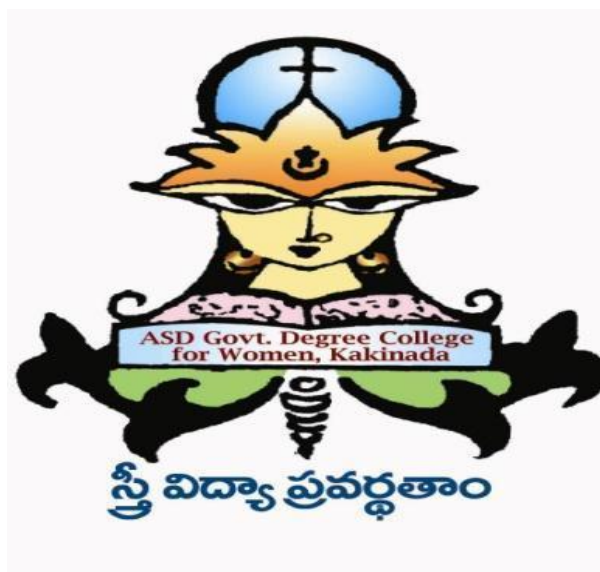


**A.S.D. Government Degree College for Women (Autonomous)
Kakinada**

UG BOARD OF STUDIES 2023-24



DEPARTEMENT OF CHEMISTRY

B.Sc CHEMISTRY

Curriculum for the Academic Year 2023-24

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**A.S.D. Government Degree College for Women (Autonomous)
Kakinada**

**BOARD OF STUDIES COMMITTEE COMPOSITION
2023-24**

As per the UGC regulations for autonomous colleges, dated 3rd April, 2023 the following are the guidelines regarding the composition and functions of Board of Studies of an autonomous college.

Composition of Board of Studies:

1. Head of the Department concerned (Chairperson).
2. One expert nominated by the Vice-Chancellor from a panel of six recommended by the Autonomous College Principal.
3. Two subject experts from outside the parent University nominated by the Academic Council.
4. One representative from industry/corporate sector/allied areas to be nominated by the principal.
5. One member of the College alumni to be nominated by the Principal.
6. All faculty members of the Department.
7. Two student members from second and third years

Term: The term of the nominated members shall be three years.

Meetings: Meeting of the Board of Studies shall be held once in a year.

Functions:

The Board of Studies shall recommend the following to the Academic Council:

- (a) Courses of studies;
- (b) Measures for the improvement of the standards of teaching and research;
- (c) Any other academic matter

**Proceedings of the Principal, A.S.D. Govt Degree College for Women (A) Kakinada
Present : Dr.V.Anantha Lakshmi, M.Sc,M.Phil,Ph.D**

Rc.No.

Sub: A.S.D GDC (W)(A), Kakinada-Board of Studies (BOS)-Program / Course
Nomination of members-Orders issued.

Ref: Resolutions adopted in Staff Council Meeting held on 15th Sept. 2023

ORDER:

The Principal, A.S.D GDC(W)(A), Kakinada is pleased to constitute Board of Studies in Chemistry for framing the syllabi during the academic year 2023-24 for all semesters duly following the norms of the UGC Autonomous guidelines dated 3rd April, 2023.

S.No.	Name of BOS member	Designation/Cat egory	Address	Mobile number & Email
1.	Dr. K. Anitha	Chairperson	Incharge of Chemistry Department ASD GDC W (A) Kakinada	9640880599 asd_chemistry_dept@asdgcw.ac.in
2.	Dr. V. Narayana Rao	University Nominee	Incharge of Chemistry Department, Govt. Degree College K. Perumallapuram	8328673942 vykuntham.n@gmail.com
3.	Dr. S.Priyadarshini	Subject Expert – SRR & CVR College, Krishna University	Assistant Professor of Chemistry, SRR & CVR College, Krishna University	8074822762
4.	Dr. Muralasetti Nookaraju	Subject Expert- JNTUK, Kakinada	Associate Professor of Chemistry Aditya College of Engineering and Technology Surampalem – 533437	9951847366 mnookarajuphd@gmail.com
5.	Sri Ch. Satyanarayana Murthy	Industry Expert	Director Lord Venky Pharma Ltd YANAM UT of Pondicherry	9699335577 chsnmurthy@gmail.com
6.	Dr. K. Jhansi Lakshmi	Member	ASD GDC W (A) Kakinada	9441236409
7.	Smt. P. Leena	Member	ASD GDC W (A) Kakinada	9505964656
8.	Mrs. M. Subbalakshmi	Member	ASD GDC W (A) Kakinada	7095490644
9.	Ms. S. Vijaya Lakshmi	Meritorious Alumnus	P. R. Govt. College (A) Kakinada	9133941966
10.	Malladi Sudhasri	Student	B. Sc (Second Year) (MPC)	9502319369
11.	A. Y. Sri Naga Mounika	Student	B. Sc (Second Year) (CBZ)	9849585799

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A) KAKINADA
Affiliated to Adikavi Nannaya University, Rajamahendravaram

DEPARTMENT OF CHEMISTRY
List of Courses offered

Board of Studies Resolutions for

Single Major System Programmes

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

Conventional Programmes

- Mathematics, Physics & Chemistry (EM)
- Botany, Zoology & Chemistry (EM)

Re-Structured Programmes

- Micro-Biology, Botany & Chemistry (EM)
- Botany, Chemistry & Horticulture (EM)
- Zoology, Chemistry & Aquaculture (EM)

Honours Programmes

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

Multidisciplinary Course

- Principles of Chemical Sciences

Certificate Course

- **Certificate Course in Basic Chemistry Molecular Modelling Softwares**
(Chem draw)

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A) KAKINADA
Affiliated to Adikavi Nannaya University, Rajahmundry

DEPARTMENT OF CHEMISTRY

Agenda of BOS - September, 2023.

AGENDA:

1. To approve the curriculum, blue print and model paper for 1st year course under CBCS for the admitted batch 2023 -24(I & II Semesters).
2. To approve the curriculum, blue print and model paper for II year under CBCS for the admitted batch 2022 -23 (III & IV Semesters)
3. To approve the curriculum, blue print and model paper for III-year Course under CBCS for the admitted batch 2021 -22 (V and VI Semesters).
4. To approve the **Certificate and Value added Courses** offered by the department.
5. To approve the incorporation of additional inputs to various courses (wherever it is felt necessary) for enhancing students understanding over the concerned course and this shall not be considered for evaluation purpose.
6. To approve the **Examination procedure for the courses for I, II, III years** (2023-24, 2022-23 & 2021-22 admitted batches).
7. To approve the **Continuous Internal Assessment pattern** for 2021-2022, 2022-23 and 2023- 24 admitted batches.
8. Assessment pattern for the Semester end theory examination and **semester end practical examination** for 2021-2022, 2023-24 and 2022-23 admitted batches. Assessment pattern for the CIA for lab work/practical work and Semester end practical examination .
9. To approve **assessment process for I, II and III Internships.**
10. To approve the proposed departmental activities for 2023-24.
11. Encouraging the students to complete at least one MOOCS course on SWAYAM Platform during the period of study.
12. To approve the best practices of the department.
13. To approve the induction cum Bridge Course.
14. To discuss and approve the feedback mechanism of the department.
15. To approve the list of examiners and paper setters for the academic year 2023-24.
16. Any other item with the permission of the chair.

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A) KAKINADA

Affiliated to Adikavi Nannaya University, Rajahmundry

DEPARTMENT OF CHEMISTRY

Minutes of the Board of Studies Meeting - September, 2023.

DATE: -09-2023

TIME: 10.00 AM

The Board of studies meeting of the Chemistry Department, convened on 26-09-2023 at 11.00 AM in hybrid mode (Both online and offline) in Chemistry lab under the Chairmanship of Dr K. Anitha, Lecturer in-charge of the department. The members present discussed various aspects such as design of curriculum, changes made in the syllabii, model question papers, practicals, scheme of valuation, Certificate course, Multi disciplinary course for the academic year 2023-2024 and made the following resolutions.

RESOLUTIONS:

It is resolved to

1. Implement the designed syllabii, blue prints and model question papers for Major and Minor theory and practicals courses for I, II semester of I B.Sc. Chemistry (Hons.) for the 2023-24 admitted batch according to the NEP-2020:
2. Implement the designed syllabii, blue prints and model question papers for theory and practicals of B.Sc (Chemistry) Programmes of III, IV and V/VI semesters as per Choice Based Credit System for the Academic Year 2023-24.
3. Adopt and implement micro scale experimentation for qualitative analysis and two burette method for volumetric analysis for all practicals/wherever is possible in all semesters.
4. Implement the Certificate Course -“Chemdraw” for the academic year 2023-24. The certificate and value added courses to be offered in I or II semesters and the final evaluation of the certificate or value added courses to be conducted by the examination cell from the admitted batch 2023-24.
5. **Additional inputs** to various courses placed at the end of syllabus.
6. **EVALUATION:** Evaluation for each course will be done as follows:It is resolved to set no minimum pass for Internal Assessment in Choice based Credit System (CBCS).
 - a) Each theory subject is evaluated for 100 Marks out of which 60 Marks through semester end examination and internal assessment would be for 40 Marks for 2022-23

and 2023-24 admitted batches. The minimum pass mark for external examinations is 21 marks (35%), but as a whole student should obtain 40% marks (40 out of total 100 marks) to pass the subject.

b) For 2021-22 admitted batches, each theory subject is evaluated for 100 Marks out of which 75 Marks through semester end examination and internal assessment would be for 25 Marks. The minimum pass mark for external examinations is 26 marks (35%), but as a whole student should obtain 40% marks (40 out of total 100 marks) to pass the subject.

7. Continuous Internal Assessment pattern: CIA structure for Single Major System for 2022-2023 and 2023-2024 admitted Batches.

- CIA assessment is done for 50 marks out of which 35 marks are for Mid examinations. In each semester two mid examinations to be conducted.
- I mid examination is to be conducted for 30 marks and scaled down to 20 marks
- II mid examination to be conducted for 30 marks and scaled down to 15 marks
- 5 marks for assignment, 5 marks for seminar and 5 marks for clean and green are allotted.
- As 40 marks are allotted for internal assessment, these 50 marks are to be scaled down to 40 marks.

I mid	II mid	Total	Assignment	Seminar	Clean & green	Total	Scaled down to
20 marks	15 marks	35 marks	5 marks	5 marks	5 marks	50 marks	40 marks

CIA structure for 2021-22 admitted batch

CIA assessment is done for 50 marks out of which 35 marks are for Mid examinations. In each semester two mid examinations to be conducted.

- I mid examination is to be conducted for 30 marks and scaled down to 20 marks
- II mid examination to be conducted for 30 marks and scaled down to 15 marks
- 5 marks for assignment, 5 marks for seminar and 5 marks for clean and green are allotted.
- As 25 marks are allotted for internal assessment, these 50 marks are scaled down to 25 marks.

I mid	II mid	Total	Assignment	Seminar	Clean & green	Total	Reduced to
20 marks	15 marks	35 marks	5 marks	5 marks	5 marks	50 marks	25 marks

- To adopt the model question paper for semester end examinations containing:
 - a. Section- A consisting of 8 Short answer questions out of which the student should answer any five, each question carrying 4 marks.
 - b. Section- B consisting of 5 Essay questions with internal choice, one question from each unit carrying 8 marks.
 - To follow the same question paper pattern for 2021-2022 admitted batch with each essay question carrying 10 marks and short answer question carrying 5 marks.
 - The composition of the question paper is as per the blueprint given.
8. **Assessment pattern for the CIA for multi-disciplinary courses (MDC), Skill Enhancement Courses (SEC), practical work and Semester end practical examination.**

For 2023-24 admitted batch, 10 marks to be allotted for continuous internal assessment and the semester end theory examination to be conducted for 40 marks for multi-disciplinary courses (MDC) and Skill Enhancement Courses (SEC). Principles of Chemical Sciences adopted as multidisciplinary course.

- For continuous internal assessment, five assignments should be submitted by the students and each assignment to be evaluated for 2 marks. The model question paper for semester end examination includes:
 - a. Section- A consisting of 6 Short answer questions out of which the student should answer any four , each question carrying 4 marks
 - b. Section- B consisting of 3 Essay questions with internal choice, one question from each unit carrying 8 marks.

CIA assessment to be allotted 10 marks i.e., for the practical observation book-5M, Attendance >90%-5M, Attendance >80%-4M, Attendance >75%-3M, Attendance >60%-2M, and Semester end Practical examination to be conducted for 40 marks. Scheme of evaluation for each practical paper given at the end of syllabus. Record work is allotted 7 marks and viva to be

conducted for 3 marks. Practical assessment both internal and final practical examination put together will be for 50 marks.

