Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Affiliated to Sri Venkateswara University, Tirupati

(Accredited by NAAC with 'A' Grade)

BOARD OF STUDIES 2025-26

DEPARTMENT OF CHEMISTRY

B.Sc. CHEM (HONS)

Curriculum for the Academic Year 2025-26

Proceedings of the Principal, NPS Govt. Degree College for Women(A), Chittoor
Present: Dr. K. Manohar

Rc.No. CHE01 /NPSGDCW/UG-BoS/2025-26 dt. 28-09-2025

Subject: NPS GDC Women(A), Chittoor – UG Board of Studies (BoS) – Nomination of Members – Orders issued.

Ref.: 1. UGC Guidelines of for Autonomous Colleges – 2023.
2. Proc. Of the VC No: **SVU/C-III (3)/BoS/Smt. NPS. Govt. Coll/Chi/2025**

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Order

The Principal, NPS GDC Women(A), Chittoor, is pleased to nominate the following members to UG Board of Studies to frame the syllabus for the Department of **Chemistry**. The members of BoS continue for a period of 3 years from 2025-26 to 2027-28, following the norms of the UGC regulations for the Autonomous Colleges 2023.

S.No.	Category	Designation	Names of the Members of Board of Studies	Contact
1	Educational	Chairperson	Dr. K. Vaishnavi, Lecturer in Chemistry, Smt. N.P.S. Govt Degree College For Women (Autonomous), Chittoor	9441552497 vaishnavik.chem@gmail.com
2	University Nominee	Member	Dr. P. Bhanuprakash, Lecturer in Chemistry, PVKN Government College (A), Chittoor	7989435754 Bhanu.reddy15@gmail.com
3	Subject Expert (Outside the Parent Univeristy)	Member	Dr. P. Surekha,Lecturer in Chemistry, Government College (A),Rajamahendravaram.	9491570456 Pinnintisurekha456@gmail.com
4	Subject Expert (Outside the Parent Univeristy)	Member	Dr. L. Rajeswari, Lecturer in Chemistry, Government College (A), Rajamahendravaram.	8333895923 Rajeswarilalam012@gmail.com
5	Subject Expert (Other Autonomous College)	Member	Sri. A. Ramesh,Lecturer in Chemistry,PVKN Government College (A),Chittoor	9182320973 rameshallu349@gmail.com

6	Industrial Representative	Member	Sri. Rakshith. N, Senior Executive (Chemistry), ONGC, Kakinada	8332997431 N_Rakshith@ongc.co.in
7	Meritorious Alumnus	Member	N. Sandhya Rani, M.Sc.Chemistry,Teaching at Jain International School,Mulbagal	9019311152 Sr1129224@gmail.com

The above members are requested to attend the BoS meetings for the first Autonomous UG-Batch 2025-26 and share their valuable views, suggestions on the following functionaries.

a) Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stakeholders and National recruitment for consideration and approval of the IQAC and Academic Cell.
b) Suggest methodologies for innovative teaching and evaluation techniques
c) Coordinate research, teaching, extension and other activities in the department of the College.
d) Suggest CLO, PLO and subject experts to develop question bank in compliance with Bloom's Taxonomy.

The above said members are requested to bestow their services for the successful organization of the event.

Principal

DEPARTMENT OF CHEMISTRY,
Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Board of Studies 2025-26

Composition of the Board of Studies Committee

S.No.	Category	Designation	Names of the Members of Board of Studies	Contact
1	Educational	Chairperson	Dr. K. Vaishnavi, Lecturer, Department Of Chemistry, Smt. N.P.S. Govt Degree College For Women (Autonomous), Chittoor	9441552497 vaishnavik.chem@gmail.com
2	University Nominee	Member	Dr. P. Bhanuprakash, Lecturer in Chemistry, PVKN Government College (A), Chittoor	7989435754 Bhanu.reddy15@gmail.com
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7	Meritorious Alumnus	Member	N. Sandhya Rani, M.Sc.Chemistry, Teaching at Jain International School, Mulbagal	9019311152 Sr1129224@gmail.com

DEPARTMENT OF CHEMISTRY,
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Board of Studies 2025-26

Content

INDEX 2025-26

DEPARTMENT OF CHEMISTRY,
Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Board of Studies 2025-26

AGENDA

- **Review of Current Syllabus**
    - Discussion on the effectiveness of the existing syllabus for all three years
    - Feedback from faculty, students, and industry experts on course content and relevance
- **Syllabus Revision Proposals**
    - Proposals for updating syllabus based on recent advances in Chemistry
    - Inclusion of emerging interdisciplinary topics (e.g., green chemistry, nanotechnology, materials science)
    - Revision of course outcomes (COs), program outcomes (POs), and program specific outcomes (PSOs) to align with current educational standards
- **Practical and Laboratory Curriculum**
    - Review of practical syllabus and laboratory manuals
- **Evaluation and Examination Patterns**
    - Discussion on the current assessment and evaluation methods
    - Proposals for continuous assessment, internal evaluation, and question paper patterns to enhance student learning and critical thinking
- **Introduction of Skill Development and Elective Courses**
    - Suggestions for skill-based courses, workshops, and certificate programs in relevant areas
    - Proposal for introducing elective or interdisciplinary courses in the curriculum
- **Research and Project Work**
    - Discussion on the scope and structure of project work or research internships for final-year students.
    - Integration of industry-relevant projects and collaboration opportunities
- **Use of Technology and Digital Resources**
    - Incorporation of e-learning tools, virtual labs, and online resources in teaching-learning
    - Training needs for faculty in the use of modern tools and computational chemistry software

