

**SRI ASNM GOVERNMENT COLLEGE(A)**

**PALAKOL**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**DEPARTMENT OF CHEMISTRY**

**BOARD OF STUDIES MEETING**

**2020-2021**

**Date:19.06.2020**

**SRI A S N M GOVERNMENT COLLEGE(A), PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**2020-2021**

**DEPARTMENT OF CHEMISTRY- BOARD OF STUDIES**

- Board of Studies Chairman** : **Sri M.SUDHAKARA RAO**  
Head of the Department
- University Nominee** : **Dr. K. DEEPTHI,**  
Assistant professor,  
Department of chemistry,  
Adikavi Nannaya University,  
Rajamahendravaram, E.G.Dt.
- Subject Experts** : **1) Sri K. VENKATA RAO,**  
Lecturer in Chemistry,  
SCIM Government College,  
Tanuku, W.G. Dt.
- : **2) Dr. V.DURGA PRAVEENA,**  
Lecturer in Chemistry,  
GDC,Narayanapuram,W,G.Dt
- Industriast / Businessman** : **Sri T. PULLA RAO**  
Ganesh rice millers, PALAKOLLU
- Alumni** : **Sri K.MANIKANTA**  
St MARY'S high school ,Palakollu.
- Members of the Department** : **1. Sri Sk.M.ANSARI**  
**2. Sri S. RAMA KRISHNA**  
**3. Sri K.JAGAPATHI BABU**  
**4. Sri E. Kalyan Kumar**
- Students:**
- 1. Ravuri Devadas**  
**II B.Sc(M.P.C)**
- 2. Kolla Yogesh**  
**III B.SC(M.P.C)**
- Agenda:-**
- 1. To prescribe the syllabi suggested by University, with modification if any not Exceeding 20%.to suits the local needs, to be implemented from the academic year 2020-2021.**
  - 2. To select paper setters and examiners for theory and practical which ever applicable from The panel of Readers/Lecturers working in some reputed colleges.**
  - 3. To approve blue print and model question paper for theory and practical wherever Applicable for semester examinations.**
  - 4. Research, Teaching, Extension and other academic activities in the department Suggest, Methodologies for innovate methods for Teaching and Learning.**
  - 5. Any other with the permission of chair**

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**  
**(Affiliated to Adikavi Nannaya University, Rajahmundry)**  
**(Accredited with NAAC “B” Grade with 2.61 CGPA points)**

After thorough discussion the following resolutions were made by the Department BOS

**Resolutions :**

1. It is observed that the Revised CBCS of UG course frame work prepared by APSICHE, Guntur need to be implemented w.e.f.2020-21, but the process is not yet completed and will be communicated soon. In this regard it is resolved that the same syllabus suggested by AKNU will be adopted and implemented w.e.f.2020-21
2. In the light of above ,it is also resolved that separate subject subcommittee are constituted to look after the implementation of I year syllabus of revised CBCS frame work and necessary marginal changes if any may immediately be adopted and the same will be ratified in the next BOS
3. Resolved to approve the proposal of certificate course on Soil & Water analysis for II & III year students
4. It is resolved to conduct External Examination for 75 Marks and Internal Examination for 25 Marks for the each paper and to conduct two internal examinations for each paper for 15 Marks. Average will be considered. 5 Marks are allotted to Seminar/Assignments/Project and remaining 5 marks for extracurricular activities and attendance.
5. Resolved that the pass marks for external examination is 26. Candidate should get total marks of 40, in both internal and external examinations put together.
6. It is resolved to conduct odd semester practical examinations with internal faculty members with subject teacher and another teacher in the department and even semester practical examination to be conducted involving external examiner. .
7. Resolved to adopt all the Modern teaching learning Methods including ICT and Digital board.
8. Resolved to advise the entire Faculty to apply for UGC for financial assistance to conduct Seminars/Workshops/Conferences /MRP's, etc., and to arrange field trips Surveys, Society outreach programmes etc.
9. Resolved to conduct Guest Lectures ,Study Projects for academic year 2019-2020.
10. Resolved to approve the list of Question paper setters and examiners appended herewith.
11. It is resolved to approve programme outcomes, programme specific out comes, course out comes& course codes

**BOS Chairman**

**Members presented:**

- |    |    |
|----|----|
| 1. | 5. |
| 2. | 6. |
| 3. | 7. |
| 4. | 8. |

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**  
**(Affiliated to Adikavi Nannaya University, Rajahmundry)**  
**(Accredited with NAAC “B” Grade with 2.61 CGPA points)**

**DEPARTMENT OF CHEMISTRY**

**Sri M.SUDHAKARA RAO, Chairman of BOS request the Academic Council to consider and approve the changes in the syllabi recommended by the Board of Studies for the academic year 2020-2021.**

**The resolutions were seconded by University Nominee Dr. K. DEEPTHI, Assistant professor, Department of chemistry, Adikavi Nannaya University.**

**The academic council is also requested to accord permission to appoint examiners for Theory and Practical for the academic years 2020-2021.**

**Chairman  
Board of Studies.**

- 1.**
- 2.**
- 3.**
- 4.**
- 5.**
- 6.**
- 7.**

**SRI A S N M GOVERNMENT COLLEGE(A), PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**COURSE STRUCTURE**

**B.SC. (W.E.F 2016-17 Batch)**

YEAR	SEMESTER	PART	SUBJECT	Hrs	Credits	Mid Sem Exam	Sem End Exam	TOTAL
<b>I st YEAR</b>	Semester I	PART II	INORGANIC & ORGANIC CHEMISTRY – I	4	3	25	75	100
			LABORATORY COURSE – I	3	2	-	50	50
	Semester II	PART II	PHYSICAL & GENERAL CHEMISTRY - I	4	3	25	75	100
			LABORATORY COURSE – II	3	2	-	50	50

YEAR	SEMESTER	PART	SUBJECT	Hrs	Credits	Mid Sem Exam	Sem End Exam	TOTAL
<b>II nd YEAR</b>	Semester III	PART II	INORGANIC & ORGANIC CHEMISTRY – I	4	3	25	75	100
			LABORATORY COURSE – I	3	2	-	50	50
	Semester IV	PART II	SPECTROSCOPY & PHYSICAL CHEMISTRY	4	3	25	75	100
			LABORATORY COURSE – II	3	2	-	50	50