10. Assessment process for I, II and III Internships will be done as follows:

First internship (Community Service Project) will be taken up after the I year II semester end examinations or the summer vacation in the intervening 1st and 2nd years of study. The assessment is to be conducted for 100 marks. The number of credits assigned is 4. Later the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightage shall be:

Project Log	20%
Project Implementation	30%
Project report	25%,
Presentation	25%

Second Internship shall be undertaken by the students in the intervening summer vacation between the 2nd and 3rd years or after the II-year IV semester end examinations. There will be only internal evaluation for this internship. The assessment is to be conducted for 100 marks and the credits assigned are 4. The marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightage shall be:

Project Log	20%
Project Implementation	30%
Project report	25%
Presentation	25%

Third internship shall be for the entire 5th/6th Semester, the student shall undergo **Apprenticeship / Internship / On the Job Training**. The assessment for the V / VI Semester long apprenticeship is for **200 marks and credits assigned are 12**. The assessment for this internship / on the job training will be both internal and external assessment. The internal assessment will be for 25% of marks which will be continuous and the assessment by the industry / enterprise / organization where the student does his/her internship will be indicated in grades. The Project Presentation is to be made by the student after he/she reports back to the College. Grading given by the Company / Business unit / Enterprise where the student has undergone the training and these grades shall be converted into marks on the scale followed by the University.

The weightage shall be:

Internal Assessment Component	Max. Marks	Marks Awarded
Project Log	10	
Project Implementation	20	
Project Report	10	
Presentation	10	
TOTAL	50	
External Assessment Component	Max. Marks	Marks Awarded
Performance Assessment by the Evaluation Committee, converting the grades awarded by the industry, enterprise, etc	100	
External Viva Voce	50	
Total	150	
Grand Total	200	

11. It is resolved to conduct Departmental activities such as Chemistry Day celebrations, Industrial Visits, Seminars, Workshops, and Extension activities etc.

LIST OF ACTIVITIES PROPOSED FOR THE ACADEMIC YEAR, 2023-24

S.No.	Month	WEEK/ DATE	Name of the activity	Remarks
1	September	1 st Week	Bridge Course	
		16 th	World Ozone Day	
2	October	2 nd Week	Workshop-Micro scale experiments	
		3 rd Week	Mole day	
		4 th Week	Awareness programme on Brest cancer	
		4 th Week	Mobile Chemistry laboratory	
3	November	2 nd Week	National Seminar/Webinar	
		3 rd Week	Industrial visit	
		3 rd Week	Guest lecture	
4	December	4 th	Chemical Disaster Prevention Day	
		10 th	Noble prize Day-National quiz	
		3 rd Week	Joy of Giving Awareness programme	
		4 th week	Plastic free Awareness Programme	
5	January	1 st Week	Each one teach one	
		2 nd week	Remedial coaching for Sem I students	
		4 th week	CIE III , IV & VI	
6	February	7 th	National Periodic Table Day	
		28 th	National Science Day	
		28 th	Open day for Junior College Students	
7	March	22 nd	World Water Day	
		4 th Week	CIE III , IV & VI	
8	April	22 nd	World Earth Day	
		4 th Week	Practicals	
9	June	4 th Week	P.G Coaching	
		June 5 th	World Environment Day	
		21 st	International Yoga Day	
		28 th	International Day Against Drug Abuse and Illicit Trafficking	

10	July	12 th July	E.J.Corey Birthday	
		2 nd Week	Open day for Junior College Students	
		3 rd Week	Career opportunities for Chemistry students	
11	August	1 st Week	Students Out Reach programme	
		3 rd Week	Mobile Chemistry laboratory	

9. It is resolved to **encourage students to complete at least one MOOCS course** on SWAYAM Platform during the period of study.

10. It is resolved to adopt and implement following best practices in the department of Chemistry

1. Microscale experiments.
2. Mobile Chemistry laboratory.
3. PGCET Coaching to UG students.
4. Student Outreach Programme.
5. Openday for junior college students.
6. Each one teach one.

14. It is resolved to conduct induction training from 18th August - 29th August and Bridge Course from 30th August- 7th September.

15. It is resolved to take student satisfaction survey for the department through Google form.

16. It is resolved to constitute a new Panel of paper setters and examiners.

17. Any other item with the permission of the chair.

B.Sc Major - Chemistry
First Semester Structure

S. No	Subject / paper	Title	Teaching department(s)	Total hrs/week	Remarks	Department conducting BOS
1.	Major Paper- I	Essentials and applications of Mathematical, Physical and Chemical Sciences	Mathematics, Physics, Chemistry & Computer science	05	No Lab	Physics
2.	Major Paper - II	Advances in Mathematical, Physical and Chemical Sciences	Mathematics, Physics, Chemistry & Computer science	05	No Lab	Physics
3.	Multidisciplinary courses	Introduction to Social Work	Political science	02	A student has to choose ONE course from among the six courses listed against the semester.	Political Science
Principles of Psychology		Home Science	Home Science			
Indian History		History	History			
Principles of Biological Sciences		Botany & Zoology	Botany			
4.	Skill courses (2 paper)	Entrepreneurship Development	Commerce	Each course/ Paper 2 hrs per week	A student has to choose any TWO of four courses	Commerce
Leadership Skills		Any department	Telugu			
Analytical Skills		Mathematics	Mathematics			
Communication Skills		English	English			
5.	English	A Course in Communication and Soft Skills	English	04		English
6.	Telugu/ Hindi/ Sanskrit	Relevant paper	Telugu/Hindi/ Sanskrit	04		Telugu/Hindi/ Sanskrit
Total work load				24 hrs / week		

**B.Sc Chemistry Honours with single Minor
Second Semester Structure**

S.No	Subject/paper	Title	Teaching department	Total hrs /week	Remarks
1.	Major III	General & Inorganic Chemistry	Chemistry	3	
2	Major-III Practical (General)	Analysis of Simple Salt	Chemistry	2	
3	Major-IV (General)	Inorganic Chemistry	Chemistry	3	
4	Major-IV Practical (General)	Preparation of Inorganic Compounds	Chemistry	2	
5	Minor I			3+2= 5Hrs	
6	First Language		English	4 Hrs	
7	Second Language		Telugu/Hindi/ Sanskrit	4 Hrs	
8	Skill Enhancement Course I & II	Business Writing	English	2+2= 4 Hrs	A student has to choose any TWO of four courses
		Marketing Skills	Commerce		
		Investment Planning	Commerce		
		Stock Market Operations	Economics		
		Digital Literacy	Computer Science		
Total work load				27 Hrs	

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A) KAKINADA

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**B.Sc. PROGRAMME - COURSE STRUCTURE IN
CHEMISTRY UNDER CBCS 2023 – 24**

S. No.	Programme Combination	Course Code	Title of the Course	Hrs/Week	Max. Marks	Marks in SEE	Marks In CIA	Credits
II B.Sc. Semester - III								
1	All combinations	CHE203303	Organic Chemistry and Spectroscopy	04	100	60	40	3
2	All combinations	CHE203303P	Practical-III: Organic Chemistry and Spectroscopy Practcal	02	50	40	10	2

II B.Sc. Semester - IV								
3	All combinations	CHE204305	Inorganic, Organic and Physical Chemistry	03	100	60	40	3
4	All combinations	CHE204305P	Practical-IV Inorganic, Organic and Physical Chemistry Practcals	02	50	40	10	2
5	All combinations	CHE204306	Inorganic and Physical Chemistry	03	100	60	40	3
6	All combinations	CHE204306P	Practical-V: Inorganic and Physical Chemistry practcals	02	50	40	10	2

III B.Sc. Semester - V/VI								
7	All combinations		Synthetic Organic Chemistry	03	100	60	40	3
8	All combinations	CHE-114AP	Practical-VIA: Synthetic Organic Chemistry	02	50	40	10	2
9	All combinations	CHE-115A	Analysis of Organic Compounds	03	100	60	40	3
10	All combinations	CHE-115AP	Practical-VIIA: Analysis of Organic Compounds	02	50	40	10	2
11	All combinations	CHE-114B	Analytical Methods in Chemistry-1	03	100	60	40	3
12	All combinations	CHE-114BP	Practical-VIB: Analytical Methods in Chemistry-1	02	50	40	10	2
13	All combinations	CHE-115B	Analytical Methods in Chemistry-2	03	100	60	40	3
14	All combinations	CHE-115BP	Practical-VIIB: Analytical Methods in Chemistry-2	02	50	40	10	2
15	All combinations	CHE205305-6D	Environmental Chemistry	03	100	60	40	3
16	All combinations	CHE205305-6DP	Environmental Chemistry -P	02	50	40	10	2
17	All combinations	CHE205306-7D	Green Chemistry and Nanotechnology	03	100	60	40	3
18	All combinations	CHE205306-7DP	Green Chemistry and Nanotechnology -P	02	50	40	10	2

LIST OF EXAMINERS AND PAPER SETTERS


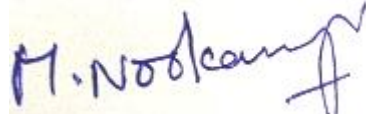

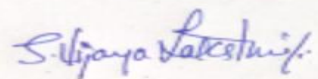
S. No.	Name of the Lecturer/Reader	College Address	Papers Taught
01	Dr. V. Mallikhajuna Sharma	GDC, Jaggampets	All
02	Dr. D. Chenna Rao	GDC, Yeleswaram	All
03	Sri T.Srinivas	Govt. College (A), Rajahmundry	All
04	Sri Y. Jacobe	Govt. College (A), Rajahmundry	All
05	Sri Shanthakumari	Govt. College (A), Rajahmundry	All
07	Dr. V. Narayana Rao	GDC, Perumallapuram	All
08	Sri S.Dhilleswararao	GDC, Tuni	All
09	Dr B Madhav	GDC, Seetanagaram	All
10	Smt V. Anantalakshmi	GDC, Pitapuram	All
11	Dr A.Srinivasarao	GDC, Tuni	All
12	Dr K.Ravendrababu	S.C.I.M. Govt. College, Tanuku	All

Date: 26-09-2023

**Chairman,
Board of Studies,
Department of Chemistry.**

List of BOS members

The following members attended the Board of studies meeting:

S.No.	Name of BOS member	Signature
1.	Dr. K. Anitha Chairperson Incharge of Chemistry Department, ASD GDC W (A) Kakinada	
2.	Dr. V. Narayana Rao University Nominee Incharge of Chemistry Department, GDC K. Perumallapuram	
3.	Dr. S.Priyadarshini Subject Expert – SRR &CVR College, Krishna University	
4.	Dr. Muralasetti Nookaraju, Subject Expert-JNTUK, Kakinada Associate Professor of Chemistry Aditya College of Engineering and Technology Surampalem –	
5.	Sri Ch. Satyanarayana Murthy Industry Expert Director Lord Venky Pharma Ltd YANAM UT of Pondicherry	
6.	Dr. K. Jhansi Lakshmi, Staff Member	
7.	Smt. P. Leena, Staff Member	
8.	Mrs. M. Subbalakshmi, Staff Member	
9	Vijaya Lakshmi Sada, Alumni	

The following documents submitted to the Academic coordinator and Controller of Examinations:

1. Resolutions of Board of Studies Meeting
2. Syllabii of I to VI semesters.
3. Model question papers for I to VI semesters.
4. Revised List of Examiners

SEMESTER – I
I B.Sc. CHEMISTRY (HONOURS)
 (Course – 1 & 2)

	A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA	Program & Semester I B.Sc. Chemistry (H) I Semester			
Course Code	TITLE OF THE COURSE Course – 1: Essentials of Mathematics, Physics, Chemistry & Computer Science				
Teaching	Hours Allocated: 60 (Theory and Activities) (5 Hrs./wk.	L	A	P	C
Pre-requisites	Basic knowledge about Mathematics, physics, Chemistry and Computer science	4	1	-	4

Course Objectives:

1. To provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences.
2. 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:

On Completion of the course, the students will be able to		Cognitive Domain
CO1	Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.	Critical Thinking
CO2	To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations	Application
CO3	To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life.	Application
CO4	ore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, intermeasures.	Application

Syllabus:

UNIT I: ESSENTIALS OF MATHEMATICS: 9hrs

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: 9hrs

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

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.

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.

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

Additional inputs: Probability, Chemical bonding, Octet rule, VB theory, MO theory, Drug development , Food adulteration, Computer Architecture .

Reference 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. Chemistry in daily life by Kirpal Singh
8. Chemistry of bio molecules by S. P. Bhutan
9. Fundamentals of Computers by V. Raja Raman

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	3	3	3
CO2	3	2	3	3	2	3	3	1	3	3	3	2	3
CO3	3	3	3	3	2	2	2	2	2	3	3	2	2
CO4	3	2	2	2	2	2	3	3	1	1	2	2	2
Avg.	2.75	2.5	2.5	2.75	2.25	2.5	2.25	2	2	2.5	2.75	2.25	2.5

Student Activities (15 hrs)**Unit – I: Mathematics****3 hrs.**

1: Complex Number Exploration Provide students with a set of complex numbers in both rectangular and polar forms.

2: Trigonometric Ratios Problem Solving Give students a set of problems that require the calculation of trigonometric ratios and their relations.

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.

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).

Unit – II: Physics**3 hrs.**

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.

Unit – III: Chemistry

3 hrs.

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.

2: Periodic Table Exploration Provide students with a copy of the periodic table. Students will explore the periodic table and its significance in organizing elements based on their properties.

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.

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.

Unit – IV: Applications of Mathematics, Physics and Chemistry

3 hrs.

1: 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, analyzing the behavior of electrical circuits, or measuring the properties of materials.

2: Mathematical Modeling Present students with real-world problems that require mathematical modeling and analysis

UNIT V: ESSENTIALS OF COMPUTER SCIENCE:

3 hrs.

