# Sri ASNM Government College (A)

## Palakol, W. G. Dt. 534260

### (Affiliated to Adi Kavi Nannayya University, Rajahmahendravaram) Accredited by NAAC with B+ Grade (3rd Cycle)

#### Department of Chemistry

# CHEMISTRY HONOURS PROGRAMME PRE BOS MEETING FOR COMMON PAPERS AY - 2023-2024

#### Date: 1-9-2023

The In charges of the Mathematics, Physics, Computer Science and Chemistry Departments assembled in Department of Chemistry laboratory in the presence of Honourable Principal, Academic Coordinator and Controller of Examinations on 1.9.2023 at 2.00 pm regarding Pre BOS meeting for two common core papers in First semester of 2023-24 academic year entitled

"Essentials of Mathematics, Physics, Chemistry & Computer Science " and "Advances In Mathematical, Physical And Chemical Sciences".

#### Agenda:

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\* Conduction of BOS for one common papers in Semester1 (2023-24).

\* Sharing of Syllabus and activities for the common papers.

\* Sharing of workload among the Mathematics, Physics, Computer Science and Chemistry faculty.

\* Marks allocation in CIA for activities provided in the syllabus.

\* Scheme and Evaluation of Papers.

#### **Resolutions:**

- It is resolved to conduct the BOS for the two common papers by the concerned departments and get approval.
- It is resolved to share the syllabus and activities of common papers among the concerned Departments as mentioned in chapter division.
- It is resolved to share the workload internally, department wise and mention in the Department minutes book.
- For the paper "Essentials of Mathematics, Physics, Chemistry & Computer Science" 1 component each from those papers will be prepared by Mathematics, Physics, Computer Science Departments along with Dept of Chemistry and 1 component will be prepared collectively by all departments.
- For the paper "Advances In Mathematical, Physical And Chemical Sciences" 1 component each from those papers will be prepared by Mathematics, Physics, Computer Science Departments along with Dept of Chemistry and 1 component will be prepared collectively by all departments.
- "Essentials of Mathematics, Physics, Chemistry & Computer Science " Paper will be evaluated by Chemistry faculty, with the elaborated scheme including answers provided by the respective departments.
- "Advances In Mathematical, Physical And Chemical Sciences" Paper will be evaluated by Chemistry faculty, with the elaborated scheme including answers provided by the respective departments.

· It is resolved that in CIA 10 marks will be allotted for activities of common papers in the inventory tasks components 2 & 3 provided by CCE SoP dated-6/4/2022.

#### **Chapters division**

"Essentials of Mathematics, Physics, Chemistry & Computer Science"

\* Unit 1 - Mathematics, Unit II - Physics, Unit III - Chemistry, Unit IV - Each department will take up their part. Unit V - Computer Science departments respectively.

"Advances In Mathematical, Physical And Chemical Sciences"

\* Unit 1 - Mathematics, Unit II - Physics, Unit III - Chemistry, Unit IV - Each department will take up their part. Unit V - Computer Science departments respectively.

#### Activities Marks: 10

1. Visit to a industry - Chemistry

2. Field trip and awareness programs on environmental pollution - Chemistry

1. Dr. u. Yamini, Incharge, Dept of chemistry + mathematicy V-E. July 2. Sri k. Bhadrachalam Incharge - Dept of computer science of physicy 1/9/20

3. Sri K. Siva Krishna, Dept of Mathematicy 1094/19/23 4. Smt. N.U.R.D padmalatha, Dept of physicy an

5. Sri T. Krishna, Controlly of Gramination + In charge Dept. of political Science

6. Dr. ch. usha Rani, Acadamic Coordinate 4 In-charge Dept of Economicy. Oh Un 1912

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PRINCIPAL Sri A.S.N.M. GOVT. COLLEGE (A PALAKOL-534 260, W.G.DIST

# Sri ASNM Government College (A)

# Palakol, W. G. Dt. 534260

### (Affiliated to Adi Kavi Nannayya University, Rajahmahendravaram) Accredited by NAAC with B+ Grade (3rd Cycle)

#### **Department of Chemistry**

### LIFE SCIENCES PROGRAMME PRE BOS MEETING FOR COMMON PAPERS

#### AY - 2023-2024

#### Date: 1-9-2023

The In charges of the Life sciences (Botany and Zoology) and Chemistry Departments assembled in Department of Chemistry laboratory in the presence of Honourable Principal, Academic Coordinator and Controller of Examinations on 1.9.2023 at 3.00 pm regarding Pre BOS meeting for one common core papers in First semester of 2023-24 academic year entitled "Introduction to Classical Biology".

#### Agenda:

- \* Conduction of BOS for one common papers in Semester1 (2023-24).
- \* Sharing of Syllabus and activities for the common papers.
- \* Sharing of workload among the Life sciences and Chemistry faculty.
- \* Marks allocation in CIA for activities provided in the syllabus.
- \* Scheme and Evaluation of Papers.

#### **Resolutions:**

- It is resolved to conduct the BOS for the two common papers by the concerned departments and get approval.
- It is resolved to share the syllabus and activities of common papers among the concerned Departments as mentioned in chapter division.
- It is resolved to share the workload internally, department wise and mention in the Department minutes book.
- For the paper Introduction to classical Biology 4 components will be prepared by Botany, Zoology Departments along with Dept of Chemistry.
- For the paper Introduction to applied Biology 4 components will be prepared by Botany, Zoology Departments along with Dept of Chemistry.
- Introduction to classical Biology Paper will be evaluated by either Botany or Zoology faculty, with the elaborated scheme including answers for V Unit provided by the Dept of Chemistry faculty.
- Introduction to applied Biology paper will be evaluated by either Botany or Zoology Faculty.
- It is resolved that in CIA 10 marks will be allotted for activities of common papers in the inventory tasks components 2 & 3 provided by CCE SoP dated-6/4/2022.

#### **Chapters** division

"Introduction to applied Biology"

\* Unit 1, III, IV - Department of Botany

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- \* Unit II & V Department of Zoology
- + "Introduction to applied Biology" Activities Marks: 10
- 1. Identification of a given organism as harmful or beneficial. Zoology
- 2. Observation of microorganisms from house dust under microscope Zoology
- 3. Finding microorganisms from pond water Zoology
- 4. Visit to a microbiology industry or biotech company Zoology
- 5. Visit to a wastewater treatment plant Chemistry

6. Field trip and awareness programs on environmental pollution by different types of wastes and hazardous materials - Chemistry

Dr. v. Yamini, In-charge, Dept of Chemistry Whiteld
 Dr. M. Rawa Krishna In Charge Dept of Zoology & Botany III.
 Srip. Srinivasa Rao, Dept of Botany Wights
 Sri T. Krishna, Cartrolley of Eleminations, & T. M. 11913
 Sn Charge, Dept of political Science. T. M. 11913
 Dr. charge, Dept of Economicy. UNIV. 119123

2023 Principal

PRINCIPAL Sri A.S.N.M. GOVT. COLLEGE (A PALAKOL-534 260, W.G.DIST

# SRIASNM GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) AY 2023-2024 DEPARTMENT OF CHEMISTRY- BOARD OF STUDIES

Board of Studies Chairman Head of the Department	Dr Yamini Vanipenta	V. & states
University Nominee	Dr K. Dcepthi, Associate professor, Department of chemistry, Adikavi Nannaya University, Rajamahendravaram, E.G.Dt.	Hilupte
Subject Experts	1. Dr Sk. Beebi, Lecturer in Chemistry, SRR&CVR Govt. Degree College (A), Vijayawada, Krishna Dt.	Substar 23
Subject Experts	2. Dr. R. Jala Babu, Lecturer in Chemistry, Y.V.N.R Govt. Degree College, Kaikaluru, Krishna Dt.	R. J-1500 5/5/23
Industrialist / Businessman	Sri Md. A. Shariff Aqua consultant,VisakhaAqua Labs Palakollu, W.G. Dt.	Ast.
Alumni	Sri P. Sai Krishna ( GDC, Kothapeta, E.G. Dt.	P. S. Tem
Members of the Department	1. Mr A. Vamsi Subbaryan 2. Mr K. Jagapathi Babu 3. Ms. S. Pujitha	thanks 19123 K. Jage path Rower Spatial 2013
Students	<ol> <li>K. Aswini Venkateswari III B.Sc (M.C.Cs)</li> <li>P. Ajay II B.Sc (M.C.Cs)</li> </ol>	K.A. venkate swani P. Ajay

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### SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) AY 2023-2024

### **DEPARTMENT OF CHEMISTRY- BOARD OF STUDIES**

After thorough discussion the following resolutions were made by the Department BOS <u>Resolutions:</u>

- 1. Implement Multiple Entry and Multiple Exit system in Single Major System from 2023-24 admitted batch onwards.
  - After completion of first year, student may exit with Certificate.
  - After completion of second year, student may exit with Diploma.
  - After completion of third year, student may exit with Degree.
  - After completion of fourth year, student will get Honours Degree.

a) Implement the designed syllabi, blue prints and model question papers for Major General and Inorganic Chemistry and the same course is prescribed as Minor course for other Major courses opted students and practical courses for I and II semesters of the following programmes for the 2023-24 admitted batch according to NEP-2020:

I B.Sc. Chemistry (Honours)

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- b) It is resolved to adopt the Revised CBCS syllabus (both theory & practicals) & model papers suggested by APSCHE for III, IV and V/VI semesters for the academic year 2023-24.
- c) It is resolved to follow the same syllabus (both theory & practicals) & model papers for VII and VIII semesters of the B.Sc Honours Chemistry program as suggested by APSCHE for 2020-21 admitted batch.
- d) It is resolved to approve and follow Semester I core paper (C1) Chemistry Unit syllabus, Blue print and Model question paper of B.Sc - Honours in CHEMISTRY for the academic year 2023-24.
  - e) It is resolved to approve and follow Semester I multidisciplinary course (Principles of Chemical sciences) syllabus, Blue print and Model question paper for academic year 2023-24.
- f) It is resolved to approve General and Inorganic chemistry (C3) as minor subject from B.Sc honors Chemistry ; as minor subject in the semester – II for the year 2023-24.
- 2) It is resolved to follow the same pattern of evaluation for III year degree and B.Sc Honours Chemistry batches and to follow the new pattern of evaluation for the 2023-24 admitted batch along with the 2022-23 batch.
  - a) It is resolved to evaluate the student's performance under continuous internal assessment (CIA) and semester-end examination components at a 40:60 ratio for the I and II B.Sc programmes and at a 25:75 ratio for the III B.Sc programme from this academic year 2023 24 which was approved the last year's BOS meeting. The duration of the examination is 3:00 hrs
  - b) It is resolved to approve continuing Internal Assessment for I, II, III and IV semesters as follows. Direct Method: 35 Marks comprising of I Mid Exam for 20 Marks and II Mid Exam for 15 Marks.

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Indirect Method: 15 Marks comprising of

Assignment - 5M, Any one Pedagogy Method - 5M (Classroom Seminar/Quiz/Group Discussion etc)

Clean and Green and attendance - 5M and a total of 50 marks will be scaled down to 40 Marks.

c) It is resolved to approve Continues Internal Assessment for V, VII and VIII semester is as follows: Direct Method: 35 Marks comprising of I Mid Exam for 20 Marks and II Mid Exam for 15

Marks.

Indirect Method: 15 Marks comprising of

Assignment - 5M, Any one Pedagogy Method - 5M (Classroom Seminar/Quiz/Group Discussion etc)

Clean and Green and attendance - 5M and a total of 50 marks will be scaled down to 25 Marks.

d) It is resolved and approved to follow common evaluation pattern for theory and Practical as per the academic council guidelines for the 2023-24.

- 3. It is resolved to arrange Internships for III year students by contacting industries of nearby towns and encouraging students to go and learn the techniques.
- 4. Resolved that the passing marks for semester end examination are 40%. Candidates should get a total mark of 40, in both internal and semester end examination put together.
- 5. 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 examinations to be conducted involving external examiners.
- 6. It is resolved to offer Certificate Courses/Add on Courses/Value added Courses for the II year students for the academic year 2023 - 2024.
- 7. Resolved to adopt Modern teaching learning Methods including ICT and Digital boards.
- 8. Resolved to advise the entire Faculty to apply for UGC for financial assistance to conduct Seminars/ Workshops/Conferences/MRPs, etc., and to arrange field trips Surveys, Society outreach programmes etc.
- 9. Resolved to conduct Guest Lectures, Study Projects for the academic year 2023-2024.
- 10. Resolved to approve the list of Question paper setters and examiners appended herewith.
- 11. It is resolved to approve programme outcomes, programme-specific outcomes, course outcomes and course codes.
- 12. Resolved to follow the syllabus suggested by APSCHE for ENVIRONMENTAL EDUCATION- Life skill course

Vifin **BOS** Chairman

Members present:

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3. R. J-eRow 5/9/23

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# SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle)

# **DEPARTMENT OF CHEMISTRY**

Dr Yamini Vanipenta, Chairman of BOS requests the Academic Council to consider and approve the changes in the syllabi recommended by the Board of Studies for the academic year 2022-2023. 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 2022-2023.

V. Coir Chairman

**Members Board of Studies** 



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Semester	Course Code	Title	Hr/ week	Credits	Internal Marks	External Marks	Total Marks			
	9	Physical Chemistry-II (States of Matter, Phase Rule & surface Chemistry)	3	3	40	60	100			
		nurse lodeTitleHr/ weekCreditsInternal MarksExternal MarksTo Marks9Physical Chemistry-II (States of Matter, Phase Rule & surface Chemistry)334060109Physical Chemistry-II (States of Matter, Phase Rule & surface Chemistry) Lab2140601010General & Physical Chemistry Lab21505011General & Physical Chemistry Lab21505011Nitrogen containing Organic Compounds & Spectroscopy33406010011Nitrogen containing Organic Compounds & Spectroscopy Lab2150502AAnalytical Methods in Chemistry- Quantitative analysis3340601002BEnvironmental Chemistry Chromatography and Instrumental Chromatography and Instrumental Rendusis Lab3340601003BGreen Chemistry and Nanotechnology3340601003BGreen Chemistry and Nanotechnology334060100	100							
IV	10	General & Physical Chemistry	3	3	40	60	100			
	10	General & Physical Chemistry Lab	2	1		50	50			
		Nitrogen containing Organic Compounds & Spectroscopy	3	3	40	60	100			
	11	Nitrogen containing Organic Compounds & Spectroscopy Lab	2	Credits         Internal Marks         External Marks         Total Marks           3         40         60         100           1         40         60         100           3         40         60         100           3         40         60         100           3         40         60         100           1         50         50         50           3         40         60         100           1         50         50         50           3         40         60         100           1         50         50         50           3         40         60         100           1         50         50         50           3         40         60         100           1         50         50         50           3         40         60         100           1         50         50         50           3         40         60         100           3         40         60         100						
	12 A	Analytical Methods in Chemistry- Quantitative analysis	3	3	40	60	100			
		Analytical Methods in Chemistry- Quantitative analysis	2	1		50	50			
	OR									
	10.0	Environmental Chemistry	3	3	40	60	100			
$\mathbf{V} = \begin{bmatrix} \mathbf{P}_{\text{Pasc Rule & surface Chemistry}} & \mathbf{J} $	50	50								
	13 4	Chromatography and Instrumental methods of Analysis	3	3	40	60	100			
	IJA	Chromatography and Instrumental methods of Analysis Lab	2	1		50	50			
		OR								
	10.5	Green Chemistry and Nanotechnology	3	3	40	60	100			
14	13 B	Green Chemistry and Nanotechnology Lab	2	1		50	50			
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Semester	Course Code	Title	Hr/ week	Credits	Internal Marks	External Marks	Total Mark
I	1	Essentials and applications of Mathematical, Physical andChemical sciences	5	4	40	60	100
	2	Advances in Mathematical, Physical and Chemical sciences	5	4	40	60	100
	2	General & Inorganic Chemistry	3	3	40	60	100
	3	General & Inorganic Chemistry Lab	2	1		50	50
n		Inorganic Chemistry-I	3	3	40	60	100
	4	Inorganic Chemistry-I Lab	2	1		50	50
	5	Fundamentals in Organic Chemistry	3	3	40	60	100
		Fundamentals in Organic Chemistry Lab	2	1		50	50
	6	Organic Chemistry (Halogen & Oxygen Organic Compounds)	3	3	40	60	100
ш		Organic Chemistry (Halogen & Oxygen Organic Compounds Lab	2	1		50	50
		Physical Chemistry-I (Solutions and Electrochemistry)	3	3	40	60	100
	/	Physical Chemistry-I ( Solutions and Electrochemistry) Lab	2	1		50	50
		Inorganic & Physical Chemistry	3	3	40	60	100
	8	Inorganic & Physical Chemistry Lab	2	1		50	50
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ermester	Course Code	Title	Hr/ week	Credits	Internal Marks	External Marks	Total Marks
		Synthetic Organic Chemistry	3	3	40	60	100
SemesterCourse Code14 ASynthetic Organ Synthetic Organ14 AIndustrial Chem Surface coating Industrial Chem Surface coating Analysis of Org Analysis of Org15 AAnalysis of Org Analysis of Org Industrial Chem water analysis Industrial Chem water analysis LVIIndustrial Chem Surface coating Industrial Chem water analysis I 	Synthetic Organic Chemistry Lab	2	1		50	50	
		OI	Hr/ week         Credits         Internal Marks         External Marks           try         3         3         40         60           try Lab         2         1         50           OR         3         3         40         60           ilisers and         3         3         40         60           ilisers and         2         1         50         0           pounds         3         3         40         60           pounds         2         1         50         0           OR         mers and         2         1         50         0           Internship         mce Studies         2         1         50         0           nce Studies         2         1         50         0         0           strial         2         1         50         0         0           ompounds         3         3         40         60         0 <td></td>				
Semester       Course Code       Title         14 A       Synthetic Organic Chemis         14 A       Synthetic Organic Chemis         14 B       Industrial Chemistry- Ferti         14 B       Industrial Chemistry- Ferti         14 B       Industrial Chemistry- Ferti         14 B       Analysis of Organic Comp         15 A       Analysis of Organic Comp         15 B       Industrial Chemistry- Poly         16 A       Inorganic Chemistry: Advaaii n Complexes and Group th         16 B       Inorganic Materials of Industrial Chemistry: Advaaii n Complexes and Group th         16 B       Inorganic Materials of Industrial Chemistry: Advaaii n Complexes and Group th         16 B       Inorganic Materials of Industrial Chemistry: Advaaii n Complexes and Group th         17 A       Spectroscopy of Organic co         17 B       Stereo Chemistry and Natur         17 B       Stereo Chemistry and Natur         17 B       Stereo Chemistry and Natur         17 B       Stereo Chemistry and Natur	Industrial Chemistry- Fertilisers and Surface coatings	3	3	40	60	100	
v	14 B	Industrial Chemistry- Fertilisers and Surface coatings Lab	Title         Hr/ week         Credits         Internal Marks         External Marks         T. Marks           c Chemistry         3         3         40         60         1           c Chemistry Lab         2         1         50         2           OR         3         3         40         60         1           c Chemistry Lab         2         1         50         2           OR	50			
	15.4	Analysis of Organic Compounds	3	3	Internal Marks       External Marks       Total Marks         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100         40       60       100      50       50       50         40       60       100         50       50       50         40       60       100         50       50       50         50       50       50         50       50       50	100	
V V V V 1 V 1 1 1 1	15 A	Analysis of Organic Compounds Lab	2	1		50	50
	lester       Course Code         14 A       14 A         14 B       14 B         14 B       15 A         15 B       15 B         1       16 A         1       16 B         1       17 A         17 B       1         17 B       1	OR					
VI	15 B	Industrial Chemistry- Polymers and water analysis	3	3	40	60	100
	15.0	Industrial Chemistry- Polymers and water analysis Lab	2	1		50	50
VI		Internsi	hip				
VI     Internship       16 A     Inorganic Chemistry:Advance Studies in Complexes and Group theory     3       Inorganic Chemistry:Advance Studies in Complexes and Group theory Lab     2       OR     Inorganic Materials of Industrial importance     3	16 A	Inorganic Chemistry:Advance Studies in Complexes and Group theory	3	3	40	60	100
	IUA	Inorganic Chemistry:Advance Studies in Complexes and Group theory Lab	2	1		50	50
	16 B	Inorganic Materials of Industrial importance	3	3	40	60	100
VII	10 D	Inorganic Materials of Industrial importance Lab	2	1		50 $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$ $50$ $60$ $100$ $50$	
		Spectroscopy of Organic compounds	InternshipChemistry:Advance Studies exes and Group theory334060100Chemistry:Advance Studies exes and Group theory Lab215050ORORMaterials of Industrial e Lab334060100Materials of Industrial e Lab215050OR334060100Materials of Industrial e Lab215050Opy of Organic compounds334060100Opy of Organic compounds215050				
VII	17 A	Spectroscopy of Organic compounds Lab	2	1		50	50
		OR					
	1	Stereo Chemistry and Natural Products	3	3	40	60	100
	17 B S	Stereo Chemistry and Natural Products	2	1		50	50

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Semester	Course Code	Title	Hr/ week	Credits	Internal Marks	External Marks	Total Marks
	18 4	Physical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics	3	3	40	60	100
VII	IOA	mrse ndeTitleHr/ weekCreditsInternal MarksExternal MarksTot MarksPhysical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics33406010A dynamics, Electro chemistry and Chemical Kinetics215050Physical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics Lab215050B AnalysisInstrumental Methods of Chemical Analysis Lab334060100A Green Chemistry Lab21505050OROROR000000PB Products& Bio Chemical Analysis334060100Analysis of Drugs, Foods, Dairy Products& Bio Chemical Analysis Lab215050OA Polymer Chemistry Lab21505050OA Polymer Chemistry Lab215050OBIndustrial Chemical Analysis Lab215050OBIndustrial Chemicals and Environment Iab334060100Inorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio- inorganic 	50				
		OR					
	18 B	Instrumental Methods of Chemical Analysis	3	3	40	60	100
VII       18 A       A       Chemical Kinetics         Physical Chemistry: Thermo       dynamics, Electro chemistry and         Chemical Kinetics Lab       Chemical Kinetics Lab         18 B       Instrumental Methods of Chemical         18 B       Instrumental Methods of Chemical         18 B       Instrumental Methods of Chemical         18 B       Green Chemistry         19 A       Green Chemistry Lab         Foducts& Bio Chemical Analysis         19 B       Analysis of Drugs, Foods, Dairy         Products& Bio Chemical Analysis       Analysis of Drugs, Foods, Dairy         Products& Bio Chemical Analysis       Polymer Chemistry         20 A       Polymer Chemistry Lab         20 B       Industrial Chemicals and Environme         20 B       Industrial Chemicals and Environme         20 B       Industrial Chemicals and Environme	2	1		50	50		
	10.1	Green Chemistry	3	3	40	60	100
	19 A 19 B	Green Chemistry Lab	2	1		50	50
		OR					
	10 B	Analysis of Drugs, Foods, Dairy Products& Bio Chemical Analysis	3	3	40	60	100
SEC	19 D	Analysis of Drugs, Foods, Dairy Products& Bio Chemical Analysis Lab		1		50	50
	20.4	Polymer Chemistry	3	3	40	60	100
	20 A	Polymer Chemistry Lab	2	1		50         50           60         100           50         50	50
		OR					
		Industrial Chemicals and Environment	3	3	40	60	100
	20 B	Industrial Chemicals and Environment Lab	2	1		50	50
	1811	Open online trans dis	ciplinar	ry course			
		Inorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio- inorganic chemistry	3	3	40	60	100
νш	21 A	Inorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio- inorganic chemistry Lab	2	1		50	50
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Semester	Course Code	Title of The Paper	Hrs	Credits	Internal	External	Total
ш	Paper III	Organic Chemistry & Spectroscopy – I	4	3	25	75	100
		Laboratory Course – I	2	1		50	50
	Paper IV	Inorganic, Organic And Physical Chemistry	4	3	25	75	100
IV		Laboratory Course – II	2	1		50	50
	Paper V	Inorganic And Physical Chemistry	4	3	25	75	100
		Laboratory Course – II	2	1		50	50
	Paper 6A	Synthetic Organic Chemistry	3	3	25	75	100
		Laboratory course – I	3	2	-	50	50
	D	Analysis of Organic Compounds	3	3	25	75	100
	Tupor ///	Laboratory course – II	3	2	-	50	50
V	Paper 6B	Analytical Methods in Chemistry-I	3	3	25	75	100
	Taper ob	Laboratory course – I	3	2	-	50	50
	Den en MD	Analytical Methods in Chemistry- II	3	3	25	75	100
	- april 13	Laboratory course - II	3	2	-	50	50