YEAR	PART	SUBJECT	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR (SEMESTER V)	Part-II	Chemistry Paper-5 (Inorganic, Organic & Physical)	3	3	25	75	100
	Part-II	Chemistry Lab Practical-5	3	2	0	50	50
	Part-II	Chemistry Paper-6 (Inorganic, Organic & Physical)	3	3	25	75	100
	Part-II	Chemistry Lab Practical-6	3	2	0	50	50
		<b>Total</b>		<b>12</b>	<b>10</b>	<b>-</b>	<b>-</b>

**SEMESTER – VI**

YEAR	PART	SUBJECT	Teaching Hours	Credits	Mid Sem Exam	Sem End Exam	Total Marks
III YEAR (SEMESTER VI)	Part-II	Elective-1 (Any one paper from VII A,B,C) Paper -7 (applied/adv)	3	3	25	75	100
	Part-II	Elective-1 Lab Practical	3	2	0	50	50
	Part-II	Elective -2 (Any one cluster from VIII A,B,C Each cluster contain three papers): Paper -8 App/Inter-domain/Gen El	9	9	75	225	300
	Part-II	Elective-2 Lab Practical	9	6	0	150	150
		<b>Total</b>		<b>24</b>	<b>20</b>	<b>-</b>	<b>-</b>

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT****(Affiliated to Adikavi Nannaya University, Rajahmundry)****(Accredited with NAAC "B" Grade with 2.61 CGPA points)****B.Sc. Chemistry Syllabus under CBCS****w.e.f. 2016-17****Structure of Chemistry Syllabus Under CBCS**

<b>YEAR</b>	<b>SEMESTER</b>	<b>PAPER</b>	<b>TITLE</b>	<b>MARKS</b>	<b>CREDITS</b>	
<b>I</b>	<b>I</b>	<b>I</b>	Inorganic and Organic Chemistry	100	03	
			Practical – I	50	02	
	<b>II</b>	<b>II</b>	Physical and General Chemistry	100	03	
			Practical – II	50	02	
<b>II</b>	<b>III</b>	<b>III</b>	Inorganic and organic Chemistry	100	03	
			Practical – III	50	02	
	<b>IV</b>	<b>IV</b>	Spectroscopy and Physical Chemistry	100	03	
			Practical – IV	50	02	
<b>III</b>	<b>V</b>	<b>V</b>	Inorganic ,Organic and Physical Chemistry	100	03	
			Practical – V	50	02	
		<b>VI</b>	<b>VI</b>	Inorganic ,Organic and Physical Chemistry	100	03
				Practical – VI	50	02
	<b>* Any one Paper from VII A, B and C</b>	<b>VII (A)*</b>	<b>VII (A)*</b>	Elective	100	03
				Practical - VII A	50	02
		<b>VII (B)*</b>	<b>VII (B)*</b>	Elective	100	03
				Practical - VII B	50	02
<b>VII (C)*</b>	<b>VII (C)*</b>	Elective	100	03		

VI	** Any one cluster from VIII, A, B and C		Practical - VII C	50	02
		VIII (A)**	<b>Cluster Electives - I :</b>		
			VIII-A-1	100	03
			VIII-A-2	100	03
			VIII-A-3	100	03
			Practical's	50	02
				50	02
				50	02
		VIII (B)**	<b>Cluster Electives - II ::</b>		
			VIII-B-1	100	03
			VIII- B-2	100	03
			VIII-B-3	100	03
			Practical's	50	02
				50	02
				50	02
		VIII (C)**	<b>Cluster Electives - III ::</b>		
	VIII-C-1	100	03		
	VIII-C-2	100	03		
	VIII-C-3	100	03		
	Practical's	50	02		
		50	02		
		50	02		



**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**  
**(Affiliated to Adikavi Nannaya University, Rajahmundry)**  
**(Accredited with NAAC “B” Grade with 2.61 CGPA points)**

**BLUE PRINT FOR THE CHEMISTRY MODEL PAPER  
FOR EVERY SEMESTER END EXAMINATIONS**

S.NO	UNIT NO	EASSY QUESTIONS			SHORT QUESTIONS		
		No of Questions	Marks allotted	Total marks	No of Questions	Marks allotted	Total marks
1	I	02	10	20	02	05	10
2	II	02	10	20	01	05	05
3	III	02	10	20	02	05	10
4	IV	02	10	20	01	05	05
5	V	02	10	20	02	05	10

**BLUE PRINT FOR INTERNAL EXAMINATIONS**

S.NO	Questions to be given			To be answered		
	No of Questions	Marks	Total Marks	No of Questions	Marks	Total Marks
1	1	10	10	1	10	10
2	1	05	05	1	05	05
	<b>Total marks</b>		<b>15</b>	<b>Total marks</b>		<b>15</b>

<b>Percentage of choice</b>	<b>: 0</b>
<b>Assignments/Seminar/Project Works</b>	<b>: 05 Marks</b>
<b>Attendance/Extra Curricular Activities</b>	<b>: 05 Marks</b>
<b>Total Marks</b>	<b>: 25 Marks</b>

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**DEPARTMENT OF CHEMISTRY**

**LIST OF EXAMINERS AND PAPER SETTERS**

<b>S.NO</b>	<b>NAME OF THE LECTURER</b>	<b>ADDRESS</b>
01	P.Sai Krishna	SCIM Government Degree College, Tanuku, W.G.Dt., Phone:9849115488
02	Dr. M. Trinadh	Government College (A), Rajahmundry, E.G.Dt Phone: 9441655767
03	Dr. B. Madhav	Government College (A), Rajahmundry, E.G.Dt Phone: 9441655767
04	Dr. M. Syam Babu	D.R.G. Government Degree College, Pentapadu, Tadevalligudem(P), W.G.Dt., Phone: 9440575085
05	Dr. V. Neeraja	SRR & CVR Government College, Vijayawada. Krishna Dt., Phone: 9705798900
06	Sri V. Sridhar	Government Degree College, Tanuku, W.G.Dt., Phone: 7386048119
07	Sri B.Venkata Rao	Government College (A), Rajahmundry, E.G.Dt Phone: 9948195459
08	Sri C.G.S.N.Rajakumar	SCIM Government Degree College, Tanuku Phone: 9491973304.
09	Sri V.Mallikharjuna Sharma	Government College (A), Kakinada. Phone: 9676822550
10	Dr M.Sujatha	S.V.R.K. Government College (M), Nidadavole. Phone: 9912344027
11	Sri K. Krishna Murthy	SMBT & AV Arts & Science College, Veeravasaram. Phone: 8500710313
12	Sri V Phani Kumar	SRR & CVR Government College, Vijayawada. Krishna Dt., Phone: 9494533594
13	Sri M.V.Murali Krishna	SVKP & Dr KSRAJU Arts & Science College, Penugonda. Phone:9948683323
14	Sri K.Venkata Rao	SCIM Government Degree College, Tanuku, W.G.Dt., Phone:9441267126