1. Identifying the attributes of network (Topology, service provider, IP address and bandwidth
2. Your college network) and prepare a report covering network architecture.
3. Identify the types of malwares and required firewalls to provide security.
4. Latest Fraud techniques used by hackers.

A.S.D GOVERNMENT DEGREE COLLEGE FOR WOMEN(A), KAKINADA

Semester End examinations model question paper

Year I

SEM - I

Course : Essentials and applications of Mathematical Physical and Chemical sciences.

TIME: 3hrs

Course Code :

MAX MARKS:60M

SECTION-A

Answer any Five Questions

5X4=20

Each question carries Four Marks.

1. If $\sec\theta = \frac{2}{3}$ Then find the value of $\frac{2\sin\theta-3\cos\theta}{4\sin\theta-9\cos\theta}$
2. If the mean of the numbers $27+x, 31+x, 89+x, 107+x, 156+x$ is 82. then find the mean of $130+x, 126+x, 68+x, 50+x, 1+x$.
3. What are Acoustic waves? what are their uses?
4. Write short note on Newton's law of motion and explain their limitations?
5. Write the classifications of matter?
6. Write short note on the role of physics in the robotics?
7. Write about environmental sustainable technologies
8. What is an I.P address? How firewall works?

SECTION-B

Answer any Five Questions.

Each question carries Eight Marks.

5x8=40M

1. a) Express the modulus –Amplitude form of $\sqrt{3} - i$.

OR

- b) If $\vec{a} = \vec{i} + \vec{j} + \vec{k}$ and $\vec{b} = \vec{j} - \vec{k}$. find a vector \vec{c} such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a} \cdot \vec{c} = 3$

2. a) Write an essay on Newtonian mechanics and relativistic mechanics?

OR

- b) Write an essay on Laws of thermodynamics with their significance?

3. a) What are vitamins ? write the classification of vitamins & explain the water soluble vitamins?

OR

- b) Write the importance of chemistry in daily life ?

4. a) If $x^3 + y^3 = 3axy$. find $\frac{dy}{dx}$

OR

- b) The position of an object at any time 't' is given by $s(t) = 3t^4 - 40t^3 + 12t^2 - 9$

i. Determine the velocity of the object at any time 't'

ii. Does the object ever stop moving ?

5. a) Explain in detail about Cryptography.

OR

- b) Discuss various types of Networks.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
I B.Sc. CHEMISTRY (H)
SEMESTER - I
QUESTION PAPER BLUE PRINT
Course -1: ESSENTIALS OF MATHEMATICS, PHYSICS, CHEMISTRY &
COMPUTER SCIENCE

TIME: 3 hrs.

Max. MARKS: 60

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS.

Units	Course Content	Essay questions(with choice)(8M)	Short answer questions (with choice)(4M)	Total
I	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

	A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA	Program & Semester I B.Sc. Chemistry (H) I Semester			
Course Code	TITLE OF THE COURSE Course – 2: Advances of Mathematics, Physics, Chemistry & Computer Science				
Teaching	Hours Allocated: 60 (Theory and Activity) (5 hrs. / wk.)	L	A	P	C
Pre-requisites	Basic knowledge about Mathematics, Physics, chemistry and Computer science	4	1	-	4

Course Objectives:

1. To provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences.
2. 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:

On Completion of the course, the students will be able to		Cognitive Domain
CO1	Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.	Application
CO2	To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations.	Application
CO3	Understand the different sources of renewable energy and their generation processes and advances in nanomaterial's and their properties.	Application
CO4	Understand and convert between different number systems, such as binary, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics.	Application

Syllabus:

UNIT I: ADVANCES IN BASICS MATHEMATICS

9hrs

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:

9hrs

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

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

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: Nanomedicine, Application of biophysics: Biophysical Imaging, Biomechanics, Neurophysics, Application of medical physics: Radiation Therapy, Nuclear medicine Solid waste management, Environmental remediation- Green Technology, Water treatment.

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.

Additional inputs: Methods in Matrix, Nanomaterials in drug delivery, Metal organic frame works and their role in dye removal, Nanotechnology, Principles of Green Chemistry, Demultiplexing.

Reference 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 PrakashanMedia(P)Ltd.
4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle
5. "Energy Storage: A Nontechnical Guide" by Richard Baxter
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 BahrouzForouzan.

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	3	3	3
CO2	3	2	3	3	2	3	3	1	3	3	3	2	3
CO3	3	3	3	3	2	2	2	2	2	3	3	2	2
CO4	3	2	2	2	2	2	3	3	1	1	2	2	2
Avg.	2.75	2.5	2.5	2.75	2.25	2.5	2.25	2	2	2.5	2.75	2.25	2.5

Student Activities (15 hrs.)**UNIT I: ADVANCES IN BASIC MATHEMATICS****3 hrs.**

- 1: Straight Lines Exploration Provide students with a set of equations representing straight lines in different forms, such as slope intercept form, point-slope form, or general form.
- 2: Limits and Differentiation Problem Solving Students will apply the concept of limits to solve various problems using standard limits.
- 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.
- 4: Matrices Manipulation Students will perform operations on matrices, including scalar multiplication, matrix multiplication, and matrix transpose.

UNIT II: ADVANCES IN PHYSICS:**3 hrs.**

1: Experimental Design Assign students to design and conduct experiments related to one of the topics: renewable energy, nanotechnology, biophysics, medical physics,

2: Group Discussion and Debate Organize 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.

UNIT III: ADVANCES IN CHEMISTRY:**3 hrs.**

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.

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 analyze the case studies, identify the sources and effects of chemical pollutants, and propose mitigation strategies to minimize their impact.

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.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY**3 hrs.**

1: Mathematical Modeling Experiment Provide students with a mathematical modeling experiment related to one of the topics. For example, in the context of renewable energy, students can develop a mathematical model to optimize the placement and configuration of solar panels in a solar farm..

2: Case Studies and Group Discussions Assign students to analyze case studies related to the applications of mathematical modeling in nanotechnology, biophysics, and medical physics, solid waste management, environmental remediation, or water treatment.

3. Group Project

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

UNIT V: Advanced Applications of computer Science**3 hrs.**

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

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
I B.Sc. CHEMISTRY (H)
SEMESTER - I
QUESTION PAPER BLUE PRINT
Course -2: ADVANCES OF MATHEMATICS, PHYSICS, CHEMISTRY &
COMPUTER SCIENCE

TIME: 3 hrs.

Max. MARKS: 60

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS.

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

SEMESTER – II
I B.Sc. CHEMISTRY (HONOURS)
 (Course –III & IV)

	A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA	Program & Semester I B.Sc. CHEMISTRY (H) SEMESTER - II			
Course Code	TITLE OF THE COURSE Course -III: GENERAL & INORGANIC CHEMISTRY				
Teaching	Hours Allocated: 45 (Theory) (3 hrs. / Wk.)	L	T	P	C
Pre-requisites:	Basic knowledge about inorganic chemistry and elements	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. Get knowledge on different theories of acids and bases and their applications

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	1. Understand the structure of atom and the arrangement of elements in the periodic table.	Understanding
CO2	2. Understand the nature and properties of ionic compounds.	Understanding
CO3	3. Explain the existence of special types of compounds through weak chemical forces.	Application
CO4	4. Define acids and bases and predict the nature of salts.	Application

Syllabus:

Unit - I: Atomic Structure and Periodic table

9 h

Electronic configuration: Bohr theory, dual nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Aufbau principle).

Periodicity: Periodic law and arrangement of elements in the periodic table (Groups and Periods) General properties of atoms: size of atoms and ions-atomic radii, ionic radii, covalent radii; trend in ionic radii, ionization potential, electron affinity; electro negativity - Pauling, Mulliken-Jaffe, Allred-Rochow definitions; oxidation states and variable valency; isoelectronic relationship; inert-pair effect;

UNIT - II: Ionic bond**9 h**

Properties of ionic compounds, factors favoring the formation of ionic compounds, ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation of ionic compound and stability. Stability of ionic compounds in terms of ΔH_f and U_o . Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds-polarization and Fajan's rules and its applications.

UNIT - III: The Covalent Bond**9 h**

Valence Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules- BeCl_2 , BF_3 , CH_4 , PCl_5 , SF_6 , effect of bonding and nonbonding electrons on the structure of molecules, effect of electronegativity,

Isoelectronic principle, illustration of structures by VESPR model: NH_3 , H_2O , SF_4 , XeF_4 , XeF_6

Molecular orbital theory -LCAO method, construction of M.O. diagrams for homonuclear and hetero-nuclear diatomic molecules (N_2 , O_2 , CO and NO)

UNIT - IV: Metallic and Weak Bonds**9 h**

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 - V: Acids and Bases 9 h

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 and Soft-Soft combinations.

Additional inputs:

Schrodinger Equation Derivation, Metals, Non-Metals, Metalloids, Coloumbs Law and Bornlande Equation, Applications of Semi Conductors, Similarities and differences between Ionic and Metallic Bonds, Characteristics of Covalent Bond, Theories of Acid Base indicators : Ostawalds Theory and Benzenoid Quininoid Theory.

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, 3 rd ed., W. H. Freeman and Co, London.

CO-PO Mapping:

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

	P O 1	P O 2	P O3	P O 4	P O 5	P O6	P O 7	P O8	P O 9	PO 10	PS O1	PS O2	PS O3
CO 1	3	2	3	2	2	2	3	3	2	2	3	3	3
CO 2	2	3	3	3	3	2	1	2	2	3	2	2	3
CO 3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO 4	2	1	2	1	3	2	3	1	2	3	2	3	2
Av g.	2.5	2.25	2.7 5	2.0	2.5	1.7 5	2.0	2.0	2.25	2.25	2.25	2.75	2.75

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
I B.Sc. CHEMISTRY (H)
SEMESTER – II
QUESTION PAPER BLUE PRINT
Course -III: GENERAL AND INORGANIC CHEMISTRY

TIME: 3 hrs.

MARKS: 60 M

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS.

Sl. No.	COURSE CONTENT	ESSAY	SHORT	Total Marks
1	UNIT - I	2	2	24
2	UNIT - II	2	2	24
3	UNIT - III	2	2	24
4	UNIT - IV	2	1	20
5	UNIT - V	2	1	20
Total		10	8	112

**A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA**

**UG SYLLABUS UNDER CBCS FROM 2023-24
SEMESTER-II**

COURSE -III [MAJOR AND MINOR]

GENERAL AND INORGANIC CHEMISTRY

MODEL QUESTION PAPER

Duration: 3hrs.

Max. Marks: 60

SECTION – A

**Answer any FIVE questions from the following. Each one carries 4 Marks.
5 X 4 = 20M**

1. Explain the following.
 - i. Heisenberg uncertainty principle
 - ii. Pauli's Exclusion Principle
2. Explain the following.
 - i. Inert pair effect
 - ii. Diagonal relationship
3. Write any four properties of ionic compounds.
4. Explain Fajan's rules with examples.
5. Explain the structures of BeCl_2 and CH_4 on the basis of VBT.
6. Write the important postulates of Molecular Orbital Theory.
7. Explain intermolecular and intramolecular Hydrogen bonding with examples.
8. Explain Arrhenius theory of acids and bases with examples.

SECTION – B

Answer ALL the questions. Each one carries 8 Marks.

5 X 8 = 40M

9. State modern periodic Law. Explain how the following properties vary in a period and in a group.
 - i. Ionic radii
 - ii. Ionization potential
 - iii. Electron affinity

(or)

10. Explain the following.
 - i. Heisenberg uncertainty principle

ii. Pauli's exclusion principle

iii. Hund's rule

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

(or)

12. Explain Born-Haber cycle.

13. Explain the Molecular Orbital Energy diagrams of O_2 and CO . Write their bond order and magnetic behavior.

(or)

14. Explain "VSEPR Theory" with examples.

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

(or)

16. Explain Free – electron theory of metals. Explain the properties of metals on the basis of this theory. Write its limitations.

17. Define Hard and Soft Acids and Bases and give examples. State HSAB principles and write its importance.

(or)

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

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

	A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE Course -III: ANALYSIS OF SIMPLE SALT	I B.Sc. CHEMISTRY(H) (II Semester)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Qualitative analysis of inorganic simple anions and cations	-	-	2	1

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
CO2	Usage of glassware, equipment and chemicals involved in salt analysis
CO3	Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis
CO4	Acquire knowledge of micro scale salt analysis procedure.

Syllabus:**Analysis of Inorganic SIMPLE SALT****40 M**

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

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate and Phosphate

Cations: Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Magnesium and Ammonium

1. A Text Book of Quantitative Inorganic Analysis - Vogel, A. I.
2. A Textbook of Elementary Qualitative Analysis. Third edition (Engelder, Carl J.)
3. Systematic Qualitative Analysis. K L Kapoor.

Web Links:

1. <https://youtu.be/adA8doZhqWs>

CO-PO Mapping:

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	2	3	2	2	3	3
CO2	3	3	3	2	3	2	2	3	2	3	3	3	3
CO3	3	2	3	2	3	1	2	2	2	2	2	3	2
CO4	3	3	2	1	3	2	2	1	2	3	3	3	3
Avg.	3	2.75	2.75	2	3	2	2	2	2.25	2.5	2.5	3	2.75

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
II SEMESTER END EXAMINATIONS
I B.Sc. CHEMISTRY 2023-24
Course -III: ANALYSIS OF SIMPLE SALT
(Micro-scale method)

Scheme of Valuation

Time: 3 hrs.