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Semester	Course Code	Title	Hr/ week	Credit s	Internal Marks	Externa 1 Marks	Total Marks		
	21.0	Organometallic Chemistry	3	3	40	60	100		
	21 B	Organometallic Chemistry Lab	2	1		50	50		
	22.4	Modern Organic synthesis and Natural Products Modern	3	3	40	60	100		
	22 A	Modern Organic synthesis and Natural Products Modern Lab	2	1		50	50		
		OR							
VIII	22 B	Chemistry of Natural products	3	3	40	60	100		
vm	22 B	Chemistry of Natural products Lab	2	1		50	50		
	22.4	Physical Chemistry: Quantum And Molecular Spectroscopy	3	3	40	60	100		
	25 A	Physical Chemistry: Quantum And Molecular Spectroscopy Lab	2	1		50	50		
	OR								
	23 B	Analytical Methods of Analysis	3	3	40	60	100		
	23 B	Analytical Methods of Analysis Lab	2	1		50	50		
	24.4	Pharmaceutical and Medicinal Chemistry	3	3	40	60	100		
	24 A	Pharmaceutical and Medicinal Chemistry Lab	2	1		50	50		
		OR							
	24 D	Pesticides and Green Chemistry	3	3	40	60	100		
	24 D	Pesticides and Green Chemistry Lab	2	1		50	50		
SEC		Corrosion and Its Prevention	3	3	40	60	100		
	25 A	Corrosion and Its Prevention Lab	2	1		50	50		
		OR							
		Material & Energy Balances and Utilities in Chemical Industry	3	3	40	60	100		
	25 B	Material & Energy Balances and Utilities in Chemical Industry Lab	2	1		50	50		
N.	r	Open online trans di	sciplina	ry cours	e				
1.	dea	upu 4.	K	TR	21	6.			
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Semester	Course Code	Title	Hr/ week	Credits	Internal Marks	External Marks	Total Marks		
3	12.4	Polymer Chemistry	4	4	25	75	100		
	12 A	Polymer Chemistry Lab	2	1		External Marks         To Marks           75         10           50         5           75         10           50         5           75         10           50         5           75         10           50         50           75         10           50         50           75         10           50         50           75         10           50         50           75         10           50         50           50         50           50         50           50         50           50         50           50         50	50		
VII SEC		OF	ł						
		Industrial Chemicals and Environment	4	4	25	75	100		
	12 B	Industrial Chemicals and Environment Lab	2	1		50	50		
		Online Swayam/NPTEL/Any other c	ourses	recognize	d by unive	ersities			
	14.4	Inorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio- inorganic chemistry	4	4	25	75	100		
	14 A	Inorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio- inorganic chemistry Lab	2	1		50	50		
	OR								
		Organometallic Chemistry	4	4	25	75	100		
4-14	14 B	Organometallic Chemistry Lab	2	1		50	50		
Semester       Course Code         12 A       Pc         12 A       Pc         12 A       Pc         12 A       Pc         12 B       In         14 A       Pn         Pro       Pro         VII       15 A         Pro       Pro         VII       15 B         Ch       Phy         In       Pro         Pro       Pro         Pro <td></td> <td>Modern Organic synthesis and Natural Products Modern</td> <td>4</td> <td>4</td> <td>25</td> <td>75</td> <td>100</td>		Modern Organic synthesis and Natural Products Modern	4	4	25	75	100		
	Modern Organic synthesis and Natural Products Modern Lab	2	1		50	50			
		CodeInteweekCreditsMarksMarksMarksMarks12 APolymer Chemistry44257510Polymer Chemistry Lab215050OR12 BIndustrial Chemicals and Environment44257510Industrial Chemicals and Environment215050Online Swayam/NPTEL/Any other courses recognized by universitiesInorganic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio- inorganic14 AChemistry44257510OROrganometallic Chemistry: Metal Cluster, Electronic spectra of Complex compounds and Bio- inorganic chemistry Lab215050OROrganometallic Chemistry Lab215050Organometallic Chemistry Lab215050 <td <="" colspan="4" td=""><td></td></td>	<td></td>						
		Chemistry of Natural products	4	4	25	75	100		
	15 B	Chemistry of Natural products Lab	2	1		50	50		
		Physical Chemistry: Quantum And Molecular Spectroscopy	4	4	25	75	100		
	16A	Physical Chemistry: Quantum And	2	1		50	50		

Semester	Course Code	Title	Hr/ week	Credit s	Internal Marks	Externa 1 Marks	Total Marks				
	8.4	Inorganic Chemistry:Advance Studies in Complexes and Group theory	4	4	25	75	100				
	oA	Inorganic Chemistry:Advance Studies in Complexes and Group theory Lab	2	1	2.20	50	50				
		OF									
	8 B	Inorganic Materials of Industrial importance		4	25	75	100				
		Inorganic Materials of Industrial importance Lab	2	1		50	50				
		Spectroscopy of Organic compounds	4	4	25	75	100				
	9 A	Spectroscopy of Organic compounds Lab	2	1		50	50				
		01	2		ARE						
VII	OP	Stereo Chemistry and Natural Products	4	4	25	75	100				
	98	Stereo Chemistry and Natural Products Lab	2	1		50	50				
	10 A	Physical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics	4	4	25	75	100				
		Physical Chemistry: Thermo dynamics, Electro chemistry and Chemical Kinetics Lab	2	1		50	50				
	OR										
		Instrumental Methods of Chemical Analysis	4	4	25	75	100				
	10 B	Instrumental Methods of Chemical Analysis Lab	2	1		50	. 50				
	11.4	Green Chemistry	4	4	25	75	100				
	IIA	Green Chemistry Lab	2	1		50	50				
VII SEC	-	C	R								
VII SEC		Analysis of Drugs, Foods, Dairy Products& Bio Chemical Analysis	4	4	25	75	100				
	ПВ	Analysis of Drugs, Foods, Dairy Products& Bio Chemical Analysis La	b 2	1		50	50				
V.8	Kile	yok 3. R.	2-0	Non	-1	5	. P.8				
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# SRIASNM GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) SEMESTER - I, II, III & IV **BLUEPRINT FOR THE CHEMISTRY MODEL PAPER** FOR SEMESTER END EXAMINATIONS

		ESSA	Y QUESTIO	NS	SHORT QUESTIONS				
S. No	UNIT No.	No of Questions	Marks allotted	Total marks	No of Questions	Marks allotted	Total marks		
1	I	2	8	16	1	4	4		
2	11	2	8	16	1	4	4		
3	m	2	8	16	2	4	8		
4	IV	2	8	16	2	4	8		
5	v	2	8	16	2	4	8		

Section -A: Out of 8 Questions 5 has to be answered.

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Section -B: Internal Choice (either / or) and 1 Question in each unit, 5 Questions has to be answered

# **BLUEPRINT FOR INTERNAL EXAMINATIONS**

	Quest	Questions to be given To be answe					
S NO		Mid 1					
S.NO	No of Questions	Marks	Total Marks	No of Questions	Marks	Total Marks	
1	1	5	5	1	5	5	
2	5	2	10	5	2	10	
3	10	0.5	5				
	Total m	arks	20	Total n	narks	15	

Percentage of choice Assignments Seminar/Project Works Attendance/Extra Curricular Activities

1. Allup-

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: 05 Marks : 05 Marks : 05 Marks

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Semester	Course Code	Title	Hr/ week	Credits	Internal Marks	External Marks	Total Marks					
			OR									
VII	ICD	Analytical Methods of Analysis	4	4	25	75	100					
vii	10 B	Analytical Methods of Analysis Lab	2	1		50	50					
	17.4	Pharmaceutical and Medicinal Chemistry	4	4	25	75	100					
	17A	Pharmaceutical and Medicinal Chemistry Lab	2	1		50	50					
	OR											
	17 B	Pesticides and Green Chemistry	4	4	25	75	100					
		Pesticides and Green Chemistry Lab	2	1		50	50					
VIII SEC	19.4	Corrosion and Its Prevention	4	4	25	75	100					
	IUA	Corrosion and Its Prevention Lab	2	1	1	50	50					
		OR										
		Material & Energy Balances and Utilities in Chemical Industry	4	4	25	75	100					
	18 B	Material & Energy Balances and Utilities in Chemical Industry Lab	2	1		50	50					

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# SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W:G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) Department of Chemistry Multidisciplinary Courses Offered for B.A./B.Com./BBA/BCA Majors

Semeste	Course	Title	Hr/	Credit	Internal	External	Total
r	Code		week	s	Marks	Marks	Marks
1		PRINCIPLES OF CHEMICAL SCIENCES	2	2	-	50	50

# BLUEPRINT FOR THE PRINCIPLES OF CHEMICAL SCIENCES MODEL PAPER FOR SEMESTER END EXAMINATIONS

		ESSA	Y QUESTIC	NS	SHOP	RT QUESTIO	NS
S. No	UNIT No.	No of Questions	Marks allotted	Total marks	No of Questions	Marks allotted	Total marks
1	I	2	10	20	2	5	5
2	П	2	10	20	3	5	5
3	ш	2	10	20	3	5	10

Section -A: Out of 6 Questions 3 has to be answered. Section -B: Out of 8 questions, 4 Questions has to be answered

1. Adupta 2. Silostoglas 3. R. J-186 05/05/23 5. P. S. C



### SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle)

# **Programme Outcomes**

Upon the successful completion of Graduate & Post Graduate programme, students will be able to:

**PO 1. Problem analysis:** Identify, formulate, review research literature, and analyse complex problems reaching substantiated conclusions using first principles of mathematics, humanities, and Sciences. (K4)

**PO 2. Design/development of solutions:** Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. (K6)

**PO 3. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. (K3)

**PO 4. Modern tool usage:** Create, select, and apply appropriate techniques, resources, IT tools including development, design, and prediction and modelling to real world activities with an understanding of the limitations. (K6)

**PO 5. Environment and sustainability:** Understand the impact of the professional problem solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. (K2)

**PO 6. Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. (K4)

**PO 7. Efficient Communication & Life Skills:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the practice. (K3)

**PO 8. Life-long learning:** Learn "how to learn"- Self-motivated and self-directed learning. Adapt to the ever-emerging demands of the workplace and life. (K6)

### SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle)

# Department of Chemistry Programme Specific Outcomes Common for AtZC, CBZ, CBH, MCCs, MPC, & Chemistry Major (Honours)

**PSO1:** Use principles of Chemistry in areas such as Synthesis, Quality Assurance, Quality Control, Diagnostics and Research. (K3)

**PSO2:** Create solutions for problems in interdisciplinary areas like Aquaculture, Botany, Environmental Science, Horticulture, Microbiology, Pharmacy, Zoology, etc. (K6)

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course -1: Essentials of Mathematics, Physics, Chemistry & Computer Science	Prog I B.	ramme Sc. Ch I Sei	e & Sem lemistry nester	nester (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Mathematics, physics, Chemistry and Computer science	4	1	-	4

#### **Course Objective:**

- The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences.
- The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

#### Course outcomes: At the end of the course, the student will be able to

COx	Course Outcome	Knowledge Level
CO1	Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.	K3
CO2	Employ the fundamental principles and concepts in various key domains of physics.	K3
СОЗ	Relate fundamental concepts encompassing various branches of chemistry in everyday life.	КЗ
CO4	Discover the intricate interrelationships and correlations among mathematics, physics, and chemistry in diverse practical scenarios.	K4
CO5	Illustrate various threats, vulnerabilities, and counter measures in the realm of network security.	К3

#### **SYLLABUS TOPICS:**

#### **UNIT I: ESSENTIALS OF MATHEMATICS:**

 $Complex \ Numbers: \ Introduction \ of \ the \ new \ symbol \ i-General \ form \ of \ a \ complex \ number-Modulus-Amplitude \ form \ and \ conversions$ 

Trigonometric Ratios: Trigonometric Ratios and their relations – Problems on calculation of angles Vectors: Definition of vector addition – Cartesian form – Scalar and vector product and problems Statistical Measures: Mean, Median, Mode of a data and problems

### **UNIT II: ESSENTIALS OF PHYSICS:**

Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe.

### UNIT III: ESSENTIALS OF CHEMISTRY

#### 9hrs

9hrs

9hrs

Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes, classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

### Additional inputs: Cosmetics and Personal Care Products, Nutrient functions of Bio molecules.

#### UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY: 9hrs

Applications of Mathematics in Physics & Chemistry: Calculus, Differential Equations & Complex Analysis Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

Application of Chemistry in Industry and Technology: Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry.

#### Additional inputs: Energy Storage and Renewable Fuels

#### UNIT V: ESSENTIALS OF COMPUTER SCIENCE

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.

Ethical and social implications: Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection

#### **Recommended books:**

- 1. Functions of one complex variable by John.B.Conway, Springer- Verlag.
- 2. Elementary Trigonometry by H.S.Hall and S.R.Knight
- 3. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.
- 4. Basic Statistics by B. L. Agarwal, New age international Publishers
- 5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
- 6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
- 7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.
- 8. Physics for Technology and Engineering" by John Bird
- 9. Chemistry in daily life by Kirpal Singh
- 10. Chemistry of bio molecules by S. P. Bhutan
- 11. Fundamentals of Computers by V. Raja Raman
- 12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

#### STUDENT ACTIVITIES

#### **UNIT I: ESSENTIALS OF MATHEMATICS**

1: Complex Number Exploration: Provide students with a set of complex numbers in both rectangular and polar forms. They will plot the complex numbers on the complex plane and identify their properties

2: Trigonometric Ratios Problem Solving: Give students a set of problems that require the calculation of trigonometric ratios and their relations. Students will solve the problems using the appropriate trigonometric functions (sine, cosine, tangent, etc.) and trigonometric identities.

9hrs

3: Vector Operations and Applications: Provide students with a set of vectors in Cartesian form.

Students will perform vector addition and subtraction operations to find the resultant vectors. They will also calculate the scalar and vector products of given vectors.

4: Statistical Measures and Data Analysis: Give students a dataset containing numerical values.

Students will calculate the mean, median, and mode of the data, as well as other statistical measures if appropriate (e.g., range, standard deviation). They will interpret the results and analyse the central tendencies and distribution of the data.

### UNIT II: ESSENTIALS OF PHYSICS:

1. Concept Mapping: Divide students into groups and assign each group one of the topics. Students will create a concept map illustrating the key concepts, relationships, and applications related to their assigned topic. Encourage students to use visual elements, arrows, and labels to represent connections and interdependencies between concepts.

#### 2. Laboratory Experiment

Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields. Provide the necessary materials, instructions, and safety guidelines for conducting the experiment. Students will work in small groups to carry out the experiment, collect data, and analyze the results. After the experiment, students will write a lab report summarising their findings, observations, and conclusions.

#### UNIT III: ESSENTIALS OF CHEMISTRY

1: Chemistry in Daily Life Presentation: Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine, or environmental issues. Students will research and create presentation (e.g., PowerPoint, poster, or video) that showcases the importance of chemistry in their assigned aspect.

2: Periodic Table Exploration: Provide students with a copy of the periodic table. Students will explore the periodic table and its significance in organising elements based on their properties. They will identify and analyse trends in atomic structure, such as electronic configuration, atomic size, and ionisation energy.

3: Chemical Changes and Classification of Matter: Provide students with various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction. Students will observe and describe the chemical changes that occur, including changes in color, temperature, or the formation of new substances.

4: Biomolecules Investigation: Assign each student or group a specific biomolecule category, such as carbohydrates, proteins, fats, or vitamins. Students will research and gather information about their assigned biomolecule category, including its structure, functions, sources, and importance in the human body. They can create informative posters or presentations to present their findings to the class.

#### **UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY**

1: Interdisciplinary Case Studies: Divide students into small groups and provide them with interdisciplinary case studies that involve the interdisciplinary application of mathematics, physics, and chemistry. Each case study should present a real-world problem or scenario that requires the integration of concepts from all three disciplines.

2: Design and Innovation Project: Challenge students to design and develop a practical solution or innovation that integrates mathematics, physics, and chemistry principles. Students can choose a

specific problem or area of interest, such as renewable energy, environmental conservation, or materials science.

3: Laboratory Experiments: Assign students laboratory experiments that demonstrate the practical applications of mathematics, physics, and chemistry. Examples include investigating the relationship between concentration and reaction rate, analysing the behaviour of electrical circuits, or measuring the properties of materials.

4: Mathematical Modelling: Present students with real-world problems that require mathematical modelling and analysis.

### UNIT V: ESSENTIALS OF COMPUTER SCIENCE

1. Identifying the attributes of network (Topology, service provider, IP address and bandwidth of your college network) and prepare a report covering network architecture.

2. Identify the types of malware's and required firewalls to provide security.

3. Latest Fraud techniques used by hackers.

### **CO-PO Mapping:**

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	3	3							
CO2	3	3	3							
CO3	3	3	3						3	3
CO4	3	3	3	3	3	3	3	3		
CO5	3	3	3	3						

### SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) B.Sc Honours Chemistry (Major) W.E.F 2023-24 for 2023-24 Admitted Batch Question Paper Blue Print

Course -1: Essentials Of Mathematics, Physics, Chemistry & Computer Science Time: 3 Hrs. Max. Marks: 60

Unit	Course Content	Essay questions (with choice) (8M)	Short answer questions (with choice) (4M)	Total
Ι	Essentials of Basic Mathematics	2	2	24
II	Essentials of Physics	2	2	24
III	Essentials of Chemistry	2	1	20
IV	Applications of Mathematics, Physics and chemistry	2	2	24
V	Essentials of Computer Science	2	1	20
	TOTAL	10	8	112

### 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)

Common For B.Sc. Honours (Chemistry, Computers, & Mathematics (Single Major) SEMESTER- I

COURSE-I: Essentials and applications of Mathematical, Physical and Chemical SciencesTIME: 3 HOURSBLUE PRINTMaxMarks : 60

#### **UNIT-I- Essentials of Mathematics**

Multiple Choice Questions	-	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

### **UNIT-II- Essentials of Physics**

Multiple Choice Questions	-	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

### UNIT-III- Essentials of Chemistry

Multiple Choice Questions	-	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

UNIT-IV- Applications of Mathematics, Physics and Chemistry

<b>Multiple Choice Questions</b>	-	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

UNIT-V- Essentials of Computer Science	
Multiple Choice Questions - 4	

<b>Multiple Choice Questions</b>	-	4
Fill in the blanks	-	
True (or) False Questions	-	
Matching	-	
Very Short Questions	-	

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL course -1. essentials and applications of mathematical, physical and chemical sciences SEMESTER-I, PAPER-1

#### **B.Sc. HONOURS (CHEMISTRY)**

#### **TIME: 3 HOURS**

#### **SECTION-A**

MAX MARKS: 60

**Answer All Questions** 20x1=20M 1. The value of  $(\frac{1+i}{1-i})^{n=1}$ b) -1 c)1 d) --i a) 0 2. Find the value of  $2(\sin^6 \Theta + \cos^6 \Theta) - 3(\sin^4 \Theta + \cos^4 \Theta) =$ c)2 a) 1 b)-1 d) 0 3. if a=6i+2j+3k and b=2i-9j+6k then find n a.b a) 18 b) 15 12 d) 14 c) 4. Calculate the Mean of the Numbers 165, 170, 168, 172, 169, 175, 168, 173 a) 168.75 b) 168.65 c)178.75 d) 167.75 5. Unit of plane angle is a Steradian d) Metre a) Radian b) c) Centimetre 6. In Newton's second law the rate of change of momentum of a body is directly proportional to the applied a) Density Temperature d) Mass b) Force c) 7. Charge of an electron is a) Positive b) Negative c)Neutral d) None 8. Velocity =Pressure/Time a) Distance/Time Mass/Time b) c) d) Displacement/Time 9. What does analytical chemistry focus on? a) Developing new materials b) Identifying and quantifying components in a substance c) Behaviour of radioactive elements d) Understanding biological molecules 10. What is the primary role of enzymes in living organisms? a) Energy production b) Structural support c) Speeding up chemical reactions d) Informational roles 11) Which vitamin is essential for vision, healthy skin, and mucous membranes? a) Vitamin C b) Vitamin A c) Vitamin D d) Vitamin E 12) What is the role of unsaturated fats in the body? a) Provide insulation b) Act as an energy source c) Form structural components d) Regulate body temperature

13) ARPANET stands for?

a) Advanced Research Project Agency Network

b) Advanced Research Programmed Auto Network

c) Advanced Research Project Automatic Network

d) Advanced Research Project Authorised Network

14) Which of the following is not a type of virus?

a) Boot sector b) Polymorphic c) Multipartite d) Trojans

15) What is the full form of OSI?

a) optical service implementation

b) open service Internet

c) open system interconnection

d) operating system interface

16) Which network topology does this represent?



a) Mesh b) Star c) Bus d) Ring

17) \_\_\_\_\_\_ equations are used to describe thermodynamic process

a) differential b) Partial c) both a &b d) None of the above

18) Transistors Made with

a)Insulators b) Conductors c) Semi conductors d) None of the above

19) In chemical manufacturing, what is the primary purpose of the Haber's process?

a) Synthesis of ammonia **b**) Polymerisation of plastics

c) Extraction of metals d) Fermentation of ethanol

20) LED Stands for

-----

a) Light Emitting Diode b) Light Energy Diode c) Light Electric Diode d) None of the above

#### **SECTION-B**

Answer All Fill in the Blank Questions	10x1 = 10M
1. Formula for cos(A-B)=	
2. Calculate Mode of the numbers 3,1,2,0,2,4,1,3,2,1	
3. In electro statics force (F) =	
4. Range of visible light wave length From	То
5. Chemical reactions often involve the	of one or more substances into new
substances	

6. \_\_\_\_\_chemistry helps understand pollution, waste management, and the impact of human activities on ecosystems.

7. Euler's Method is a basic technique used to approximate solutions of

8. Chemistry is crucial in Chemical Manufacturing for improving processes, reducing waste, and improving overall \_\_\_\_\_\_.