- **Industry Collaboration and Employability Enhancement**
    - Suggestions to strengthen industry-academia interaction
    - Proposal for guest lectures, internships, and placement assistance programs
- **Quality Assurance and Accreditation**
    - Review of compliance with university/NAAC/UGC guidelines and quality standards
    - Preparation for upcoming audits or accreditation processes
- **Any Other Matter**
    - Open floor for additional suggestions, concerns, or new proposals from members
- **Date and Venue for Next Meeting**
    - Scheduling the next Board of Studies meeting

Signature of the BOS Chairman

DEPARTMENT OF CHEMISTRY,
Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Board of Studies 2025-26

The college was granted autonomous status by the University Grants Commission (UGC) in 2024-25. Following this, the institution submitted formal communications to the parent university, the UGC, and the Government of Andhra Pradesh, requesting the constitution of statutory bodies and the issuance of an official notification by the affiliating university. In response, the Registrar of S.V. University issued the notification and instructed the implementation of autonomy starting from the academic year 2025–26.

Since then, the college administration has been conducting academic activities in accordance with the guidelines issued by the Higher Education authorities. An academic schedule was prepared to ensure the smooth conduct of classes, as well as internal and external examinations. This schedule was developed based on recommendations provided by the Board of Studies (BOS), duly constituted and approved by the Academic Council and the Governing Body for the academic year 2025–26.

In the current BOS meeting held on 24-10-2025, the committee discussed and unanimously approved the following resolutions. Any decisions or changes made at the college level, wherever necessary, may be adopted in subsequent academic years starting from the date of this BOS meeting.

The agenda was presented before the committee to invite constructive suggestions aimed at further enhancement, with a focus on addressing local requirements, market trends, industry needs, and employment opportunities, in alignment with UGC Regulations 2025.

DEPARTMENT OF CHEMISTRY,
Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Board of Studies 2025-26

Minutes of Meeting

Date:15 November 2025
Time: 11:00 AM – 1:30 PM
Venue: Department of Chemistry Offline and Online (Hybrid) mode

Members Present

S.No.	Name	Designation
1	Dr. K. Vaishnavi	Chairperson
2	Dr. P. Bhanu Prakash	University Nominee
3	Dr. P. Surekha	Subject Expert
4	Dr. L. Rajeswari	Subject Expert
5	Sri. A. Ramesh	Subject Expert
6	Sri N. Rakshith	Expert from Industry
7	Smt.N. Sandhya Rani	Alumni Nominee

Minutes of Meeting

1. Review of B.Sc. Chemistry Curriculum

- The existing curriculum was discussed in light of NEP-2020 recommendations, current academic trends, and feedback from students, faculty, employers, and alumni.
- Members agreed and approved the content that strengthens practical and applied knowledge.

2. Introduction & Revision of Courses

- Revised APSCHE syllabus is introduced

3. Textbooks & Reference Materials

- New editions of authoritative texts were recommended.
- Members approved adoption of digital reference materials and e-resources (NPTEL/SWAYAM).

4. Laboratory Upgrades & Safety

- Safety signage, updated SOPs, and Safety Orientation for first-year students were approved.
- Procurement of chemicals to follow standardized quality specifications.

5. Internship / Project Guidelines

- Project reports must follow a standard format recommended by the Department.
- Emphasis on literature survey, data interpretation, plagiarism rules, and ethical research practices.

Resolutions Passed

Resolution 1:

- Minutes of the BoS meeting were approved unanimously.

Resolution 2:

- Revised B.Sc. Chemistry curriculum (2025–26) incorporating NEP-2020 guidelines is approved.

Resolution 3:

- Revised syllabi are approved for implementation from the next academic year.

Resolution 4:

- Updated list of textbooks, reference materials, and digital learning resources is approved.

Resolution 5:

- Laboratory upgrades and revised safety protocols are approved; implementation to begin immediately.

Resolution 6:

- Internship and Project guidelines for final-year students are approved.

Resolution 7:

- Recommended career development practices and certificate courses

Conclusion

The meeting ended with a vote of thanks by the chairperson and the Principal Dr. K. Manohar appreciated the contributions of all members.

DEPARTMENT OF CHEMISTRY,

Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Board of Studies 2025-26 Under CBCS W.E.F. 2023-24

The following members attended the Board of studies meeting

S.No.	Name of the member		Signature
1	Dr. K. Vaishnavi, Lecturer in Chemistry, Smt. NPS GDC (W), Chittoor	Chair Person	
2	Dr. P. Bhanuprakash, Lecturer in Chemistry, PVKN Government College (A), Chittoor	University Nominee	
3	Sri. Rakshith. N, Senior Executive (Chemistry), ONGC, Kakinada	Industrial Representative	
4	Dr. P. Surekha, Lecturer in Chemistry Government College (A), Rajamahendravaram.	Subject Expert (Outside Parent Univeristy)	
5	Dr. L. Rajeswari, Lecturer in Chemistry Government College (A), Rajamahendravaram.	Subject Expert (Outside Parent Univeristy)	
6	Sri. A. Ramesh, Lecturer in Chemistry, PVKN Government College (A),Chittoor	Subject Expert (Other Autonomous College)	
7	N. Sandhya Rani, M.Sc.Chemistry, Teaching at Jain International School,Mulbagal	Meritorious Alumnus	