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**  
**(Affiliated to Adikavi Nannaya University, Rajahmundry)**  
**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**I.B.Sc.**

**SEMESTER – I (Wef 2016-17 batch)**

**Paper I - Inorganic & Organic Chemistry    60hrs (4h/w)**

**INORGANIC CHEMISTRY**

**30 hrs (2h / w)**

**UNIT –I**

**p-block elements –I**

**15h**

Group-13: Synthesis and structure of diborane and higher boranes

( $B_4H_{10}$  and  $B_5H_9$ ), boron-nitrogen compounds ( $B_3N_3H_6$  and BN)

Group - 14: Preparation and applications of silanes and silicones and Graphitic compounds

Group - 15: Preparation and reactions of hydrazine, hydroxylamine and Phosphozenes

**UNIT-II**

**1. p-block elements -II**

**8h**

Group - 16: Classifications of oxides based on (i) Chemical behaviour and

(ii) Oxygen content, oxy acids sulphurs (structures only)

Group-17: Inter halogen compounds, pseudo halogens and comparison with halogens

**2. Organometallic Chemistry**

**7h**

Definition - classification of Organometallic compounds - nomenclature, preparation, properties and applications of alkyls of Li and Mg.

**ORGANIC CHEMISTRY**

**30hrs (2h /w)**

**UNIT-III**

**Structural theory in Organic Chemistry**

**10 h**

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like  $H_2O$ ,  $NH_3$  &  $AlCl_3$ ).

Bond polarization : Factors influencing the polarization of covalent bonds, electro negativity - inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes.

Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.

**UNIT-IV**

## 1. Acyclic Hydrocarbons

6 h

**Alkenes** - Preparation of alkenes. Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H<sub>2</sub>O, HOX, H<sub>2</sub>SO<sub>4</sub> with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition). Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

**Alkynes** - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X<sub>2</sub>, HX, H<sub>2</sub>O (Tautomerism), Oxidation with KMnO<sub>4</sub>, OsO<sub>4</sub>, reduction and Polymerisation reaction of acetylene.

## 2. Alicyclic hydrocarbons (Cycloalkanes)

4 h

Nomenclature, Preparation by Freund's method, Wislicenus method. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.

## UNIT-V

### Benzene and its reactivity

10h

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO<sub>2</sub> and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens (Explanation by taking minimum of one example from each type)

### List of Reference Books

1. Inorganic Chemistry by J.E.Huheey
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. A textbook of qualitative inorganic analysis by A.I. Vogel
4. Organic Chemistry by Morrison and Boyd
5. A Text Book of Organic chemistry by I L Finar Vol I
6. Concise Inorganic Chemistry by J.D.Lee
7. A Text Book of Organic Chemistry by B.S.Bhal and Arun Bhal

**LABORATORY COURSE-I**

**30 hrs (3 h / w)**

**Practical-I Simple Salt Analysis**

(At the end of Semester-I)

**Qualitative inorganic analysis**

Analysis of simple salt containing one anion and cation from the following

**Anions:** Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate, phosphate.

**cations:** Lead, copper, iron, aluminum, zinc, manganese, nickel, calcium, strontium, barium, potassium and ammonium.

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**  
**(Affiliated to Adikavi Nannaya University, Rajahmundry)**  
**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**MODEL PAPER**

**THREE YEAR B.Sc, DEGREE EXAMINATION**

**FIRST YEAR EXAMINATIONS**

**SEMESTER I**

**Paper –I: INORGANIC & ORGANIC CHEMISTRY - I**

**Time: 3 hours**

**Maximum Marks: 75**

**PART- A**

Answer **ALL** the questions

Each carries **TEN** marks

**5x10 = 50 Marks**

1. (a) Write note on Preparation, Structure and Properties of Silicones.

**(OR)**

(b) Explain the Preparation and Oxidation- Reduction reactions of Hydroxylamine.

2.(a) Give an account on different types of interhalogen compounds.

**(OR)**

(b) How the following are prepared from the Methyl Magnesium bromide and methyl lithium

1) Formaldehyde      2) Acetaldehyde      3) Acetone      4) t- butyl alcohol

3. (a) Describe different types of Organic Reactions with one example to each.

**(OR)**

(b) What is inductive effect and explain the following by using inductive effect

i) Basicity of amines    ii) Acidity of carboxylic acids    iii) Stability of carbonium ions

4.(a) Explain the addition of these reagents to alkenes with mechanism.

1) H<sub>2</sub>O      2) HOX      3) H<sub>2</sub>SO<sub>4</sub>

**(OR)**

(b) Explain Baeyer's bond angle strain theory.

5. (a) Describe the Molecular Orbital structure of Benzene.

**(OR)**

(b) Explain the orientation in benzene with respect to alkyl and nitro group.

**PART- B**

Answer any **FIVE** of the following questions

Each carries **FIVE** marks

**5x5 = 25 Marks**

6. Define the electron deficient molecules and draw the structures of Borazole and Diborane.

7. Write brief note Electrophiles and Nucleophiles .

8. How the following are synthesized from Organo Lithium Compounds.

a) Acetic acid      b) Ethyl alcohol

9. Define Hyper conjugation and explain the stability of olefins (alkenes) .

10. Define the Markonikov's rule and explain the addition of 1- Propene with HBr.

11. Explain the acidity of the Acetylinic hydrogen with example.

12. Draw the conformational structures of Cyclohexane.

13. Define aromaticity and apply the Huckel's rule to benzene and naphthalene.

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**I.B.Sc.**

**SEMESTER – II (Wef 2016-17 batch)**

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

**PHYSICAL CHEMISTRY      30 hrs (2h / w)**

**UNIT-I**

**Solidstate**

**10h**

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects.

**UNIT-II**

**1.Gaseous state**

**6 h**

Compression factors, deviation of real gases from ideal behavior. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The vander Waal's equation and the critical state. Law of corresponding states. Relationship between critical constants and vander Waal's constants. Joule Thomson effect.