9. A computer \_\_\_\_\_\_ is a malicious code which self-replicates by copying itself to other programs.

10. TCP/IP Stands for \_\_\_\_\_

### SECTION-C

#### **Answer All True or False Questions**

10x1=10M

1.  $T \overline{\tau} = |T|^2$  (True or False)

2. Sin3A=3Sin3A-4Sin<sup>3</sup>A (True or False)

3. Force = Mass×Acceleration(True or False)

4. A car moving in straight line at constant speed, then net force acting on the body is zero. (True or False)

5. Chemistry is often referred to as the central science because it bridges the gap between physics and mathematics. (True or False)

6. The Aufbau Principle states that electrons fill higher energy orbitals first before lower energy orbitals. (True or False)

7. Chemical Manufacturing exclusively focuses on improving processes, neglecting the importance of reducing waste. (True or False)

- 8. Mathematical Models are used to analyse Medical data (True or False)
- 9. Firstly Internet was connected through 13 computers in 1969. (True or False)

10. RAM is volatile memory. (True or False)

### **SECTION-D**

#### **Answer All Very Short Answer Questions**

1. Let a=2i-j+k and b=3i+4J-K If  $\Theta$  is the Angle between a and b then find  $\sin \Theta$ 

2. Prove that 
$$\operatorname{Sin}^2(52\frac{1}{2})$$
-  $\operatorname{Sin}^2(22\frac{1}{2}) = \frac{\sqrt{3}+1}{4\sqrt{2}}$ 

- 3. State zeroth law of thermodynamics
- 4. What is Doppler effect ?
- 5. How does chemistry contribute to drug discovery?
- 6. Why is the understanding of electronic configuration important in chemistry?
- 7. What is the significance of applying chemical knowledge in the food and beverage industry?
- 8. Write any two uses of Physics in Robotics?
- 9. What are the Types of Networks?
- 10. What is Cryptography?

10x1=10M

#### **SECTION-E**

(

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(

#### **Answer The Matching Questions**

1. If z=3-5i

2. Mode of Grouped data	(
3. Many substances especially metals emit	
electrons when exposed to a suitable	
frequency of light (radiation) is called as	(
4. According to uncertainty principle	
the product of uncertainty in momentum and	ł
uncertainty in position is $\ge h/4\pi$ is called as	(
5. Inorganic Chemistry	(
6. Vitamin B6	(
7. Which type of mathematical	
Modelling is used to study the	
Behaviour of electrons	(

8. ICs	
9. Software intentionally designed	

to cause disruption to a computer 10. Network security system that monitors

and controls incoming and outgoing network Traffic 10x1=10M )  $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) xh$ ) then  $z^3 - 10z^2 + 58Z - 136 = 0$ 

) Uncertainty principle

) Photo electric effect

) Pyridoxine

) Study of compounds that do not contain carbon-hydrogen bonds.

) Integrated Circuits

) Complex Analysis

) Malware

) Firewall

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course - 2 : Advances In Mathematical, Physical And Chemical Sciences	Programme & Semester I B.Sc. Chemistry (H) I Semester		nester (H)	
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Mathematics, physics, Chemistry and Computer science	4	1	-	4

### **Course Objective:**

- The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences.
- The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

#### Course outcomes: At the end of the course, the student will be able to

СОх	Course Outcome	
CO1	Use mathematical concepts to model and solve real-world problems in the fields of physics and chemistry.	K3
CO2	Demonstrate an advanced understanding of the concepts and recent developments in renewable energy generation.	K3
СОЗ	Apply advanced techniques in design of drugs, nano sensors, catalysis and pollutant remediation.	КЗ
CO4	Develop models on principles of mathematics, physics, and chemistry in diverse applications	K6
CO5	Implement knowledge of number systems, signals, error detection, and networking devices to communication technologies.	K4

#### **SYLLABUS TOPICS:**

### **UNIT I: ADVANCES IN BASICS MATHEMATICS**

Straight Lines: Different forms – Reduction of general equation into various forms –Point of intersection of two straight lines. Limits and Differentiation: Standard limits – Derivative of a function –Problems on product rule and quotient rule Integration: Integration as a reverse process of differentiation – Basic methods of integration.

Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose of a matrix and determinants

#### **UNIT II: ADVANCES IN PHYSICS:**

Renewable energy: Generation, energy storage, and energy-efficient materials and devices. Recent advances in the field of nanotechnology: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

### UNIT III: ADVANCES IN CHEMISTRY:

#### 9hrs

9hrs

9hrs

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method.

#### Additional inputs: Nano materials in Drug Delivery.

### UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY 9hrs

Mathematical Modelling applications in physics and chemistry Application of Renewable energy: Grid Integration and Smart Grids, Application of nanotechnology: Nano medicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neuro physics, Application of medical physics: Radiation Therapy, Nuclear medicine

Solid waste management, Environmental remediation- Green Technology, Water treatment.

#### Additional inputs: Membrane Filtration Technologies

#### **UNIT V: Advanced Applications of computer Science**

9hrs

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway.

Recommended books:

- 1. Coordinate Geometry by S.L.Lony, Arihant Publications
- 2. Calculus by Thomas and Finny, Pearson Publications
- 3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.
- 4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle
- 5. "Energy Storage: A Nontechnical Guide" by Richard Baxter
- 6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara
- 7. "Biophysics: An Introduction" by Rodney Cotterill
- 8. "Medical Physics: Imaging" by James G. Webster
- 9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas
- 10. Nano materials and applications by M.N.Borah
- 11. Environmental Chemistry by Anil.K.D.E.
- 12. Digital Logic Design by Morris Mano
- 13. Data Communication & Networking by Bahrouz Forouzan.

### **STUDENT ACTIVITIES**

#### **UNIT I: ADVANCES IN BASIC MATHEMATICS**

#### 1: Straight Lines Exploration

Provide students with a set of equations representing straight lines in different forms, such as slopeintercept form, point-slope form, or general form. Students will explore the properties and characteristics of straight lines, including their slopes, intercepts, and point of intersection.

2: Limits and Differentiation Problem Solving. Students will apply the concept of limits to solve various problems using standard limits. Encourage students to interpret the results and make connections to real-world applications, such as analysing rates of change or optimising functions.

#### 3: Integration Exploration

Students will explore the concept of integration as a reverse process of differentiation and apply basic methods of integration, such as the product rule, substitution method, or integration by parts.

Students can discuss the significance of integration in various fields, such as physics and chemistry

#### 4: Matrices Manipulation

Students will perform operations on matrices, including scalar multiplication, matrix multiplication, and matrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems of equations or representing transformations in geometry.

### **UNIT II: ADVANCES IN PHYSICS**

1: Case Studies

Provide students with real-world case studies related to renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

Students will analyse the case studies, identify the challenges or problems presented, and propose innovative solutions based on the recent advances in the respective field.

They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements.

#### 2: Experimental Design

Assign students to design and conduct experiments related to one of the topics: renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

They will identify a specific research question or problem to investigate and design an experiment accordingly.

Students will collect and analyse data, interpret the results, and draw conclusions based on their findings.

They will discuss the implications of their experimental results in the context of recent advances in the field.

#### 3: Group Discussion and Debate

Organise a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology, biophysics, medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

#### UNIT III: ADVANCES IN CHEMISTRY

#### 1. Experimental Design and Simulation

In small groups, students will design experiments or simulations related to the assigned topic. For example, in the context of computer-aided drug design, students could design a virtual screening experiment to identify potential drug candidates for a specific disease target.

For nano sensors, students could design an experiment to demonstrate the sensitivity and selectivity of nano sensors in detecting specific analytes.

Chemical biology-related activities could involve designing experiments to study enzyme- substrate interactions or molecular interactions in biological systems.

Students will perform their experiments or simulations, collect data, analyse the results, and draw conclusions based on their findings.

2. Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants on ecosystems and human health.

Students will analyse the case studies, identify the sources and effects of chemical pollutants, and propose mitigation strategies to minimise their impact.

Encourage discussions on the ethical and environmental considerations when dealing with chemical pollutants.

For the dye removal using the catalysis method, students can explore case studies where catalytic processes are used to degrade or remove dyes from wastewater.

Students will discuss the principles of catalysis, the advantages and limitations of the catalysis method, and its applications in environmental remediation.

#### 3: Group Project

Assign students to work in groups to develop a project related to one of the topics.

The project could involve designing a computer-aided drug delivery system, developing a nano sensor for a specific application, or proposing strategies to mitigate the impact of chemical pollutants on ecosystems.

Students will develop a detailed project plan, conduct experiments or simulations, analyse data, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

#### UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Mathematical Modelling Experiment

Provide students with a mathematical modelling experiment related to one of the topics. For example, in the context of renewable energy, students can develop a mathematical model to optimise the placement and configuration of solar panels in a solar farm.

Students will work in teams to design and conduct the experiment, collect data, and analyse the results using mathematical models and statistical techniques.

They will discuss the accuracy and limitations of their model, propose improvements, and interpret the implications of their findings in the context of renewable energy or the specific application area.

2: Case Studies and Group Discussions

Assign students to analyse case studies related to the applications of mathematical modelling in nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.

Students will discuss the mathematical models and computational methods used in the case studies, analyse the outcomes, and evaluate the effectiveness of the modelling approach.

Encourage group discussions on the challenges, ethical considerations, and potential advancements in the field.
Students will present their findings and engage in critical discussions on the advantages and limitations of mathematical modelling in solving complex problems in these areas.

#### 3. Group Project

Assign students to work in groups to develop a group project that integrates mathematical modelling with one of the application areas: renewable energy, nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.

The project could involve developing a mathematical model to optimise the delivery of radiation therapy in medical physics or designing a mathematical model to optimise waste management practices.

Students will plan and execute their project, apply mathematical modelling techniques, analyse the results, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

#### **UNIT V: Advanced Applications of computer Science**

1. Students must be able to convert numbers from other number system to binary number systems

- 2. Identify the networking media used for your college network
- 3. Identify all the networking devices used in your college premises.

#### **CO-PO Mapping:**

#### (1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
C01	3	3	3	3				3		
CO2	3	3	3	3	3			3		
CO3	3	3	3	3	3			3	3	3
CO4	3	3	3	3	3		3	3	3	3
CO5	3	3	3	3						

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) B.Sc Honours Chemistry (Major) W.E.F 2023-24 for 2023-24 Admitted Batch Question Paper Blue Print

Course - 2 : Advances In Mathematics, Physics, Chemistry & Computer Science Time: 3 Hrs. Max. Marks: 60

Unit	Course Content	Essay questions (with choice) (8M)	Short answer questions (with choice) (4M)	Total
Ι	Advances in Basic Mathematics	2	2	24
II	Advances in Physics	2	2	24
III	Advances in Chemistry	2	1	20
IV	Advances applications of Mathematics, Physics and chemistry	2	2	24
V	Advances applications of Computer Science	2	1	20
	TOTAL	10	8	112

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) Common For B.Sc. Honours (Chemistry, Computers, & Mathematics (Single Major) SEMESTER- I COURSE-II: Advances in Mathematical, Physical and Chemical Sciences

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<b>TIME: 3 HOURS</b>	<b>BLUE PRINT</b>	Max Marks : 60

**UNIT-I-** Advances in Basics Mathematics

Multiple Choice Questions	-	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

## **UNIT-II- Advances in Physics**

Multiple Choice Questions		4	
Fill in the blanks	-	2	
True (or) False Questions	-	2	
Matching	-	2	
Very Short Questions	-	2	

## UNIT-III- Advances in Chemistry

Multiple Choice Questions	-	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

UNIT-IV- Advanced Applications of Mathematics, Physics and Chemistry

<b>Multiple Choice Questions</b>	-	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

## **UNIT-V- Advanced Applications of Computer Science**

<b>Multiple Choice Questions</b>	s –	4
Fill in the blanks	-	2
True (or) False Questions	-	2
Matching	-	2
Very Short Questions	-	2

## SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL COURSE -2 . ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES SEMESTER-I, PAPER-II

**B.Sc. Major Honours (Chemistry)** 

TIME: 3 HOURS

#### **SECTION-A**

**Answer All Questions** 

#### 20x1=20M

MAX MARKS: 60

1) Intersection point of the straight lines 3x+5y-6=0 and 5x-y-10=0 is

a) 
$$(3,0)$$
 b)  $(2,0)$  c)  $(5,-1)$  d)  $(6,3)$   
2)  $\frac{d}{dx}(e^{3x}) =$   
a)  $e^{3x}$  b)  $-e^{3x}$  c)  $3e^{3x}$  d)  $3x$   
3)  $\int x^3 dx =$   
a)  $x^3$  b)  $\frac{x^4}{4}$  c) $x^4$  d)  $3x^4$ 

4) A Matrix having number of rows equals to number of columns is called

a) Rectangular Matrix b) Square Matrix c) Row Matrix d) Identity Matrix

5) What is the unit of energy

a) Meter b) Newton c) Joule d) Kelvin

6) One Nano meter =

a) 10^-10m b) 10^-6m c) 10^-3m d) 10^-9

7) Photovoltaic cells ( Solar cells) are devices which are made with

a) Semi conductors b) conductors c) insulators d) none

8) Radiation therapy most often uses

a) UV Rays b) Gama Rays c) X-Rays d) Sound Waves

9) What is the primary focus of Structure-Based Drug Design (SBDD)?

a) Analysing ligand structures b) Identifying potential targets

c) Determining target protein structures d) Synthesising lead compound

10) In the drug-discovery process, which phase involves evaluating the absorption, distribution, metabolism, excretion (ADME), and toxicity profiles of lead compounds?

a) Discovery phase b) Development phase c) Registry phase d) Experimental phase 11) In biotechnology, chemical biology is used for creating:

a) Enhancing food safety b) Monitoring pollutants c) Improving electronic device performance d) Detecting explosives 13) PLM Stands for a) Peak Load Management b) Plant Load Management c) Power leakage Management d) Plant Leakage Management 14) Neuro Physics is the branch of medical physics that studies nervous system in a) Legs b) Brain c) Hands d) Stomach 15) Nuclear Medicine uses a) Non Radioactive Materials b) Organic Materials c) Radioactive Materials d) None of the above

a) Engineered organisms b) Drug targets c) Biosensors d) Chemical probes

16) What is the advantage of using Metal and metal oxide nanoparticles as catalysts?

a) Low surface area b) nability to degrade dyes

12) In Nanoelectronics, Nano sensors are primarily used for:

c) High surface area and reactivity d) Limited use in wastewater treatment

17) Convert  $(214)_8$  into decimal.

a) $(140)_{10}$	b) $(141)_{10}$	c) $(142)_{10}$	d) $(130)_{10}$
w) (1.0)10	0)(1.1)10	•)(1.)10	

18) Convert the binary number (01011.1011)2 into decimal.

a) (11.6875)<sub>10</sub> b) (11.5874)<sub>10</sub> c)  $(10.9876)_{10}$ d) (10.7893)<sub>10</sub>

19) How many layers are there in the ISO OSI reference model?

a) 7 b) 5 c) 4 d) 620

20) Which of the following devices forwards packets between networks by processing the routing information included in the packet?

a) firewall b) bridge c) hub d) router

#### **SECTION-B**

## Answer All Fill in the Blank Questions 1. The slope of the equation of a line 2x-6y+3=0 is 2. If A= A<sup>T</sup>, then the matrix A is called

3. In radiation Therapy most often uses \_\_\_\_\_

4. Give examples of renewable energy sources

10x 1 = 10M

- 5. CADD enables the systematic identification of novel potential uses for drugs already approved for other \_\_\_\_\_.
- 6. Chemical genomics involves large-scale screening of small molecules against
- 7. OMS Means
- 9. The decimal equivalent of the binary number (1011.011)2 is \_\_\_\_\_
- 10. (170)10 is equivalent to \_\_\_\_\_\_ in hexadecimal form

#### **SECTION-C**

#### Answer All True or False Questions .

#### 10x1=10M

- 1. Let A and B be invertible matrices then  $(AB)^{-1} = B^{-1}A^{-1}$  (TRUE OR FALSE)
- 2.  $\lim_{x \to \infty} \left( \frac{\sin x}{x} \right) = 3$  (TRUE OR FALSE)
- 3. Solar energy is the nonrenewable energy. (TRUE OR FALSE)
- Energy efficient materials and devices reducing green house gas emissions.(TRUE OR FALSE)
- 5. In the drug-discovery process, the discovery phase focuses on evaluating compounds in in vitro and in vivo models.(TRUE OR FALSE)
- 6. Nanosensors operate on a larger scale than 100 nanometers for better sensitivity. (TRUE OR FALSE)
- 7. The Smart grid will help consumers manage their electricity bill (TRUE OR FALSE)
- 8. Exposure to certain chemical pollutants during pregnancy has impact on the development of the foetus. (True or False)
- 9. A device that is used to connect a number of LANs is called a router(TRUE OR FALSE)
- 10. Hexadecimal number system is a base 16 number system (TRUE OR FALSE)

#### **SECTION-D**

#### Answer All Very Short Answer Questions.

10x1=10M

- 1. Write the equation of a straight line in Slope –intercept form
- 2. Define Transpose of a Matrix.
- 3. Explain the basic structure of quantum Dot.

- 4. What are shape memory materials?
- 5. What is the main objective of Computer-Aided Drug Design (CADD) in the drug-discovery process?
- 6. How does chemical biology contribute to structural biology?
- 7. What is Smart Grid?
- 8. What is a potential impact of airborne chemical pollutants on ecosystems?
- 9. Define a router?
- **10.** List out functionalities of bride.?

#### **SECTION-E**

(

(

## **Answer The Matching Questions**

1. $\int x dx$	( ) (a) 2x
2. $\frac{d}{dx}(x^2)$	( ) (b) $\frac{x^2}{2}$
3. The by products of hydrogen fuel cell	
is heat and electricity and	( ) (c) electricity
4. Solar cells directly converts light into	( ) (d) Water
5. Protein-Ligand Docking	( ) (e) Large-scale screening of small
	molecules
6. Chemical Genomics	() (f) Predict how ligands interact

7. The general equation for Exponential

Decay is

- 8. Solid Waste is the
- 9. Router works at ---- layer of OSI model
- 10. Bridge works at ---- Layer of OSI model
- ) (g) Discorded Material

of small

10x1=10M

- ) (h)  $N(t) = N_0 e^{-rt}$ (
- ) (i) Data link layer (
  - ) (j) Network layer

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL         ourse Code       TITLE OF THE COURSE         Course – 1: Introduction To Classical Biology		Programme & Semester I B.Sc. Botany/Zoology (H) I Semester			
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Basic knowledge about Botany, Zoology, and Chemistry	4	1	-	4	

## Learning Outcomes: On completion of the course the student will be able to

COx	Course Outcome	Knowledge Level
CO1	Outline the principles of classification and preservation of biodiversity	K2
CO2	Explain the plant anatomical, physiological and reproductive processes.	K2
CO3	Describe animal classification, physiology, embryonic development and their economic importance.	K2
CO4	Outline the cell components, cell processes like cell division, heredity and molecular processes.	K2
CO5	Comprehend the chemical principles in shaping and driving the macromolecules and life processes	K3

## Unit 1: Introduction to systematics, taxonomy and ecology

1.1. Systematics – Definition and concept, Taxonomy – Definition and hierarchy. 1.2. Nomenclature – ICBN and ICZN, Binomial and trinomial nomenclature. 1.3. Ecology – Concept of ecosystem, Biodiversity and conservation.

1.4. Pollution and climate change.

## Unit 2: Essentials of Botany

2.1. The classification of plant kingdom.

2.2. Plant physiological processes (Photosynthesis, Respiration, Transpiration, phytohormones).

2.3. Structure of flower – Micro and macro sporogenesis, pollination, fertilisation and structure of mono and dicot embryos.

2.4 Mushroom cultivation, floriculture and landscaping.

## Unit 3: Essentials of Zoology

3.1. The classification of Kingdom Animalia and Chordata.

3.2 Animal Physiology - Basics of Organ Systems & their functions, Hormones and Disorders 3.3

Developmental Biology – Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis)

3.4 Economic Zoology - Sericulture, Apiculture, Aquaculture

## Unit 4: Cell biology, Genetics and Evolution

4.1. Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.

4.2. Chromosomes and heredity – Structure of chromosomes, concept of gene. 4.3. Central Dogma of Molecular Biology.

4.4. Origin of life

## Unit 5: Essentials of chemistry

5.1. Definition and scope of chemistry, applications of chemistry in daily life.

5.2. Branches of chemistry

5.3. Chemical bonds – ionic, covalent, non covalent – Vander Waals, hydrophobic, hydrogen bonds.5.4. Green chemistry

Additional inputs: Intermolecular Forces, boiling points, melting points, and solubility.

#### References

1. Sharma O.P., 1993. Plant taxonomy. 2<sup>nd</sup> Edition. McGraw Hill publishers.

2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4<sup>th</sup> edition. S. Chand publishers, New Delhi, India.

3. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.

4. Rastogi, S.C., 2019. Essentials of animal physiology. 4<sup>th</sup> Edition. New Age International Publishers.

- 5. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology.
- S. Chand publishers, New Delhi, India.

6. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4<sup>th</sup> Edition. Elsevier publishers.
7. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.

8. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5<sup>th</sup> Edition. Pearson publishers.

9. Subrata Sen Gupta, 2014. Organic chemistry. 1<sup>st</sup> Edition. Oxford publishers.

## Activities:

1. Make a display chart of life cycle of nonflowering plants.

- 2. Make a display chart of life cycle of flowering plants.
- 3. Study of stomata
- 4. Activity to prove that chlorophyll is essential for photosynthesis
- 5. Study of pollen grains.
- 6. Observation of pollen germination.
- 8. Differentiate between edible and poisonous mushrooms.
- 9. Visit a nearby mushroom cultivation unit and know the economics of mushroom cultivation.
- 11. Visit to Zoology Lab and observe different types of preservation of specimens

12. Hands-on experience of various equipment – Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow

13. Visit to Zoo / Sericulture / Apiculture / Aquaculture unit

14. List out different hormonal, genetic and physiological disorders from the society

## **CO-PO Mapping:**

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
C01	3	3	3							
CO2	3	3	3							
CO3	3	3	3							
CO4	3	3	3							
CO5	3	3	3						3	3

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) B.Sc Honours Botany/Zoology (Major) W.E.F 2023-24 for 2023-24 Admitted Batch Question Paper Blue Print Course 1: Introduction To Classical Biology

Time: 3 Hrs.

Max. Marks: 60

Unit	Course Content	Essay questions (with choice) (8M)	Short answer questions (with choice) (4M)	Total
Ι	Introduction to systematics, taxonomy and ecology.	2	2	24
II	Essentials of Botany	2	2	24
III	Essentials of Zoology	2	1	20
IV	Cell biology, Genetics and Evolution	2	2	24
V	Essentials of chemistry	2	1	20
	TOTAL	10	8	112

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course - 3 : General And Inorganic Chemistry	Programme & Semester I B.Sc. Chemistry (H) II Semester				
Teaching	Hours Allocated: 45 (Theory and Activities ) (3 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Basic knowledge about Atomic structure, periodic properties and chemical bonding.	3	-	-	3	

## **Course Objectives:**

- 1. Gain knowledge about on atomic structure and Periodic table.
- 2. Gain knowledge about different types of chemical bonds and their applications.
- 3. Knowledge on different theories of acids and bases and their applications

## Course outcomes: At the end of the course, the student will be able to

СОх	Course Outcome	Knowledge Level
C01	Apply principles of electronic configuration, periodicity, and general properties of atoms to predict chemical behaviour and trends in atomic properties.	КЗ
CO2	Use knowledge of properties of ionic compounds, and covalent character to explain solubility, thermal stability, and polarisation.	КЗ
CO3	Identify the structure of the given inorganic compound.	КЗ
CO4	Use chemical bonds for explaining their influence on material properties and classifying materials as conductors, semiconductors, or insulators.	КЗ
CO5	Assess reaction outcomes and chemical reactivity in diverse solvents and systems using theories of acids and bases.	КЗ

#### SYLLABUS:

#### Unit I: Atomic Structure and Periodic table

Electronic configuration: Bohr theory, duel nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, normalisation of wave function, radial and angular wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Auf Bau principle).