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

1. Resolutions of Board of Studies Meeting
2. Syllabus of I and II semesters.
3. Model question papers for I and IIsemesters.
4. List of Examiners

DEPARTMENT OF CHEMISTRY,

Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Board of Studies 2025-26, Under CBCS W.E.F. 2025-26

LIST OF PAPER SETTERS/QUESTION BANK SETTERS

S. No.	Name of the Examiner with Designation	Qualification	Address
1	Dr. P. Bhanuprakash, Lecturer in Chemistry	Ph.D, M.Sc	PVKN Government College (A), Chittoor, Phone no: 7989435754, Mail Id: bhanu.reddy15@gmail.com
2	Dr. M. Trinadh, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry- 533105, Phone no; 9441383828, Mail Id: drtrinadhchem@gcrjy.ac.in
3	Dr. Santha Kumari, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry- 533105, Phone number: 9949291500, Mail Id: santhijosh@gmail.com
4	Dr. Ch. Rajani, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry- 533105, Phone No: 9701391136, Mail Id: srirajani85@gcrjy.ac.in
5	Dr. P. Murali Krishna, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry- 533105, Phone No: 8897709571, Mail Id: muralipatoju@gcrjy.ac.in
6	Dr. V. Satyanarayana, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry- 533105, Phone No: 9573901095, Mail Id: satyanarayana54@gcrjy.ac.in
7	Dr. Veera Durga Praveena, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry- 533105, Phone No: 9440454229, Mail Id: praveena.veera@gcrjy.ac.in

DEPARTMENT OF CHEMISTRY,
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Board of Studies 2025-26, Under CBCS W.E.F. 2025-26

LIST OF Examiners

S. No.	Name of the Examiner with Designation	Qualification	Address
1	Dr. M. Vanaja, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Ananthapuram, Phone No:8500987261, Mail Id: vanajamanchuru@gmail.com
2	Dr. Sankara Rao Miditana, Lecturer in Chemistry	Ph.D, M.Sc	Government Degree College, Puttur-517583, Phone number: 9491806362, Mail ID: sraom90@gmail.com
3	Sri. A. Ramesh, Lecturer in Chemistry	M.Sc	PVKN Government College (A),Chittoor, Phone no: 9182320973, Mail Id: rameshallu349@gmail.com
4	Dr. P. Surekha, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry-533105, Phone no: 9491570456, Mail Id: pinnintisurekha456@gmail.com
5	Dr. L.Rajeswari, Lecturer in Chemistry	Ph.D, M.Sc	Government College (A), Rajahmundry-533105, Phone no: 8333895923, Mail Id: rajeswarilalam012@gmail.com
6	M. Sudhakar, Lecturer in Chemistry	M.Sc	Government College (A), Rajahmundry- 533105, Phone No: 9666006009, Mail Id: sudhakarraomarada@gcrjy.ac.in
7	Sri M. Prasad, Lecturer in Chemistry	M.Sc	Government College (A), Rajahmundry- 533105, Phone No: 8897850270, Mail Id: prasad.melapu@gmail.com

DEPARTMENT OF CHEMISTRY,
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Board of Studies 2025-26 Under CBCS W.E.F. 2025-26

Scheme of Valuation

Total Marks: 100
External Examination: 70 Marks
Internal Evaluation: 30 Marks

A. External Examination (70 Marks)

- The external examination shall be conducted by the University at the end of the semester for 70 marks.
- The question paper shall be set and evaluated as per the regulations approved by the Board of Studies.
- The duration of the examination shall be **2 hours 30 minutes**.

B. Internal Evaluation (30 Marks)

The internal evaluation shall be conducted for a total of **60 marks** and subsequently **scaled down to 30 marks**.
Internal evaluation is based on continuous assessment of student performance throughout the semester, distributed as follows:

Component	Maximum Marks	Description
• Continuous Internal Evaluation – I	- 20	- First internal test covering the syllabus up to the first half of the semester.
• Continuous Internal Evaluation – II	- 20	- Second internal test covering the remaining portion of the syllabus.
• Assignment	- 5	- Based on submission of assignments, mini-projects, or reports as prescribed by the course teacher.
➢ Attendance	- 5	- Based on the percentage of attendance as per the institutional regulations.
➢ Seminar / Quiz	- 5	- Evaluation based on performance in seminar presentations, quizzes, or group discussions.
➢ Swachh Bharat Activity	- 5	- Evaluation based on participation in cleanliness drives or related social responsibility activities.
➢ **Total (Internal Evaluation)**	- **60**	- **Scaled down to 30 marks**

- **Summary of Marks Distribution**

Component		Maximum Marks
External Examination	-	70
Internal Evaluation (scaled from 60)	-	30
Total	-	**100**

Note:

1. A student must secure the minimum 40% in both **Internal** and **External** examinations separately to pass the course.
2. Internal marks are to be submitted to the Controller of Examinations before the commencement of the University examination.
3. The scheme may be reviewed periodically by the Board of Studies to ensure effective continuous assessment.
4. The marks split up for the attendance (5 marks) based on their attendance percentage.