**2.Liquid state**

**4 h**

Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

**UNIT-III**

**Solutions**

**10h**

Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure - composition and vapour pressure- temperature curves. Azeotropes-HCl-H<sub>2</sub>O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation.

**Nernst distribution law.** Calculation of the partition coefficient. Applications of distribution law.

## GENERAL CHEMISTRY

30 hrs (2h / w)

### UNIT-IV

#### 1. Surface chemistry

8 h

Definition of colloids. Solids in liquids (sols), preparation, purification, properties - kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid.

Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses.

Adsorption: Physical adsorption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption

#### 2. Chemical Bonding

7h

Valence bond theory, hybridization, VB theory as applied to  $\text{ClF}_3$ ,  $\text{Ni}(\text{CO})_4$ , Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules ( $\text{N}_2$ ,  $\text{O}_2$ ,  $\text{CO}$  and  $\text{NO}$ ).

### UNIT-V

#### Stereochemistry of carbon compounds

15 h

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

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

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

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

Additional input: Conformational isomerism of Ethane & Ethylene glycol

#### List of Reference Books

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Stereochemistry of Organic compounds by E L Eliel
6. Advanced Organic Chemistry by F A Carey and R J Sundberg
7. Stereochemistry by P.S.Kalsi
8. Stereochemistry of Organic compounds by D. Nasipuri
9. Advanced physical chemistry by Bahl and Tuli
10. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan



**LABORATORY COURSE -II**  
**Practical-II Analysis of Mixture Salt**

**30 hrs (3 h / w)**

(At the end of Semester-II)

**Qualitative inorganic analysis**

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

**Anions:** Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate, phosphate.

**Cations:** Lead, copper, iron, aluminum, zinc, manganese, calcium, strontium, barium, potassium and ammonium.

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**MODEL PAPER**

**THREE YEAR B.Sc, DEGREE EXAMINATION**

**FIRST YEAR EXAMINATIONS**

**SEMESTER II**

**Paper -II: INORGANIC & ORGANIC CHEMISTRY**

**Time: 3 hours**

**Maximum Marks: 75**

**PART-A**

Answer **ALL** questions. Each question carries **10** marks.

5X10=50 Marks

□□□□ □□□□□□□□ □□□□□□□□ □□□□□□□□ . □□□□ □□□□□□□□ **10**

□□□□□□□□ .

1. (a) Derive Bragg's equation. Explain crystal structure by rotating crystal method.

□□□□□ □□□□□□□□ □□□□□□□□□□ . □□□□□ □□□□□ □□□□□□□□

□□□□□ □□□□□ □□□□□□□□□□

□□□□□□□□□□ .

**OR**

(b) Explain crystal defects.

□□□□□□ □□□□□□ □□□□□□□□□□ .

2. (a) Derive Vander Waals equation for real gases.

□□□ □□□□□□□□□□ □□□□□□ □□□□ □□□□□□□□□□ □□□□□□□□□□□□ .

**OR**

(b) Derive relationship between Critical Constants and Vander Waals Constants.

□□□□□□□ □□□□□□□□□□□□ □□□□□ □□□□□□ □□□□ □□□□□□□□□□□□□□ □□□□

□□ □□□□□□□□□□

□□□□□□□□□□□□ .

3. (a) What is critical solution temperature? Explain C.S.T in Phenol-Water System, Trimethyl Amine-Water System.

□□□□□□□ □□□□□□□□ □□□□□□□□ □□□□□□□□ . □□□□□□-□□□□□

□□□□□□□□□□ , □□□□ □□□□□□ □□□□□-□□□□ □□□□□□□□ □□□□□□□□

□□□□□□□ □□□□□□□□ □□□□□□□□□□ .

**OR**

(b) Write a note on Nernst Distribution Law and its application.

□□□□□□□□□□ □□□□□ □□□□□□ □□□□□ □□□□ □□□□□□□□□□□□□□

□□□□□□□□□□ .

4. (a) Write differences between Physical Adsorption and Chemisorption.

□□□□□ □□□□□□□□ □□□□□ □□□□□ □□□□□□□□□□ □□□□ □□□□□□□□

□□□□□□□□□□ .

**OR**

(b) Draw the Molecular orbital diagram of O<sub>2</sub>, CO molecules and calculate Bond Order, Magnetic Character.

O<sub>2</sub>, CO □□□□□□□ □□□ □□□□□□□□□□ □□□□□□ □□□□□□ □□□□□ □□□□

□□□□□□□ , □□□□□□□□□□

□□□□□□□□□□ □□□□□□□□□□□□ .

5. (a) Write the R,S configuration method with priority rules with examples.

R,S □□□□□□□□□□□□ □□□□□□□□ □□□□□□□□□□ □□□□□□□□□□

□□□□□□□□□□□□ .

OR

(b) Define and explain Enantiomers and Diastereomers with examples.

□□□□ □□□□□□□□ □□□□□□□□□□□□□□□□ □□□□□□□□□□□□ □□□□  
□□□□□□□□□□ □□□□□□□□□□ .

...2.

-2-

**PART-B**

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

5X5=25 Marks

□□□□□ □□□ □□□□□□□□□□ □□□□□□□□□□ □□□□□□□□ . □□□□□□ □□□□□□□□□□  
□□□ □□□□□□□□□□ .

6. Write a short note on Law of rationality indices.

□□□□ □□□□ □□□□□□□□ □□□□□□ □□□□□□ □□□□□□□□ .

7. Write a short note on Weeiss Indices and Miller Indices.

□□□□ □□□□□□□□ □□□□□ □□□□□□□□ □□□□□□□□ □□□□□□□□□□□□□□□□□□  
□□□□□□□□ .

8. Write a short note on Joule Thomson effect.

□□□□ □□□□□□□□ □□□□□□ □□□□□□ □□□□□□□□□□□□ □□□□□□□□ .

9. Define Liquid Crystals and write its applications.

□□□□ □□□□□□□□□□ □□□□□□□□□□□□ □□□□□ □□□□ □□□□□□□□□□□□□□□□□□□□  
□□□□□□□□ .

10. Define and explain Raoult's Law.

□□□□□□ □□□□□□□□ □□□□□□□□□□□□ □□□□□ □□□□□□□□□□□□ .

11. Write a short note on Gold Number.

□□□□□□ □□□□□□□□ □□□□□□ □□□□□□□□□□□□ □□□□□□□□□□□□ .