Periodicity: periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number, horizontal, vertical, and diagonal relationships in the periodic table. 1.3 General properties of atoms: size of atoms and ions-atomic radii, ionic radii, covalent radii; trend in ionic radii, ionisation potential, electron affinity; electronegativity - Pauling, Mulliken-Jaffe, Allred-Rochor definitions; oxidation states and variable valency; isoelectronic relationship; inert-pair effect;

## **UNIT 2: Ionic bond**

Properties of ionic compounds, factors favouring the formation of ionic compounds- ionisation potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation.

(9 h)

(9 h)

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course - 3 : General And Inorganic Chemistry	Programme & Semester I B.Sc. Chemistry (H) II Semester				
Teaching	Hours Allocated: 45 (Theory and Activities ) (3 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Basic knowledge about Atomic structure, periodic properties and chemical bonding.	3	-	-	3	

## **Course Objectives:**

- 1. Gain knowledge about on atomic structure and Periodic table.
- 2. Gain knowledge about different types of chemical bonds and their applications.
- 3. Knowledge on different theories of acids and bases and their applications

## Course outcomes: At the end of the course, the student will be able to

СОх	Course Outcome	Knowledge Level
C01	Apply principles of electronic configuration, periodicity, and general properties of atoms to predict chemical behaviour and trends in atomic properties.	КЗ
CO2	Use knowledge of properties of ionic compounds, and covalent character to explain solubility, thermal stability, and polarisation.	КЗ
CO3	Identify the structure of the given inorganic compound.	КЗ
CO4	Use chemical bonds for explaining their influence on material properties and classifying materials as conductors, semiconductors, or insulators.	КЗ
CO5	Assess reaction outcomes and chemical reactivity in diverse solvents and systems using theories of acids and bases.	КЗ

#### SYLLABUS:

#### Unit I: Atomic Structure and Periodic table

Electronic configuration: Bohr theory, duel nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, normalisation of wave function, radial and angular wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Auf Bau principle).

Periodicity: periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number, horizontal, vertical, and diagonal relationships in the periodic table. 1.3 General properties of atoms: size of atoms and ions-atomic radii, ionic radii, covalent radii; trend in ionic radii, ionisation potential, electron affinity; electronegativity - Pauling, Mulliken-Jaffe, Allred-Rochor definitions; oxidation states and variable valency; isoelectronic relationship; inert-pair effect;

## **UNIT 2: Ionic bond**

Properties of ionic compounds, factors favouring the formation of ionic compounds- ionisation potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation.

(9 h)

(9 h)

of ionic compound and stability. Stability of ionic compounds in terms of  $\Delta$ Hf and Uo. Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds-polarisation and Fajan's rules; effects of polarisation-solubility, melting points, and thermal stability of typical ionic compounds.

## **UNIT 3: The Covalent Bond**

Valance Bond theory-arrangement of electrons in molecules, hybridisation of atomic orbitals and geometry of molecules-BeCl<sub>2</sub>, BF<sub>3</sub>, CH<sub>4</sub>, PCl<sub>5</sub>, SF<sub>6</sub>– VSEPR model- effect of bonding and nonbonding electrons on the structure of molecules, effect of electronegativity, isoelectronic principle, illustration of structures by VESPR model-NH<sub>3</sub>, H<sub>2</sub>O, SF<sub>2</sub>, *ICl*– , XeF<sub>4</sub>, *ICl*–2, XeF<sub>6</sub>

Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear and hetero nuclear diatomic molecules (N<sub>2</sub>, O<sub>2</sub>, CO and NO)

## **UNIT 4: Metallic and Weak Bonds**

The Metallic bond: metallic properties, free electron theory, Valence Bond Theory, band theory of metals. Explanation of conductors, semiconductors and insulators.

Weak bonds: hydrogen bonding-intra- and intermolecular hydrogen bonding, influence on the physical properties of molecules, comparison of hydrogen bond strength and properties of hydrogen bonded N, O and F compounds; associated molecules-ethanol and acetic acid; Vander Waals forces, ion dipole-dipole interactions.

## **UNIT 5: Acids and Bases**

Theories of acids and bases: Arrhenius theory, Bronsted-Lowry theory, Lewis theory, the solvent system, Non aqueous solvents: classification-protonic and aprotic solvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia.

Types of chemical reactions: acid-base, oxidation-reduction, calculation of oxidation number. Definition of pH, pKa, pKb. Types of salts, Salt hydrolysis. Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard andSoft-Soft combinations.

# Additional inputs: Classification of ionic structures, Geometry of BF<sub>4</sub>- & IF<sub>7</sub>, Chemical Bonding in Complex Molecules, Band theory of alloys.

List of Reference Books:

1. J. D. Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.

2. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., 1996.

3. D. F. Shriver and P. W. Atkins, Inorganic Chemistry, 3rd ed., W. H. Freeman and Co, London,

CO-PO Mapping:		
(1: Slight [Low]; 2: N	Ioderate [Medium]; 3: Substan	tial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
C01	3	3	3						3	3
CO2	3	3	3						3	3
CO3	3	3	3						3	3
CO4	3	3	3						3	3
CO5	3	3	3					3	3	3

(9 h)

(9 h)

(9 h)

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course - 3 : Qualitative Analysis Of Simple Salt.	Programme & Semester I B.Sc. Chemistry (H) II Semester			
Teaching	Hours Allocated: 30 (Practical)	L	Т	Р	С
Pre-requisites	Basic knowledge about laboratory apparatus handling and analysis of inorganic anions and cations	-	-	2	1

Qualitative inorganic analysis (Minimum of Six simple salts should be analysed)

50 M

Course Objectives:

- 1. Identification of inorganic simple anions
- 2. Identification of inorganic simple cations
- 3. Usage of different lab equipment and reagents for simple salt analysis.
- 4. Chemical reactions involving in the identification of acidic and basic radicals.

## **Course Outcomes:**

On Completion of the course, the students will be able to			
CO1	Understand the basic concepts of qualitative analysis of inorganic salts	K2	
CO2	Use of glassware, equipment and chemicals involved in salt analysis	К3	
CO3	Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis	К3	
CO4	Acquire knowledge of micro scale salt analysis procedure.	K4	

Analysis of simple salt containing ONE anion and ONE cation from the following:

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate. Cations: Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Magnesium and Ammonium.

Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning.

2. Class Tests, Work sheets and Quizzes

3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality

4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER

Reference books:

1. Vogel's Quanlitative Inorganic Analysis, Seventh edition, Pearson.

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) Course -III: ANALYSIS OF SIMPLE SALT (Micro-scale method) Scheme of Valuation

Time: 3 hrs.

Max. Marks: 40

For Record - 7 Marks Marks For Viva-voce - 3 Marks Marks For Practical -30 Marks

Splitting of Practical Marks:

S.No.	Description	Marks
1	Colour	1
2	State	1
3	Odour	1
4	Solubility	1
5	Flame Test	2
6	Action of Heat	2
7	Preparation of SCE	2
8	Marks for each ion identification (2 ions)	4
9	Marks for each ion conformation (2 ions)	4
10	Report	4

## SRIASNM GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) B.Sc Honours Chemistry (Major) W.E.F 2023-24 for 2023-24 Admitted Batch **Question Paper Blue Print**

## Course - 3: General And Inorganic Chemistry

	Time: 3 Hrs.		Max. Marks: 6	0
S. No.	Course Content	Essay questions (with choice) (8M)	Short answer questions (with choice) (4M)	Total
1	Unit - 1	2	2	24
2	Unit - 2	2	2	24
3	Unit - 3	2	1	20
4	Unit - 4	2	2	24
5	Unit - 5	2	1	20
	TOTAL	10	8	112

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) FIRST YEAR B. Sc. DEGREE EXAMINATION, Semester - II (WEF 2023-24 Batch)

## COURSE -III (MAJOR AND MINOR) MODEL PAPER

## General and Inorganic Chemistry

#### Max. Marks: 60

5 X 4 = 20 M

#### SECTION – A

Answer any FIVE questions from the following. Each one carries 4 Marks.

1. Explain the following.

Time:3Hrs.

- i. Significance of wave function ii. Pauli's Exclusion Principle
- 2. Explain the following.
  - i. Inert pair effect ii. Diagonal relationship
- 3. List four properties of ionic compounds.
- 4. Explain Fajan's rules with examples.
- 5. Explain the structures of BeCl<sub>2</sub> and CH<sub>4</sub> on the basis of Valence Bond Theory.
- 6. Outline the important postulates of Molecular Orbital Theory.
- 7. Describe intermolecular and intramolecular Hydrogen bonding with examples.
- 8. Explain Arrhenius theory of acids and based with examples.

#### SECTION – B

Answer ALL the questions. Each one carries 8 Marks.

5 X 8 = 40M

9. State modern periodic Law. Discuss how the following properties vary in a period and in a group.

i. Ionic radii ii. Ionisation potential iii. Electron affinity

(Or)

- 10. Explain the following.
  - i. Heisenberg uncertainty principle ii. Aufbau principle iii. Hund's rule

11. Explain the factors favouring the formation of ionic compounds.

## (Or)

12. Explain Born - Haber cycle.

13. Determine the bond order and magnetic behaviour of  $O_2$  and CO by using Molecular Orbital Energy diagrams.

(Or)

14. Explain "VSEPR Theory" with examples.

15. Explain conductors, non - conductors and semi - conductors on the basis of band theory.

#### (Or)

16. Explain the properties of metals on the basis of free electron theory and its limitations.

17. Discuss principles of Hard and Soft Acids and Bases with examples, and state its importance.

#### (Or)

18. (a) Explain Lewis theory of acids and bases with examples.

(b) Write the classification of non – aqueous solvents with examples.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL         Course Code       TITLE OF THE COURSE Course – 4: Inorganic Chemistry					
Teaching	Hours Allocated: 45 (Theory and Activities ) (3 Hrs./wk)	L	Т	Р	C	
Pre-requisites	Basic knowledge about Inorganic and Nuclear Chemistry.	3	-	-	3	

## **Course Objectives:**

- 1. To learn the preparation and structure and Diborane and Borazole.
- 2. To provide knowledge about different types of Interhalogen compounds.
- 3. To provide basic knowledge on d-block elements and f-block elements.
- 4. To learn the synthetic applications of Grignard reagents.

#### Course outcomes: At the end of the course, the student will be able to:

COx	Course Outcome							
CO1	Prepare group 13, 14, and 15 compounds by using concepts of p-block elements.	K3						
CO2	Determine the structure of group 16, 17 compounds.	K3						
СОЗ	Express the characteristics of d-block elements like variable valence, colour, magnetic properties.	КЗ						
CO4	Distinguish lanthanides and actinides, lanthanide and actinide contraction.	K3						
CO5	Apply principles of radioactivity for medicine, industry, and energy production.	K3						

## **SYLLABUS TOPICS:**

## UNIT -I Chemistry of p-block elements -

Group 13: Preparation & structure of Diborane, Borazine and (BN)x Group14: Preparation, classification and uses of silicones and Silanes. Group 15: Preparation & structure of Phosphonitrilic Chloride  $P_3N_3Cl_6$ 

## Unit II Chemistry of p-block elements -

Group 16: Classification of Oxides, structures of oxides and Oxoacids of Sulphur Group 17: Preparation and Structures of Inter halogen compounds. Pseudo halogens.

## UNIT-III Chemistry of d-block elements:

Characteristics of d-block elements with special reference to electronic configuration, variable valence, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d series - Latimer diagrams.

## **UNIT-IV Chemistry of f-block elements:**

Chemistry of lanthanides - electronic configuration, oxidation states, lanthanide contraction, consequences of lanthanide contraction, colour, magnetic properties.

Separation of lanthanides by ion exchange method.

## 9 h

9 h

9 h

## 9 h

Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

## Unit - V Radioactivity

9 h

Definition, Isotopes, n/p ratio, binding energy, types of radioactivity, Soddy-Fajan's displacement law, Law of Radioactivity, Radioactive decay series, Nuclear Reactions- fission and fusion, Applications of radioactivity.

# Additional inputs: Carbon dating, Separation of lanthanides by solvent extraction, Applications of d-block elements in catalysis.

List of Reference books:

- 1. Basic Inorganic Chemistry by Cotton and Wilkinson
- 2. Advance Inorganic chemistry vol-I by Satya Prakash
- 3. Inorganic chemistry by Puri and Sharma
- 4. Concise Inorganic Chemistry by J D Lee
- 5. Nuclear Chemistry by Maheshwar Sharon, 2009

#### **CO-PO Mapping:**

## (1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	3	3						3	3
CO2	3	3	3						3	3
CO3	3	3	3						3	3
CO4	3	3	3	3					3	3
CO5	3	3	3		3				3	3

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course - 4 : Preparation Of Inorganic Compounds	Programme & Semester I B.Sc. Chemistry (H) II Semester				
Teaching	Hours Allocated: 30 (Practical)	L	Т	Р	С	
Pre-requisites	Basic knowledge about laboratory apparatus handling and analysis of inorganic anions and cations	-	-	2	1	

## **Course Objectives:**

- 1. To get knowledge on properties of inorganic elements
- 2. Understand the structures of inorganic compounds
- 3. Usage of different lab equipment and reagents for preparation of inorganic compounds
- 4. Chemical reactions involving in the preparation of inorganic compounds

## **Course Outcomes:**

On C	On Completion of the course, the students will be able to						
		Level					
CO1	Understand the basic concepts of inorganic preparations	K2					
CO2	Use glassware, equipment and chemicals and follow experimental procedures in the laboratory	К3					
CO3	Apply the properties of various elements for the preparation of inorganic compounds.	К3					
CO4	Acquire knowledge on the structures of inorganic compounds	K4					

## Syllabus:

Preparation of Inorganic compounds:

Crystallisation of compounds and determination of melting point.

- 1. Preparation of Cuprous chloride.
- 2. Preparation of Potash Alum.
- 3. Preparation of Chrome Alum.
- 4. Preparation of Ferrous oxalate
- 5. Preparation of Ferrous ammonium sulphate.

## **Co-curricular activities and Assessment Methods**

10. Continuous Evaluation: Monitoring the progress of student's learning

11. Class Tests, Worksheets and Quizzes

12. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality

13. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

Reference books:

1. Vogel's Quanlitative Inorganic Analysis, Seventh edition, Pearson.

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) Course -III: Preparation of Inorganic Compounds (Micro-scale method) Scheme of Valuation

Time: 3 hrs.

Max. Marks: 40

For Record - 7 Marks Marks For Viva-voce - 3 Marks Marks For Practical -30 Marks

Splitting of Practical Marks:

A) Preparation of the compound - 20 Marks

B) Separation by Crystallisation - 5 Marks

C) Determining Melting Point - 5 Marks

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) B.Sc Honours Chemistry (Major) W.E.F 2023-24 for 2023-24 Admitted Batch Question Paper Blue Print Course - 4: Inorganic Chemistry

Time: 3 Hrs.

Max. Marks: 60

S. No.	Course Content	Essay questions (with choice) (8M)	Short answer questions (with choice) (4M)	Total
1	Unit - 1	2	2	24
2	Unit - 2	2	2	24
3	Unit - 3	2	1	20
4	Unit - 4	2	2	24
5	Unit - 5	2	1	20
	TOTAL	10	8	112

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) FIRST YEAR B. Sc. DEGREE EXAMINATION, Semester - II (WEF 2023-24 Batch) COURSE -IV (MAJOR) MODEL PAPER

#### **Inorganic Chemistry**

Max. Marks: 60

5 X 4 = 20 M

#### SECTION – A

Answer any FIVE questions from the following. Each one carries 4 Marks.

- 1. Explain the structure of P<sub>3</sub>N<sub>3</sub>Cl<sub>6</sub>.
- 2. Explain the preparation and structure of Borazole.
- 3. Give the structures of oxyacids of sulphur.
- 4. Explain pseudo halogens.

Time:3Hrs.

- 5. Describe the abnormal electronic configurations of Cr and Cu.
- 6. Outline Latimer diagrams.
- 7. Differentiate Lanthanides and Actinides.
- 8. Explain n/p ratio and binding energy.

#### **SECTION – B**

Answer ALL the questions. Each one carries 8 Marks.  $5 \times 8 = 40M$ 

9. Classify silicones? Give the preparation and applications of Silicones.

#### (OR)

- 10. Write the preparation and structure of Diborane
- 11. Explain the classification of oxides based on oxygen content .

#### (OR)

12. Explain the preparation and structures of AX<sub>5</sub> and AX<sub>7</sub> type Inter halogen compounds.

- 13. Explain the following characteristic properties of d-block elements.
  - i. Ability to exhibit variable oxidation states ii. Ability to form complex compounds.

#### (OR)

- 14. Write short notes on the following properties of d- block elements
  - i. Catalytic properties ii. Magnetic properties.
- 15. What is Lanthanide contraction ? Explain.the consequences of Lanthanide contraction?

#### (OR)

16. Explain the separation of Lanthanides by ion exchange method.

#### 17. Discuss

i. Soddy-Fajan's displacement law ii. Law of Radioactivity

#### (OR)

18. Describe Nuclear fission and fusion reactions.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course -1: PRINCIPLES OF CHEMICAL SCIENCES	Programme & Semester I B.Sc. Chemistry (H) I Semester			nester (H)
Teaching	Hours Allocated: 30 (Theory and Activities ) (2 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about physical sciences	2	-	-	2

## **Course Objective:**

- The objective of this course is to provide students with a understanding of the concepts of chemical sciences.
- Course outcomes: At the end of the course, the student will be able to

COx	Course Outcome							
CO1	Understand the structure of atom.	K2						
CO2	Identify the isotopes and isobars.	К3						
CO3	Define acids and bases and predict the nature of salts.	K1						
CO4	Explain ionic and covalent bonding.	К2						
CO5	Describe the importance of Chemistry in daily life.	К2						

#### **SYLLABUS TOPICS:**

#### Unit I: Matter, Atoms, Molecules & Nuclear Chemistry

Classification of matter, Dalton atomic theory, Thomson Model, Rutherford Model, Bohr's model of atom, quantum numbers, electronic configuration, Aufbau Principle, Pauli's exclusion principle, Hund's rule. Isotopes-Isobars, Nuclear decay, Band of Stability, Nuclear Reaction types, Nuclear Applications.

#### Unit II: Elements, Classification and Chemical Bonding

Classification of elements, Periodic Classification of elements based on electronic configuration, classification into types, classification into metals, non-metals and metalloids, periodic propertiesatomic radii, ionisation enthalpy, electronegativity, Octet rule, ionic bond properties of Ionic compounds-covalent bond, properties of covalent molecule.

#### Unit III: Acids, Bases, Salts, Chemistry in Daily life

Definition, types and properties of Acids, Bases, Salts, strength of acids and bases, pH, Importance of Chemistry in daily life. (food, drugs, textiles, preservatives, soaps and detergents.)

## III. List of Reference Books:

- 1. Inorganic Chemistry by Puri and Sharma
- 2. Basic concepts of Inorganic Chemistry by D.N.Singh

## **IV.** Co-curricular activities:

Projects on Importance of Chemistry in food, drugs, textiles, preservatives, soaps and detergents.

## **CO-PO Mapping:**

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	1							1		
CO2	1	1						1		
CO3	3	3						1		
CO4	1	1						1		
CO5	1							1		

# SECOND YEAR SEMESTER - III

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper III - Organic Chemistry & Spectroscopy	Prog II B	ramme .Sc. Cl III Se	e & Sen hemistry emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (4 Hrs./wk)	L	Т	Р	С
Pre-requisites	Functional groups, IUPAC nomenclature, aromaticity, oxidation & reduction, rearrangements	3	1	-	3

## **Course Objectives:**

- 1. To study preparation, properties and reactions of halo alkanes, haloarenes and oxygen containing functional groups.
- 2. To learn about the functional group transformations.

## **Course outcomes:**

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

СОх	Course Outcome							
CO1	Describe the preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups.	К2						
CO2	Use the synthetic chemistry to do functional group transformations.	К3						
CO3	Compare reaction mechanism of carboxylic acid derivatives.	К3						
CO4	Summarise spectroscopic principles and selection rules.	К3						
CO5	Choose proper spectroscopic technique for the identification of simple organic molecules.	К3						

## **ORGANIC CHEMISTRY**

#### UNIT I

## **Chemistry of Halogenated Hydrocarbons**

Alkyl Halides: Methods of preparation and properties, nucleophilic substitution reactions– SN1, SN2 and SN1 mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination, Williamson's synthesis. Aryl Halides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

## **Alcohols & Phenols**

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvet Blanc Reduction; Oxidation Of Diols By Periodic Acid And lead Tetra acetate, Pinacol- Pinacolone Rearrangement;

Phenols: Preparation And Properties; Acidity And Factors Affecting It, Ring substitution reactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen Rearrangement with mechanism;

## UNIT-II

## **Carbonyl Compounds**

Structure, reactivity, preparation and properties; Nucleophilic Addition, Nucleophilic Additionelimination reactions with ammonia derivatives Mechanisms of Aldol and Benzoin Condensation,

## 6h

## 10h

6h

Villiger oxidation,  $\alpha$ - substitution reactions, oxidations and reductions (Clemmensen, Wolf – Kishner, with LiAlH<sub>4</sub>&NaBH<sub>4</sub>). Addition Reactions Of  $\alpha$ ,  $\beta$ - unsaturated carbonyl compounds: Michael Addition. Active Methylene Compounds: Keto-enol tautomerism. Preparation And Synthetic Applications Diethyl malonate and ethyl acetoacetate.

## UNIT III

## Carboxylic Acids and their Derivatives

General methods of preparation, physical properties and reactions of monocarboxylic acids, the effect of substituents acidic strength. Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids. Preparation And Reactions Of Acid Chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group-Mechanism of acidic and alkaline hydrolysis of esters, Claisen Condensation, Reformatsky reactions and Curtius Rearrangement 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-Decker reaction, decarboxylation by Schmidt reaction, Arndt- Eistert synthesis, halogenation by Hell- Volhard- Zelinsky Reaction.

Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann Haloform Reaction And Baeyer

## SPECTROSCOPY

UNIT IV

**Molecular Spectroscopy**: Interaction of electromagnetic radiation with molecules and various types of spectra;

**Rotation spectroscopy**: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

**Vibrational Spectroscopy**: Classical Equation of Vibration, computation of force constant, Harmonic and anharmonic oscillator, Morse Potential curve, vibrational degrees of freedom for polyatomic molecules, modes of vibration. Selection rules for vibrational transitions, Fundamental Frequencies, overtones and hot bands.

**Electronic spectroscopy**: 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. bathochromic and hypsochromic shifts. Beer-Lambert's law and its limitations.