DEPARTMENT OF CHEMISTRY,
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Board of Studies 2025-26 Under CBCS W.E.F. 2025-26

Scheme of Valuation for Practical Examination

- **Practical Examination (50 Marks)**

  - The **external practical examination** shall be conducted at the end of the even semesters II, IV, VI, by the college under the supervision of an external examiner. For odd semesters I, III, V, the external practical examination shall be conducted under the supervision of internal examiner.
  - The evaluation shall be based on the student's performance in the **laboratory exercise**, **viva voce**, and **record submission** during the examination.
  - The duration of the practical examination shall be 3 hours.

Component	Maximum Marks	Description
• Record	- 10	- Evaluation based on completeness, accuracy, and neatness of the practical record book.
• Viva Voce	- 10	- Based on the student's understanding of experiments performed and related theoretical concepts.
• Procedure / Performance	- 15	- Assessment of the student's experimental skill, handling of apparatus, accuracy, and adherence to safety norms.
• Practicals Recorded in the Record	- 15	- Evaluation of the number and quality of practicals completed and recorded during the semester.
• **Total Evaluation**	- **50**	

Note:

1. Students must secure the **minimum 40% marks** to pass the practical examination.
2. Internal marks shall be submitted to the Controller of Examinations before the commencement of the external practical examination.
3. The Board of Studies may revise the scheme periodically to maintain alignment with academic standards and laboratory requirements.

DEPARTMENT OF CHEMISTRY,
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Board of Studies 2025-26 Under CBCS W.E.F. 2025-26

PROGRAM OUTCOMES

PO1 - Disciplinary Knowledge

Demonstrate in-depth knowledge of fundamental and advanced topics in Inorganic, Organic, Physical, Analytical, and Industrial Chemistry, and related interdisciplinary concepts.

PO2 - Use of Modern Tools & Techniques :

Use modern chemical instrumentation, computational tools, data analysis software, modelling and simulation tools relevant to chemical sciences.

PO3 - Application & Problem Solving **:**

Identify, formulate and solve chemical problems (theoretical and experimental) using appropriate strategies and tools.

PO4 - Experimental Skills & Laboratory Competence :

Plan, perform, analyze, interpret chemical experiments, including proper handling of chemicals, instrumentation, error analysis, and safety practices.

PO5 - Teamwork & Leadership :

Work effectively as an individual or in teams, lead projects, collaborate across disciplines, and take initiative in organizational or research settings.

PO6 - Employability & Entrepreneurial Skills :

Be prepared for careers in industries, academia, research, government agencies, or entrepreneurship by having relevant domain-specific and transferable skills.

PO7 - Communication Skills :

Effectively communicate chemical knowledge, results, and interpretations through oral, written, graphical, and presentation modes.

PO8 - Ethical, Social & Environmental Awareness :

Recognize the ethical, social, safety, environmental, and sustainability implications of chemistry and adhere to professional and ethical norms.

PO9 - Critical Thinking & Lifelong Learning :

Demonstrate ability to critically analyze new scientific literature, adapt to emerging developments in chemistry, and engage in independent learning

PO10 - Social and Environmental awareness :

Understand sensibly the environment sustainability challenges.

PROGRAM SPECIFIC OUTCOMES

PSO1 – Mastery over Core Chemistry

Attain a solid understanding of core branches: inorganic, organic, physical, analytical, and industrial chemistry, and their interrelationships

PSO2 – Interdisciplinary Application

Apply chemistry knowledge in allied fields (e.g. materials science, environmental chemistry, biochemistry, pharmaceuticals, nanotechnology) to solve contemporary problems

PSO3 – Career & Competitive Readiness

Be equipped to compete for postgraduate programs, research fellowships, industry roles, teaching positions, and national/international competitive examinations.

DEPARTMENT OF CHEMISTRY,
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Board of Studies 2025-26 Under CBCS W.E.F. 2025-26
Course Structure (I year - Sem I & II)

S. No.	Course Code	Title of the Course	Hrs/ Week	Max. Marks	Marks in SEE	Marks In CIA	Total Marks	Credits
	SEMESTER-I							
1	25ENG101T	Language- General English	4	100	70	30	100	4
2	25TEL101T	Language- Telugu/Hindi	4	100	70	30	100	4
3	25BCS101S	Skill Enhancement Course (Intro to Artificial Intelligence)	4	100	70	30	100	4
4	25BCS101L	Skill Enhancement Course (Intro to Artificial Intelligence) practice	2	-	-	-	-	-
5	25CHE101T Major-1 (General)	General Chemistry	3	100	70	30	100	3
6	25CHE101P Major-1 Practical	Qualitative Analysis of Simple Salt	2	50	50		50	1
7	25CHE102T Major-2 (General)	Inorganic Chemistry	3	100	70	30	100	3
8	25CHE102P Major-2 Practical	Inorganic Preparations	2	50	50	-	50	1
	End of Semester I of 1st Year							
	SEMESTER-II							
1	25ENG202T	Language- General English	4	100	70	30	100	4
2	25TEL202T	Language- MIL- Telugu/Hindi	4	100	70	30	100	4
3	25CHE202S	Skill Enhancement Course (Application of Artificial Intelligence)	4	100	70	30	100	4
	25CHE202L	Skill Enhancement Course (Application of Artificial Intelligence) Practice	2	-	-	-	-	-
4	25HIS201M	Multi-Disciplinary Course (Introduction to social work)	2	50	50	-	50	2
5	25CHE203T Major-3	Organic Chemistry – I (Structural Theory & Hydrocarbons)	3	100	70	30	100	3
6	25CHE203P Major-3 Practical	Organic Preparations	2	100	50	50	100	1
7	25CHE204T Major-4	Physical Chemistry – I (States of Matter, Phase rule & Surface Chemistry)	3	100	70	30	100	3
8	25CHE204P Major-4 Practical	Physical Chemistry – I Practical	2	100	50	50	100	1
9		Indian Knowledge System	2	-	-	-	-	0
10	Community Service Project (minimum of 80 hours with 1 Credit)							1
	End of Semester II of 1st Year							