Max. Marks: 40

For Record - 7 Marks

For Viva-voce - 3 Marks

For Practical -30 Marks

Splitting of Practical Marks:

S.No.	Description	Marks
1.	Colour	01
2.	State	01
3.	Odour	01
4.	Solubility	01
5.	Flame Test	02
6.	Action of Heat	02
7.	Preparation of SCE	02
8.	Marks for each ion identification (2 ions)	04
9.	Marks for each ion conformation (2 ions)	04
10.	Report	04

	A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE Course -IV: INORGANIC CHEMISTRY	I B.Sc. Chemistry (H) (I Semester)			
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites	Basics in inorganic chemistry and elements	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:

On Completion of the course, the students will be able to	
CO1	Acquire knowledge on preparation and structure and Diborane and Borazole.
CO2	Identify the importance of Interhalogen compounds and pseudo halogens.
CO3	Comprehend the applications of d-block elements and f-block elements.
CO4	Identify the importance of Organo metallic compounds in Organic synthesis.

Syllabus:

UNIT –I Chemistry of p-block elements – I

9 h

Group 13: Preparation & structure of Diborane, Borazine and (BN)_x

Group 14: Preparation, classification and uses of silicones and Silanes.

Group 15: Preparation & structure of Phosphonitrilic Chloride P₃N₃Cl₆

Unit II Chemistry of p-block elements – II

9 h

Group 16: Classification of Oxides, structures of oxides and Oxoacids of Sulphur

Group 17: Preparation and Structures of Interhalogen compounds. Pseudo halogens,.

UNIT-III Chemistry of d-block elements:**9 h**

Characteristics of d-block elements with special reference to electronic configuration, variable valence, color, 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:**9 h**

Chemistry of lanthanides - electronic configuration, oxidation states, lanthanide contraction, consequences of lanthanide contraction, color, magnetic properties. Separation of lanthanides by ion exchange method. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

UNIT-V: ORGANOMETALLIC CHEMISTRY

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

Additional inputs: Oxyacids of Phosphorous, Zeolites, Classification of Interhalogen Compounds and their structures, Frost Diagrams, Comparison between d and f Block elements, Applications of radioactive f block elements in Cancer therapy, Metal Carbonyls, Structure of Ferrocene, EAN rule, 18-Electron rule.

List of Reference Books:

1. Inorganic Chemistry by J.E.Huheey
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. A textbook of qualitative inorganic analysis by A.I. Vogel
4. Concise Inorganic Chemistry by J.D.Lee

CO-PO Mapping:

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

	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O1 0	PS O1	PS O2	PS O3
CO1	3	2	3	2	2	2	3	3	2	2	3	3	3
CO2	2	3	3	3	3	2	1	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	1	2	1	3	2	3	1	2	3	2	3	2
Av g.	2.5	2.25	2.75	2.0	2.5	1.75	2.0	2.0	2.25	2.25	2.25	2.75	2.75

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
I B.Sc. CHEMISTRY (H)
SEMESTER – II
QUESTION PAPER BLUE PRINT
Course -IV: INORGANIC CHEMISTRY

TIME: 3 hrs.

MARKS: 60 M

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS.

Sl. No.	COURSE CONTENT	ESSAY	SHORT	Total Marks
1	UNIT - I	2	2	24
2	UNIT - II	2	2	24
3	UNIT - III	2	2	24
4	UNIT - IV	2	1	20
5	UNIT - V	2	1	20
Total		10	8	112

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
I B.Sc. CHEMISTRY (H)
SEMESTER – II
MODEL QUESTION PAPER
Course -IV: INORGANIC CHEMISTRY

Time: 3 hours

Maximum Marks: 60M

SECTION – A

Answer any FIVE questions from the following. Each one carries 4 Marks.
5 X 4 = 20M

1. Explain the structure of $P_3N_3Cl_6$.
2. Explain the preparation and structure of Borazole.
3. What is lanthanide contraction. Explain the consequences of Lanthanide Contraction.
4. Write the comparison between lanthanides and Actinides.
5. Explain the abnormal electronic configurations of Cr and Cu.
6. Write a short note on Latimer diagrams.
7. Write the differences between Lanthanides and Actinides.
8. Explain briefly about the classification of Organometallic compounds.

SECTION – B

Answer ALL the questions. Each one carries 8 Marks. **5 X 8 = 40M**

9. What are silicones? Write the classification, 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 AX₅ and AX₇ 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. Write the preparation and synthetic applications of Grignard reagents.

(OR)

18. Explain the preparation and synthetic applications of R-Li.

	A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE Course -IV: Preparation of Inorganic compounds	I B.Sc. CHEMISTRY(H) (II Semester)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Properties of various inorganic elements	-	-	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 Completion of the course, the students will be able to	
CO1	Understand the basic concepts of inorganic preparations
CO2	Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
CO3	Apply the properties of various elements for the preparation of inorganic compounds.
CO4	Acquire knowledge on the structures of inorganic compounds

Syllabus:

Preparation of Inorganic compounds

50 M

Preparation of following Inorganic compounds:

1. Crystallization of compounds and determination of melting point.
2. Preparation of Cuprous chloride.
3. Preparation of Potash Alum.
4. Preparation of Chrome Alum.
5. Preparation of Ferrous oxalate
6. Preparation of Ferrous ammonium sulphate.

Reference books:

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

CO-PO Mapping:

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	2	3	2	2	3	3
CO2	3	3	3	2	3	2	2	3	2	3	3	3	3
CO3	3	2	3	2	3	1	2	2	2	2	2	3	2
CO4	3	3	2	1	3	2	2	1	2	3	3	3	3
Avg.	3	2.75	2.75	2	3	2	2	2	2.25	2.5	2.5	3	2.75

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
II SEMESTER END EXAMINATIONS
I B.Sc. CHEMISTRY 2023-24
Course -IV: PREPARATION OF INORGANIC COMPOUNDS

Scheme of Valuation

Time: 3 hrs.

Max. Marks: 40

For Record - 7 Marks

For Viva-voce - 3 Marks

For Practical -30 Marks

Splitting of Practical Marks:

S.No.	Description	Marks
1.	Theory/ Principle	10
2.	Procedure	15
3.	Report	05

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2023-24
SECOND YEAR, SEMESTER– III
Paper III (ORGANIC CHEMISTRY & SPECTROSCOPY) 60 h (4 h / w)

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:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	Acquire the knowledge of analysis of materials by using UV and Visible light which helps in identification of impurities and conjugation in organic compounds and biological macro molecules.	Applying
CO2	Capable of identifying the functional groups present in organic molecules by using I.R. spectroscopy and molecular structure determination by using NMR spectroscopy which are useful in research.	Understanding
CO3	Get the knowledge of the bond nature of C-OH and C-X and how they are used in daily life and industries.	Understanding
CO4	Acquire the knowledge about carbonyl compounds, carboxylic acids and how they become backbone of organic chemistry.	Applying

UNIT –I

Chemistry of Halogenated Hydrocarbons: Alkyl Halides: Methods of preparation and properties, nucleophilic substitution reactions– SN1, SN2 and SNi 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; SN Ar, 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 Tetraacetate, Pinacol- Pinacolone Rearrangement;

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

UNIT II:

Carbonyl Compounds: Structure, reactivity, preparation and properties; Nucleophilic Addition, Nucleophilic Addition-elimination reactions with ammonia derivatives Mechanisms of Aldol and Benzoin Condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann Haloform Reaction And Baeyer Villiger oxidation, α - substitution reactions, oxidations and reductions (Clemmensen, Wolf–Kishner, with LiAlH_4 & NaBH_4). Addition Reactions Of α , β -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, effect of substituent acidic strength. Typical reactions of carboxylic 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 Hunsdiecker reaction, decarboxylation by Schmidt reaction, Arndt–Eistert synthesis, halogenation by Hell–Volhard–Zelensky reaction.

SPECTROSCOPY

30 h (2h / w)

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 (σ , π , 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:

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 λ_{\max} of conjugated dienes and α , β - 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: Classification and Nomenclature of Alkyl, Aryl and Aryl Alkyl Halides, Identification of Alcohols, Active methylene Compounds definition and Examples, Acidity of active methylene compounds, Mechanism of Nucleophilic Substitution reaction at SP^2 carbon, Comparison of reactivity of acid derivatives, Hypochromic Shift, Hyperchromic Shift, Solvent

effects in UV, IR, NMR spectroscopy, Structure determination from spectras (Three Combined problems).

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. & Aggarwal, R. Comprehensive Practical Organic Chemistry:Preparation and Quantitative Analysis,

Web Links:

1. <https://youtu.be/RqBAW-uFHK0>
2. <https://youtu.be/OiukFtC8E04>

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO2	3	2	2	3	3	2	2	2	2	3	2	2	3
CO3	1	2	3	3	2	1	1	2	3	1	2	3	1
CO4	3	3	2	2	3	2	3	1	2	3	1	2	3
Avg.	2.25	2.5	2.5	2.75	2.5	1.75	2.25	2.0	2.25	2.25	2.0	2.25	2.25

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA
A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
CHEMISTRY SECOND YEAR
SEMESTER – III
QUESTION PAPER BLUE PRINT
Course -3: ORGANIC AND SPECTROSCOPY - III

TIME: 3 hrs.

MARKS: 60 M

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS

Sl. No.	COURSE CONTENT	ESSAY	SA
1	UNIT - I	2	2
2	UNIT - II	2	1
3	UNIT - III	2	1
4	UNIT - IV	2	2
5	UNIT - V	2	2
Total		10	8

**A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
CHEMISTRY SECOND YEAR SEMESTER – III MODEL PAPER (2023-24)
ORGANIC CHEMISTRY AND SPECTROSCOPY**

Time: 3 h.

Max. Marks: 60

SECTION – A (Short Answer Questions)

Answer any **FIVE** from the following questions: (5x4 = 20 M)

1. Discuss two methods for preparation of aryl halides.
2. Explain the mechanism for Pinacol-Pinacolone rearrangement
3. Discuss the mechanism for Baeyer-Villiger oxidation reaction.
4. Explain the effect of substituents on acidic strength of mono-carboxylic acids.
5. Write the mechanism for Claisen Condensation reaction.
6. Write the selection rules in rotational spectroscopy.
7. Explain Spin – Spin coupling.
8. Explain types of electronic transitions in UV spectroscopy.

SECTION – A (Essay Questions)

Answer **ALL** the questions. Each carries **TEN** marks (5 X 8 = 40 M)

9. (a). Give the mechanism & stereochemistry of SN1 & SN2 reactions of alkyl halides with suitable example.

(OR)

- (b). Explain the following reactions.

- (i) Reimer-Tiemann reaction (ii) Fries rearrangement.

10. (a). Discuss the following reactions.

- (i) Perkin reaction. (ii) Cannizzaro reaction

(OR)

- (b). Write the preparation and any three synthetic applications of diethyl malonate.

11. (a). Explain acid and base hydrolysis reaction of esters with mechanism.

(OR)

(b). Explain Curtius rearrangement & Reformatsky reactions.

12. (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.

13.(a). Write Woodward-Fieser rules for calculating λ_{\max} for conjugated dienes and α, β – unsaturated carbonyl compounds, and apply them for one example each.

(OR)

(b).(i) What is Fingerprint region? Explain its significance with an example.

(ii) Write IR spectral data for any one alcohol, aldehyde and ketone

LABORATORY COURSE -III 30h (2 h / w)

Practical Paper-III (At the end of Semester-III)

Organic Preparations and IR Spectral Analysis Lab: 40 Marks

Course Objectives:

1. To interpret the IR spectra of functional groups.
2. To understand the methods of preparation like acylation, benzylation, nitration
3. To learn about some green approaches.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Know the preparative methods of some organic compounds
CO2	Interpret IR spectra which will be used in identifying the functional groups present in unknown samples.
CO3	Apply the knowledge of organic reactions in preparing some industrially important compounds.
CO4	Create some methods for preparation in green methods.

Organic preparations: 40 M

i. Acetylation of one of the following compounds:

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

- a. Using conventional method.
- b. Using green approach

ii. Benzylation of one of the following amines

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

iii. Nitration of any one of the following: Acetanilide/nitrobenzene by conventional method

IV. Nitration of Salicylic acid by green approach (using calcium nitrate and acetic acid).

V. Preparation of benzylidene aniline by condensation of benzaldehyde with aniline.

VI. Preparation of dibenzalpropanone from benzaldehyde and acetone by adopting green aldol condensation.

Preparation of 1-phenylazo β -naphthol by diazotization and coupling with β -naphthol.