**Nuclear Magnetic Resonance(NMR) spectroscopy**: 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.

#### UNIT V

#### 8h

## Application of Spectroscopy to Simple Organic Molecules

#### Application of visible, ultraviolet and Infrared spectroscopy in organic molecules.

Application of electronic spectroscopy and Woodward rules for calculating  $\lambda$ max of conjugated dienes and  $\alpha$ , $\beta$  – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

## Additional Inputs:

<u>Raman Spectra:</u> Introduction to Pure Rotational Raman spectra and Vibrational Raman spectra, Polarization of light and Raman effect.

## **Co-curricular activities and assessment methods**

1. Continuous Evaluation: Monitoring the progress of students' learning

## 12h

## 18h

2. Class Tests, Worksheets and Quizzes

3. Presentations, Projects and Assignments and Group Discussions: Enhances critical

thinking skills and personality

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods

adopted by teachers throughout the semester.

## **REFERENCE BOOKS:**

- 1. A Textbook of Organic Chemistry by Bahl and Arunbahl
- 2. A Textbook of Organic chemistry by I L FinarVol I
- 3. Organic chemistry by Bruice
- 4. Organic chemistry by Clayden
- 5. Spectroscopy by William Kemp
- 6. Spectroscopy by Pavia
- 7. Organic Spectroscopy by J. R. Dyer
- 8. Elementary organic spectroscopy by Y.R. Sharma
- 9. Spectroscopy by P.S.Kalsi

10. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)

11. Spectrometric Identification of Organic Compounds by Robert M Silverstein, Francis X Webster

12. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. & Tatchell, A.R. Practical Organic Chemistry,5th Ed. Pearson (2012)

13. Ahluwalia, V.K. & Agarwal, R. Comprehensive Practical OrganicChemistry: Preparation and Quantitative Analysis, University Press (2000)

## **CO-PO Mapping:**

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	2					3	3	3
CO2	3	2						3	3	3
CO3	2	1	3					3	3	3
CO4	3	2	3	3				3	3	3
CO5	3	2	2	3				3	3	3

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper III - Organic Preparations and IR Spectral Analysis	Programme & Semester II B.Sc. Chemistry (H) III Semester			
Teaching	Hours Allocated: 30 (Laboratory Activities ) (2 Hrs./wk)	L	Т	Р	С
Pre-requisites	Functional groups, rearrangements			2	1

## **Course outcomes:**

On the completion of the course, the student will be able to do the following:

- 1. How to use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 2. How to calculate limiting reagent, theoretical yield, and percent yield
- 3. How to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately
- 4. How to dispose of chemicals in a safe and responsible manner
- 5. How to perform common laboratory techniques including reflux, distillation, crystallisation, and vacuum filtration.
- 6. How to create and carry out work up and separation procedures
- 7. How to critically evaluate data collected to determine the identity, purity, and percent yield
- of products and to summarise findings in writing in a clear and concise manner

## **Organic Preparations:**

1. Acetylation of one of the following compounds:

amines (aniline, o-, m-, p- toluidine and o-, m-, p-anisidine) and phenols ( $\beta$ - naphthol, vanillin, salicylic acid) by any one method:

- (a) Using conventional method.
- (b) Using the green approach
- 2. Benzoylation of one of the following amines

(aniline, o-, m-, p- toluidine and o-, m-, p-anisidine)

3. Nitration of any one of the following: Acetanilide/nitrobenzene by conventional method Salicylic acid by green approach (using Ceric ammonium nitrate).

## IRSpectralAnalysis

IR Spectral Analysis of the following functional groups with examples

Hydroxyl groups

Carbonyl groups

Amino groups

Aromatic groups

40M

10M

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) II B.Sc, Semester - III (WEF 2020-21 Batch) MODEL PAPER THREE YEAR B. Sc. DEGREE EXAMINATION SECOND YEAR EXAMINATIONS SEMESTER III

#### Paper –III: Organic Chemistry & Spectroscopy

#### Time:3Hrs.

#### Section – A

Answer ALL the questions. Each carriesTEN marks

5 X 8 = 40 M

Max. Marks: 60

 (a). Give the mechanism & stereochemistry of SN<sup>1</sup>& SN<sup>2</sup> reactions of alkyl halides with a suitable example.

#### (OR)

- (b). Explain the following reactions with the mechanism.
- (i) Reimer-Tiemann reaction (ii) Fries rearrangement.
- 2. (a). Discuss the mechanism for following reactions.(i) Perkin reaction. (ii) Cannizzaro Reaction

#### (OR)

- (b). Write the preparation and any three synthetic applications of diethyl malonate.
- 3. (a). Explain the acid and base hydrolysis reaction of esters with the mechanism.

## (OR)

- (b). Explain the mechanisms of Curtius rearrangement & Arndt Eistert reaction.
- 4. (a). (i) Write a note on vibrational degrees of freedom for polyatomic molecules.(ii) Explain different modes of vibrations & selection rules in IR spectroscopy.

#### (OR)

- (b).(i) Define Bathochromic shift. Explain the effect of conjugation in U.V. spectroscopy.(ii) Discuss the principle of NMR spectroscopy.
- 5. (a). Write Woodward-Fieser rules for calculating  $\lambda$ max for conjugated dienes and  $\alpha$ , $\beta$  Unsaturated carbonyl compounds, and apply them for one example each.

#### (OR)

(b). (i) What is the Fingerprint region? Explain its significance with an example.(ii) Write IR spectral data for any one alcohol, aldehyde and ketone

#### Section – B

Answer any FIVE of the following questions. Each carries five marks. 5x4 = 20M

6. Discuss two methods for the preparation of aryl halides.

- 7. Explain the mechanism for Pinacol-Pinacolone rearrangement
- 8. Discuss the mechanism for the Baeyer-villiger oxidation reaction.
- 9. Explain the effect of substituents on the acidic strength of mono-carboxylic acids.

- 10. Write the mechanism for Claisen Condensation Reaction.
- 11. Write the selection rules in rotational spectroscopy.
- 12. Explain Spin Spin coupling and CouplingConstant.
- 13. Explain types of electronic transitions in UV spectroscopy.

# SECOND YEAR SEMESTER - IV

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper IV - Inorganic, Organic Chemistry and Physical Chemistry	Programme & Semester II B.Sc. Chemistry (H) IV Semester			
Teaching	Hours Allocated: 60 (Theory and Activities ) (4 Hrs./wk)	L	Т	Р	С
Pre-requisites	Chemical bonding, Valence bond theory, isomerism, heater atomic organic compounds.	3	1	-	3

## **Course objectives:**

1. To learn about the laws of absorption of light energy by molecules and the subsequent photochemical reactions.

2. To understand the concept of quantum efficiency and mechanisms of photochemical reactions.

## **Course outcomes:**

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

COx	Course Outcome	
CO1	Explain the preparation, P-acceptor behaviour and synergic effects of metal carbonyls.	К2
CO2	Demonstrate the interconversion of aldoses and ketoses.	К3
CO3	Describe the classification, preparation and properties of amino acids and heterocyclic compounds.	К2
CO4	Discuss the preparation and chemical reaction mechanisms of compounds of nitrogen.	К2
CO5	Relate quantum efficiency and mechanisms of photochemical reactions, thermodynamics and spontaneous and non spontaneous processes.	К3

## UNIT I:

**Organometallic Compounds:** Definition and classification of organometallic compounds on the basis of bond type, Concept of hapticity of organic ligands. Metal Carbonyls:18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation of mono and binuclear carbonyls of 3d series. P-acceptor behaviour of carbon monoxide. Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies).

#### **UNIT II:**

## Carbohydrates:

Occurrence, classification and their biological importance, Monosaccharides: Constitution and absolute configuration glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth Projection And Conformational Structures; Interconversions of aldoses and ketoses; Kiliani-Fischer synthesis and Ruff degradation; Disaccharides– Elementary Treatment of Maltose, lactose and sucrose. Polysaccharides–Elementary Treatment Of starch.

## **UNITIII:**

Amino acids and proteins:

## 8h

## 8h

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) Gabriel Phthalimide synthesis c) Strecker 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.

#### **Heterocyclic Compounds**

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 positions, 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:**

Nitrogen-Containing Functional Groups: Preparation, properties and important reactions of nitro compounds, amines and diazonium salts.

#### Nitro hydrocarbons

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.

## Amines:

Introduction, classification, chirality in amines (pyramidal inversion), importance and general methods of preparation.

Properties: Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. The distinction between Primary, secondary and tertiary amines using Hinsberg's Method and Nitrous Acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann- Bromamide Reaction, Carbylamine Reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction and Cope elimination.

**Diazonium Salts**: Preparation and synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, amino and nitro compounds. Coupling Reactions of Diazonium Salts (preparation of azodyes).

#### **UNIT V:**

#### Photochemistry

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 and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).

#### Thermodynamics

The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat

12h

## 3h

11h

7h

## 5h
capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work 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. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non-spontaneous processes, Helmholtz and Gibbs energies-Criteria for spontaneity.

### Additional Inputs:

Derivatives of Furan: Furfural preparations and properties.

#### Co-curricular activities and assessment methods

- 1. Continuous Evaluation: Monitoring the progress of students' learning
- 2. Class Tests, Worksheets and Quizzes
- 3. Presentations, Projects and Assignments and Group Discussions: Enhances critical

thinking skills and personality

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods

adopted by teachers throughout the semester.

## **REFERENCE BOOKS:**

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

#### **CO-PO Mapping:**

## (1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	3	2					3	3	3
CO2	3	2		3			2	3	3	3
CO3	2	2	3	3				3	3	3
CO4		3	3					3	3	3
CO5	3	2	2	3		2		3	3	3

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper IV -Organic Qualitative Analysis		Programme & Semester II B.Sc. Chemistry (H) IV Semester					
Teaching	Hours Allocated: 30 (Laboratory Activities ) (2 Hrs./wk)	L	Т	Р	С			
Pre-requisites	Functional groups, analysis, handling of instruments and organic reactions			2	1			

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

- 1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 2. Determine melting and boiling points of organic compounds
- 3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

#### **Organic Qualitative analysis**

## 50 M

Analysis of an organic compound through the 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.

## SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) MODEL PAPER THREE YEAR B.Sc DEGREE EXAMINATION SECOND YEAR EXAMINATIONS SEMESTER IV

Paper – IV: Inorganic, Organic & Physical Chemistry

#### Time:3Hrs.

## Max. Marks: 75

#### Section – A

Answer ALL the questions. Each carries TEN marks.  $5 \times 10 = 50 \text{ M}$ 1.(a).What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples.

#### (OR)

(b). Discuss the general methods of preparations of mono & bi-nuclear carbonyls of 3d series.

2. (a). Discuss the constitution, configuration and ring size of glucose. Draw the Haworth and Conformational structure of glucose.

#### (OR)

(b). (i) Explain Ruff's degradation. (ii) Explain Kiliani- Fischer synthesis.

3. (a). What are amino acids? Write any three general methods of preparation of amino acids.

#### (OR)

(b). Discuss the aromatic character of Furan, Thiophene and pyrrole.

4. (a). Write the mechanism for the following.

(i) Nef reaction (ii) Mannich reaction

#### (OR)

(b) (i) Explain Hinsberg's separation of amines.

(ii) Discuss any three synthetic applications of diazonium salts.

5. (a). What is a quantum yield? Explain the photochemical combination of Hydrogen- Chlorine and Hydrogen - Bromine.

#### (**OR**)

(b). Define entropy. Describe entropy changes in the reversible and irreversible process.

#### Section - B

#### Answer any FIVE of the following questions. Each carries FIVEmarks. 5x5 = 25M

6. Describe the 18 electron rule of mononuclear and polynuclear metal carbonyls with suitable examples.

7. What are epimers and anomers? Give examples.

8. Discuss isoelectric point and Zwitter ion.

9. Discuss the Paul-Knorr synthesis of five-membered heterocyclic compounds.

10. Explain the Tautomerism shown by nitroalkanes

11. Discuss the basic nature of amines.

12. Write the differences between thermal and photochemical reactions.

13. Derive heat capacities and derive Cp - Cv = R

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper V - Inorganic, Organic and Physical Chemistry	Prog II B	ramme .Sc. Cl IV Se	e & Sem nemistry emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (4 Hrs./wk)	L	Т	Р	С
Pre-requisites	Chemical bonding, electrolytes, oxidation and reduction, chemical equilibrium.	3	1	-	3

### **Course objectives:**

1. Understanding and application of theories of complex compounds, Isomerism and reaction mechanisms of complex compounds, metal ions in biological systems.

2. Understanding and application of phase rule, electrochemistry and chemical kinetics

#### **Course outcomes:**

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

COx	Course Outcome	Knowledge Level
CO1	Establish relation between crystal field effects and CFSE of octahedral and tetrahedral complexes.	К3
CO2	Determine the composition and stability of complexes.	К3
CO3	Identify congruent and incongruent melting points and freezing mixtures.	К2
CO4	Choose electrodes for EMF measurement and cells.	К3
CO5	Calculate the order and half life of the reaction.	K3

#### Syllabus: INORGANIC CHEMISTRY UNIT - I

#### **Coordination Chemistry**

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectrochemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion, square planar coordination.

## UNIT-II

## 1. Inorganic Reaction Mechanism:

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions - SN1 and SN2, Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications

## 2. Stability of metal complexes:

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. 3.

26 h

12 h

#### 4h

2 h

Bioinorganic Chemistry: 8 h Metal ions present in biological systems, classification of elements according to their action in biological system. Geo chemical effect on the distribution of metals, Sodium/Kpump, carbonicanhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cis platinasananti-cancer drug. Iron and its application in bio-systems, Haemoglobin, Myoglobin. Storage and transfer of iron.

PHYSICAL CHEMISTRY

## UNIT-III

Phase rule

Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point, freezing mixtures.

## UNIT-IV

## Electrochemistry

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye- Huckel-Onsagar's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conductometric titrations. Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal-metal ion, Gas electrode, Inert electrode, Redox electrode, Metalmetal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements - Potentiometric titrations. Fuel cells- Basic concepts, examples and applications

## UNIT-V

## **Chemical Kinetics**

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).Enzyme catalysis- Specificity, factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaels- Menten equation- derivation, significance of Michaelis-Menten constant.

List of Reference Books

- 1. Text book of physical chemistry by S Glasstone
- 2. Concise Inorganic Chemistry by J.D. Lee
- 3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
- 4. Advanced physical chemistry by Gurudeep Raj
- 5. Principles of physical chemistry by Prutton and Marron
- 6. Advanced physical chemistry by Bahl and Tuli
- 7. Inorganic Chemistry by J.E. Huheey
- 8. Basic Inorganic Chemistry by Cotton and Wilkinson

34 h

6 h

14 h

14 h

- 9. A textbook of qualitative inorganic analysis by A.I. Vogel
- 10. Atkins, P.W. & Paula, J. deAtkin's Physical Chemistry Ed., Oxford University Press 10th Ed (2014).
- 11. Castellan, G.W. Physical Chemistry 4th Ed. Narosa (2004).
- 12. Mortimer, R.G. Physical Chemistry 3rdEd. Elsevier: NOIDA, UP (2009).
- 13. Barrow, G.M. Physical Chemistry

## Additional Inputs:

Geo chemical effect of the distribution of metals Sodium/K-pump, carbonic anhydrase and carboxypeptidase.

## Co-curricular activities and assessment methods

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

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods adopted by teachers throughout the semester.

## **CO-PO Mapping:**

## (1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	3	2			2		3	3	3
CO2	3	3	3		2		2	3	3	3
CO3	2	2	3	3				3	3	3
CO4	2	3	3					3	3	3
C05	3	2	2	3				3	3	3

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper V - Conductometric and Potentiometric Titrimetry Lab	Programme & Semester II B.Sc. Chemistry (H) IV Semester				
Teaching	Hours Allocated: 30 (Laboratory Activities ) (2 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Electrolytes, conductance, resistance			2	1	

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

- 1. Use glassware, equipment and chemicals and follow experimental procedures in the Laboratory
- 2. Apply concepts of electrochemistry in experiments
- 3. Be familiar with electro analytical methods and techniques in analytical chemistry which Studyan analyte by measuring the potential (volts) and/or current (amperes) in Electrochemical Cell containing the analyte

## Conductometric andPotentiometricTitrimetry50 M

1. Conductometric titration- Determination of concentration of HCl solution using

standard NaOH solution.

2. Conductometric titration- Determination of concentration of CH<sub>3</sub>COOH Solution

using standard NaOH solution.

3. Conductometric titration- Determination of concentration of CH<sub>3</sub>COOH and HCl

in a mixture using standard NaOH solution.

- 4. Potentiometric titration- Determination of Fe (II) using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
- 5. Determination of rate constant for acid-catalyzed ester hydrolysis.

## SRI A S N M GOVERNMENT COLLEGE (A), PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) MODEL PAPER THREE YEAR B.Sc, DEGREE EXAMINATION SECOND YEAR EXAMINATIONS SEMESTER IV Paper –V: Inorganic & Physical Chemistry

Time:3Hrs.

Max. Marks:75

5 X 10 = 50 M

#### Section - A

Answer ALL the questions. Each carriesTEN marks

1. (a). Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT. **(OR)** 

(b). Define CFSE. Explain the factors affecting the magnitude of crystal field splitting energy.

2. (a). Explain the Trans effect. Explain the theories of trans effect and write any two applications of trans effect.

#### (OR)

(b). (i) Write the biological functions of Hemoglobin and Myoglobin.

(ii) Write a note on the use of chelating agents in medicines.

3. (a). Define the Phase rule and terms involved in it. Explain the phase diagram of the Pb-Ag system.

#### (OR)

(b).(i) Explain the phase diagram for the NaCl-water system.

(ii) Explain briefly about Freezing mixtures.

4. (a). Define the Transport number. Write an experimental method for the

determination of

transport numbers by the Hittorf method.

#### (OR)

(b). (i) Define single electrode potential.

(ii) Explain four types of electrodes with examples.

5. (a). Explain general methods for the determination of the order of a reaction.

#### (OR)

(b).Explain Collision theory and Activated complex theory of bimolecular reactions.

#### Section – B

Answer any **FIVE** of the following questions. Each carries **FIVE** marks. **5x5 = 25M** 

6. Write note on Jahn-Teller Distortion

7. Explain Labile & inert complexes.

8. Explain Job's method for determination of composition complex.

9. Explain the Thermodynamic derivation of Gibb's phase rule.

10. Explain any two conductometric titrations.

- 11. Write notes on Fuel Cells with examples and applications.
- 12. What is enzyme catalysis? Write any three factors affecting enzyme catalysis.
- 13. Derive Michaelis- Menten equation.

# THIRD YEAR SEMESTER - V

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper 6A - Synthetic Organic Chemistry	Programme & Semester III B.Sc. Chemistry (H) V Semester				
Teaching	Hours Allocated: 90 (Theory Activities ) (3 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Chemical bonding, electrolytes, oxidation and reduction, chemical equilibrium.	3	-	-	3	

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

COx	Course Outcome	Knowledge Level
CO1	Identify the importance of reagents used in the synthesis of organic compounds.	К3
CO2	Acquire knowledge of basic concepts in different types of pericyclic reactions.	К3
CO3	Understand the importance of retrosynthesis in organic chemistry.	K2
CO4	Comprehend the applications of different reactions in synthetic organic chemistry.	К3

#### **Syllabus**

#### **Unit-1: Pericyclic reactions**

A brief introduction to synthetic organic chemistry

Features and classification of pericyclic reactions: Phases, nodes and symmetry properties of molecular orbital's in ethylene, 1, 3-butadiene, 1, 3, 5-hexatriene, alkylation and ally radical. Thermal and photochemical reactions.

Electro cyclic reactions: Definition and examples, definitions of con and dis rotation, Woodward-Hoffmann selection rules.(Correlation diagrams are not required)

Cycloaddition reactions: Definition and examples, definitions of supra facial and a tar facial addition, Woodward- Hoffmann selection rules. (Correlation diagrams are not required)

#### **Unit-2: Organic photochemistry**

Jablonski diagram-singlet and triplet states 1.

Photochemistry of Carbonyl compounds -  $n - \pi$  and  $\pi - \pi^*$  transitions, Norrish Type-1 and type-2 2. reactions

Paterno – Buchi reaction. 3.

#### **Unit-3: Retro synthesis**

Important terms in Retro synthesis with examples-Disconnection, Target molecule, FGI, Synthon, 1. Retro synthetic analysis, chemo selectivity, region selectivity

2. Importance of Order of events in organic synthesis

Retrosynthetic analysis of the compounds: a. cyclohexene, b.4-Nitro toluene, 3.

c. Paracetamol.

#### **Unit-4: Synthetic Reactions**

8 hours

12 hours

8 hours

Shapiro reaction, Stork - enamine reaction (only alkylation), Wittig reaction, Robinson annulation, Bailys-Hillman reaction, Heck reaction, Suzuki coupling. Synthesis of aldehydes and ketones using 1, 3-Dithiane.

### Unit-5: Reagents in Organic Chemistry

Oxidizing agents: PCC, PDC, SeO<sub>2</sub> (Riley oxidation), NBS.

Reducing agents: LiAlH<sub>4</sub> (with mechanism), LTBA, Metal-solvent reduction (Birch reduction), Catalytic reduction.

III. References

1. Pericyclic reactions by Ian Fleming, Second edition, Oxford University Press.

2. Peri cyclic Reactions-A Textbook: Reactions, Applications and Theory by S.Sankararaman, WILEY-VCH.

3. Reaction Mechanism Organic Chemistry by S.M. Mukherji and S.P.Singh, Revised edition, Trinity Press.

4. Pericyclic reactions-AMechanistic study by S.M.Mukherji, Macmillan in India.

5. Organic synthesis: The disconnection approach by Stuart Warren, John Wiley & Sons.

6. Organic chemistry by Jonathan Clayden, Nick Greeves and Stuart Warren, Second edition, Oxford university press.

7. Reactions, Reagents and Rearrangements by S.N. Sanyal, Bharati Bhawan Publishers & Distributors.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL         Course Code       TITLE OF THE COURSE Paper 6A - Synthetic Organic Chemistry		Programme & Semester II B.Sc. Chemistry (H) IV Semester				
Teaching	Hours Allocated: 30 (Laboratory Activities ) (2 Hrs./wk)	L	Т	Р	C		
Pre-requisites	Functional groups, chromatography basics			3	2		

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

COx	Course Outcome	Knowledge Level
CO1	Perform the organic qualitative analysis for the detection of N, S and halogens using the green procedure.	К3
CO2	Learn the procedure for the separation of mixture famine acids using paper Chromatography.	K3
CO3	Prepare the TLC plates for TLC chromatography.	K2
CO4	Acquire skills in conducting column chromatography for the separation of dyes in the given mixture.	К3

#### Practical (Laboratory) Syllabus :(30hrs)

(Max.50 Marks)

- 1. Green procedure for organic qualitative analysis: Detection of N, S and halogens
- 2. Separation of a given mixture of amino acids (glycine and phenylalanine) using ascending paper chromatography.
- 3. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
- 4. Separation of a mixture of methyl range and methyl enable by column chromatography
- 5. Separation of food dyes using Column Chromatography
- 6. Separation of triglycerides using TLC
- VI. Lab References:
- 1. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
- 2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
- 3. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
- 4. Mann F. G and Saunders B.C, Practical Organic Chemistry, Pearson Education.