DEPARTMENT OF CHEMISTRY,

Smt. N.P.S. GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

Board of Studies 2025-26

Full Course Structure

SNO	COURSE	TOTAL MARKS	MID SEM EXAM (CIA)	SEM END EXAM(SEE)	TEACHING HOURS	CREDITS
1	Core Paper-1	100	30	70	3	3
2	Core Paper - 1 Lab Practical	50	-	50	2	1
3	Core Paper-2	100	30	70	3	3
4	Core Paper - 2 Lab Practical	50	-	50	2	1
5	Core Paper-3	100	30	70	3	3
6	Core Paper - 3 Lab Practical	50	-	50	2	1
7	Core Paper-4	100	30	70	3	3
8	Core Paper - 4 Lab Practical	50	-	50	2	1
9	Core Paper-5	100	30	70	3	3
10	Core Paper - 5 Lab Practical	50	-	50	2	1
11	Core Paper-6	100	30	70	3	3
12	Core Paper -6 Lab Practical	50	-	50	2	1
13	Core Paper-7	100	30	70	3	3
14	Core Paper - 7 Lab Practical	50	-	50	2	1
15	Cluster Paper-8	100	30	70	3	3
16	Cluster Paper - 8 Lab Practical	50	-	50	2	1
17	Cluster Paper-9	100	30	70	3	3
18	Cluster Paper - 9 Lab Practical	50	-	50	2	1
19	Cluster Paper-10	100	30	70	3	3
20	Cluster Paper - 10 Lab Practical	50	-	50	2	1
21	Cluste Paper-11	100	30	70	3	3
22	Cluster Paper - 11 Lab Practical	50	-	50	2	1
23	Cluster Elective Paper-12 A or B	100	30	70	3	3
24	Cluster Elective Paper - 12 Practical	50	-	50	2	1

25	Cluster Elective Paper-13 A or B	100	30	70	3	3
26	Cluster Elective Paper - 13 Practical	50	-	50	2	1
27	Cluster Elective Paper-14	100	30	70	3	3
28	Cluster Elective Paper - 14 Practical	50	-	50	2	1
29	Cluster Elective Paper-15	100	30	70	3	3
30	Cluster Elective Paper - 15 Practical	50	-	50	2	1

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **I B.Sc.** **Chemistry (H) Semester – I**			
Course Code 25CHE101T	TITLE OF THE COURSE **GENERAL CHEMISTRY**				
Teaching	Hours Allocated: 45 (**Theory**) (3 hrs. / Week.)	L	T	P	C
Pre-requisites:	Basic knowledge about atoms 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-	
CO1	Understand and explain fundamental concepts of atomic structure, periodic trends, and chemical bonding.
CO2	Apply bonding theories (VBT, VSEPR, MOT) to predict molecular geometry and bonding characteristics.
CO3	Analyze properties of ionic, covalent, metallic, and hydrogen bonds, and their effects on physical properties.
CO4	Explain the principles of nuclear chemistry and assess the applications of radioactivity in real-world contexts.

Syllabus:

UNIT-1: ATOMIC STRUCTURE AND PERIODIC TABLE (9 h)

Electronic configuration-Aufbau principle, Hund's rule and Pauli's exclusion principle. Periodic law and arrangement of elements in the periodic table, horizontal, vertical, and diagonal relationships in the periodic table. Definition and periodic trends of atomic radii, ionic radii, covalent radii, ionization potential, electron affinity, and electronegativity, Pauling scale, variable valency, inert-pair effect.

UNIT-2: IONIC BOND (9 h)

Properties of ionic compounds, factors favouring the formation of ionic compounds, Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle - enthalpy of formation of ionic compound and stability, Covalent character in ionic compounds - polarization and Fajan's rules, effects of polarization.

UNIT- 3: COVALENT BOND (9 h)

Valence Bond theory: Hybridization of atomic orbitals and geometry of molecules - $BeCl_2$, BF_3, CH_4, PCl_5, and SF_6

VSEPR model: Effect of bonding and nonbonding electrons on the structure of molecules - NH_3, H_2O, SF_4, ICl_2^- and XeF_4

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

UNIT-4: METALLIC AND HYDROGEN BONDS

Metallic bond: Metallic properties, free electron theory, band theory of metals. Explanation of conductors, semiconductors and insulators.

Hydrogen bonding: Intra and Inter-molecular hydrogen bonding, influence on the physical properties of molecules, Van der waals forces, dipole-dipole interactions.

UNIT-5: NUCLEAR CHEMISTRY (9 h)

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

REFERENCES:

1. J.D. Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.
2. B. R. Puri, L.R. Sharma, K.C. Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co.,1996.
3. D.F. Shriver and P.W. Atkins, Inorganic Chemistry, 3rd ed., W. H. Freeman and Co, London,
4. James E. Huheey, Inorganic Chemistry: Principles of Structure and Reactivity, 4thed., 2017.
5. H.J. Arnikar, Essentials of Nuclear Chemistry, New Age International Publishers, 2015.

