOND YEAR 2019-20

SEMESTER-III

Paper-II (INORGANIC & ORGANIC CHEMISTRY) 60hrs(4hrs/week)

OBJECTIVES:

1.Understands the reason for characteristic properties of d- and f-block elements.

2.Appreciates the application of M.O. Theory to conductors, Semi-conductors and Insulators.

3.Gains knowledge of properties of hetero compounds with mechanism.

4.Able to apply principles of anion synthesis.

INORGANIC CHEMISTRY 30hrs(2hrs/week)

UNIT-I

1.Chemistry of d-block elements: 9 hrs

Characteristics of d-block elements with special reference to electronic configuration, variable valences, magnetic properties, catalytic properties and ability to form complexes, stability of various oxidation states.

2.Theories of bonding in metals: 6 hrs

Metallic properties and its limitations. Valence bond theory, Free electron theory. Explanation of thermal and electrical conductivity of metals, limitations. Band theory, formation of bands, explanation of conductors, semi-conductors and insulators.

UNIT-II

3.Metal carbonyls: 7hrs

EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni.

4.Chemistry of f-block elements: 8hrs

Chemistry of lanthanides-electronic structure, oxidation states. Lanthanide contraction. consequences of lanthanide contraction, magnetic properties. Chemistry of actinides-electronic configuration, oxidation states, actinide contraction, comparison of lanthanides with actinides.

ORGANIC CHEMISTRY 30hrs(2hrs/week)

UNIT-III

1.Halogen compounds: 5hrs

Nomenclature and classification of alkyl (into primary, secondary, tertiary),aryl, aralkyl, allyl, vinyl, benzyl halides. Nucleophilic aliphatic substitution reaction-classification into SN^1 and SN^2 – reaction mechanism with examples- Ethyl chloride, t-butyl chloride and optically active alkyl halide 2-bromo butane.

2.Hydroxy compounds: 5hrs

Nomenclature and classification of hydroxyl compounds.

Alcohols: Preparation with hydroboration reaction.Grignard synthesis of alcohols.

Phenols: Preparation i)from diazonium salt ii)from aryl sulphonates iii)from cumene.

Physical properties : Hydrogen bonding (inter molecular and intra molecular). Effect of hydrogen bonding on boiling point and solubility in water.

Identification of alcohols by oxidation with $KMnO_4$, Ceric ammonium nitrate. Luca's reagent and phenols by reaction with $FeCl_3$.

Chemical properties**:** a)Dehydration of alcohols b)Oxidation of alcohols by CrO_3, $KMnO_4$ c) Special reaction of phenols: Bromination. Kolbe-Schmidt reaction, Riemer-Tiemann reaction. Fries rearrangement, azo coupling, pinacole-pinacolone rearrangement.

UNIT-IV

Carbonyl compounds: 10hrs

Nomenclature of aliphatic and aromatic carbonyl compouns, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.

Physical properties : Reactivity of carbonyl group in aldehydes and ketones.

Nucleophilic addition reaction with a)$NaHSO_3$ b)HCN c)RMgX d)NH_2OH e)$PhNHNH_2$ f)2,4-DNPH g)Alcohols - formation of hemiacetal and acetal.

Base catalysed reactions: a)Aldol condensation b)Cannizaro's reaction c) Perkin reaction d) Benzoin condensation e)Haloform reaction f)Knoevangel reaction. Oxidation of aldehydes : Baeyer-Villiger oxidation of ketones.

Reduction: Clemensen reduction, Wolf-kishner reduction. MPV reduction , reduction with $LiAlH_4$ and $NaBH_4$. Analysis of aldehydes and ketones with
a)2,4-DNPH test b)Tollen's test c)Fehling's test d)Schiff's test e) Haloform test (with equation)

UNIT-V

1.Carboxylic acids and derivatives: 6hrs

Nomenclature: classification and structure of carboxylic acids. Methods of preparation by a)Hydrolysis of nitriles, amides b)Hydrolysis of esters and bases with mechanism c) Carbonation of Grignard reagents. Special methods of preparation of aromatic acids by a)Oxidation of side chain b) Hydrolysis by benzo tri chlorides c) Kolbe reaction

Physical properties**:** Hydrogen bonding, dimeric association, acidity-strength of acids with examples of trimethyl acetic acid and tri-chloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids.