## VII. Co-Curricular Activities

a) Mandatory:(Lab/field training of students by teacher:(lab: 10+field:05):

1. For Teacher: Training of students by the teacher in laboratory and field for not less than15 hours on the field techniques/skills of detection of N, Sand halogens using the green procedure, preparation of TLC plates, detection of organic compounds using Rf values in TLC/ paper chromatography, loading of the column, selection of a solvent system for column chromatography, separation of amino acids and dye mixture using chroma to graphic techniques.

**2.** For Students: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the synthetic reactions. Write their observations and

submit a handwritten fieldwork/project work report notexceeding10 pages in the given format to the teacher.

3. Max marks for Fieldwork/project work Report: 05.

**4.** Suggested Format for Fieldwork/project work: Title page, student details, index page, details of the place visited, observations, findings, and acknowledgements.

**4.** Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.

2. Assignments, Seminars and quizzes (on related topics), collection of relevant videos and material.

3. Visits of abilities, firms, research organizations etc.

Invited lectures and presentations on related topics by field/industrial

## SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL, W.G. Dt. (Affiliated to AdikaviNannaya University, Rajahmundry) (Reaccredited with NAAC "B" Grade with 2.61 CGPA points) MODEL PAPER THREE YEAR B.Sc.DEGREE EXAMINATIONS III B.Sc. SEMESTER V PAPER 6A: Synthetic Organic Chemistry

Time:3Hrs.

Max. Marks:75

## <u>SECTION – A</u> (5x10=50 Marks)

Answer all questions (Internal choice)

1	
2	
3	
4	
5	

#### **SECTION - B** (5x5=25Marks)

Answer any five questions. Each answer carries 5 marks

1	
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7	
8	

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL           Course Code         TITLE OF THE COURSE Paper 7A Analysis of Organic Compounds			Programme & Semester II B.Sc. Chemistry (H) IV Semester				
Teaching	Hours Allocated: 90 (Theory Activities ) (3 Hrs./wk)	L	Т	Р	С			
Pre-requisites	Basics of spectroscopy, solubility, polar non polar solvents			3	2			

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

COx	Course Outcome	Knowledge Level
CO1	Identify the importance of mass spectrometry in the structural elucidation of organic compounds.	К2
CO2	Acquire the knowledge eon structural elucidation of organic compounds.	К3
CO3	Explain various chromatography methods in the separation and identification of organic compounds.	К2
CO4	Demonstrate the knowledge gained in solvent extraction for separating the organic compounds.	К3

 Syllabus :( Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

 Unit-1: Mass Spectrometry

 10 hours

A brief introduction to the analysis of organic compounds

Basic principles, Instrumentation - Mass spectrometer, electron Ionization (Electron Impact ionization, EI), Molecular ions, metastable ions, Isotope abundance. Basic fragmentation types. Fragmentation patterns in Toluene, 2-Butanol, But aldehyde, Propionic acid.

## Unit-2: Structural elucidation of organic compounds using IR, NMR, Mass spectral data

2, 2, 3, 3-Tetra methyl butane, Butane-2, 3-dione, Propionic acid and methyl propionate.

## Unit-3: Structural elucidation of organic compounds using IR, NMR, and Mass spectral data 8 hours

Phenyl acetylene, aceto phenone, amici acid and p-nitroaniline.

## Unit-4: Separation techniques-1

1. Solvent extraction-Principle and theory, Batch extraction technique, application of batch extraction in the separation of organic compounds from the mixture- acid & neutral, base or neutral.

2. Chromatography- Principle and theory, classification, types of adsorbents, eluents, Rf values and factors affecting Rf values.

3. Thin layer chromatography principle, experimental procedure, advantages and applications.

8 hours

#### **Unit-5: Separation techniques-2**

1. Paper chromatography- Principle, experimental procedure, ascending, descending, radial and twodimensional, applications.

- 2. Column chromatography-Principle, classification, experimental procedure, applications.
- 3. HPLC-Principle, Instrumentation-block diagram and applications.

## III. References

- 1. Organic Spectroscopy by William Kemp, Third Edition, Palgrave USA.
- 2. Introduction to Spectroscopy by Pavia, Lamp man, Kriza and Vyvyan, Fifth edition, Cengage.
- 3. Organic Spectroscopy: Principles and Applications by Jag Mohan, Second edition, Alpha Science.
- 4. Spector's copy of Organic Compounds by P.S.Kalsi, Seventh edition, New Age International.
- 5. Spectroscopic Methods in Organic Chemistry by Ian Fleming and Dudley Williams, Seventh edition, Springer.

6. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.

7. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug, Seventh edition, Wiley.

8. Quantitative analysis by R.A.Day Jr. and A.L.Underwood, Sixth edition, Pearson.

9. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

### Course7-A: Analysis of Organic Compounds -PRACTICAL SYLLABUS

IV. Learning Outcomes:

On successful completion of this practical course, students shall be able to:

- 1. Prepare acetanilide using the green synthesis.
- 2. Demonstrate the preparation of an azo dye.
- 3. Acquire skills in the separation of organic compounds in the given mixture using solvent extraction

(**30hrs**) (Max.50 Marks)

- V. Practical (Laboratory) Syllabus:
- 1. Identification of various equipment in the laboratory.
- 2. Acetylating of 1<sup>o</sup> amine by the green method: Preparation of acetanilide
- 3. Rearrangement reaction in green conditions: Benzil Benzilic acid rearrangement
- 4. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
- 5. Green oxidation reaction: Synthesis of adipic acid
- 6. Preparation and characterization of biodiesel from vegetable oil/ waste cooking oil
- 7. Photoreduction of Benzophenone to Benzopinacol in the presence of sunlight.

8. Separation of organic compounds in a mixture (acidic compound + neutral compound) using solvent extraction.

9. Separation of organic compounds in a mixture (basic compound +neutral compound) using solvent extraction.

VI. Lab References:

- 1. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
- 2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
- 3. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
- 4. Mann F.G and Saunders B.C, Practical Organic Chemistry, Pearson Education.

## SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL, W.G. Dt. (Affiliated to AdikaviNannaya University, Rajahmundry) (Reaccredited with NAAC "B" Grade with 2.61 CGPA points) MODEL PAPER THREE YEAR B.Sc.DEGREE EXAMINATIONS III B.Sc. SEMESTER V Paper - V 7A Analysis of Organic Compounds Max. Marks:75

Time:3Hrs.

## <u>SECTION – A</u> (5x10=50 Marks)

Answer all questions (Internal choice)

1	
2	
3	
4	
5	

#### <u>SECTION - B</u> (5x5=25Marks) Answer any five questions. Each answer carries 5 marks

1	
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Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper 6-B: Analytical Methods in Chemistry-1	Programme & Semester II B.Sc. Chemistry (H) IV Semester					
Teaching	Hours Allocated: 90 (Theory Activities ) (3 Hrs./wk)	L	Т	Р	С		
Pre-requisites	Solutions, concentration terms, basic mathematics, apparatus handling.	3			3		

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

СОх	Course Outcome	Knowledge Level
CO1	Apply principles of analytical chemistry.	К3
CO2	Describe principles of gravimetric analysis.	K2
CO3	Illustrate accuracy, precision, error analysis, and minimisation of errors.	К3
CO4	Discuss principles of solvent extraction and its applications.	К3
CO5	Analyse water samples.	K4

### Syllabus:

(Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.) **Unit-1: Quantitative analysis-1** 

1. A brief introduction to analytical methods in chemistry

Principles of volumetric analysis, concentration terms- Molarity, Molality, Normality, v/v, w/v, ppm and ppb, preparing solutions- Standard solution, primary standards and secondary standards.
 Description and use of common laboratory apparatus- volumetric flask, burette, pipette, beakers, measuring cylinders.

## Unit-2: Quantitative analysis-2

1. Principles of volumetric analysis: Theories of acid-base (including the study of acid-base titration curves), redox, complex metric, iodometric and precipitation titrations-choice of indicators for the saturations.

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

#### Unit-3: Treatment of analytical data

Types of errors- Relative and absolute, significant figures and their importance, accuracy - methods of expressing accuracy, errors- Determinate and indeterminate and minimization of errors, precision methods of expressing precision, standard deviation and confidence interval.

## **Unit-4: separation techniques**

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

2. Ion Exchange method: Introduction, the action of ion exchange resins, applications. UNIT-5: Analysis of water 10 hours

#### 12 hours

8 hours

8 hours

Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, COD, and determination of chloride using Mohr's method.

<u>Additional inputs</u>: Differentiate between gravimetric and volumetric analysis, Determination of temporary and permanent hardness, regeneration of ion exchange resins, sampling methods. III. References

1. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.

2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin.Schug, Seventh edition, Wiley.

3. Quantitative analysis by R.A.DayJr. And A.L.Underwood, Sixth edition, Pearson.

4. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

5. Textbook of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & CoLtd.

#### CO-PO Mapping: (1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	3	3					3	3	3
CO2	3	3	3		3		2	3	3	3
CO3	3	2	3	3			2	3	3	3
CO4	3	3	3			2		3	3	3
CO5	3	2	2	3				3	3	3

### Course 6-B: Analytical Methods in Chemistry-1 PRACTICAL SYLLABUS

IV. Learning Outcomes:

On successful completion of this practical course, students shall be able to:

- 1. Estimate Iron(II) using standard Potassium dichromate solution
- 2. Learn the procedure for the estimation of the total hardness of water
- 3. Demonstrate the determination of chloride using Mohr's method
- 4. Acquire skills in the operation and calibration of pH meter
- 5. Perform the strong acid vs strong base titration using pH meter

## V. Practical (Laboratory) Syllabus: (30hrs) (Max.50 Marks)

- 1. Estimation of Iron(II) using standard Potassium dichromate solution (using DPA indicator)
- 2. Estimation of total hardness of water using EDTA
- 3. Determination of chloride ion by Mohr's method

4. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.

5. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride- ammonium hydroxide.

6. pH metric titration of (i) strong acid vs. strong base, and (ii) weak acid vs. strong base.

7. Determination of dissociation constant of a weak acid.

- VI. Lab References:
- 1. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

## 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 EXAMINATIONS III B.Sc.-SEMESTER-V**

PAPER VI-B: ANALYTICAL METHODS IN CHEMISTRY-1

#### Time: 3 Hrs.

#### PART-A

Max. Marks: 75 M

Answer all questions. Each question carries TEN marks. 5 x 10=50 Marks

1. A) Define primary and secondary standard solutions. Explain in detail the preparation of a standard solution with an example.

#### (OR)

B) Describe common laboratory apparatus and how to use them with neat diagrams.

2. A) Explain acid base titrations and the choice of indicators for acid - base titrations with the help of titrations curves.

#### (OR)

B) Discuss principles and processes involved in Gravimetric Analysis.

3. A) Explain absolute error and relative error with examples.

## (OR)

B) Write a note on accuracy and precision.

4. A) Describe Batch extraction, continuous and counter current extraction.

#### (OR)

B) Discuss the determination of Iron(III) by solvent extraction.

5. A) Write a note on Alkalinity, Turbidity, and Dissolved Oxygen.

#### (OR)

B) Explain how hardness of water can be determined by complexometry.

#### **PART-B**

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

6. Briefly explain Molarity and Normality.

7. Outline redox titrations.

8. Write a short note on coagulation and peptisation.

9. Explain the significance of significant figures.

10. Explain the steps involved in calculating standard deviation.

11. Outline the regeneration of ion exchange resin.

12. List the factors affecting solvent extraction.

13. Explain briefly the determination of chloride ions present in water.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Paper 7- <i>B</i> : Analytical Methods in Chemistry-2	Programme & Semester II B.Sc. Chemistry (H) IV Semester				
Teaching	Hours Allocated: 90 (Theory Activities ) (3 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Solutions, concentration terms, basic mathematics, Solubility, polar and non polar solvents.	3			3	

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

COx	Course Outcome	Knowledge Level
CO1	Describe principles of chromatography.	К2
CO2	Apply Thin Layer and Paper chromatography for the identification of purity of samples.	К3
CO3	Illustrate Column chromatography and HPLC	К3
CO4	Use Beer - Lambert's law for determination of $Fe^{+2}$ , $Mn^{+2}and Pb^{+2}$	К3
CO5	Discuss atomic spectroscopy	K2

 II. Syllabus :( Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

 Unit-1: Chromatography-Introduction and classification

 10 hours

 Principle,

 Classification of chromatographic methods, Nature of adsorbents, eluents, Rf values, factors affecting

 Rf values.

UNIT-2: TLC and paper chromatography12 hours1. Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbentsand solvents, development of chromatogram, detection of spots, applications and advantages.2. Paper Chromatography: Principle, Experimental procedure, choice of paper and solvents, variousmodes of development- ascending, descending, radial and two dimensional, applications.UNIT-3: Column chromatography12 hours1. Column chromatography: Principle, classification, Experimental procedure, stationary and mobilephases, development of the Chromatogram, applications.

2. HPLC: Basic principles, instrumentation –block diagram and applications.

## **UNIT-4: Spectrophotometry**

Principle, Instrumentation: Single beam and double beam spectrometer, Beer-Lambert's law-Derivation and deviations from Beer-Lambert's law, applications of Beer- Lambert's law-Quantitative determination of Fe<sup>+2</sup>, Mn<sup>+2</sup> and Pb<sup>+2</sup>.

## **UNIT-5: Atomic spectroscopy**

Types, atomizer, atomic absorption and emission and applications.

Additional Inputs: Ion exchange chromatography, Ultra HPLC

8 hours

III. References

1. Fundamental so Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.

2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug, Seventh edition, Wiley.

- 3. Quantitative analysis by R.A.Day Jr. and A.L.Underwood, Sixth edition, Pearson.
- 4. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition/ Pearson.

## CO-PO Mapping: (1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

COx	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	3	2					3	3	3
CO2	2	2	3		3			3	3	3
CO3	2	2	3	2				3	3	3
CO4	3	3	3		2	2		3	3	3
CO5	3	2	2	3				3	3	3

### Course 7-B: Analytical Methods in Chemistry-2 PRACTICAL SYLLABUS

V. Learning Outcomes:

On successful completion of this practical course, students shall be able to:

1. Perform the separation of a given dye mixture using TLC

- 2. Learn the preparation of TLC plates
- 3. Demonstrate the separation of a mixture of amino acids using paper chromatography
- 4. Acquire skills in using column chromatography for the separation of dye mixture

## VI. Practical (Laboratory) Syllabus:

1. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).

(30hrs) (Max.50 Marks)

2. Separation of a mixture of methyl orange and methylene blue by column chromatography.

3. Separation of a given mixture of amino acids (glycine and phenylalanine) using ascending paper chromatography.

- 4. Separation of food dyes using Column Chromatography
- 5. Separation of triglycerides using TLC

6. Verification of Beer Lambert's law. (Using potassium permanganate solution) using colorimeter / spectrophotometer.

## VII. Lab References:

- 1. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
- 1. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
- 2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley- Eastern.
- 3. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
- 4. Mann F.Gand Saunders B.C, Practical Organic Chemistry, Pearson Education.

## 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 EXAMINATIONS III B.Sc.-SEMESTER-V PAPER VII-B: ANALYTICAL METHODS IN CHEMISTRY-2 PART-A

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

1. A) what is chromatography? Briefly explain the classification of chromatography.

(OR)

B) Explain different types of adsorbents & eluents used in chromatography.

2. A) what is thin layer chromatography? Describe the experimental procedure of thin layer chromatography.

#### (OR)

B) Explain types of paper chromatography based on modes of development?

3. A) Discuss about column chromatography.

#### (OR)

B) Explain the principle of HPLC & give the block diagram.

4. A) Derive the Beer-lambert's law & write the deviations of Beer-lambert's law.

#### (OR)

B) Explain the principle & instrumentation of double beam spectrophotometer.

5. A) Explain the principle & instrumentation of atomic absorption spectroscopy.

#### (OR)

B) Explain the principle & instrumentation of atomic emission spectroscopy.

## PART-B

#### Answer any FIVE of the following questions. Each carries FIVE marks.

5 x 5=25 Marks

5 x 10=50 Marks

6. What is Rf value? Write the factors effecting Rf values.

7. Define stationary & mobile phases used in chromatography with examples.

8. Write a short note preparation of plates in TLC.

9. Write the applications of paper chromotography.

10. Write about the important applications of column chromotography.

11. What is absorbance & transmittance? explain.

12. Give short notes on single beam spectrophotometer.

13. Explain briefly the types of atomic spectroscopy.

# FOURTH YEAR SEMESTER - VII

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 8B: Inorganic Materials of Industrial importance	Programme & Semester IV B.Sc. Chemistry (H) VII Semester				
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Basic knowledge about Inorganic Chemistry, s, p, d - groups.	4	1	-	4	

#### **Course learning Outcomes:**

By the end of the course, the students will be able to:

1. Learn the composition and applications of the different kinds of glass.

2. Understand glazing of ceramics and the factors affecting their porosity.

- 3. Give the composition of cement and discuss the mechanism of setting of cement.
- 4. Explain the suitability of fertilisers for different kinds of crops and soil.

5. Explain the process of formulation of paints and the basic principle behind the protection offered by the surface coatings.

6. Explain the principle, working and applications of different batteries.

7. List and explain the properties of engineering materials for mechanical construction used in day today life.

8. Explain the synthesis and properties of nano-dimensional materials, various semiconductor and superconductor oxides

#### Syllabus

#### Total: 60hours(4hr/Week)

#### **Unit I: Silicate Industries**

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

Ceramics: Brief introduction to types of ceramics. glazing of ceramics.

**Cement**: Manufacture of Portland cement and the setting process, Different types of cements: quick setting cements, eco-friendly cement (slag cement), puzzolana cement

#### Unit II: Fertilisers:

Different types of fertilisers (N, P and K). Importance of fertilisers, chemistry involved in the manufacture of the following fertilisers: urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates, superphosphate of lime, potassium chloride and potassium nitrate.

#### Unit III: Batteries:

Primary and secondary batteries, characteristics of an Ideal Battery, principle, working, applications and comparison of the following batteries: Pb- acid battery, Li-metal batteries, Li - ion batteries, Li-polymer batteries, solid state electrolyte batteries, fuel cells, solar cells and polymer cells.

#### Unit IV: Synthesis of inorganic solids:

#### 12 hours

14 hours

#### 10 hours

Conventional heat and beat method, Co-precipitation method, Sol-gel method, Hydrothermal method, Chemical vapour deposition (CVD), Ion-exchange and Intercalation method.

#### Unit V: Nano materials:

#### 12 hours

Overview of nanostructure and nano material's, classification, preparation and optical properties of gold and silver metallic nanoparticles, concept of surface Plasmon resonance, carbon nano tubes, inorganic nanowires, Bio inorganic nano material's natural and artificial nano material's, self-assembled nano structures, control of Nano architecture, one dimensional control.

## **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of abilities, firms, research organisations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts

#### **Suggested Text Books:**

1. Poole Jr.; Charles P.; Owens, Frank J. (2003), **Introduction to Nanotechnology**, John Wiley and Sons

2. West, A. R. (2014), Solid State Chemistry and Its Application, Wiley

3. Smart, L. E.; Moore, E. A. (2012), Solid State Chemistry An Introduction, CRC PresTaylor&Francis.

4. Atkins, P.W.; Overton, T.L.; Rourke, J.P.; Weller, M.T.; Armstrong, F.A.(2010), Shriver and

Atkins Inorganic Chemistry, W. H. Freeman and Company.

5. Kent, J. A. (ed) (1997), Riegel's Handbook of Industrial Chemistry, CBS Publishers, NewDelhi.

## **References:**

1. Svehla, G. (1996), Vogel's Qualitative Inorganic Analysis, Prentice Hall.

2. Banewicz, J. J.; Kenner, C.T. Determination of Calcium and Magnesium in Limestones and Dolomites, Anal. Chem., 1952, 24 (7), 1186–1187.

#### Course 8B: Inorganic Materials of Industrial importance-Practical syllabus

#### Learning outcomes:

By the end of the course students will be able to:

- 1. Identify sulphate and ammonium ion present in ammonium sulphate fertiliser
- 2. Estimate the amount of calcium present in a fertiliser
- 3. Synthesise nanoparticles by chemical method
- 4. Synthesise metal doped metal oxide nanoparticles
- 5. Prepare and characterise silver nanoparticles.

#### **Practical Syllabus:**

#### *Total* Hours: 30h (2h/week)

1. Detection of constituents of Ammonium Sulphate fertiliser (Ammonium and Sulphate ions) by qualitative analysis and determine its free acidity.

2. Detection of constituents of CAN fertiliser (Calcium, Ammonium and Nitrate ions) fertiliser and estimation of Calcium content.

3. Synthesis of ZnO nanoparticles by chemical method and its characterisation using UV-visible Spectrophotometer.

4. Cu doped ZnO nanoparticles

5. Synthesis of silver nanoparticles by green methods and its characterisation using UV-visibleSpectrophotometer.

6. Detection of constituents of Dolomite (Calcium, Magnesium and carbonate ions) and Determination of composition of Dolomite (Complexometric titration).

## **Co-Curricular Activities:**

**Mandatory:** (Lab/field training of students by teacher : (lab:10+field:05):

1. For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of synthesis of nanoparticles and its characterization using various techniques.

3. Max. Marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

#### **References:**

1. Ghorbani, H. R.; Mehr, F.P.; Pazoki, H.; Rahmani B. M. Synthesis of ZnO Nanoparticles by Precipitation Method. Orient J Chem. 2015;31(2).

2. Orbaek, W.; McHale, M.M.; Barron, A.R. Synthesis and characterization of silver nanoparticles for an undergraduate laboratory, J. Chem. Educ. 2015, 92, 339–344.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 9A: Spectroscopy of Organic compounds	Programme & Semester IV B.Sc. Chemistry (H) VII Semester				
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Basic knowledge about Organic Chemistry, EMS, spectroscopy, functional groups, structures.	4	1	-	4	

#### **Learning Outcomes:**

By the end of the course, the students will be able to:

1) Gain insight into the basic fundamental principles of IR and UV-Vis spectroscopic techniques.

2) Use basic theoretical principles underlying UV-visible and IR spectroscopy as a tool for functional group identification in organic molecules

- 3) Interpret of IR, UV-visible spectra and their applications
- 4) Interpret of NMR, Mass spectra and their applications
- 5) Interpret the spectra in identifying the organic compounds

#### **Syllabus**

#### **Unit-I UV-Vis Spectroscopy**

Energy transitions – Simple chromophores – UV absorption of Alkenes – polyenes unsaturated cyclic systems – Carbonyl compounds,  $\alpha$ ,  $\beta$ -unsaturated carbonyl systems – Woodward Fieser rules – aromatic systems – solvent effects – geometrical isomerism – acidand base effects – typical examples – calculation of  $\lambda$ max values using Woodward - Fieser rules.

ORD: Theory of optical rotatory dispersion, a-Axial halo ketone rule and octant rule -

Application of these rules in the determination of absolute configuration of cyclohexanones, decalones and cholestanones.

Circular Dichroism: Principle – positive and negative cotton effects – Absolute configuration.