IR Spectral Analysis: 10M

IR Spectral Analysis of the following functional groups with examples

- a) Hydroxyl groups
- b) Carbonyl groups
- c) Amino groups
- d) Aromatic groups

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
III SEMESTER END EXAMINATIONS
II B.Sc. CHEMISTRY 2022-23
ORGANIC PREPARATIONS AND IR SPECTRAL ANALYSIS - PRACTICAL

Scheme of Valuation

Time : 3 hrs

Max. Marks .40

- | | |
|----------------|----------|
| 1. Record | 7 Marks |
| 2. Practical | 30 Marks |
| 3. Viva - voce | 3 Marks |

Splitting of Practical Marks (35)

- | | |
|------------------------|------------|
| i) Principle/ Equation | : 5 Marks |
| ii) Procedure | : 10 Marks |
| iii) M.P. | : 3 Marks |
| iv) Report of yield | : 5 Marks |

Splitting of Practical Marks for IR spectral analysis:

Identification of the frequencies of the bonds present
in the given IR spectrum of an organic compound : 7 Marks

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2023-24
SECOND YEAR, SEMESTER– IV
Paper IV (Course 4) INORGANIC, ORGANIC & PHYSICAL CHEMISTRY
60 h (4 h / w)

Course Outcomes:

1. To understand the concept of hapticity and classification of organometallic compounds.
2. To learn constitution, configuration, ring structures, inter conversions of monosaccharides
3. To learn classification and preparation of amino acids and understand concept of isoelectric point and Zwitter ion.
4. To understand the aromatic character of 5 and 6 membered heterocyclic compounds
5. To learn concept of tautomerism and mechanisms of various named reactions in nitrogen containing compounds
6. To understand the three laws of thermodynamics and concept entropy, enthalpy and Gibbs free energy functions
7. To learn about the laws of absorption of light energy by molecules and subsequent photochemical reactions.
8. To understand the concept of quantum efficiency and mechanisms of photochemical reactions.

UNIT I:

Organometallic Compounds: Definition and classification of organometallic compounds on the basis of bond type, Concept of hapticity of organic ligands. Metal Carbonyls: 18electron 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; Killiani-Fischer synthesis and Ruff degradation; Disaccharides– Elementary Treatment of Maltose, lactose and sucrose. Polysaccharides–Elementary Treatment of starch.

UNIT III:

Amino acids and proteins: 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's synthesis.

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

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

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 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan. Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

UNIT IV:

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

1. 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.

2.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. Distinction between Primary, secondary and tertiary amines using Heinsberg'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 azo dyes).

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 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- Kirchhoff'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.

Continuous Evaluation: Monitoring the progress of student's learning Class Tests, Worksheets and Quizzes Presentations, Projects and Assignments Group Discussions: Enhances Critical Thinking Skills And personality.

Additional inputs: Applications of Organometallic compounds in Catalysis, Acetal, Ketal, Differences between reducing sugar and non reducing sugar, Differences between Glucose and Fructose, Enzymes, Comparison of Aromatic character of Furan, Thiophene and Pyrrole and Pyridine, Distinction between primary, secondary and tertiary nitroalkanes with HNO₂ and applications of nitroalkanes, Singlet and triplet states, Selection rules of UV-Visible spectroscopy, Determination of quantum yield with actinometer, with Photosynthesis, Examples of fluorophores, Resonance Fluorescence and delayed Fluorescence, Synthesis

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. Text book of physical chemistry by S Glasstone
6. Concise Inorganic Chemistry by J.D.Lee
7. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
8. A Text Book of Organic Chemistry by Bahl and Arunbahl
9. A Text Book of Organic chemistry by I L FinarVol I
10. A Text Book of Organic chemistry by I L FinarVol II

Web Links:

1. <https://youtu.be/lsNalwRnaq0>
2. https://youtu.be/BZ_tY88o0oI

CO-PO Mapping:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	3	3	2	2	3	3	3
CO2	2	3	3	3	3	2	2	2	2	3	2	2	3
CO3	3	2	3	2	2	3	2	2	3	2	3	3	3
CO4	2	3	1	1	3	2	3	2	2	3	3	2	2
CO5	2.5	2.5	2.5	2	2.5	2.25	2.5	2.25	2.25	2.5	2.75	2.5	2.75

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

KAKINADA

CHEMISTRY II YEAR, SEMESTER – IV

BLUE PRINT

Paper IV (Course 4) INORGANIC, ORGANIC & PHYSICAL CHEMISTRY

Time: 3 Hrs.

Max. Marks: 60

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS

Sl. No.	COURSE CONTENT	ESSAY	SHORT	Total Marks
1	UNIT - I	2	1	25
2	UNIT - II	2	1	25
3	UNIT - III	2	2	30
4	UNIT - IV	2	1	25
5	UNIT - V	2	3	35
Total		10	8	140

**A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS),
KAKINADA
CHEMISTRY II YEAR
SEMESTER – IV MODEL PAPER (2023-24)
Paper IV (Course 4):INORGANIC, ORGANIC & PHYSICAL CHEMISTRY**

Time: 3 Hrs.

Max. Marks: 60

SECTION – A

Answer any **FIVE** from the following questions: (5x4 = 20M)

1. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.
2. What are epimers and anomers. Give examples.
3. Discuss about iso electric point and zwitter ion.
4. Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds.
5. Explain Tautomerism shown by nitro alkanes.
6. Discuss the basic nature of amines.
7. Write the differences between thermal and photochemical reactions.
8. Derive heat capacities and derive $C_p - C_v = R$

SECTION – B (Essay Questions)

Answer **Any Five** of the following questions (5x8 = 40M)

9. (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.

10. (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 Killiani- Fischer synthesis.

- 11.(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.

- 12 (a). Write the mechanism for the following.

- (i) Hoffmann Bromamide reaction (ii) Mannich reaction

(OR)

- (b). Explain Heinsberg separation of amines.

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

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

(OR)

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

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA

LABORATORY COURSE -IV 30hrs (2 h / w)

Practical Paper-IV (At the end of Semester-IV)

(Course-4L) Organic Qualitative analysis Lab: 40 Marks

Course Outcomes:

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

Organic Qualitative analysis 40 M

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

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

Reference and Text books:

1. Vogel's textbook of practical organic chemistry.

Web Links:

1. <https://www.geeksforgeeks.org/qualitative-analysis-of-organic-compounds/>
2. <https://www.youtube.com/watch?v=EAWuP6PrEr4>

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	2	2	3	3	3
CO2	3	3	3	3	3	3	2	3	2	3	2	2	3
CO3	3	2	3	2	2	3	2	3	3	2	3	3	3
CO4	2	3	2	2	3	2	3	2	2	3	3	2	2
CO5	2.75	275	27.5	2.75	2.75	2.75	2.5	275	2.25	2.5	2.75	2.5	2.75

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA

IV SEMESTER END EXAMINATIONS

II B.Sc. CHEMISTRY

LABORATORY COURSE-IV: ORGANIC QUALITATIVE ANALYSIS - PRACTICAL

Scheme of Valuation

Time : 3 hrs

Max. Marks. 40

Record: 7 M

Viva: 3 M

Practical: 30 M

Splitting of Practical Marks:

- | | | |
|---|---|-----------------------------------|
| ◆ Colour | - | 1 Mark |
| ◆ Physical State | - | 1 Mark |
| ◆ Odour | - | 1 Mark |
| ◆ MP / BP | - | 2 Marks |
| ◆ Ignition test | - | 1 Marks |
| ◆ Litmus test | - | 1 Marks |
| ◆ Solubility & Classification basing
on solubility data | - | 3 Marks |
| ◆ Detection of extra elements | - | 3 Marks (including extract -1 M) |
| ◆ Unsaturation test
(with bromine water & Bayer's reagent) | - | 4 Marks |
| ◆ Identification test for functional group | - | 3 Marks |
| ◆ Confirmatory tests (2) for functional group | - | 6 Marks |
| ◆ One derivative of the organic compound | - | 2 Marks |
| ◆ Report | - | 2 Marks |

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2023-24
SECOND YEAR, SEMESTER- IV
Paper V (Course 5) (INORGANIC&PHYSICAL CHEMISTRY) 60 h (4 h / w)

INORGANIC CHEMISTRY

Course outcomes:

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

1. Understand the structures and geometries of the complex compounds.
2. Understand the crystal field splitting of d – orbitals in octahedral and tetrahedral complexes.
3. Understand the mechanisms of Ligand substitution reactions in octahedral and tetrahedral complexes.
4. Understand and illustrate various types of isomerism in coordination compounds.
5. Explain trans effect and its applications.
6. Explain the determination of complexes by Job's method and Mole – Ratio method.
7. Explain the biological significance of trace elements viz., Na, K, Fe etc.
8. Explain the biological functions of Hemoglobin and myoglobin.
9. Explain the toxicity of metals viz., Hg, Pb, Cd and As.

UNIT I:

Coordinator 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 - SN^1 and SN^2 , 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.

Bioinorganic Chemistry:

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Sodium / K - pump, carbonic anhydrase 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-platin as an anti-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-Onsager'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, Metal-metal 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.

Additional inputs: Sidgwick's electronic theory, Werner theory, Calculation of CFSE for weak and strong field ligands, Chlorophyll and its functions, Structures of Haemoglobin and Chlorophyll, Clarius-Clayperon equation, Phase Diagram of Mg-Zn System, Reduced phase rule and Condensed Systems, Arrhenius theory of weak electrolytes, Ostwald's dilution law of weak electrolytes, Graphical representations of Integrated rate equations of Zero and First Order Reactions, Derivation of integrated rate equations for third order reactions.

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
9. A textbook of qualitative inorganic analysis by A.I. Vogel
10. Atkins, P.W. & Paula, J.de Atkin's Physical Chemistry Ed., Oxford University Press 10thEd(2014)
11. Castellan, G.W.PhysicalChemistry, 4thEd.Narosa(2004)
12. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).

Web Links:

1. <https://youtu.be/Hs5JBjX51dc>
2. <https://youtu.be/OrHlwgmMTq4>

CO-PO Mapping:

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

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CO2	2	3	3	3	3	2	2	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	3	2	1	3	2	3	1	2	3	3	2	2
Avg.	2.5	2.75	2.75	2	2.5	1.75	2.25	2	2.25	2.25	2.5	2.5	2.75

**A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA
CHEMISTRY SECOND YEAR**

SEMESTER – IV

QUESTION PAPER BLUE PRINT

INORGANIC AND PHYSICAL CHEMISTRY - V

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS

Sl. No.	COURSE CONTENT	ESSAY	SHORT	Total Marks
1	UNIT - I	2	1	25
2	UNIT - II	2	2	30
3	UNIT - III	2	1	25
4	UNIT - IV	2	2	30
5	UNIT - V	2	2	30
Total		10	8	140

A.S.D.GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
KAKINADA
CHEMISTRY II YEAR SEMESTER – IV MODEL PAPER (2023-24)
(Course-5) INORGANIC&PHYSICAL CHEMISTRY

Time: 3 hrs.

Max. Marks: 60

SECTION – A

Answer any **FIVE** from the following questions: (5x4 = 20M)

1. Write note on Jahn-Teller distortion?
2. Explain Labile & inert complexes?
3. Explain Job's method for determination of composition of complex?
4. Explain the terms Phase and number of components with examples?
5. Define equivalent conductance. Write the effect of dilution on equivalent conductance?
6. Write Nernst equation and explain the terms involved in it?
7. Define order and molecularity of a reaction. Write the differences between them?
8. Write the important features of collision theory?

SECTION – B

Answer **Any Five** of the following questions (5x8 = 40M)

9. (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.

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

(OR)

- (b). (i) Write the biological functions of Haemoglobin and Myoglobin.
(ii) Write a note on the use of chelating agents in medicines.

11. (a). Define Phase rule and terms involved in it. Explain phase diagram of

Pb-Ag system.

(OR)

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

(ii) Explain briefly about Freezing mixtures.

12. (a). Define Transport number. Write an experimental method for the determination of transport number by Hittorf method.

(OR)

(b) State Kohlrausch's Law and write any three of its applications.

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

(OR)

(b). Derive integrated rate equation for first order reaction.

Give two examples of first order reactions.

**A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
LABORATORY COURSE -IV 30hrs (2 h / w)**

Practical Paper-IV (At the end of Semester-IV)

(Course-5L) Conductometric and Potentiometric Titrimetry Lab :40 Marks

Course Outcomes:

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Apply concepts of electrochemistry in experiments
3. Be familiar with electroanalytical methods and techniques in analytical chemistry which study an analyte by measuring the potential (volts) and/or current (amperes) in an electrochemical cell containing the analyte

Conductometric and Potentiometric Titrimetry 50 M

1. **Conductometric titration-** Determination of concentration of HCl solution using standard NaOH solution.
2. **Conductometric titration-** Determination of concentration of CH₃COOH Solution using standard NaOH solution.
3. **Conductometric titration-** Determination of concentration of CH₃COOH and HCl in a mixture using standard NaOH solution.
4. **Potentiometric titration-** Determination of Fe (II) using standard K₂Cr₂O₇ solution.
5. Determination of rate constant for acid catalyzed ester hydrolysis.
6. Adsorption of Acetic Acid on Charcoal.

Web Links:

1. <https://youtu.be/Hs5JBjX51dc>
2. <https://youtu.be/OrHlwgmMTq4>

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CO2	2	3	3	3	3	2	2	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	3	2	1	3	2	3	1	2	3	3	2	2
Avg.	2.5	2.75	2.75	2	2.5	1.75	2.25	2	2.25	2.25	2.5	2.5	2.75

**A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
IV SEMESTER END EXAMINATIONS**

II B.Sc. CHEMISTRY 2023-24

**LABORATORY COURSE-V: CONDUCTOMETRIC AND POTENTIOMETRIC
TITRIMETRY - PRACTICAL**

SCHEME OF VALUATION

Time : 3 hrs.