12. Explain the structure of Ni(CO)<sub>4</sub> as per Valency Bond theory.

□□□□□□□□ □□□ □□□□□□□□□□□ □□□□□□ □□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□  
□□□□□□□□□□□□ .

13. Explain Conformational Isomerism in n-Butane.

n-□□□□□□□□□□ □□□□ □□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ .

**II.B.Sc.**  
**SEMESTER – III (Wef 2016-17 batch)**

**Paper III (INORGANIC & ORGANIC CHEMISTRY) 60 hrs (4 h / w)**

**INORGANIC CHEMISTRY**

**30 hrs (2h / w)**

**UNIT – I**

**1. Chemistry of d-block elements:**

**9h**

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

**2. Theories of bonding in metals:**

**6h**

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, semiconductors and insulators.

**UNIT – II**

**3. Metal carbonyls :**

**7h**

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:**

**8h**

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 and actinides.

**ORGANIC CHEMISTRY**

**30 h (2h/w)**

**UNIT – III**

**1. Halogen compounds**

**5 h**

Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aryl alkyl, 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-bromobutane.

**2. Hydroxy compounds**

**5 h**

Nomenclature and classification of hydroxy 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 (intermolecular and intramolecular). Effect of hydrogen bonding on boiling point and solubility in water.

Identification of alcohols by oxidation with  $\text{KMnO}_4$ , Ceric ammonium nitrate, Luca's reagent and phenols by reaction with  $\text{FeCl}_3$ .

Chemical properties:

- Dehydration of alcohols.
- Oxidation of alcohols by  $\text{CrO}_3$ ,  $\text{KMnO}_4$ .
- Special reaction of phenols: Bromination, Kolbe-Schmidt reaction, Riemer-Tiemann reaction, Fries rearrangement, azocoupling, Pinacol-Pinacolone rearrangement.

Additional inputs:  $\text{S}_\text{N}1$  Mechanism

## UNIT-IV

### Carbonyl compounds

10 h

Nomenclature of aliphatic and aromatic carbonyl compounds, 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)  $\text{NaHSO}_3$ , b)  $\text{HCN}$ , c)  $\text{RMgX}$ , d)  $\text{NH}_2\text{OH}$ , e)  $\text{PhNHNH}_2$ , f) 2,4 DNPH, g) Alcohols-formation of hemiacetal and acetal. Base catalysed reactions: a) Aldol, b) Cannizzaro's reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction. Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with  $\text{LiAlH}_4$  and  $\text{NaBH}_4$ . Analysis of aldehydes and ketones with a) 2,4-DNPH test, b) Tollen's test, c) Fehling test, d) Schiff's test e) Haloform test (with equation)

Additional input: Wittig Reaction, Rosenmund Reduction

## UNIT-V

### 1. Carboxylic acids and derivatives

6 h

Nomenclature, classification and structure of carboxylic acids. Methods of preparation by a) Hydrolysis of nitriles, amides b) Hydrolysis of esters by acids 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 benzotrichlorides. c) Kolbe reaction. **Physical properties:** Hydrogen bonding, dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic 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 (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction.

## 2. Active methylene compounds

4 h

**Acetoacetic ester:** keto-enol tautomerism, preparation by Claisen condensation, Acid hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids. b) Dicarboxylic acids. c) Reaction with urea

**Malonic ester:** preparation from acetic acid. **Synthetic applications:** Preparation of a) monocarboxylic acids (propionic acid and n-butyric acid). b) Dicarboxylic acids (succinic acid and adipic acid) c)  $\alpha,\beta$ -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

**LABORATORY COURSE -III**

**30 hrs. (3 h / w)**

**Practical Paper-III** Titrimetric analysis and Organic Functional Group Reactions (At the end of Semester-III)

**Titrimetric analysis:****25M**

1. Determination of Fe (II) using  $\text{KMnO}_4$  with oxalic acid as primary standard.
2. Determination of Cu(II) using  $\text{Na}_2\text{S}_2\text{O}_3$  with  $\text{K}_2\text{Cr}_2\text{O}_7$  as primary standard.

**Organic Functional Group Reactions****25M**

3. Reactions of the following functional groups present in organic compounds  
(at least four) Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids and Amides

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**MODEL PAPER**

**THREE YEAR B.Sc, DEGREE EXAMINATION**

**YEAR EXAMINATIONS**

**SEMESTER III**

**Paper –III: INORGANIC & ORGANIC CHEMISTRY**

**Time: 3 hours**

**Maximum**

**Marks: 75**

**PART- A**

Answer any **FIVE** of the following questions

Each carries **TEN** marks.

**. 5 x 10 = 50 Marks**

- (a) What are transition elements? Explain any two characteristic properties of transition elements. .  
(OR)  
(b) Explain the Band theory of metals.
- (a) Explain the structures of  $[\text{Ni}(\text{CO})_4]$  and  $\text{Fe}(\text{CO})_5$ .  
(OR)  
(b) How are lanthanides separated by ion exchange and solvent extraction methods? .3. (a)
- 3.Explain  $\text{SN}_1$  and  $\text{SN}_2$  reactions of alkyl halides. With stereo chemistry.  
(OR)  
(b) Write the mechanism for the following:  
i) Riemer-Tiemann reaction ii) Pinacol-Pinacolone rearrangement.
- (a) Write the mechanism for the following:  
i) Cannizzaro's reaction ii) Baeyer-Villiger oxidation  
(OR)  
(b) How does acetone react with the following?  
i)  $\text{HCN}$  ii)  $\text{RMgX}$  iii)  $\text{NH}_2\text{OH}$
- (a) Write about any three preparation methods of carboxylic acids with examples.  
(OR)  
(b) State and explain Claisen condensation. How are the following prepared from Malonic ester.  
i) Crotonic acid ii) adipic acid

**PART-B**

Each carries **FIVE** marks

**5x5 = 25 Marks**

6. Explain the variable valences of d-block elements.
7. What is lanthanide contraction and give its consequences.
8. Write a note on semiconductors.
9. Explain the reactivity of vinyl and allyl chlorides. .
10. Write about the hydrogen bonding in hydroxy compounds.
11. How do we distinguish aldehydes from ketones?
12. Explain Arndt-Eistert synthesis with two examples.
13. What is meant by active methylene group? Give two examples.