#### Unit-II Infrared Spectroscopy (FT-IR):

Fundamental modes of vibrations – Stretching and bending vibrations – overtones, combination bands and Fermi resonance, factors influencing vibrational frequencies, hydrogen bonding – fingerprint region and its importance – Study of typical group frequencies for – CH, -OH, -NH, -CO-NH2, -CC, -CHO, -CO and aromatic systems. Application in structural determination –Simple problems

#### Unit-III 1H NMR spectroscopy:

Magnetic properties of Nuclei, Nuclear resonance, Fourier Transformation and its importance in NMR. Equivalent and non-equivalent protons, The chemical shift and it's importance, calculation of chemical shift, factors affecting the chemical shifts such as electronegativity and anisotropy, effect of deuteration, Signal integration, Spin-spin coupling: vicinal (Karplus relationships), germinal and long range. Coupling constants (*J*) and factors affecting coupling constants. –Shielding and deshielding mechanisms in acetylene carbonyl and Benzene, anisotropy –Spin-Spin Interactions related to first

## Total: 60hours(4hr/Week)

## 12 hours

#### 12 hours

order and higher order spectra (AB, A2; AB2, ABX, ABC, AMX) –temperature dependence spectra, Hydrogen bonding. Nuclear Overhauser effect (NOE).

### Unit-IV Electron Spin Resonance Spectroscopy (ESR):

Basic Principles, Comparison of NMR & ESR. Determination of 'g' value, Factors affecting the 'g' value. Isotropic and Anisotropic constants. Splitting, hyperfine splitting coupling constants. Line width, Zero field splitting, and Kramer degeneracy. Crystal field splitting, Crystal field effects.

**Applications:** Detection of free radicals; ESR spectra of(a) Methyl radical (CH3·), (b) Benzene anion (C6H6-).

#### **UNIT-V MASS SPECTROMETRY**

Introduction, ion production, type of ionisation, EI, CI, FD, and FAB-factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular-ion peak, metastable peak, Mac Lafferty rearrangement. Nitrogen rule, isotope labelling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

#### **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of abilities, firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

#### **Suggested Text Books:**

- 1. Organic spectroscopy, W. Kemp 5th Ed, ELBS
- 2. Spectroscopy of organic compounds, RM Silversteen and others, 5th Ed, John Wiley
- 3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.

#### **References:**

- 1. NMR in chemistry-A multi nuclear introduction, William Kemp, McMillan, 1986.
- 2. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi

#### Course 9A: Spectroscopy of Organic Compounds- Practical Syllabus Total Hours: 30h (2h/week)

#### Learning outcomes:

By the end of the course students will be able to

- 1. Identify the functional groups present in the molecules
- 2. Apply data to in identification of the molecule
- 3. Describe principles involved in Spectroscopic methods
- 4. Predict number of signals, splitting patterns in the proton NMR of a compound

#### 12 hours

5. Develop ability in the combined use of mass spectrometry and spectroscopic techniques for structure elucidation

## **Practical Syllabus**

- a) Problems involving individual spectral methods UV, IR, PMR and Mass
- b) Problems involving combined any two of UV, IR, PMR and Mass
- c) Problems involving combined any three of UV, IR, PMR and Mass
- c) Problems involving all four UV, IR, PMR and Mass spectral data.

#### **Co-Curricular Activities:**

Mandatory:(Lab/field training of students by teacher:(lab:10+field:05):

**1.** For Teacher: Training of students by the teacher in laboratory and field for not less than15 hours on the field techniques/skills of detection of organic compounds using spectroscopic data.

**2.** For Students: Student shall visit a related industry/chemistry laboratory in universities/research organisations/private sector facility and observes the synthetic reaction and obtaining spectral data and analysing the organic compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding

10 pages in the given format to the teacher.

3. Max. Marks for Fieldwork/project work Report: 05.

**4.** Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

#### **References:**

1. NMR in chemistry-A multi nuclear introduction, William Kemp, McMillan, 1986.

2. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmig

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 10B: Instrumental Methods of Chemical Analysis	Programme & Semester IV B.Sc. Chemistry (H) VII Semester			
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Organic Chemistry, EMS, spectroscopy, functional groups, structures.	4	1	-	4

#### **Learning Outcomes**

By the end of the course, the students will be able to:

- 1) Handle analytical data
- 2) Understand basic components of IR, FTIR, UV-Visible and Mass spectrometer.
- 3) Interpret of IR, FTIR, UV-visible spectra and their applications.
- 4) Understand the use of single and double beam instruments.

5) Learn elemental analysis, Electro analytical Methods, Radio chemical Methods, X-ray analysis and electron spectroscopy

#### Syllabus:

#### Total: 60hours(4hr/Week)

#### Unit- I: Introduction to analytical methods of data analysis and Electroanalytical Methods:

#### 10 hours

Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental methods. Consideration of electromagnetic radiations. Potentiometry & Voltammetry.

#### Unit –II: Molecular spectroscopy

**Infrared spectroscopy:** Interaction of radiations 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), and advantages of Fourier-Transform Infrared (FTIR) spectroscopy.

Applications: Issues of quality assurance and quality control, special problems for portable instrumentation and rapid detection.

## Unit- III: UV-Visible/ Near IR Spectroscopy

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: 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 quadra pole. Resolution, time and multiple separations, detection and interpretation.

#### 14 hours

#### 12 hours

#### Unit – V: Elemental analysis

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).

## **Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.

- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of abilities, firms, research organisations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

#### **Suggested Text Books:**

1. Willard, H.H.; Merritt, L.L. Jr.; Dean, J.A.; Settle, F.A. Jr.(2004), Instrumental methods of analysis, 7th edition, CBS Publishers.

2. Skoog, D.A.; Holler, F. J.; Crouch, S.(2006), Principles of Instrumental Analysis, Thomson Brooks/ Cole.

3. Ban well, C.N. (2006), Fundamentals of Molecular Spectroscopy, Tata McGraw-Hill Education

Reference Books:

- 1. Skoog, D. A.; Holler, F. J.; Crouch, S.(2006), Principles of Instrumental Analysis, CengageLearning.
- 2. Christian, G.D. (2004), Analytical Chemistry, 6th Edition, John Wiley & Sons, New York.

#### **Course 10B: Instrumental Methods of Chemical Analysis-Practical Syllabus**

Total Hours: 30h (2h/week)

#### **Course learning outcomes**

By the end of the course students will be able to

- 1) Determine the isoelectric pH of a protein
- 2) Identify the functional groups present in organic compounds
- 3) Estimate the amount of chloride and iodide present in the solution
- 4) Recognize the quality of water

#### **Practical-Syllabus**

- 1. Determination of the isoelectric pH of a protein.
- 2. Titration curve of an amino acid
- 3. IR absorption spectra (study of aldehydes and ketones)
- 4. Potentiometric titration of a chloride-iodide mixture
- 5. Potentiometric Titration of Metal Ions in Ethanol
6. Estimation of Alkalinity, BOD and COD

Co-Curricular Activities:

a) Mandatory:(Lab/field training of students by teacher:(lab:10+field:05):

1. **For Teacher**: Training of students by the teacher in laboratory and field for not less than15 hours on the field techniques/skills of detection of organic compounds using spectroscopic data.

2. **For Students**: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the synthetic reactions and obtain spectral data for interpretation of the synthetic compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max. marks for Fieldwork/project work Report:05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

# **References:**

1. Skoog, D. A.; Holler, F. J.; Crouch, S.(2006), Principles of Instrumental Analysis, Cengage Learning.

2. Christian, G.D.(2004), Analytical Chemistry, 6th Edition, John Wiley & Sons, New York.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 11B: Analysis of Drugs, Foods, Dairy Products &Bio- Chemical Analysis	Prog IV B	ramme .Sc. C VII S	e & Sem hemistr emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Organic Chemistry, food products, nutrition, functional groups, structures.	4	1	-	4

# **Learning Outcomes:**

Students after successful completion of the course will be able to:

- 1. Explain the principles of formulation and application of Drugs.
- 2. Acquire a critical knowledge on synthetic techniques of drugs.
- 3. Demonstrate the skills in analysis of Foods, Dairy Products.
- 4. Comprehended the applications of **Bio-Chemical Analysis**.
- 5. Acquire a critical knowledge on analysis of Foods, Dairy Products.

# Syllabus:

# UNIT- I

Analysis of the following drugs and pharmaceuticals preparations: (Knowledge of molecular formula, structure and analysis) Analysis of anlgesics and antipyretics like aspirin and paracetamol Analysis of anti-materials like choloroquine.

Analysis of drugs in the treatment of infections and infestations: Amoxycillin., chloramphenicol, metronidazole, penicillin, tetracycline, cephalexin(cefalexin).

Anti-tuberculous drug- isoniazid.

# UNIT- II

Analysis of the following drugs and pharmaceuticals preparations: (Knowledge of molecular formula, structure and analysis)

Analysis of antihistamine drugs and sedatives like: allegra, Zyrtec (citirizine), alprazolam, trazodone, lorazepem, ambien (zolpidem), diazepam,

# UNIT- III

Analysis of anti-epileptic and anti-convulsant drugs like phenobarbital and phenacemide. Analysis of drugs used in case of cardiovascular drugs: atenolol, Norvasc (amlodipine), Analysis of Lipitor (atorvastatin) a drug for the prevent in of product in of cholesterol.

Analysis of diuretics like: furosemide (Lasix), triamterene

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

# UNIT- IV

Analysis of Milk and milk products: Acidity, total solids, fat, total nitrogen, protenines, lactose, phosphate activity, casein, choride. Analysis of food materials- Preservatives: Sodium carbonate,

# 10 hours

# 10 hours

# 15 hours

# 15 hours

sodium benzoate sorbic acid Coloring matters, - Briliant blue FCF, fast green FCF, tertrazine, erytrhosine, sunset yellow FCF.

Flavoring agents - Vanilla, diacetyl, isoamyl acetate, limonene, ethylpropionate, allyl hexanoate and Adulterants in rice and wheat, wheat floo0r, sago, coconut oil, coffee powder, tea powder, milk..

# UNIT-V

#### 10 hours

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

# **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of related Industries/firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

# **Text Books:**

- 1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
- 2. Foye's Principles of Medicinal Chemistry.
- 3. Burger's Medicinal Chemistry, Vol I to IV.
- 4. Introduction to principles of drug design- Smith and Williams.

# **References Books:**

- a. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
- b. Foye's Principles of Medicinal Chemistry.
- c. Burger's Medicinal Chemistry, Vol I to IV.
- d. Introduction to principles of drug design- Smith and Williams.
- e. Remington's Pharmaceutical Sciences.
- f. Martindale's extra pharmacopoeia.
- g. Organic Chemistry by I.L. Finar, Vol. II.
- h. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
- i. Text book of practical organic chemistry- A.I. Vogel.

# Course 11B. Analysis of Drugs, Foods, Dairy Products & Bio-Chemical Analysis- Practical

# **Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

- 1. Develop comprehensive product development programs to meet new product criteria and timing.
- 2. Acquire skills in the Analysis of Drugs, foods and Dairy Products.
- 3. Demonstrate proficiency in the experimental techniques of biomedical chemical

- 4. Carry out food testing with the knowledge of foods.
- 5. Learn the procedure of synthesis of drugs.

6. Critically develop, apply, report, interpret and reflect on strategies for collecting data in the lab and field.

# Practical (Laboratory) Syllabus:

# Total Hours: 30h (2h/week)

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

# **References Books:**

- a. Introduction to principles of drug design- Smith and Williams.
- b. Remington's Pharmaceutical Sciences.
- c. Martindale's extra pharmacopoeia.
- d. Organic Chemistry by I.L. Finar, Vol. II.
- e. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
- f. Text book of practical organic chemistry- A.I. Vogel.

# **Co-Curricular Activities**

Mandatory:(Lab/field training of students by teacher:(lab: 10+field:05):

a. **For Teacher**: Training of students by the teacher in laboratory and field for not less than15 hours on the field techniques/skills of comprehensive product development programs to meet new product criteria and timing. Acquire skills in the preparation of Drugs, foods and Dairy Products, carry out food testing with the knowledge of testing food adulteration and learn the procedure of synthesis of drugs.

b. **For Students**: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the preparation of Cosmeceuticals and Pharmaceutical. Write their observations and submit a hand written fieldwork/project work report not exceeding10 pages in the given format to the teacher. a). Max marks for Fieldwork/project work Report: 05.

b). Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

c). Unit tests (IE).

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 12A: Polymer Chemistry	Prog IV E	Programme & Semeste IV B.Sc. Chemistry (H VII Semester			
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С	
Pre-requisites	Basic knowledge about Organic Chemistry, functional groups, structures.	4	1	-	4	

# **Course Learning Outcomes**

By the end of this course, students will be able to:

1. Know about history of polymeric materials and their classification

 $2 \cdot$  Learn about different mechanisms of polymerization and polymerization techniques  $3 \cdot$  Evaluate kinetic chain length of polymers based on their mechanism

4. Differentiate between polymers and copolymers

5. Learn about different methods of finding out average molecular weight of polymers

 $6\cdot$  Differentiate between glass transition temperature (Tg) and crystalline melting point (Tm)  $7\cdot$  Determine Tg and Tm

8. Know about solid and solution properties of polymers

9. Learn properties and applications of various useful polymers in our daily life.

# Syllabus:

# lotal: 60nours(4nr/week)

# Unit-1 History of polymeric materials and functionality and its importance 10 hours

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers. Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems.

# **Unit-II Kinetics of Polymerization**

Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

# Unit-III Determination of molecular weight of polymers and crystallinity 12 hours

(*Mn*,*Mw*, etc) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index. Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

# Unit-IV Glass transition temperature (Tg) and Polymer Solution

Free volume theory, WLF equation, Factors affecting glass transition temperature (Tg). Criteria for polymer solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and

# Total: 60hours(4hr/Week)

# 12 hours

# 14 hours

free energy change of mixing of polymers solutions, Flory- Huggins theory, Lower and Upper critical solution temperatures.

# **Unit-V Properties of Polymers**

#### 12 hours

(Physical, thermal, Flow & Mechanical Properties).

Brief introduction to preparation, structure, properties and application of the following polymers: poly olefins, polystyrene and styrene copolymers, poly (vinyl chloride) and related polymers, poly (vinyl acetate) and related polymers, acrylic polymers, fluoro polymers, polyamides and related polymers. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [poly acetylene, poly aniline, poly(p- phenylene sulphide poly pyrrole, poly thiophene)].

# **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of abilities, firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

# **Suggested Text Books:**

1. R.B. Seymour & C.E. Carraher: Polymer Chemistry: An Introduction, Marcel Dekker, Inc. New York, 1981.

- 2. G. Odian: Principles of Polymerization, 4th Ed. Wiley, 2004.
- 3. F.W. Billmeyer: Textbook of Polymer Science, 2nd Ed. Wiley Interscience, 1971.
- 4. P. Ghosh: Polymer Science & Technology, Tata McGraw-Hill Education, 1991.

5. R.W. Lenz: Organic Chemistry of Synthetic High Polymers. Interscience Publishers, New York, 1967.

# **References:**

1. Allcock, H.R.; ; Lampe, F. W.; Mark, J. E.(2003), Contemporary Polymer Chemistry, Prentice-Hall.

2. Fried, J.R. (2003), Polymer Science and Technology, Prentice-Hall.

# Course 12A: Polymer Chemistry-12A- Practical Syllabus

# **Learning Outcomes:**

By the end of the course students will be able to

- 1. Determine the molecular weight of a polymer by viscometric studies
- 2. Prepare urea formaldehyde polymer
- 3. Determine the molecular weight by end group analysis

# **Practical Syllabus**

# Total Hours: 30h (2h/week)

1. Estimation of the amount of HCHO in the given solution by sodium sulphite method

- 2. Determination of molecular weight by viscometry: Poly vinyl proplylidine (PVP) in water
- 3. Determination of molecular weight by end group analysis
- 4. Preparation of urea-formaldehyde resin
- 5. Precipitation polymerization of acrylonitrile
- 6. Redox polymerization of acrylamide

# **Co-Curricular Activities:**

Mandatory: (Lab/field training of students by teacher :(lab:10+field:05):

1. **For Teacher**: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of preparation of polymers.

2. **For Students**: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the preparation steps of polymers and quality polymer formed using various techniques. Write their observations and submit a hand written fieldwork/project work report not exceeding

10 pages in the given format to the teacher.

3. Max. Marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

# 5. Unit tests (IE).

# **References:**

- 1. Munk, P.; Aminabhavi, T. M. (2002), Introduction to Macromolecular Science, John Wiley & Sons.
- 2. Sperling, L.H.(2005), Introduction to Physical Polymer Science, John Wiley & Sons.

One Online Course chosen from Swayam/NPTEL/Any other courses recognised by universities per semester-VII. 5 Credits

# FOURTH YEAR SEMESTER - VIII

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 14A: Inorganic Chemistry-II: Metal clusters, Electronic spectra of Complex compounds and Bio-inorganic chemistry	Prog IV B	rammo S.Sc. C VIII S	e & Sen hemistr emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	C
Pre-requisites	Basic knowledge about Inorganic Chemistry, Coordination compounds, structures.	4	1	-	4

# **Course Learning outcomes:**

1. The Students are able to understand the study of age compounds of oxygen, phosphorous and sulphur compounds and also iso poly and heteropoly anions.

2. The student will understand the various metal clusters and metal  $\pi$  complexes.

- 3. Understanding the reactions of organo metallic compounds and its applications.
- The Students are able to understanding the reaction mechanism in transition metal complexes, 4. anation reactions, and complementary reactions.

The Students are able to understand the orgel diagrams and electronic spectra of transition metal 5. complexes.

The study of magnetic properties and anamolous magnetic moments of transition complexes. 6.

The Students are able to understanding structure and functions of hemoglobin, myoglobin and 7. vitamin B12, photochemical laws.

#### **Syllabus:**

# Unit-I: Non-metal cages and metal clusters:

Structure and bonding in phosphorous-oxygen, phosphorous-Sulphur cages; structure and bonding in higher boranes with (special reference to B12 icosahedra). Carboranes, metalloboranes, metallo carboranes. Classification- LNCs and HNCs, Isoelectronic and Isolobal relationships, electron counting rules: Wade's and Lauher's rules. M-M multiple bonding; preparation, structure and bonding in di -nuclear [Re2Cl8]<sup>2</sup>-ion, tri nuclear [Re3Cl9], tetra nuclear W4(OR)16, hexa nuclear [Mo6Cl8]<sup>4+</sup> and [Nb6Cl12]2-.

# Unit-II: Organo metallic chemistry of transition metals:

Classification and electron counting rules, hapticity, synthesis, structure and bonding of Ferrocene, dibenzene chromium, cycloheptatriene and tropylium complexes of transition metals. Reactions of organo metallic compounds- oxidative addition reductive elimination, insertion and elimination. Applications of organo metallic comp- ounds -Catalytic hydrogenation, Hydroformylation.

# **Unit-III: Reaction mechanism of transition metal complexes:**

Kinetics of octahedral substitution, acid hydrolysis, base hydrolysis-conjugate base (CB) mechanism. Direct and indirect evidences in favour of CB mechanism. Anation reactions. Reactions without metalligand bond cleavage. Factors affecting the substitution reactions in octahedral complexes. Trans effect on substitution reactions in square planar complexes. Mechanism of redox reactions, outer sphere mechanism, cross reactions and Marcus – Hush equation, inner sphere mechanism.

# Unit-IV: Term symbols and Electronic spectra:

# **12Hours**

# **12Hours**

Total: 60hours(4hr/Week)

# 12Hours

**12Hours** 

Term symbols: Term symbols and their derivation Microstates, Hunds rules to predict ground terms and ground states. List of ground energy and higher energy terms from d<sup>1</sup> to d<sup>9</sup> configurations;

Electronic spectra of transition metal complexes: Spectro scopic terms. Selection rules, Slator– Condon parameters, Racah parameters, Term separation energies for  $d^n$  configurations Correlation diagrams and Orgel diagrams. Tanabe-Sugano diagrams for  $d^1$ tod<sup>9</sup> configurations. Calculations of Dq, Band  $\beta$  parameters. Charge transfer spectra.

Unit-V: Bio-inorganic chemistry and Magnetic properties of complexes: 12Hours Storage and transport of dioxygen by Hemoglobin and Myoglobin, Chlorophyll, Vitamin B12 and its importance.

Magnetic properties of transition metal complexes: Orbital and spin contribution, spin- orbitcoupling and magnetic moments. Types of magnetism, factors affecting on Para magnetism, Dia, ferro and Anti magnetism.

# **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of abilities, firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts

# **Textbooks:**

- 1. Inorganic Chemistry by Huheey. Harper and Row.
- 2. Concisein organic chemistry by J.D. Lee, ELBS.
- 3. Inorganic chemistry, K.F. Purcelland J.C.Kotz, Holt Saunders international
- 4. Organometallic chemistry by R.C.Mehrotraand A.Singh. New Age International.
- 5. Advanced Inorganic Chemistry by Cotton and Wilkinson, Wiley Eastern

# **Reference books:**

- 1. Inorganic reaction mechanism by Basoloand Pearson, Wiley Eastern
- 2. Bioinorganic Chemistry by K. Hussan Reddy
- 3. Biological Aspects of inorganic chemistry by A. W. Addiso, W.R.Cullen, D.Dorphinand

G.J.James. Weliey Inter science.

4. Photo chemistry of coordination compounds by V. Balzani and V. Carassiti. Academic Press.

5. Text book of Coordination chemistry by K.Soma Sekhara Rao and K.N.K. Vani, Kalyani Publishers.

# **Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Chemistry lab.

2. Learn the concepts and procedures of preparation of standard solutions, primary and secondary standards.

3. Demonstrate skills in Volumetric and gravimetric determinations.

4. Acquire skills in standardizing and determination of different metal ions.

5. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equillibria.

# **Practical Syllabus:**

Total Hours: 30h (2h/week)

Quantitative analysis:

Volumetric:

- 1. Determination of Ferric iron by photochemical reduction
- 2. Determination of Nickel by EDTA
- 3. Determination of Calcium and Magnesium in a mixture by EDTA
- 4. Determination of Ferrocyanide by Ceric sulphate
- 5. Determination of Copper(II) in presence of iron(III)

Gravimetric:

- 6. Determination of Zinc as Zinc pyrophosphate
- 7. Determination of Nickel from a mixture of Copper and Nickel.

Co-Curricular Activities Mandatory: (Lab/fieldtrainingofstudentsbyteacher: (lab:10+field:05):

1. For Teacher: Training of students by the teacher in laboratory and field for not lessthan15

hours on the field techniques/skills of determination of cations by volumetric and gravimetric determinations.

2. **For Students**: Student shall visit are lated industry/ chemistry laboratory in universities/ research organizations/private sector facility and observes the synthetic reactions. Write their observations and submit a hand written fieldwork/project workreportnotexceeding10 pages in the given format to the teacher.

3. Max marks for Fieldwork/projectworkReport:05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests(IE).

# **Reference books:**

Vogel's textbook of quantitative chemical analysis, 5th edition by G.H. Jeffery et al.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 15B: Chemistry of Natural Products	Prog IV B	ramme S.Sc. C VIII S	e & Sen hemistr emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Chemistry, organic functions groups, structures.	4	1	-	4

# **Course learning Outcomes**

By the end of the course students will be able to:

Understand isolation, purification and characterization of simple chemical constituents from the natural source

- 1. Learn the different types of alkaloids and their chemistry
- 2. To know the classification of terpenoids, isoprene rule, structures and their natural sources.
- 3. Learn advanced methods of structural elucidation of compounds of natural origin
- 4. Understand isolation, purification, chemical constituents from the natural source
- 5. To know the structure characterization and synthesis of steroids

#### **Syllabus:**

# **Unit I: Alkaloids**

Introduction, general methods for the elucidation of the structure, breaking into small fragments, determination of structure of fragments. Type of linkage, functional nature of oxygen, zwitter ion method to know number of -OH groups, C=O group, -COOH group -OCH3 (Ziesel's method).Detection of N atom, Detection of -N-CH3 group. Herzig-Meyer method to recognize heterogeneous system. Hofmann exhaustive methylation. Emde's degradation, Von-Braundegradation, reductive degradation, Alkali fusion, oxidation, dehydrogenation.