Chemical properties**:** Reactions involving H, OH and COOH groups - salt formation, anhydride formation, acid chloride formation, amide formation and esterification(with mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schmidt reaction. Arndt-Eistert synthesis, halogenations by Hell-Volhard-Zelinsky reaction.

2.Active methylene compounds: 4 hrs

Acetoacetic ester: Keto-enol tautomerism, preparation by Claisen condensation, Acid hydrolysis and ketonic hydrolysis. Preparation of a)mono carboxylic acids

b) Dicarboxylic acids c) Reaction with urea.

Malonic ester : preparation from acetic acid.

Synthetic applications: Preparation of a)mono carboxylic acids(propionic acid and n-butyric acid). B) Dicarboxylic acids (succinic acid and adipic acid)

c)α,β-unsaturated carboxylic acids (crotonic acid) d) Reaction with urea.

List of Reference Books

1.Selected topics in inorganic chemistry by W.D.Malik, G.D.Tuli, R.D.Madan

2.Inorganic Chemistry J.E Huheey, E.A.Keiter and R.L.Keiter

3.A Text Book of Organic Chemistry by Bahl and Arun Bahl

4.A Text Book of Organic Chemistry by I.L.Finar Vol.I

5.Organic Chemistry by Bruice

6.Organic Chemistry by Clayden

7.Advanced Inorganic Chemistry by Gurudeep Raj

8.Basic Inorganic Chemistry by Cotton and Wilkinson

9.Concise Inorganic Chemistry by J.D.Lee

III – SEMESTER CHEMISTRY Paper-III

Weightage to content

S.No	Course content	Essay	Short questions	Total no.of questions	Total No. of Marks allotted to each Unit
	INORGANIC CHEMISTRY				
1	UNIT-I	2	2	4	30
2	UNIT-II	2	2	4	30
	ORGANIC CHEMISTRY				
3	UNIT-III	1	2	3	20
4	UNIT-IV	1	1	2	15
5	UNIT-V	2	1	2	25
	TOTAL	**8**	**8**	**16**	**120**

SEMESTER-III Chemistry model question paper 2019-20

INORGANIC & ORGANIC CHEMISTRY

(Revised Question paper w.e.f.2018-19)

Time:2½ hrs Marks : 60

Answer **two** questions from SECTION-A, **two** questions from SECTION-B any **four** questions from Section-C. Each question carries 10 marks.

SECTION-A(INORGANIC CHEMISTRY) 2X10=20M

1. Explain the tendency of formation of complex compounds and catalytic properties of d-block elements.

2. Give a detailed account of Band theory of metals. How could you explain the properties of conductors, insulators and semi-conductors basing on this theory.

3. Explain the structures of $Fe(CO)_5$ and $Co_2(CO)_8$

4. Explain the following properties of f-block elements.i)Electronic configurations & ii)Oxidation states

SECTION-B(ORGANIC CHEMISTRY) 2X10=20M

5. Write the following with examples:(i)Walden inversion in S_N^2 reaction & (ii)Racemisation in S_N^1 reaction

6. Give the mechanism of the following (i)Cannizaro reaction & (ii) Aldol condensation

7. Explain the mechanism of ester hydrolysis in presence of acids and bases

8. Propose the preparation of malonic ester. Describe any two synthetic applications of it.

SECTION-C (4X5=20 marks)

Answer any **four** questions. Each question carries 5 marks.

9.What are transition elements? Explain the general properties with reference to magnetic properties.

10.Discuss about free electron theory.

11.What are metal carbonyls? Give their classification briefly.

12.What is lanthanide contraction? Write its consequences.

13.Write any four differences between S_N^1 & S_N^2 reactions.

14.Explain Acidity of phenols.

15.Discuss about the identification of Aldehydes and Ketones with equations.

16.Write briefly about Keto - enol tautomerism.

P.R.GOVERNMENT COLLEGE (AUTONOMOUS)-KAKINADA

SECOND YEAR 2019-20

SEMESTER-III

Paper-II (INORGANIC & ORGANIC CHEMISTRY)

Question bank

D-BLOCK ELEMENTS

1. What are the transition elements? Explain the following properties:
   a) Electronic Configurations b) Various Oxidation states
   c) Catalytic properties d) Complex compounds formation e) Magnetic behaviour

2. Explain Free electron theory & Valence bond theory.

3. Explain Band theory of Conductors, Semi conductors and Insulators.

4. Explain about n-type and p-type semi conductors.

METAL CARBONYLS

5. What are metal carbonyls and explain them?

6. Explain Effective Atomic Number with Examples.

7. Explain the structures of $Ni(CO)_4$, $Fe(CO)_5$, $CrCO_6$, $Fe_2(CO)_9$,$Co_2(CO)_8$

F-BLOCK ELEMENTS

8. What is lanthanide contraction? Explain its consequences?

9. Write the Comparison and differences between Lanthanides and Actinides?

10. What are the Inner transition elements?
    Explain the properties of a) Electronic configurations b) Oxidation states and
    c) Magnetic properties.