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**



**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**II.B.Sc.**

**SEMESTER IV (Wef 2016-17 batch)**

**Paper IV ( SPECTROSCOPY & PHYSICAL CHEMISTRY) 60 hrs (4 h / w)**

**SPECTROSCOPY 30 hrs (2h / w)**

**UNIT-I 6h**

General features of absorption - Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis of 1. Chromium in  $K_2Cr_2O_7$   
2. Manganese in Manganous sulphate

**Electronic spectroscopy: 8h**

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals ( $\sigma$ ,  $\pi$ ,  $n$ ). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore and auxochrome.

**UNIT-II**

**Infra red spectroscopy 8h**

Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols carbonyls, and amines with one example to each.

Additional inputs: Finger print region and its applications

**Proton magnetic resonance spectroscopy ( $^1H$ -NMR) 8h**

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

**PHYSICAL CHEMISTRY 30 hrs (2h / w)**

**UNIT-III**

**Dilute solutions 10h**

Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties- Van't Hoff factor. Additional inputs: Reverse osmosis

## **UNIT-IV**

### **Electrochemistry-I**

**10h**

Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorfs method. Application of conductivity measurements- conductometric titrations.

## **UNIT-V**

### **1. Electrochemistry-II**

**4h**

Single electrode potential, sign convention, Reversible and irreversible cells Nernst Equation- Reference electrode, Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode, Determination of EMF of cell, Applications of EMF measurements - Potentiometric titrations.

### **2.Phase rule**

**6h**

Concept of phase, components, degrees of freedom. Thermodynamic Derivation of Gibbs phase rule. Phase equilibrium of one component system - water system. Phase equilibrium of two- component system, solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, simple eutectic diagram, desilverisation of lead., NaCl-Water system, Freezing mixtures.

### **List of Reference Books**

1. Spectroscopy by William Kemp
2. Spectroscopy by Pavia
3. Organic Spectroscopy by J. R. Dyer
4. Modern Electrochemistry by J.O. M. Bockris and A.K.N.Reddy
5. Advanced Physical Chemistry by Atkins
6. Introduction to Electrochemistry by S. Glasstone
7. Elementary organic spectroscopy by Y.R. Sharma
8. Spectroscopy by P.S.Kalsi

**LABORATORY COURSE – IV**  
**Practical Paper - IV Physical Chemistry and IR Spectral Analysis**  
**(at the end of semester IV)**  
**30 hrs (3 h / W)**

**Physical Chemistry**

**25M**

1. Critical Solution Temperature- Phenol-Water system
2. Effect of NaCl on critical solution temperature (Phenol-Water system)
3. Determination of concentration of HCl conductometrically using standard NaOH solution.
4. Determination of concentration of acetic acid conductometrically using standard NaOH Solution.

**IR Spectral Analysis**

**25 M**

5. IR Spectral Analysis of the following functional groups with examples
  - a) Hydroxyl groups
  - b) Carbonyl groups
  - c) Amino groups
  - d) Aromatic groups

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**MODEL PAPER**

**THREE YEAR B.Sc, DEGREE EXAMINATION**

**YEAR EXAMINATIONS**

**SEMESTER IV**

**Paper –IV: INORGANIC & ORGANIC CHEMISTRY**

**Time: 3 hours**

**Maximum Marks: 75**

Answer **ALL** the questions..

Each carries **TEN** marks.

**. 5 x 10 = 50 Marks**

1. (a) How do you estimate the amount of chromium in potassium dichromate and manganese in manganous sulphate spectrophotometrically.  
(OR)  
(b) i) Write the selection rules for electronic spectra.  
ii) How does conjugation effect  $\lambda_{max}$ ?
- 2.(a) What is finger print region in IR and discuss its significance in structure elucidation.  
(OR)  
(b) Write the principle and applications of NMR spectroscopy.
- 3.. (a) What are colligative properties? Explain elevation of boiling point and derive relation between molecular weight and elevation in boiling point.  
(OR)  
(b) What is Osmotic pressure ? Describe experimental determination of osmotic pressure.
- 4.. (a) Define Kohlrausch's law. Write any two applications of it.  
(OR)  
(b) Define transport number. How do you determine it by Hittorf's method?
- 5.. (a) Write about potentiometric titrations with one example.  
(OR)  
(b) State phase rule. Draw a neat phase diagram of water system and explain different parts of the system.

**PART-B**

Answer any **FIVE** of the following questions.

Each carries **FIVE** marks.

**5 x 5 = 25 Marks**

6. Write Beer-Lambert's law and its limitations.
7. Explain the concept of chromophore..
8. Write a note on chemical shift in NMR spectroscopy.
9. Explain about VantHoff's factor.
10. What is Raoult's law
11. Write about Ostwald's dilution law.
12. Explain about hydrogen electrode with a neat diagram.
13. Draw the phase diagram of Pb-Ag system.

**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**  
**(Affiliated to Adikavi Nannaya University, Rajahmundry)**  
**(Accredited with NAAC “B” Grade with 2.61 CGPA points)**

## SEMESTER-V

### Paper - V (INORGANIC, PHYSICAL & ORGANIC CHEMISTRY) 45 hrs (3 h / w)

#### INORGANIC CHEMISTRY

##### UNIT – I

###### **Coordination Chemistry:**

**8h**

IUPAC nomenclature - bonding theories - Review of Werner's theory and Sidgwick's concept of coordination - Valence bond theory - geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal field theory - splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes - low spin and high spin complexes - factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

##### UNIT-II

###### **1. Spectral and magnetic properties of metal complexes:**

**4h**

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouy method.

###### **2. Stability of metal complexes:**

**3h**

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

#### ORGANIC CHEMISTRY

##### UNIT- III

###### **Nitro hydrocarbons:**

**3h**

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

##### UNIT – IV

###### **Nitrogen compounds:**

**12h**

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods –

1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).

Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophilic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.

## **PHYSICAL CHEMISTRY**

### **UNIT- V**

#### **Thermodynamics**

**15h**

The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule-Thomson effect- coefficient. Calculation of  $w$ , for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation-Kirchoff's equation. Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes.