# Unit II: Structure and synthesis

- a. Phenyl ethyl amine group alkaloids (adrenaline)
- b. Piperedine group alkaloids (piperine)
- c. Pyridine group alkaloids (coniine)

# **Unit- III Terpenoids**

Isoprene rule, special isoprene rule, classification. General methods of the determination of

structure. Nature of Oxygen, number of alkyl groups (Kuhn-roth method). Unsaturation detection, reduction (NOCl), dehydrogenation, oxidative degradation, ozonolysis, H2O2, Baeyer's reagent, NaOX, HNO3, dehydration-ZnCl2, H2SO4 . Catalytic hydrogenation, Grignard reaction, Reformatsky reaction.

# **Unit-IV Structure and synthesis**

Mono terpenoids (acyclic)-Citral–structure and synthesis. Monocyclic mono terpenoids:  $\alpha$  -Terpeniol, Menthol, Limonine –Structure and Synthesis

# Total: 60hours(4hr/Week)

# 12 hours

12 hours

#### 10 hours

# 12 hours

# **Unit-V Steroids**

#### 12 hours

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry. Isolation, structure determination and synthesis of Cholesterol (Synthesis not required), Bio Synthesis of Steroids. Chemistry and synthesis of oestrone, progesterone, androsterone, testosterone, cortisone.

# **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of abilities, firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

# **Suggested Text Books:**

- a. Some Modern methods of Organic Synthesis W. Carithers, Cambridge University Press, Cambridge.
- b. Organic Chemistry: Stereochemistry and the Chemistry of Natural Products.-I.L. Finar,

# Pearson Education, Asia

- c. Organic Chemistry, Morrison and Boyd, Pearson, 7th Edition
- d. Organic Chemistry, Solmons and Fryhle, Willy Student Edition
- e. Organic Chemistry a Lab Manual, Piva, Lampman, Engel. Cengage Learning India

# **References:**

- 1. The terpenoids by Simonsen
- 2) The steroids by Shoppee
- 3) Chemistry of Carbon compounds by Rodd

# Course 15B: Chemistry of Natural Products- Practical Syllabus

# Learning outcomes:

By the end of the course students will be able to:

- a. Separate the natural products using chromatographic techniques
- b. Identify the alkaloids present in extracted natural products
- c. Identify the terpenes present in plant extracts
- d. Identify the steroids present in plant extracts
- e. Identify the phenolic groups present in natural products

# **Practical Syllabus**

# Total Hours: 30h (2h/week)

- 1. Separation of natural products using column chromatography
- 2. Identification of alkaloids in any three plant extracts
- 3. Identification of terpenes in any three plant extracts
- 4. Identification of di terpinoids in any three plant extracts

5. Identification of Steroids in any three plant extracts

6. Identification of phenolic groups in three plant extracts

Co-Curricular Activities:

Mandatory: (Lab/field training of students by teacher :(lab:10+field:05):

1. For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of analyzing organic compounds using spectroscopic data.

2. **For Students**: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes the separation of natural products obtaining spectral data and analyzing the functional groups and type of natural product. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max. Marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

# **References:**

1. The terpenoids by Simonsen

- 2) The steroids by Shoppee
- 3) Chemistry of Carbon compounds by Rodd.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course 16B: Analytical Methods of Analysis	Prog IV B	ramme S.Sc. C VIII S	e & Sen hemistr emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Chemistry, Mathematics, laboratory handling.	4	1	-	4

# **Learning Outcomes:**

By the end of this course, students will be able to:

1. Perform experiment with accuracy and precision.

 $2 \cdot$  Develop methods of analysis for different samples independently.  $3 \cdot$  Test contaminated water samples.

4. Understand basic principle of instrument like Flame Photometer, UV-vis spectrophotometer. 5. Learn separation of analytes by chromatography.

6. Apply knowledge of geometrical isomers and keto-enoltautomers to analysis. 7. Determine composition of soil.

8. Estimate macronutrients using Flame photometry.

# Syllabus:

# Unit I: Qualitative and quantitative aspects of analysis:

Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression. Normal law of distribution of indeterminate errors, statistical test of data; F, Q and ttest, rejection of data, and confidence intervals.

# Unit II: Optical methods of analysis

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection Rules.

UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument; Transmittance. Absorbance and Beer- Lambert law Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers.

Flame Atomic Absorption and Emission Spectrometry: Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs). Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal, Techniques for the quantitative estimation of trace levelof metal ions from water samples.

# Unit III: Thermal methods of analysis:

Theory of thermo gravimetry (TG) and basic principle of instrumentation of thermal analyser. Techniques for quantitative estimation of Ca and Mg from their mixture.

# **Unit IV: Electroanalytical methods**

# 10 hours

10 hours

# 14 hours

# 12 hours

Total: 60hours(4hr/Week)

Classification of electro-analytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points. Techniques used for the determination of pKa values.

# **Unit V: Separation techniques**

#### 12 hours

Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by salvation and chelation, Technique of extraction: batch, continuous and counter current extractions, Qualitative and quantitative aspects of solvent extraction: extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and non aqueous media.

Chromatography: Classification, principle and efficiency of the technique, Mechanism of separation: adsorption, partition & ion-exchange, Development of chromatograms: frontal, elution and displacement methods.

# **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of abilities, firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

# **Suggested Text Books:**

1. Willard, H.H. (1988), **Instrumental Methods of Analysis**, 7th Edition, Wards worth PublishingCompany.

- 2. Christian, G.D. (2004), Analytical Chemistry, 6th Edition, John Wiley & Sons, New York.
- 3. Harris, D. C. (2007), Quantitative Chemical Analysis,6th Edition, Freeman.

# **References:**

i. Khopkar, S.M. (2008), Basic Concepts of Analytical Chemistry, New Age International Publisher.

ii. Skoog, D.A.; Holler F.J.; Nieman, T.A. (2005), Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd.

# Course 16B: Analytical Methods of Analysis- Practical Syllabus Total: 30hours(2hr/Week)

# **Learning Outcomes**

By the end of the course students will be able to

- 1. Separate ions using chromatography
- 2. Identify the ion by comparing Rf values with the literature
- 3. Analyze soil parameters
- 4. Verify Beer Lamberts law
- 5. Determine the carbonate and bicarbonate using pH

# **Syllabus**

1. Separation of mixtures by paper chromatography and reporting the Rf values of Co<sup>2+</sup> and Ni<sup>2+</sup>.

2. Separation of mixtures by paper chromatography and reporting the Rf values of Amino acids present in the given mixture

3. To separate a mixture of Ni<sup>2+</sup>& Fe<sup>2+</sup> by complexation with DMG and extracting the Ni<sup>2+</sup> DMG complex in chloroform, and determine its concentration by spectrophotometry

4. Analysis of soil:

(i) Determination of  $p^{H}$  of soil. (ii) Estimation of calcium and magnesium

(iii) Qualitative detection of nitrate and phosphate

5. Verification of Lambert-Beer's law and determination of concentration of a coloured species (CuSO4, KMnO4)

6. Determination of carbonate- and bicarbonate in a mixture using p<sup>H</sup> metry

# **Co-Curricular Activities:**

Mandatory: (Lab/field training of students by teacher :(lab:10+field:05):

1. **For Teacher**: Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of estimating the quality of soil.

2. **For Students**: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes various measured parameters of soil analysis. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max. Marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

# **References:**

i. Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C.(1989), Vogel's Textbook of Quantitative Chemical Analysis, John Wiley and Sons.

ii. Analytical Chemistry by Gary D. Christian 6th Edition John Wiley & Sons Inc New York 1994.

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course-17B. Pesticides and Green Chemistry	Prog IV B	ramme .Sc. C. VIII S	e & Sem hemistr emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Chemistry, Botany, structure of organic molecules.	4	1	-	4

# **Learning Outcomes:**

On completion of this course, the student will be able to

- 1. Understand the basic knowledge of pesticides and their classification.
- 2. Explain the synthetic methods of pesticides.
- 3. Acquire knowledge about the different types of pesticide formulations and their use.
- 4. Explain concepts in green chemistry.
- 5. State and explain the principles of green chemistry.
- 6. Identify the need of green chemistry and green synthesis.

7. Think to design and develop materials and processes that reduce the use and generation of hazardous substances in industry.

#### Syllabus :

# **Unit-I Pesticides**

Introduction to pesticides, advantages and disadvantages of pesticides, types of pesticides – Insecticides, Fungicides, Herbicides, Weedicides, Rodenticides plant growth regulators, Pheromones and Hormones. Brief discussion with examples, Structure and uses.

# **Unit-II Pesticides Synthesis**

Synthesis and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil); Anilides (Alachlor and Butachlor).

# **Unit-III Pesticide Formulations**

Dust and Granules, Wettable powders, seed disinfectant, Surfactants, Emulsifiable concentrates, Aerosols, Sprays, and Controlled Release Formulations.

# **Unit-IV Green Chemistry**

Introduction: Definition of green Chemistry, need of green chemistry, twelve principles of Green Chemistry with their explanations and examples; Green Synthesis-Maximum utilization of reactants and reagents (atom economy). Selection of solvent: Aqueous phase reactions, Reactions in ionic liquids, Solid supported synthesis, Solvent free reactions (solid phase reactions), and Green catalysts: Phase transfer catalysts (PTC) and Biocatalysts.

# **Unit-V Green Synthesis**

# 10 hours

10 hours

Total theory hours: 60h(4h/week)

# 15 hours

10 hours

#### 15 hours

Green Synthesis of the following compounds: Styrene, Adipic Acid, Catechol, BHT, Methyl Methacrylate, Urethane, 4- amino diphenylamine, benzyl bromide, Acetaldehyde, Furfural, Ibuprofen, Paracetamol, Citral.

# **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of related Industries/firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

# **TEXT BOOKS**

- 1. Industrial chemistry by B.K. Sharma. Goel Publishing House, Meerut.
- 2. E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
- 3. Chemistry of pesticides by N. K. Roy
- 4. R. Cremlyn: Pesticides, John Wiley.
- 5. V.K. Ahluwalia & M.R. Kidwai: New Trends in Green Chemistry, Anamalaya Publishers(2005).

6. P.T. Anastes & J.K. Warmer: Oxford Green Chemistry- Theory and Practical, University Press (1998).

7. A.S. Matlack: Introduction to Green Chemistry, Marcel Deckkar (2001).

# **References Books:**

- 1. Fundamentals of industrial chemistry pharmaceuticals, polymers, and business by John A.Tyrell.
- 2. Riegel's Handbook of Industrial Chemistry ninth edition Edited by James A. Kent.
- 3. E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.
- 4. Chemistry of pesticides by N. K. Roy
- 5. R. Cremlyn: Pesticides, John Wiley.
- 6. Pesticides Formulations Van Wade. Velkenburg, 1973.
- 7. Pesticides Synthesis Mavy, Kohn, Menn, 1979.

8. Kirchoff, M. & Ryan, M.A. Greener approaches to undergraduate chemistry experiment. American Chemical Society, Washington DC (2002).

# Course-17B: Pesticides and Green Chemistry-Practical Syllabus:

# Laboratory Outcomes:

On successful completion of this practical course, student shall be able to:

- 1. List out, identify and handle various equipment in the laboratory.
- 2. Learn the procedures of green synthesis.
- 3. Acquire skills in Microwave assisted organic synthesis.
- 4. Perform some applications of green synthesis.

# Practical (Laboratory) Syllabus

#### 30h(2h/week)

The list of suggestive experiments is given below. However, depending upon available resources, any three experiments may be conducted)

- 1. Benzoin condensation using Thiamine Hydrochloride as a catalyst (instead of cyanide).
- 2. Formation of Chalcones A Greener Alternative.
- 3. Preparation of Salicylic Acid (Aspirin) by Microwave Assisted Method.
- 4. Green Synthetic Process for Acetanilide.
- 5. Green Synthetic Process for Dibenzal Propanone.
- 6. Green Synthetic Process for trans esterification of vegetable oil to crude bio-diesel.

# **Recommended Books/References:**

1. Anastas, P.T & Warner, J.C. Green Chemistry: Theory and Practice, OxfordUniversity Press(1998).

2. Kirchoff, M. & Ryan, M.A. Greener approaches to undergraduate chemistry experiment. American Chemical Society, Washington DC (2002).

3. Ryan, M.A. Introduction to Green Chemistry, Tinnesand; (Ed), American ChemicalSociety, Washington DC (2002).

4. Sharma, R.K.; Sidhwani, I.T. and Chaudhari, M.K. I.K. Green Chemistry Experiment: Amonograph, International Publishing ISBN 978-93-81141-55-7 (2013).

5. Cann, M.C. and Connelly, M. E. Real world cases in Green Chemistry, AmericanChemical Society (2008). UGC DOCUMENT ON LOCF CHEMISTRY 83

6. Cann, M. C. and Thomas, P. Real world cases in Green Chemistry, AmericanChemical Society (2008).

7. Lancaster, M. Green Chemistry: An Introductory Text RSC Publishing, Second Edition, 2010.

8. Pavia, D. L., Lampman, G.M., Kriz, G.S. & Engel, R.G. Introduction to Organic Laboratory Techniques: A Microscale and Macro Scale Approach, W. B. Saunders, 1995.

# **Co-Curricular Activities**

Mandatory:(Lab/field training of students by teacher:(lab: 10+field:05):

1. **For Teacher**: Training of students by the teacher in laboratory and field for not less than15 hours on the field techniques/skills of comprehensive product development programs to meet new product criteria and timing. Acquire skills in the preparation of Cosmeceuticals and Pharmaceutical drugs, Carry out perfume testing with the knowledge of perfumes and learn the procedure of synthesis of drugs.

2. **For Students**: Student shall visit a related industry/chemistry laboratory in universities/research organisations/private sector facility and observes the preparation of Cosmeceuticals and Pharmaceutical. Write their observations and submit a hand written fieldwork/project work report not exceeding10 pages in the given format to the teacher.

a) Max marks for Fieldwork/project work Report: 05.

b) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

c) Unit tests (IE).

Course Code	SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS), PALAKOL TITLE OF THE COURSE Course-18A: Corrosion and Its Prevention	Prog IV B	ramme .Sc. C VIII S	e & Sen hemistr emester	nester y (H)
Teaching	Hours Allocated: 60 (Theory and Activities ) (5 Hrs./wk)	L	Т	Р	С
Pre-requisites	Basic knowledge about Chemistry and Electrochemistry	4	1	-	4

# Learning Outcomes:

1. This course will create awareness of corrosion and its control process

- 2. It focuses on protective metallic coatings for prevention of corrosion
- 3. It focuses on protective coatings of materials.

4. It covers about the insulating materials in electric industries and also aware about semiconductors.

Syllabus:

#### **Unit-I: Corrosion**

Introduction - Economic aspects of corrosion - Dry or Chemical Corrosion - Wet or electrochemical corrosion - Mechanism of Electrochemical Corrosion. Galvanic Corrosion - Concentration Cell Corrosion - Differential aeration corrosion - Pitting Corrosion - Underground or soil corrosion -Passivity.

# **Unit-II: Corrosion and Its Control**

Factors Influencing Corrosion - Microbiological Corrosion Atmospheric corrosion - Corrosion Control - Proper designing - Using pure metal - Using metal alloys. Chemical conversion - Coating -Phosphating – Chromising - Treatment of metal surfaceshot dipping - Use of inhibitors.

# **Unit-III: Protective Coatings**

PROTECTIVE COATINGS - Introduction - Metallic Coatings - Various methods of cleaning articles before electrode position - Electroplate and - Electroplating methods.

Pre-treatment of the surface - Metallic Coatings - Hot Dipping -Cementation or Impregnated Coatings - Sprayed Metal Coatings - Cladding - Vapour Deposition.

# **Unit-IV Paints**

Paints - ingredients and their functions Required Properties of a Paint- Paint. Constituents and Their Functions - Manufacture of Paint.

Types of Pigments - Characteristics of pigment - Oils - Uses in Paint Emulsion Paints - Special Paints -Paint Remover Varnishes.

#### **Unit-V: Insulators and Semiconductors**

Electrical Insulating Materials - Dielectric properties - Requirements of an Electrical Insulating Material - Classification of insulating material - Electrical Rigid Insulations.

Semiconductors - Introduction - Classification - Degenerate semiconductors - Super conductors.

#### 12 hours

# 12 hours

12 hours

Total theory hours: 60h(4h/week)

# 12 hours

# 12 hours

#### **Suggested Co-Curricular Activities**

- 1. Training of students by related industrial experts.
- 2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
- 3. Visits of related Industries/firms, research organizations etc.
- 4. Invited lectures and presentations on related topics by field/industrial experts.

#### **Text Books**

- 1. M.G. Fontana: Corrosion Engineering, McGraw Hill International BookCo. London.
- 2. L.L. Shreir: Corrosion, Vol I and Vol II, Newness Butterworths, EdwardArnold Ltd, London.
- 3. J.C. Scully: Fundamental of Corrosion, Pergamon Press Inc. New York, USA.

#### **References Books:**

- 1. M.G. Fontana: Corrosion Engineering, McGraw Hill International BookCo. London.
- 2. L.L. Shreir: Corrosion, Vol I and Vol II, Newness Butterworths, EdwardArnold Ltd, London.
- 3. J.C. Scully: Fundamental of Corrosion, Pergamon Press Inc. New York, USA.
- 4. V.S. Sastry: Corrosion Inhibitors, Principles & Applications, John Wiley & Sons.
- 5. C.C. Nathan: Corrosion Inhibitors, NACE, Houston, Texas.
- 6. Corrosion Causes and Prevention: Speller. F. N.
- 7. Material Science mini refresher by H.S. Bawa, Tata publisher India.

# Course 18A: Corrosion and its Prevention -Practical Syllabus:

#### **Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

- 1. Chalk out a plan to decrease the rate of corrosion.
- 2. Preparation of pigment.
- 3. To study about the Rate of corrosion with respect to Aluminium and Iron plates
- 4. To determine the effect of temperature on rate of corrosion

#### Practical (Laboratory) Syllabus:

- 1. Electroless metallic coatings on ceramic and plastic material.
- 2. Preparation of pigment (zinc oxide)
- 3. To determine the rate of corrosion on different metallic plates (Iron, Aluminium) in various Concentrations of HCl.
- 4. To determine the effect of temperature on rate of corrosion in acidic medium.
- 5. To determine the rate of corrosion on a metallic plate in acidic medium.
- 6. To determine the rate of corrosion on an Aluminium plate in basic medium.

Total Hours: 30h(2h/week)

# Lab References:

1. Analytical Chemistry by Gary D. Christian 6th edition Wiley publication.

2. Senior Practical Physical Chemistry, B.D. Khosla, V.C. Garg, Adarsh Gulati, R Chand and Co.

3. Applied Chemistry Theory and Practice, O.P. Virani, A.K. Nebula. New Age InternationalPublishers, 2nd Edition.

4. S.W. Rajbhoj and T. K. Chondhekar, Systematic Experimental Physical Chemistry, AnjaliPublication, Second Edition 2000.

5. Sunita Rattan, Experiments in Applied Chemistry, S.K. Kataria & Sons, Second edition, 2008

6. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.:New Delhi (2011).

7. UGC practical manual for experimental analysis.

# **Co curricular Activities:**

a) Mandatory :( Lab/field training of students by teacher :( lab: 10+ fields: 05):

**1. For Teacher**: Training of students by the teacher in laboratory and field for notless than15 hours on the field techniques/skills of corrosion formation observations in nature.

**2. For Students**: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observes corrosion process and its prevention. Write their observations and submit a hand written fieldwork/project work report notexceeding10 pages in the given format to the teacher. And also observe the semiconductors, insulators used in industry.

a. Max marks for Fieldwork/project work Report: 05.

**b.** Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

C. Unit tests (IE).

One Online Course chosen from Swayam/NPTEL/Any other courses recognised by universities in semester VIII. 5 Credits

# SRI A S N M GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) DEPARTMENT OF CHEMISTRY CERTIFICATE COURSE: Food Chemistry and Nutritional Analysis

Course Duration: 30 hours

# **Course Objectives:**

- To provide students with a foundational understanding of the chemical composition of food.
- To explore the role of chemistry in food preservation, processing, and flavor development.

# **Course Outcomes:**

Upon completing this unit, students will be able to:

- Identify and explain the major components of food and their functions.
- Demonstrate proficiency in using analytical techniques for food analysis.
- Apply quality assurance techniques to ensure the safety and quality of food products.

# **Unit 1: Fundamentals of Food Chemistry**

Introduction to Food Chemistry, Composition of Major Food Components (Carbohydrates, Proteins, Lipids), Food Additives and Preservatives - Chemical Reactions in Food Processing - Food Quality and Flavor Development

# Unit 2: Analytical Techniques in Nutritional Analysis

Spectroscopy and Spectrophotometry in Nutritional Analysis - Chromatographic Methods for Food Analysis, Nutrient Analysis and Quantification - Food Labelling and Regulation - Laboratory Techniques in Nutritional Analysis

# **Unit 3: Food Safety and Quality Assurance**

Food Safety Principles and Hazards, Microbiological Safety and Control, Chemical Contaminants in Food, Quality Assurance and Control, Food Legislation and Regulatory Compliance

Textbook:

• Title: "Food Chemistry", Author: Owen R. Fennema, Taylor & Francis

Reference book:

Title: "Nutritional Biochemistry" Author: Tom Brody, Academic Press, 1999.

# (10 hours)

# (10 hours)

(10 hours)

# SRIASNM GOVERNMENT COLLEGE (A), Palakol, W.G. District (Affiliated to Adikavi Nannaya University, Rajamahendravaram) Accredited with NAAC "B+" Grade (3rd Cycle) **DEPARTMENT OF CHEMISTRY**

# **CERTIFICATE COURSE:** Food Chemistry and Nutritional Analysis

#### Course Duration: 30 hours

#### **Course Objectives:**

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- . To provide students with a foundational understanding of the chemical composition of food.
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Upon completing this unit, students will be able to:

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- . Demonstrate proficiency in using analytical techniques for food analysis.
- Apply quality assurance techniques to ensure the safety and quality of food products.

#### Unit 1: Fundamentals of Food Chemistry

Introduction to Food Chemistry, Composition of Major Food Components (Carbohydrates, Proteins, Lipids), Food Additives and Preservatives - Chemical Reactions in Food Processing - Food Quality and Flavor Development

Unit 2: Analytical Techniques in Nutritional Analysis

Spectroscopy and Spectrophotometry in Nutritional Analysis - Chromatographic Methods for Food Analysis, Nutrient Analysis and Quantification - Food Labelling and Regulation - Laboratory Techniques in Nutritional Analysis

#### Unit 3: Food Safety and Quality Assurance

Food Safety Principles and Hazards, Microbiological Safety and Control, Chemical Contaminants in Food, Quality Assurance and Control, Food Legislation and Regulatory Compliance

#### Textbook:

Title: "Food Chemistry", Author: Owen R. Fennema, Taylor & Francis .

#### Reference book:

Title: "Nutritional Biochemistry" Author: Tom Brody, Academic Press, 1999.

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