HALOGEN COMPOUNDS & HYDROXY COMPOUNDS

1. Explain SN_1 & SN_2 reactions with examples?
2. Explain preparation methods of Alcohols and Phenols?
3. Explain the following reaction mechanisms
   a) Reimer - Tiemann reaction b) Kolbe-Schmidt reaction
   c) Fries rearrangement d) Pinacol – Pinacalone rearrangement

4. Explain the identification tests of Primary, Secondary & Tertiary alcohols.
5. Explain the chemical properties of Alcohols?

CARBONYL COMPOUNDS

1.Explain the preparation methods of Aldehydes and ketones ?

2. Explain the preparation methods of Grignard reagents & Alcohols from Carbonyl compounds?

3. Explain the following reactions:
a) Clemensen reduction b) Wolf-Kishner reduction 3) MPV Reduction

4. Explain the following reactions:
a)Haloform reaction b) knovenangel condensation c) Bayer-villeger oxidation

5. Explain the following reaction mechanisms:
a) Aldol condensation b) Cannozaro reaction c) Benzoin condensation d) Perkin reaction.

6. Explain the identification of Aldehydes & ketones ?

7. Write the nucleophilic addition reactions of carbonyl compounds?

CARBOXYLIC ACIDS AND ACTIVE METHYLENE COMPOUNDS

1. Explain Ester hydrolysis in presence of acids and bases?

2. Explain about preparation of carboxylic acids?

3. Explain the reaction mechanism of Ester hydrolysis?

4. Explain the following reactions:
a) Huns-diecker's reaction b) Schmidt reaction c) Arndt-Eistert reaction d) HVZ Reaction

5. Explain the chemical properties of carboxylic acids?

6. Explain about keto - enol tautomerism ?

7. Write the prepation of Acetoacetic ester by Claisen condensation method?

8. Write the following preparations from Acetoacetic ester
a) Propionic acid & n-Butyric acid b) Succinic acid, Glutaric acid & Adipic acids
c) 4-Methyl Uracil

9. Write the preparation of Malonic ester from Acetic acid &

Write the following preparations from Malonic ester
a) Propionic acid & n-Butyric acid b) Succinic acid & adipic acid
c) Crotonic acid d) Malonyl urea

LABORATORY COURSE – III SEMESTER 30 hours.(2 hours / week)

Practical Paper-II SEMESTER-III

Titrimetric Analysis & Organic Functional Group Reactions

(At the end of Semester-III)

Titrimetric analysis:

1.Determination of Fe(II) using $KMnO_4$ with Oxalic acid as primary standard.

2.Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.

3.Preparation Of Tetra ammine Copper (II) Sulphate.

4Determination of Ni(II) using EDTA.

5.Determination of carbonate and bicarbonate in a mixture.

Organic Functional Group Reactions:

6.Reactions of the following functional groups present in organic compounds

(at least four)

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids and Amides.

SCHEME OF VALUATION FOR III SEMESTER
CHEMISTRY LABORATORY COURSE
TITRIMETRIC ANALYSIS &
ORGANIC FUNCTIONAL GROUP REACTIONS

Time:3 hours Max. Marks : 50

For Record : 10 marks
For Viva-voce : 5 marks
For Practical : 35 marks

Splitting of Practical marks for titrimetric analysis :

i) Preparation of standard solution : 5 marks
ii) Standardization of intermediate solution : 5 marks
iii) Determination of the given compound : 10 marks
Error <1% : 10 marks
Error 1-1.5% : 8 marks
Error >2% : 5 marks (Minimum marks)
iv) Correct calculation : 3 marks

Splitting of Practical marks for Organic compound functional group reactions:
Any **FOUR** reactions of the given functional group : (4x3)=12 marks

SEMESTER-IV
CHEMISTRY PAPER-II
SPECTROSCOPY & PHYSICAL CHEMISTRY
60hrs (4hrs/week)