#### **List of Reference Books**

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by
5. Text book of physical chemistry by S Glasstone
6. Concise Inorganic Chemistry by J.D.Lee
7. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
8. A Text Book of Organic Chemistry by Bahl and Arun bahl
9. A Text Book of Organic chemistry by I L Finar Vol I
10. Advanced physical chemistry by Gurudeep Raj

**SRI A.S.N.M. GOVERNMENT COLLEGE(AUTONOMOUS) PALAKOL; W.G. Dt.**  
(Affiliated to Adikavi Nannaya University, Rajahmundry)  
(Reaccredited with NAAC "B" Grade with 2.61 CGPA points)

### **DEPARTMENT OF CHEMISTRY**

#### **MODEL PAPER**

THREE YEAR B.Sc.DEGREE EXAMINATIONS

III B.Sc. SEMISTER V

PAPER V: INORGANIC, ORGANIC& PHYSICAL CHEMISTRY

Time: 3 hours

Maximum Marks: 75

#### **PART –A**

**Answer all questions. Each carries TEN marks.**

**5 x 10=50 Marks**

1. A) Explain the formation of  $\text{Fe}(\text{CN})_6^{4-}$  and  $\text{Fe}(\text{CN})_6^{3-}$  on the basis of Valence Bond Theory.

(OR)

B) Explain the stereo chemistry of complexes with 4 & 6 coordination numbers.

2. A) How do you Determine the magnetic susceptibility of metal complexes using Guoy balance method

(OR)

B) How do you Determine the composition of metal complexes using Job's method?

3. A) Write the methods of preparation of Nitroalkanes.

(OR)

B) Explain the Mannich reaction and Michael addition

4. A) How amines are prepared from Gabriel synthesis and Hoffmann bromamide method?

(OR)

B) Write any four electrophilic substitution reactions of aromatic amines.

5. A) Derive Kirchoff's equation.

(OR)

B) Describe the Carnot Cycle.

### **PART-B**

Answer any FIVE of the following questions. Each carries FIVE marks. 5 x 5=25 Marks

6. Explain the EAN rule with suitable examples.

7. Explain the silent features of Crystal field theory.

8. Write the factors effecting stability of metal complexes?

9. Write Mechanism of Nef reaction.

10. Explain the basicity of amines.

11. Write a note on Diazotization.

12. State and explain Joule-Thomson effect.

13. Write a note on Entropy.



**SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT**

**(Affiliated to Adikavi Nannaya University, Rajahmundry)**

**(Accredited with NAAC "B" Grade with 2.61 CGPA points)**

**SEMESTER-V**

**Paper - VI (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)**

**45 hrs (3 h / w)**

**INORGANIC CHEMISTRY**

**UNIT-I**

**1. Reactivity of metal complexes: 4h**

Labile and inert complexes, ligand substitution reactions -  $SN^1$  and  $SN^2$ , substitution reactions of square planar complexes - Trans effect and applications of trans effect.

**2. Bioinorganic chemistry: 4h**

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl. Metalloporphyrins – Structure and functions of hemoglobin, Myoglobin and Chlorophyll.

**PHYSICAL CHEMISTRY**

**UNIT-II**

**1. Chemical kinetics 8h**

Rate of reaction - Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

**2. Photochemistry 5h**

Difference between thermal and photochemical processes. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Photosensitized reactions- energy transfer processes (simple example)

**ORGANIC CHEMISTRY**

**UNIT- III**

**Heterocyclic Compounds 7h**

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,- dicarbonyl compounds, Paul-Knorr synthesis.

Properties : Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

#### **UNIT-IV**

##### **Carbohydrates**

**8h**

Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).

(-) Fructose (keto hexose) - Evidence of 2 - keto hexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula) - osazone formation from glucose and fructose – Definition of anomers with examples.

Interconversion of Monosaccharides: Aldopentose to Aldo hexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldo hexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation. Aldo hexose to Keto hexose [(+) Glucose to (-) Fructose] and Keto hexose to Aldo hexose (Fructose to Glucose)

#### **UNIT- V**

##### **Amino acids and proteins**

**7h**

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

##### **List of Reference Books**

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mare loudan, Purdue Univ
4. Advanced Physical Chemistry by Atkins
5. Text book of physical chemistry by S Glasstone
7. Instrumentation and Techniques by Chatwal and Anand
8. Essentials of nano chemistry by pradeep
9. A Textbook of Physical Chemistry by Puri and Sharma
10. Advanced physical chemistry by Gurudeep Raj

**LABORATORY COURSE – V**  
**Practical Paper – V Organic Chemistry**  
**(at the end of semester V)**

**30 hrs (3 / W)**

**Organic Qualitative Analysis:**

**50M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives.

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic Primary Amines, Amides and Simple sugars.

**LABORATORY COURSE – VI**  
**Practical Paper – VI Physical Chemistry**  
**(at the end of semester V)**

**30 hrs (3 h/W)**

1. Determination of rate constant for acid catalyzed ester hydrolysis.
2. Determination of molecular status and partition coefficient of benzoic acid in Benzene and water.
3. Determination of Surface tension of liquid
4. Determination of Viscosity of liquid.
5. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.

(Affiliated to Adikavi Nannaya University, Rajahmundry)  
(Reaccredited with NAAC "B" Grade with 2.61 CGPA points)

**DEPARTMENT OF CHEMISTRY**

**MODEL PAPER**

**THREE YEAR B.Sc.DEGREE EXAMINATIONS**

**SEMISTER -V**

**PAPER VI: INORGANIC, ORGANIC & PHYSICAL CHEMISTRY**

**Time: 3 hours**

**PART -A**

**Maximum Marks: 75**

**Answer all Questions. Each carries Ten Marks**

**5\*10=50 Marks**

1. A) Discuss the ligand substitution reactions in metal complexes.

**Or**

B) Write the structure and functions of Hemoglobin.

2. A) What is first order reactions and Derive rateconstant, time for half change .

**Or**

B) What is quantum yield and Explain the photochemical reaction between  $H_2-Cl_2$  &  $H_2-Br_2$

3.A) Discuss electrophilic substitution reactions in Pyrrole, Furan & Thiophene.

**Or**

B) Write any one method for preparation Pyridine and Illustrate the substitution reactions of Pyridine.

4. A) Discuss the structure of glucose.

**Or**

B) What are Epimers give example and write about the formation of Glucosazone.

5. A) Give any three methods of preparation of Alanine

**Or**

B) Discuss the general reactions amino and carboxylgroup.