CO-PO MAPPING:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	3	1	2	1	1	1	1	1	3	1	3	3	1
CO2	3	2	3	1	1	1	1	1	2	1	3	3	2
CO3	3	2	2	1	1	2	1	2	3	3	3	2	3
CO4	3	1	2	1	1	3	3	3	3	3	3	3	3
Average	3	1.5	2.25	1	1	1.75	1.5	1.75	2.75	2	3	2.75	2.25

PROPOSED ACTIVITIES:

- Chart on periodic trends like radii, ionization energy, electronegativity across groups/periods. 2. Worksheet solving- MOT diagrams and hybridization problems.
- Model Building-Build 3D structures using kits/software for CH_4, PCl_5, XeF_4 etc.

CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS

- Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning.
- Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
- Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR

I B.SC. CHEMISTRY (HONS.) SEMESTER–I 2025-26

CHEMISTRY COURSE: GENERAL CHEMISTRY

QUESTION PAPER BLUE PRINT

TIME: $2^1/_2$ hrs. **MAX. MARKS: 70 M**

PART – A

Answer any **FIVE** of the following questions. **5x4 = 20 M**

1. Questions from UNIT-I
2. Questions from UNIT-I
3. Questions from UNIT-II
4. Questions from UNIT-II
5. Questions from UNIT-III
6. Questions from UNIT-III
7. Questions from UNIT-IV
8. Questions from UNIT-IV
9. Questions from UNIT-V
10. Questions from UNIT-V

PART – B

Answer **ALL** the following questions. **5x10 = 50M**

11a Question from UNIT-I

OR

11b. Question from UNIT-I

12a. Question from UNIT-II

OR

12b Question from UNIT-II

13a. Question from UNIT-III

OR

13b. Questions from UNIT III

14a Question from UNIT-IV

OR

14b. Question from UNIT- IV

15a Question from UNIT-V

OR

15b Question from UNIT V

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR

I B.SC. CHEMISTRY (HONS.) SEMESTER–I 2025-26

CHEMISTRY COURSE : GENERAL CHEMISTRY

MODEL PAPER

Time: 2 ½ Hrs. **Max. Marks: 70M**

PART – A

Answer any FIVE questions (5 x 4 = 20 Marks)

1. Explain the Aufbau principle with an example.
2. Define ionization potential and discuss its trend in the periodic table.
3. What is lattice energy? Mention the factors affecting it.
4. State and explain Fajan's rules.
5. Describe the hybridization and geometry of BF_3 molecule.
6. Draw the molecular orbital energy level diagram for N_2 molecule.
7. Explain the free electron theory of metallic bonding.
8. What is hydrogen bonding? How does it affect the boiling point of water?
9. Define isotopes and explain the significance of neutron-to-proton ratio.
10. Write the difference between nuclear fission and fusion.

PART – B

Answer ALL questions. Each question carries 10 marks.

11a. Discuss the arrangement of elements in the periodic table with special reference to trends of properties in horizontal and vertical relationships.

OR

11b. Explain the inert-pair effect and give examples.

12a. Explain the Born-Haber cycle with an example and derive an expression for lattice energy.

OR

12b. Discuss the covalent character in ionic compounds and the effect of polarization.

13a. Explain VSEPR theory and predict the shape of SF_4 molecule.

OR

13b. Construct and explain the molecular orbital diagram for O_2 molecule.

14a. Discuss the band theory of metals and explain the difference between conductors, semiconductors, and insulators.

OR

14b. Describe intermolecular forces in detail and explain their influence on physical properties.

15a. Define binding energy and explain its significance in nuclear stability.

OR

15b. Describe the radioactive decay series and applications of radioactivity in medicine.

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **I B.Sc.** **Chemistry (H) Semester – I**			
Course Code 25CHE101P	TITLE OF THE COURSE **QUALITATIVE ANALYSIS OF SIMPLE SALT**				
Teaching	Hours Allocated: 30 (**Practical**) (2 hrs. / Week.)	L	T	P	C
Pre-requisites:	Basic knowledge about inorganic chemistry and elements	-	-	2	1

COURSE OBJECTIVES:

1. To learn the systematic procedure for identification of simple inorganic anions.
2. To learn the systematic procedure for identification of simple inorganic cations.
3. To learn the laboratory techniques involved in the inorganic qualitative analysis.
4. To understand the chemical reactions involved in the identification of acidic and basic radicals

COURSE OUTCOMES:

On Completion of the course, the students will be able to	
CO1	Identify and confirm common anions and cations in inorganic salts through systematic qualitative analysis.
CO2	Demonstrate proficiency in using classical wet-lab techniques for salt analysis, including confirmatory tests.
CO3	Interpret chemical reactions involved in salt analysis using relevant chemical principles and observations.
CO4	Follow proper laboratory safety protocols and exhibit good laboratory practices while handling reagents and equipment.

Syllabus

Analysis of inorganic simple salt: **50 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.

References:

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.