Max. Marks .40

Record: 7 M

Viva: 3 M

Practical: 30 M

Splitting of Practical Marks:

1. Principle	5 M
2. Procedure	5 M
3. Neat Tabulation & Formula with units	5 M
4. Graph construction	5 M
5. Calculation	5M
6. Report:	
error < 10% error	5 M
error 10% -15%	3M
error > 15%	2M

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2023-24
THIRD YEAR, SEMESTER- V

Paper 6 - D (ENVIRONMENTAL CHEMISTRY) 60 h (4 h / w)

Course6-D: Environmental Chemistry

(Skill Enhancement Course (Elective), Credits -05

Max Marks: 100

I. Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the environment functions and how it is affected by human activities.
2. Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services.
3. Engage in simple and advanced analytical tools used to measure the different types of pollution.
4. Explain the energy crisis and different aspects of sustainability.
5. Analyze key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life.

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

UNIT-I: Introduction

10 h

Environment Definition – Concept of Environmental chemistry- Scope and importance of environment in nowadays – Nomenclature of environmental chemistry – Segments of environment– Effects of human activities on environment – Natural resources–Renewable Resources–Solar and biomass energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydro logical cycle.

UNIT-II: Air Pollution

10 h

Definition – Sources of air pollution – Classification of air pollution – Ambient air quality standards- Climate change – Global warming – Pollution from combustion systems- Acid rain – Photochemical smog – Greenhouse effect – Formation and depletion of ozone – Bhopal gas disaster–Instrumental techniques to monitor pollution – Controlling methods of air pollution.

UNIT-III: Water pollution**10 h**

Unique physical and chemical properties of water – Water quality standards and parameters – Turbidity- pH Dissolved oxygen – BOD, COD, Suspended solids, total dissolved solids, alkalinity– Hardness of water–Methods to convert temporary hard water in to soft water – Methods to convert permanent hard water into soft water – eutrophication and its effects – Industrial waste water treatment.

UNIT-IV: Chemical Toxicology**10 h**

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

UNIT-V: Ecosystem and biodiversity**10 h****Ecosystem**

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

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

Additional inputs: Water cycl, Climate change, Ozone Depletion Substances, Responsibility of individual in protecting Ozone layer, Drinking Water Parameters-Indian Standards, Methods and Tools used in Chemical Toxicology, Carbon inputs to Ecosystem, Effect of pollutants on ecosystem and human health.

III. List of Reference books:

1. Fundamentals of ecology by M.C.Dash
2. A Text book of Environmental chemistry by W. Moore and F.A. Moore
3. Environmental Chemistry by Samir k.Banerji
4. Water pollution, Lalude, MC Graw Hill
5. Environmental Chemistry, Anil Kumar De, Wiley Eastern ltd.
6. Environmental analysis, SM Khopkar (IIT Bombay)
7. Environmental Chemistry by BK Sharma & H Kaur, Goel publishing house.
8. Fundamentals of Environmental Chemistry, Manahan, Stanley. E
9. Applications of Environmental Chemistry, Eugene R. Wiener

Web Links:



1. <https://youtu.be/zph2PxDNH8g>
2. <https://youtu.be/IX4cT6sSa3s>

CO-PO Mapping:

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CO2	2	3	3	3	3	2	2	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	3	2	1	3	2	3	1	2	3	3	2	2
Avg.	2.5	2.75	2.75	2	2.5	1.75	2.25	2	2.25	2.25	2.5	2.5	2.75

**A.S.D. GOVERNEMENT DEGREE COLLEGE FOR WOMEN(A),
KAKINADA**

SEMESTER - V

Paper –6D: ENVIRONMENTAL CHEMISTRY

MODEL QUESTION PAPER

Time: 3 hours

Maximum Marks: 75M

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS

ELECTIVE PAPER – 6 - D: ENVIRONMENTAL CHEMISTRY

Sl. No.	COURSE CONTENT	ESSAY	SA
1	UNIT - I	2	1
2	UNIT - II	2	2
3	UNIT - III	2	1
4	UNIT - IV	2	2
5	UNIT - V	2	2
Total		10	8

**A.S.D. GOVERNEMENT DEGREE COLLEGE FOR WOMEN(A),
KAKINADA**

**QUESTION PAPER
SEMESTER - V**

Paper –6D: ENVIRONMENTAL CHEMISTRY

MODEL QUESTION PAPER

Time: 3 hours

Maximum Marks: 75 M

PART- A

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

1. Explain the importance of environment in now-a-days.
2. Explain Greenhouse effect.
3. Write a brief note on Bhopal Gas Disaster.
4. Give about the hardness of water.
5. Explain the toxicity of mercury.
6. Define Hardness of water. Explain different types of hardness present.
7. What are the functions of eco system.
8. Discuss briefly about food chain.

PART-B

Answer **ALL** the questions. Each carries **EIGHT** marks

5x10 = 50 M

9. (a) Explain the segments of the environment.

(OR)

(b) Write about the renewable and Non-renewable resources.

10. (a) Explain the following:

- i. Formation and depletion of Ozone layer
- ii. Acid rain

(OR)

(b) Define air pollution. Write different sources of air pollution. Write any two controlling methods of air pollution.

11. (a) Write an essay on the quality parameters of water.

(OR)

(b) Explain one method each for the removal of temporary hardness and permanent hardness of water.

12. (a) Define Pesticides. Explain the biochemical effects of pesticides.

(OR)

(b) Explain the toxicity of Mercury and Lead.

13. (a) Describe the types of ecosystems.

(OR)

(c) Give detailed account on biodiversity.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2023-24
THIRD YEAR, SEMESTER– V
Course 6-D: Environmental Chemistry – Practical syllabus

IV. Lab work-Skills 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 procedures of preparation of standard solutions.
3. Demonstrate skills in operating instruments.
4. Acquire skills in handling spectrophotometer.
5. Analyse water and soil samples.

V. Practical (Laboratory) Syllabus: (30 h) (Max.40 M).

1. Identification of various equipment in the laboratory.
2. Determination of carbonate and bicarbonate in water samples by double titration method.
3. Determination of hardness of water using EDTA
 - a) Permanent hardness
 - b) Temporary hardness
4. Determination of Chlorides in water samples by Mohr's method.
5. Determination of pH in water sample using pH metry and Total dissolved Substance (TDS) of Water.
6. Determination of Ca^{+2} and Mg^{+2} in soil sample by flame photometry.
7. Determination of PH in soil samples using pH metry.
8. Determination of Conductivity of Water by Conductimetry.

Text books:

1. III B.Sc. Unified Environmental Chemistry by R.K.Agarwal- Jai prakashnath publications
2. Practical volumetric analysis by Peter AC Pherson

Reference books:

1. Practical hand book of Water analysis by Kanwaljit kaur
2. Volumetric analysis by Mc grew-Hill
3. Volumetric analysis by Henry W.Schimpf

Web links:

2. <https://youtu.be/Set3XdRshGo>
3. <https://youtu.be/zXvEmlFqicw>
4. <https://youtu.be/OiWMSopuuLU>

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CO3	3	3	3	3	3	2	3	2	1	2	3	3	1
CO4	3	2	2	2	2	3	2	3	2	2	2	2	2
Avg.	3	2.5	2.5	2.5	2.75	2.75	2.75	2.5	2.25	2.25	2.5	2.75	2.25

VI. Co-Curricular Activities:

a)Mandatory: (Training of students by teacher on field related skills: 15hrs)

- 1. For Teacher:** Skills training of students by the teacher in classroom, lab and field for not less than 15 hours on field related quantitative techniques for the water quality parameters, soil pollution and air pollution.
- 2. For Student:** Individual visit to any one of the local field agencies/research laboratories in universities/research organizations/private sector culminating writing and submission of a hand-written fieldwork/project work Report not exceeding 10 pages in the given format.
- 3.** Max marks for Fieldwork/project work Report: 05.
- 4.** Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of places visited, observations, findings and acknowledgements.*
- 5.** Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Visits to research organizations and laboratories.
3. Invited lectures and presentations on related topics by field / industrial experts.
4. Assignments.
5. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
6. Preparation of videos on tools, techniques and applications of spectrophotometry.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
V/VI SEMESTER END EXAMINATIONS
III B.Sc. CHEMISTRY 2022-23
LABORATORY COURSE-VIC: ENVIRONMENTAL CHEMISTRY - PRACTICAL

SCHEME OF VALUATION

Time : 3 hrs

Max. Marks .40

Record: 7 M

Viva: 3 M

Practical: 30 M

Splitting of Practical Marks:

1. Principle		5 M
2. Procedure		5 M
3. Tabulation		5 M
4. Calculation		5M
5. Report:	error < 10% error	10 M
	error 10% -15%	7 M
	error > 15%	5 M

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2023-24
THIRD YEAR, SEMESTER- V

Paper 7 - D (GREEN CHEMISTRY AND NANOTECHNOLOGY) 60 h (4 h / w)
Course7- D: Green Chemistry and Nanotechnology

(Skill Enhancement Course, Elective, Credits – 05)

Max Marks: 75

1. Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the importance of Green chemistry and Green synthesis.
2. Engage in Microwave assisted organic synthesis.
3. Demonstrate skills using the alternative green solvents in synthesis.
4. Demonstrate and explain enzymatic catalysis.
5. Analyze alternative sources of energy and carry out green synthesis.
6. Carry out the chemical method of nanomaterial synthesis.

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

UNIT-I Green Chemistry: Part- I 10 h

Introduction-Definition of green Chemistry, Need for green chemistry, Goals of Green chemistry Basic principles of green chemistry. Green synthesis- Evaluation of the type of the reaction

- i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic). Organic reactions by Sonication method: apparatus required and examples of sonochemical reactions (Heck, Hundsdicker and Wittig reactions).

UNIT- II Green Chemistry: Part- II 10 h

A) Selection of solvent:

- i) Aqueous phase reactions
ii) Reactions in ionic liquids, Heck reaction, Suzuki reactions, epoxidation. Iii) Solid supported synthesis

B) Supercritical CO₂: Preparation, properties and applications, (decaffeination, drycleaning)

C) Green energy and sustainability.

UNIT-III Microwave and Ultrasound assisted green synthesis: 10 h

Apparatus required, examples of MAOS (synthesis of fused anthraquinones, Leukart reductive amination of ketones) - Advantages and disadvantages of MAOS. Aldol condensation –Cannizzaro reaction- Diels-Alder reactions-Strecker's synthesis

UNIT-IV Green catalysis and Green synthesis

10 hrs.

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

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

UNIT – V Nanotechnology in Green chemistry

10

hrs

Basic concepts of Nano science and Nanotechnology – Bottom-up approach and Top down approaches with examples – Synthesis of Nano materials – Classification of Nanomaterial – Properties and Application of Nanomaterial. Chemical and Physical properties of Nanoparticles – Physical synthesis of nanoparticles – Inert gas condensation - aerosol method - Chemical Synthesis of nanoparticles – precipitation and co-precipitation method, sol-gel method.

Additional inputs:Wurtz Reaction, Diels-Alder reaction, Sigmatropic rearrangements (100% atom economic) Solvent Selection, Sonochemical Michael addition, Recent Advances in Microwave and Ultrasound Assisted Green Synthesis, Applying Novel technology in Microwave Synthesis, Advances of nanotechnology, Advantages of Green Synthesis of Nanoparticles.

III. Reference books:

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

7. Nanotechnology: Health and Environmental Risks, Jo Anne Shatkin, CRC Press (2008).

8. Green Processes for Nanotechnology: From Inorganic to Bioinspired Nanomaterials, Vladimir A. Basiuk, Elena V. Basiuk Springer (2015).

Web Links:

<https://youtu.be/Dam3cyRyGrI>

1. <https://youtu.be/2bDf7JSRvf8>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; 4 : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	3	3	2	2	3	3	3
CO2	2	3	3	3	3	2	2	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	3	2	1	3	2	3	1	2	3	3	2	2
Avg.	2.5	2.75	2.75	2	2.5	1.75	2.25	2	2.25	2.25	2.5	2.5	2.75

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF CHEMISTRY

BOARD OF STUDIES: 2023-24

THIRD YEAR, SEMESTER- V

Paper 7 - D (GREEN CHEMISTRY AND NANOTECHNOLOGY)

NO QUESTION SHOULD BE GIVEN FROM ADDITIONAL INPUTS

Sl. No.	COURSE CONTENT	ESSAY	SA
1	UNIT - I	2	2
2	UNIT - II	2	1
3	UNIT - III	2	1
4	UNIT - IV	2	3
5	UNIT - V	2	1
Total		10	8

**A.S.D. GOVERNEMENT DEGREE COLLEGE FOR WOMEN(A),
KAKINADA**

**QUESTION PAPER
SEMESTER - V**

Paper –7D: GREEN CHEMISTRY AND NANO TECHNOLOGY

MODEL QUESTION PAPER

Time: 3 hours

Maximum Marks: 75M

PART- A

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

1. Discuss atom economy reactions.
2. Write short notes on Heck reaction.
3. Explain solid supported synthesis.
4. Describe the green synthetic procedure for the Diels-alder reaction
5. Brief about Bio catalysis.
6. How do you perform Strecker's synthesis by green synthesis method?
7. Discuss about Ultrasound assisted reactions.
8. Write the chemical synthesis of Nanoparticles using Sol-gel method.