**PART-B**

**Answer any FIVE of the following questions. Each carries FIVE marks.5\*5=25 Marks**

6. Define Laible and inert complexes with suitable examples.

7. Explain the biological significance of Na and K

8. Define Order and Molecularity.

9. Write a note on Mutarotation.

10. What are the photosensitized reactions? Give one example.

11. Explain the nature of Pyrrole and Pyridine.

12. How to convert aldopentose(D-arabinose) to aldohexose (D-glucose, D-mannose)

13. Wrtie note on Isoelectric point.

(Affiliated to Adikavi Nannaya University, Rajahmundry)  
(Reaccredited with NAAC "B" Grade with 2.61 CGPA points)

**DEPARTMENT OF CHEMISTRY**  
**SYLLABUS FOR VI SEMESTER**

**III B.Sc. CHEMISTRY**

**PAPER-VII:ELECTIVE-ANALYTICAL METHODS IN CHEMISTRY**

**UNIT-I**

**Quantitative analysis:**

**10 h**

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:**

**7 h**

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:**

**8 h**

Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism., Application - Determination of

Iron (III)

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

**UNIT-IV**

**10 h**

**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**

**10 h**

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.

### **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

### **CHEMISTRY LABORATORY COURSE – VII-A**

(at the end of semester VI)

**30 hrs (3 / w)**

**50 Marks**

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







(Reaccredited with NAAC "B" Grade with 2.61 CGPA points)

**DEPARTMENT OF CHEMISTRY**

**SYLLABUS FOR VI SEMESTER**

**III B.Sc. CHEMISTRY**

**PAPER:VIII- CLUSTER ELECTIVE –1-POLYMER CHEMISTRY**

**UNIT-I**

**12 h**

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, Fibres 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**

**10 h**

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 and Osmometry methods.

**UNIT-III**

**6 h**

Kinetics of Free radical polymerization, Glass Transition temperature (T<sub>g</sub>) and Determination of

T<sub>g</sub>: Free volume theory, WLF equation, factors affecting glass transition temperature (T<sub>g</sub>).

**UNIT-IV**

**9 h**

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**

**8 h**

Polymers and their applications:

Preparation and industrial applications of Polyethylene, Polyvinyl chloride, Teflon, Terelene, Polyacrylonitrile, Nylon6,6 and 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, New York, 1967.





**DEPARTMENT OF CHEMISTRY  
SYLLABUS FOR VI SEMESTER  
III B.Sc. CHEMISTRY**

**PAPER-VIII: CLUSTER ELECTIVE –2 : INSTRUMENTAL METHODS OF ANALYSIS**

**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: 8 h**

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.

**UNIT – III 10 h**

UV-Visible/ Near IR - emission, absorption, fluorescence and photoacoustic, 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, photoacoustic, fluorescent tags).

**UNIT – IV Separation techniques 15 h**

**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).

**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).

**UNIT – V Elemental analysis 8 h**

**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:** Principle, Instrumentation, Factors affecting chemical shift, Spin coupling, Applications.

**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. & Settle, 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







**SYLLABUS FOR VI SEMESTER  
III B.Sc. CHEMISTRY**

**PAPER-VIII:CLUSTER ELECTIVE -3:ANALYSIS OF DRUGS, FOODS, DAIRY  
PRODUCTS**

**& BIO-CHEMICAL ANALYSIS**

**UNIT- I**

**10 h**

Analysis of the following drugs and pharmaceuticals preparations:

(Knowledge of molecular formula, structure and analysis)

Analysis of analgesics and antipyretics like aspirin and paracetamol.

Analysis of antimalarials like chloroquine.

Analysis of drugs in the treatment of infections and infestations: Amoxycillin, chloramphenicol,

penicillin, tetracycline.

Anti tuberculous drug- isoniazid.

**UNIT - II**

**6 h**

Analysis of the following drugs and pharmaceuticals preparations:

(Knowledge of molecular formula, structure and analysis)

Analysis of antihistamine drugs and sedatives like allegra, zyrtec (citrizine), alprazolam, trazodone, lorazepam, ambien (zolpidem), diazepam.

**UNIT - III**

**10 h**

Analysis of anti epileptic and anti convulsant drugs like phenobarbital and phenacemide.

Analysis of cardiovascular drugs like atenolol, norvasc (amlodipine).

Analysis of lipitor (atorvastatin) - a drug for the prevention of productin of cholesterol.

Analysis of diuretics like furosemide (Lasix).

Analysis of prevacid (lansoprazole) - a drug used for the prevention of production of acids in stomach.

**UNIT - IV**

**10 h**

Analysis of Milk and milk products: Acidity, total solids, fat, total nitrogen, proteins, lactose, phosphate activity, casein, choride.

Analysis of food materials - Preservatives: Sodium carbonate, sodium benzoate, sorbic acid.

Coloring matters - Brilliant blue FCF, fast green FCF, sunset yellow FCF.

Flavoring agents - Vanilla, diacetyl, isoamyl acetate, limonene.

Adulterants in rice and wheat, wheat floor, coconut oil, coffee powder, tea powder, milk.

**UNIT - V**

**9 h**

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. F.J. Welcher - Standard methods of analysis.
2. A.I.Vogel - A text book of quantitative Inorganic analysis-ELBS.
3. F.D. Snell & F.M. Biffen - Commercial methods of analysis-D.B.Taraporavala & sons.
4. J.J.Elving and I.M.Kolthoff - Chemical analysis - A series of monographs on analytical chemistry and its applications -- Inter Science- Vol I to VII.
5. Analytical Agricultural Chemistry by S.L.Chopra & J.S.Kanwar -- Kalyani Publishers
6. Quantitative analysis of drugs in pharmaceutical formulations by P.D.Sethi, CBS Publishers and Distributors, New Delhi.
7. G.Ingram- Methods of organic elemental micro analysis- Chapman and Hall.
8. H.Wincciam and Bobbles (Henry J)- Instrumental methods of analysis of food additives.
9. H.Edward-The Chemical analysis of foods; practical treatise on the examination of food stuffs and the detection of adulterants.
10. The quantitative analysis of drugs- D.C.Garratt-Chapman & Hall.
11. A text book of pharmaceutical analysis by K.A.Connors-Wiley-International.
12. Comprehensive medicinal chemistry-Ed Corwin Hansch Vol 5,Pergamon Pres

**SRI A.S.N.M. GOVERNMENT COLLEGE(AUTONOMOUS) PALAKOL; W.G. Dt.**  
**(Affiliated to Adikavi Nannaya University, Rajahmundry)**  
**(Reaccredited with NAAC "B" Grade with 2.61 CGPA points)**

### **MODEL PAPER**

**THREE YEAR B.Sc. DEGREE EXAMINATION**