Weblink:

https://youtu.be/adA8doZhqWs

CO-PO Mapping:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	2	2	2	2	2	2	3	2	2
CO2	3	2	3	3	2	2	2	2	2	2	3	2	3
CO3	3	1	2	2	2	2	1	2	2	2	3	2	2
CO4	2	2	2	3	2	2	2	3	2	2	2	1	2
Average	2.75	1.75	2.5	2.5	2	2	1.75	2.25	2	2	2.75	1.75	2.25

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **I B.Sc.** **Chemistry (H) Semester – I**			
Course Code 25CHE102T	TITLE OF THE COURSE **INORGANIC CHEMISTRY**				
Teaching	Hours Allocated: 45 (**Theory**) (3 hrs. / Week.)	L	T	P	C
Pre-requisites:	Basic knowledge about inorganic chemistry and elements	3	-	-	3

COURSE OBJECTIVES:

1. To learn the preparation and structure of Diborane and Borazole.
2. To provide the knowledge about different types of Interhalogen compounds.
3. To provide the 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	Understand the preparation, structure, and properties of selected compounds of p-block elements across Groups 13–17.
CO2	Explain the properties and chemical behavior of d-block and f-block elements, including electronic configuration and complex formation.
CO3	Analyze the trends in oxidation states, magnetic and catalytic properties among transition and inner transition elements.
CO4	Describe the processes involved in extraction, refining, and corrosion prevention of metals using metallurgical principles.

SYLLABUS:

UNIT-1: CHEMISTRY OF p-BLOCK ELEMENTS – I (9 h)

Group 13: Preparation and structure of Diborane, Borazine and (BN)x.

Group 14: Preparation, classification and uses of silicones.

Group 15: Preparation and structure of Phosphonitrilic Chloride $P_3N_3Cl_6$.

UNIT-2: 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, Pseudohalogens.

UNIT-3: CHEMISTRY OF d-BLOCK ELEMENTS (9 h)

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

UNIT-4: CHEMISTRY OF f-BLOCK ELEMENTS (9 h)

Chemistry of Lanthanides: Electronic configuration, oxidation states, colour, magnetic properties, lanthanide contraction, consequences of lanthanide contraction, comparison of lanthanides and actinides.

UNIT-5: GENERAL PRINCIPLES OF METALLURGY (9 h)

Occurrence of metals, minerals and ores, Concentration of ores- levigation, magnetic separation, froth floatation, leaching, Conversion of concentrated ores to oxide- calcination and roasting, reduction of oxide to the metal, Refining of crude metal-distillation, liquation, poling, electrolysis, zone refining and vapour phase refining, Corrosion and its prevention, Alloys.

REFERENCES:

- J. D. Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.
- B.R. Puri, L.R. Sharma, K.C. Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co.,1996.
- D.F. Shriver, P.W. Atkins, Inorganic Chemistry, W. H. Freeman and Co, London,1999.
- J.E. Huheey, **Inorganic Chemistry: Principles of Structure and Reactivity**, 4thed., 2017.
- A.K. Das, Fundamentals of Metallurgy. Tata McGraw Hill Education, 2011.

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PROPOSED ACTIVITIES:

- Group discussion: Trends in d-block and f-block properties across periods and groups.
- Comparative worksheet: Lanthanide vs Actinide behaviour.
- Seminar: Uses of metals in daily life.

CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

- Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning.
- Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
- Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

REFERENCE BOOKS:

- Inorganic Chemistry by J.E.Huheey
- Basic Inorganic Chemistry by Cotton and Wilkinson.
- 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	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2	2	2	2	2	2	3	2	1
CO2	3	2	3	2	2	2	2	2	2	2	3	3	2
CO3	3	1	3	2	2	2	2	2	2	2	3	3	2
CO4	3	1	2	2	2	2	2	1	2	2	3	2	3
Average	3	1.5	2.5	2	2	2	2	1.75	2	2	3	2.5	2

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR

I B.Sc. CHEMISTRY (Hons.) **SEMESTER–I 2025-26**

CHEMISTRY COURSE-1 : INORGANIC CHEMISTRY

QUESTION PAPER BLUE PRINT

TIME: $2^1/_2$ hrs. **MAX. MARKS: 70**

PART – A

Answer any **FIVE** of the following questions. **5x4 = 20 M**

1. Questions from UNIT-I
2. Questions from UNIT-I
3. Questions from UNIT-II
4. Questions from UNIT-II
5. Questions from UNIT-III
6. Questions from UNIT-III
7. Questions from UNIT-IV
8. Questions from UNIT-IV
9. Questions from UNIT-V
10. Questions from UNIT-V

PART – B

Answer **ALL** the following questions. **5x7 = 35 M**

11a Question from UNIT-I

(OR)

11b. Question from UNIT-I

12a. Question from UNIT-II

(OR)

12b Question from UNIT-II

13a Question from UNIT-III

(OR)

13b Questions from UNIT-III

14a Question from UNIT-IV

(OR)

14b Question from UNIT-IV

15a Question from UNIT-V

(OR)

15b Question from UNIT-V

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR
I B.Sc. CHEMISTRY (Hons.) SEMESTER–I 2025-26
CHEMISTRY COURSE : INORGANIC CHEMISTRY

Model Question paper

Time: $2^1/_2$ Hrs. **Maximum Marks: 70**

PART – A

Answer any FIVE questions (5 x 4 = 20 Marks)

1. Describe the structure of Diborane (B_2H_6).
2. Explain the classification and uses of silicones.
3. Write the preparation and structure of Phosphonitrilic Chloride ($P_3N_3Cl_6$).
4. Classify the oxides of sulfur and describe their structures.
5. What are interhalogen compounds? Give examples.
6. Discuss the electronic configuration and variable valency of 3d-series elements.
7. Explain the lanthanide contraction and its consequences.
8. Describe the properties of lanthanides.
9. What is froth flotation? How is it used in ore concentration?
10. Discuss the different methods of refining metals.