PART-B

Answer **ALL** the questions. Each carries **EIGHT** marks

5x10 = 50 M

9. (a) Explain the basic principles of green chemistry.
(OR)
(b) Illustrate the sonication method with any two reactions.
10. (a) Describe the preparation and properties of super critical carbon dioxide.
(OR)
(b) What are ionic liquids? Explain any two reactions in ionic liquids.
11. (a) Explain the synthesis of fused anthraquinones by microwave assisted organic synthesis.
(OR)
(b) What are advantages and disadvantages of microwave assisted organic synthesis?
Write any two reactions in microwave assisted organic synthesis.
12. (a) How are Adipic acid and catechol prepared by green synthesis?
(OR)
(b) Write Microwave assisted reaction in water –
(i) Hoffmann elimination
(ii) methyl benzoate to benzoic acid
(iii) oxidation of toluene
13. (a) Discuss the classification and applications of Nano materials.
(OR)
(b) Write the physical and chemical properties of Nano materials.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
DEPARTMENT OF CHEMISTRY
BOARD OF STUDIES: 2023-24
THIRD YEAR, SEMESTER– V
Paper 7 - D (GREEN CHEMISTRY AND NANOTECHNOLOGY)
PRACTICAL

Lab work - Skills 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 advantages of green synthesis over conventional synthesis.
3. Learn procedures of green synthesis.
4. Demonstrate skills in the preparation of Nanomaterials.
5. Acquire skills in Microwave assisted organic synthesis.
6. Perform some applications of Nanomaterials.

Practical (Laboratory) Syllabus: (30 hrs.) (Max.40 Marks).

1. Identification of various equipment in the laboratory.
2. Acetylation of 1^o amine by 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 of biodiesel from vegetable oil/ waste cooking oil.
7. Preparation and characterization of Nanoparticles of gold using tea leaves.
8. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.
9. Photo reduction of Benzophenone to Benzopinacol in the presence of sunlight.
10. Preparation of Nanoparticles of Copper/ SILVER/ Iron using *Aloe barbedensis* /*Azadirachta indica*.
11. Diels-Alder reaction between Furan and Maleic acid/ Maleic anhydride

Reference books

1. Practical book of green synthesis by Dar Bashir Ahmed
2. Laboratory manual of green chemistry by Anuradha Mukherjee.

Web Links:

1. <https://youtu.be/eFh9CfQltqo>
2. <https://youtu.be/FxqWzZnzleg>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; 4 : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	3	3	3	3	3	3	2	3
CO2	3	2	3	3	3	3	3	2	3	3	3	3	3
CO3	3	3	3	3	3	2	3	2	1	2	2	3	1
CO4	3	2	2	2	2	3	2	3	2	2	3	2	2
Avg.	3	2.5	2.5	2.5	2.75	2.75	2.75	2.5	2.25	2.25	2.75	2.5	2.25

IV. Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher on field related skills: 15 hours*)

1. For Teacher: Training of students by the teacher in the classroom or in the laboratory for not less than 15 hours on field related quantitative techniques for Enzymatic catalysis, Microwave assisted organic synthesis, Biodiesel preparation etc.

2. For Student: Individual visit to any one of the local field agencies, research laboratories in universities/research organizations/private sector culminating writing and submission of a hand-written fieldwork/project work Report not exceeding 10 pages in the given format.

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

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

5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.

2. Visits to research organizations and laboratories.

3. Invited lectures and presentations on related topics by field / industrial experts.

4. Assignments.

5. Seminars, Group discussions, Quiz, Debates etc. (on related topics).

6. Preparation of videos on tools, techniques and applications of Green chemistry and Nanosynthesis.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
V/VI SEMESTER END EXAMINATIONS
III B.Sc. CHEMISTRY 2023-24
LABORATORY COURSE-VIIC: GREEN CHEMISTRY - PRACTICAL

Scheme of Valuation

Time : 3 hrs

Max. Marks. 40

Record: 7 M

Viva: 3 M

Practical: 30 M

Splitting of Practical Marks:

- | | |
|--|-----|
| 1. Principle/ Equation | 7M |
| 2. Procedure | 8 M |
| 3. MP | 5 M |
| 4. Calculation of yield and % of yield | 5M |
| 5. Yield report: | 5M |

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA
Multidisciplinary Courses Offered for B.A./B.Com./BBA/BCA Majors

w.e.f. AY 2023-24

SEMESTER-I

PRINCIPLES OF CHEMICAL SCIENCES

Credits: 2

2 hrs/week

	A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA	Program & Semester I B.A., B.Com., BBA			
Course Code MDC	TITLE OF THE COURSE PRINCIPLES OF CHEMICAL SCIENCES				
Teaching	Hours Allocated: 30 (Theory)	L	T	P	C
Pre-requisites:	Periodic table	2	-	-	2

Course Objectives:

1. Understand the structure of atom.
2. Identify the isotopes and isobars.
3. Define acids and bases and predict the nature of salts.
4. Explain ionic and covalent bonding.
5. Describe the importance of Chemistry in daily life.

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 properties atomic 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.)

List of Reference Books:

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

Co-curricular activities:

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

A.S.D. GOVERNEMENT DEGREE COLLEGE FOR WOMEN(A),

KAKINADA

SEMESTER – I 2023-24

Multi-Disciplinary Course

Principles of Chemical Sciences BLUE PRINT

Sl. No.	Chapter	Essay Question (8M) knowledge	Short Answer Question (4 M) Under standing
1.	UNIT-I	02	02
2.	UNIT-II	02	02
3.	UNIT-III	02	02
Total no. of Questions		06	06

**A.S.D. GOVERNEMENT DEGREE COLLEGE FOR WOMEN(A),
KAKINADA
I SEMESTER END EXAMINATIONS
I Year Degree 2023-24
MDC - PRINCIPLES OF CHEMICAL SCIENCES**

Time: 2 hrs

Max. Marks: 40

PART- A

3 x 8 = 24 Marks

Answer **Any THREE** of the following questions. Each carries **EIGHT** marks.

1. Explain Bohr's model of atom.

(OR)

2. Explain the following:

i) Pauli's exclusion principle ii) Aufbau principle iii) Hund's rule

3. Give the classification of elements based on metallic nature?

(OR)

4. Define ionic bond. Give the properties of ionic compounds.

5. What are acids and bases? Write a note on their properties.

(OR)

6. Explain the importance of chemistry in daily life.

PART-B

4 x 4 = 16 Marks

Answer **Any FOUR** of the following questions. Each carries **FOUR** marks.

7. Write short notes on Rutherford model of atom.

8. Give any three applications of nuclear reactions.

9. Write a note on Ionization Enthalpy.

10. Exemplify electro negativity.

11. Describe Octet rule.

12. Write the classification of elements based on pH.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) KAKINADA
DEPARTMENT OF CHEMISTRY
Certificate Course in Basic Chemistry Molecular Modelling Softwares

Course Duration: 40 Hours

Eligibility: All B.Sc. First year SEM II Students

Number of seats: 30

Objectives:

1. Department of Chemistry of A.S.D. Government Degree College for Women (Autonomous) Kakinada offers 60 hours **Certificate Course in Basic Chemistry Molecular Modelling softwares**.
2. This course aims at imparting skills on use of various open-source chemistry tools that are essential for any student with chemistry as a major subject.
3. At the end of course, the participants will be able to use these softwares for drawing chemical structures, generation of their names, retrieve information about physical properties calculations, three-dimensional molecular structure calculations, spectroscopic signatures, chemical reaction pathways prediction, molecular functional groups and other parameters efficiently.

Course outcomes:

1. The candidate will be able to use ACD ChemsSketch for generation and processing of simple and complex chemical structures.
2. The candidate will be able to use Cambridge ChemDraw Ultra for generation, processing and calculation of physical/chemical properties of simple and complex molecules.
3. The candidate will be able to use Cambridge ChemDraw Ultra for generation, processing and calculation of physical/chemical properties of simple and complex molecules.

Certificate Course in Basic Chemistry Molecular Modelling Softwares
SYLLABUS

Module -I: Chemical structures, Names and Physical properties (8 hours)

Drawing various chemical structures (acyclic, cyclic, polycyclic, heterocyclic hydrocarbons, Hydroxy compound, Carbonyl compounds, Acids and its derivatives), Conversion of structure into IUPAC name, Convert the IUPAC name into structure, calculation of physical properties such as density, molecular weight, molecular formula from structural formula, bond angles, bond lengths, dihedral angles.

Module-II: Stereochemistry & Spectroscopy (12 hours)

Drawing of Chiral centered molecules, Find the stereochemistry of molecule, Convert the 2D structure into 3D structure, drawing structure of biomolecules such as proteins, carbohydrates etc.

Spectral data analysis:

To predict IR, ^1H , ^{13}C NMR spectrum's from molecular structure

Predict the ^1H NMR spectra and chemical shift values, Predict the ^{13}C NMR spectra and chemical shift values.

Module-III: Chemical equations and mechanisms (20 hours)

To draw following Chemical equations and Write the mechanism of chemical reaction using CHEM DRAW soft ware and to Study their reaction mechanisms through chemistry softwares-ACD ChemSketch software/ ChemDraw Ultra software.

1. Friedel crafts alkylation
2. Friedel crafts acylation.
3. Nitration of Benzene
4. Aldol Condensation
5. Cannizaro reaction
6. Benzoin Condensation
7. Claisen Condensation
8. Pinacol Rearrangement
9. Kolbe-Schmidt Reaction

**A.S.D. GOVERNEMENT DEGREE COLLEGE FOR WOMEN(A),
KAKINADA**

MODEL QUESTION PAPER

SEMESTER - II

Certificate Course in Basic Chemistry Molecular Modelling Softwares

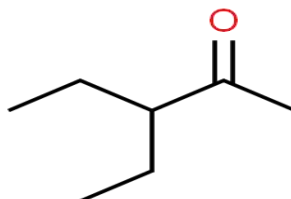
Time: 2 hours

Maximum Marks: 40M

Section- A

Answer any TEN of the following questions. Each carries TWO marks 10 X 2 =
20 M

1. Draw structure of 2-Propanol and find its physical properties M.Pt, B.Pt, density and refractive index?
2. Find IUPAC Nomenclature of following compound. Predict bond angle, bond length, dihedral angle of carbonyl functional group?



3. Predict 3D structure of (S)-2 Bromo butane ?
4. Predict IR spectrum of Ethyl alcohol and write functional group stretching frequency from IR spectrum?
5. Determine NMR spectrum of acetaldehyde ? Analyse its Chemical shift values from spectrum?
6. Analyse ^{13}C NMR of Toluene?
7. Write Chemical equations for Friedel crafts acylation?
8. Write Chemical equations for Pinacol-Pinacolone Rearrangement
9. Write Chemical equations for Claisen Condensation?
10. Write Chemical equations for Pinacol-Pinacolone Rearrangement?
11. Write Chemical equations for Friedel Crafts alkylation?
12. Write Chemical equations for Kolbe-Schmidt Reaction?

Section- B

Answer any **FOUR** of the following questions. Each carries **FIVE** mark **4X5 = 20 M**

1. Draw structure of following compounds and predict their physical properties
a) Phenol b) Pyridine.
2. Predict IR, NMR, ^{13}C spectral data of Toluene? Write their spectral data?
3. Sketch structure (S)-Alanine and get its IR, NMR Spectrums?
4. Write mechanism of Aldol reaction?
5. Write mechanism of Cannizzaro reaction?
6. Write mechanism of Friedel Crafts alkylation?
7. Write mechanism of Nitration of Benzene?
8. Write mechanism of Benzoin Condensation

A.S.D. GOVERNEMENT DEGREE COLLEGE FOR WOMEN(A),

KAKINADA

SEMESTER – I 2023-24

Certificate Course in Basic Chemistry Molecular Modelling Softwares BLUE PRINT

Sl. No.	Chapter	Essay Question (5M) knowledge	Short Answer Question (2M) Under standing
1.	UNIT-I	01	02
2.	UNIT-II	02	04
3.	UNIT-III	03	06
Total no. of Questions		06	12

Programme Outcomes (POs)

Programme Outcomes (POs) are what knowledge, skills and attitudes a graduate should have at the time of graduation.

Students of Undergraduate Programmes (B. Sc, B. Com, BA) at the time of graduation will be able to:

PO1. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in at least one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO5. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO7. Problem solving skills: Identify, formulate, and analyse complex problems, reaching substantiated conclusions by applying the knowledge and skills acquired during undergraduate study for the welfare of individuals and society.

PO8. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO9. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PO10. Higher Progression, Employability and Entrepreneurship: Progress towards higher education / become potential workforce by enhancing employability through skill-based education / become good entrepreneurs.

PSO's of MPC

1. Enable to acquire strong foundation in Algebra, Real Analysis, Calculus and Linear Algebra.
2. Develop logical, analytical, critical thinking skills by solving maths problems which assists to solve real life problems in related areas.
3. Develop the knowledge and skills in the areas of Mechanics, Thermal Physics, Optics, Electromagnetism, Quantum Physics, Solid state Physics for pursuing higher education and research.
4. Knowledge in energy and matter enables fabrication of new devices.
5. Attain sound knowledge and skill in Inorganic chemistry, Physical Chemistry, which leading to develop new technologies including catalysis, new advanced materials and energy storage devices like lithium batteries etc. It leads better quality of life and sustainable world.
6. Develop knowledge on organic reactions and their mechanisms which in turn plays major role in the synthesis and development of new Chiral drugs/drugs which impact our quality of lives by addressing global society issue health.
7. Achieve the ability to analyse qualitatively, to estimate quantitatively, to synthesize, separate, and characterize compounds using experimental and instrumentation techniques.
8. Pursue higher studies and research in interdisciplinary areas.

PSO's of CBZ

1. To develop skills in both theory and practical in Botany, Zoology and Chemistry.
2. To appreciate interdisciplinary aspects in Botany, Zoology and Chemistry.
3. To facilitate the students to pursue higher studies in interdisciplinary areas such as Biochemistry, Bioinorganic Chemistry, Bioinformatics etc.,
4. To facilitate employment as lab analyst in Biological Laboratories.
5. To acquire knowledge and understanding in various instrumentation techniques such as Chromatography, PCR, HPLC which are applicable to all subject disciplines.
6. Attain sound knowledge and skill in Inorganic chemistry, Physical Chemistry, which leading to develop new technologies including catalysis, new advanced materials and energy storage devices like lithium batteries etc. It leads better quality of life and sustainable world.

7. Develop knowledge on organic reactions and their mechanisms which in turn plays major role in the synthesis and development of new Chiral drugs/drugs which impact our quality of lives by addressing global society issue health.
8. Achieve the ability to analyse qualitatively, to estimate quantitatively, to synthesize, separate, and characterize compounds using experimental and instrumentation techniques.
9. Pursue higher studies and research in interdisciplinary areas.

PSO's of CZAqt

1. To develop theoretical and practical skills in Zoology, Chemistry and Aquaculture.
2. To understand the interdisciplinary areas in Chemistry, Zoology and Chemistry.
3. To provide opportunity in pursuing higher studies in all disciplines of life sciences and Chemistry.
4. To create Entrepreneurship / Self-employment opportunities in Aqua culture areas.
5. To apply various laboratory techniques learnt in Chemistry in Aqua culture laboratories in areas such as Quality assurance, Quality Control and diagnostics.
6. Attain sound knowledge and skill in Inorganic chemistry, Physical Chemistry, which leading to develop new technologies including catalysis, new advanced materials and energy storage devices like lithium batteries etc.It leads better quality of life and sustainable world.
7. Develop knowledge on organic reactions and their mechanisms which in turn plays major role in the synthesis and development of new Chiral drugs/drugs which impact our quality of lives by addressing global society issue health.
8. Achieve the ability to analyse qualitatively, to estimate quantitatively, to synthesize, separate, and characterize compounds using experimental and instrumentation techniques.
9. Pursue higher studies and research in interdisciplinary areas.

PSO's of CBMb

1. To acquire knowledge in chemistry, Botany and Microbiology and their interrelationships
2. To understand various microbial diseases of plants and their treatment in order to enhance the crop yield.

3. To apply the knowledge and understanding of the three subject disciplines in getting employment opportunities such as Quality control Analyst, Quality assurance chemist in microbiological Laboratories.
4. To make use of the skills in the production of food products, Vaccines and Beverages etc.,
5. To pursue higher education in multidisciplinary areas like Food, Microbiology, Food Technology etc.,
6. Attain sound knowledge and skill in Inorganic chemistry, Physical Chemistry, which leading to develop new technologies including catalysis, new advanced materials and energy storage devices like lithium batteries etc. It leads better quality of life and sustainable world.
7. Develop knowledge on organic reactions and their mechanisms which in turn plays major role in the synthesis and development of new Chiral drugs/drugs which impact our quality of lives by addressing global society issue health.
8. Achieve the ability to analyse qualitatively, to estimate quantitatively, to synthesize, separate, and characterize compounds using experimental and instrumentation techniques.
9. Pursue higher studies and research in interdisciplinary areas.

PSO's of CBHt

1. To learn the chemical composition of Organic and Inorganic manures and pesticides and their application to crops.
2. To promote Organic Farming to reduce environmental pollution and to sustain the quality of environment.
3. To motivate the students towards entrepreneurship and self-employment in Landscaping, Nurseries, Green House Management, Grafting Techniques etc.,
4. To pursue higher education in Horticulture, Chemistry, Botany and other interdisciplinary areas.
5. Attain sound knowledge and skill in Inorganic chemistry, Physical Chemistry, which leading to develop new technologies including catalysis, new advanced

materials and energy storage devices like lithium batteries etc. It leads to a better quality of life and a sustainable world.

6. Develop knowledge on organic reactions and their mechanisms which in turn plays a major role in the synthesis and development of new chiral drugs/drugs which impact our quality of lives by addressing global society issues like health.

7. Achieve the ability to analyse qualitatively, to estimate quantitatively, to synthesize, separate, and characterize compounds using experimental and instrumentation techniques.

8. Pursue higher studies and research in interdisciplinary areas.

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN (A)

KAKINADA

DEPARTMENT OF CHEMISTRY

List of ADDITIONAL INPUTS 2023-24

SEMESTER - I

Course – 1: Essentials of Mathematics, Physics, Chemistry & Computer Science

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1	Unit -1 : Essentials and Applications of Mathematics	Probability	2	10%
2	Unit – 2: Physics			
3	Unit -3 : Essentials Of Chemistry	Chemical bonding, Octet rule, VB theory, MO theory	3	20%
4	Unit -4 : Applications Of Mathematics, Physics & Chemistry	Drug development , Food adulteration .	2	10%
5	Unit-5: Essentials Of Computer Science:	Computer Architecture,	2	5%
	Total			

Course – 2: Advances of Mathematics, Physics, Chemistry & Computer Science

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1	Unit -1 : Advances in basic Mathematics	Methods in Matrix	2	10%
2	UNIT 2: Advances In Physics			
3	UNIT III: Advances In Chemistry :	Nanomaterials in drug delivery, Metal organic frame works and their role in dye removal.	3	20%
4	UNIT IV: Advanced Applications Of Mathematics, Physics & Chemistry	Nanotechnology, Principles of Green Chemistry	2	10%
5	Unit-5: Applications of computer Science	Demultiplexing	1	5%
	Total			

SEMESTER - II: COURSE III, GENERAL AND INORGANIC CHEMISTRY

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1.	Unit -1 : Atomic Structure and Periodic Table	Schrodinger Equation Derivation, Metals, Non-Metals, Metalloids	3	15%
2.	Unit-2 : Ionic Bond	Coloumbs Law and Bornlande Equation	2	10%
3.	Unit-3 : The Covalent Bond	Characteristics of Covalent Bond, Shape of ethylene and acetylene molecule.	3	15%
4.	Unit-4 : Matallic and Weak Bonds	Applications of Semi Conductors, Similarities and differences between Ionic and Metallic Bonds	2	10%
5.	Unit-5 : Acids and Bases	Theories of Acid Base indicators : Ostawalds Theory and Benzenoid Quininoid Theory	2	10%
	Total	12	12	13%

SEMESTER - II: COURSE IV, INORGANIC CHEMISTRY

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1.	Unit-1 : Chemistry of P-Block Elements - I	Oxyacids of Phosphorous, Zeolites	2	10%
2.	Unit-2 : Chemistry of P Block Elements - II	Classification of Interhalogen Compounds and their structures	2	10%
3.	Unit-3 : Chemistry of d Block Elements	Frost Diagrams	2	10%
4.	Unit-4 : Chemistry of f Block Elements	Comparison between d and f block elements, Applications of radioactive f block elements in Cancer therapy	2	10%
5.	Unit-5 : Organometallic Chemistry	Metal Carbonyls, Structure of Ferrocene, EAN rule, 18 electron rule	3	15%
	Total	9	10	12%

SEMESTER - III:Organic Chemistry and Spectroscopy

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1	Unit:1: Chemistry of Halogenated Hydrocarbons Alcohols and Phenols	1. Classification and Nomenclature of Alkyl, Aryl and Aryl Alkyl Halides 2. Identification of Alcohols	2	15%
2	Unit II: Carbonyl Compounds	Active methylene Compounds definition and Examples, Acidity of active methylene compounds	2	10%
3	Unit – III: Carboxylic Acids and their Derivatives	Mechanism of Nucleophilic Substitution reaction at SP ² carbon, Comparison of reactivity of acid derivatives.	2	10%
4	Unit – IV: Spectroscopy	Hypochromic Shift, Hyperchromic Shift, Solvent effects in UV, IR, NMR spectroscopy	3	15%
5	Unit - V: Applications of Spectroscopy	Structure determination from spectra (Three Combined problems)	3	12%
	TOTAL	4	4	12%

**LABORATORY COURSE -III: Organic Preparations and IR Spectral Analysis
Lab:**

Name of the topic added	No. of hours allotted	% of addition
Nitration of Salicylic acid by green approach (using calcium nitrate and acetic acid), Preparation of benzylidene aniline by condensation of benzaldehyde with aniline, Preparation of dibenzalpropanone from benzaldehyde and acetone by adopting green aldol condensation, Preparation of 1-phenylazo β-naphthol by diazotization and coupling with β-naphthol.	8	20%

SEMESTER – IV (PAPER – IV) :Inorganic, Organic and Physical Chemistry

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1	Unit:1: Organo Metallic Compounds	EAN, Applications of Organometallic compounds in Catalysis	2	15%
2	Unit II: Carbohydrates	Acetal, Ketal, Differences between reducing sugar and non reducing sugar, Differences between Glucose and Fructose	3	15%
3	Unit – III: Amino acids and Proteins Heterocyclic Compounds	Enzymes, Comparison of Aromatic character of Furan, Thiophene and Pyrrole and Pyridine	3	15%
4	Unit – IV: Nitrogen Containing Compounds	Distinction between primary secondary and tertiary nitroalkanes with HNO ₂ and applications of nitroalkanes	3	15%
5	Unit - V: Photochemistry and Thermodynamics	Singlet and triplet states, Selection rules of UV-Visible spectroscopy, Determination of quantum yield with actinometer, with Photosynthesis, Examples of fluorophores, Resonance Fluorescence and delayed Fluorescence, Synthesis	4	20%
	TOTAL	15	4	17%

SEMESTER – IV (PAPER – V) INORGANIC AND PHYSICAL CHEMISTRY

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1	Unit:1: Coordination Chemistry	Sidgwick's electronic theory, Werner theory, Calculation of CFSE for weak and strong field ligands.	3	15%
2	Unit II: Inorganic Reaction Mechanism Stability of Metal Complexes Bio-Inorganic Chemistry	----- Chlorophyll and its functions. Structures of Haemoglobin and Chlorophyll.	2	15%
3	Unit – III: Phase Rule	Clasius-Clayperon equation, Phase Diagram of Mg-Zn System, Reduced phase rule and Condensed Systems	2	15%
4	Unit – IV: Electrochemistry	Arrhenius theory of weak electrolytes, Ostwald's dilution law of weak electrolytes.	2	15%
5	Unit - V: Chemical Kinetics	Graphical representations of Integrated rate equations of Zero and First Order Reactions, Derivation of integrated rate equations for third order reactions.	3	17%
	TOTAL	13	12	16%

SEMESTER – V/VI (D) ENVIRONMENTAL CHEMISTRY

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1	Unit:1: Terminology in Environmental Chemistry	Water cycle and Climate change	1	15%
2	Unit II: Air Pollution	Ozone Depletion Substances, Responsibility of individual in protecting Ozone layer	3	15%
3	Unit – III: Water Pollution	Drinking Water Parameters-Indian Standards	3	14%
4	Unit – IV: Chemical Toxicology	Methods and Tools used in Chemical Toxicology	2	15%
5	Unit - V: Ecosystem and Biodiversity	Carbon inputs to Ecosystem, Effect of pollutants on ecosystem and human health.	3	15%
	TOTAL	12	5	15%

SEMESTER – V/ VII D GREEN CHEMISTRY AND NANOTECHNOLOGY

S. No.	Unit No. & Name	Name of the topic added	No. of hours allotted	% of addition
1	Unit:1: Green Chemistry Part - I	Wurtz Reaction, Diels-Alder reaction, Sigmatropic rearrangements (100% atom economic)	2	15%
2	Unit II: Green Chemistry Part - II	Solvent Selection, Sonochemical Michael addition	2	10%
3	Unit – III: Microwave and Ultrasound Assisted Green Synthesis	Recent Advances in Microwave and Ultrasound Assisted Green Synthesis	2	10%
4	Unit – IV: Green Catalysis and Green Synthesis	Applying Novel technology in Microwave Synthesis	1	10%
5	Unit - V: Nanotechnology in Green Chemistry	Advances of nanotechnology, Advantages of Green Synthesis of Nanoparticles	3	12%
	TOTAL	11	10	12%

SEMESTER – V/ VII D GREEN CHEMISTRY AND NANOTECHNOLOGY practical

Name of the topic added	No. of hours allotted	% of addition
Preparation of Nanoparticles of Copper/ SILVER/ Iron using tea leaves/ <i>Aloe barbedensis</i> / <i>Azadirachta indica</i> . Diels-Alder reaction between Furan and Maleic acid/ Maleic anhydride	4	10%