PART – B

Answer ALL questions. Each question carries 10 marks.

11a. Explain the preparation and structure of Borazine.
OR
11b. Discuss the preparation and classification of silicones with examples.

12a. Describe the structure and preparation of pseudohalogens.
OR
12b. Explain the classification and structures of oxoacids of sulfur.

13a. Describe the catalytic properties and color of 3d transition metals.

OR

13b. Explain the stability of various oxidation states of the 3d-series elements.

14a. Compare the chemistry of lanthanides and actinides with respect to oxidation states and electronic configuration.

OR

14b. Discuss the magnetic properties and colour of lanthanides.

15a. Explain the steps involved in the extraction of metals from ores, highlighting the role of roasting and calcination.

OR

15b. Describe the causes of corrosion and methods used for corrosion prevention.

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **I B.Sc.** **Chemistry (H) Semester – I**			
Course Code 25CHE102P	TITLE OF THE COURSE **Inorganic Preparations**				
Teaching	Hours Allocated: 30 (**Practical**) (2 hrs. / Week.)	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	Perform the synthesis of selected inorganic compounds using standard laboratory procedures and techniques.
CO2	Demonstrate correct usage of laboratory apparatus and follow safety protocols in inorganic compound preparation.
CO3	Record, analyze, and interpret physical and chemical changes observed during synthesis processes.
CO4	Understand the chemical principles underlying the synthesis of double salts and coordination compounds.

Syllabus:

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

REFERENCES:

1. G. Svehla, Vogel's Textbook of Qualitative Inorganic Analysis, Pearson Education, 2008.
2. G.H. Jeffery, J. Bassett, J. Mendham, R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, John Wiley and Sons, 1989.

CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

a. Internal Practical Assessment

b. Lab Record Evaluation

c. Final Practical Examination

d. Oral/Viva Voce

CO-PO Mapping:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	2	2	2	2	2	2	3	2	2
CO2	2	2	2	3	2	2	2	3	2	2	3	1	2
CO3	3	2	3	2	2	2	1	2	2	2	3	2	2
CO4	3	2	2	2	2	2	2	2	2	2	3	2	2
Average	2.75	2	2.5	2.5	2	2	1.75	2.25	2	2	3	1.75	2

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **II B.Sc.** **Chemistry (H) Semester – II**			
Course Code 25CHE203T	TITLE OF THE COURSE **ORGANIC CHEMISTRY – 1** **(Structural theory and Hydro Carbons)**				
Teaching	Hours Allocated: 45 (**Theory**) (3 hrs. / Week.)	L	T	P	C
Pre-requisites:	Basic knowledge about organic chemistry	3	-	-	3

COURSE OBJECTIVES:

1. To provide basic knowledge about structural theory in organic chemistry
2. To provide knowledge on alkenes, alkynes and its applications
3. To gain knowledge on synthetic organic chemistry
4. Analyze and apply Huckel's rule to benzenoid and non-benzenoid aromatic compounds.
5. Interpret stereochemical representations and identify chiral molecules.

COURSE OUTCOMES:

On Completion of the course, the students will be able to-	
CO1	Understand key concepts in structural theory, including bond fission, reactive intermediates, and electronic effects.
CO2	Explain mechanisms and types of organic reactions in saturated and unsaturated hydrocarbons with proper regio- and stereoselectivity.
CO3	Analyze aromaticity, electrophilic aromatic substitution reactions, and orientation effects in substituted benzenes.
CO4	Apply stereochemical principles to identify and represent chiral molecules and determine absolute and relative configurations.

Syllabus:

UNIT-1: STRUCTURAL THEORY IN ORGANIC CHEMISTRY (9 h)

Functional groups in organic chemistry, Types of bond fission, Electrophiles, Nucleophiles, Reactive intermediates-carbocations, carbanions & free radicals. Inductive effect and its application: (a) Basicity of amines and (b) Acidity of carboxylic acids, Resonance or Mesomeric effect and its application: (a) Acidity of phenol, and (b) Acidity of carboxylic acids. Hyper conjugation and its application to the stability of carbonium ions.

UNIT-2: SATURATED HYDROCARBONS (ALKANES & CYCLOALKANES) (9 h)

Types of organic reactions: Addition, Elimination, Substitution and Rearrangement reactions.
Alkanes: Preparation of alkanes by Corey House synthesis, Substitution reactions of alkanes.
Cycloalkanes: Cycloalkanes and their relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram.

UNIT-3: UNSATURATED HYDROCARBONS (ALKENES & ALKYNES) (9 h)

Alkenes: Preparation of alkenes by dehydration of alcohols, Saytzeff and Hofmann eliminations, Electrophilic Additions of X_2, H_2O, HX to alkene, Markownikoff and Anti-markownikoff addition, Ozonolysis, Diels-Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes.

Alkynes: Additions of X_2, H_2O, HX to alkynes, acidity and alkylation of terminal alkynes.

UNIT-4: AROMATICITY, BENZENE AND ITS REACTIVITY

Aromaticity: Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non-Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropylium cation). Electrophilic aromatic substitution benzene- Halogenation, Nitration, Friedel- Craft's alkylation and Friedel- Craft's acylation.

Orientation of aromatic substitution: Ortho, para and meta directing groups with examples, Ring activating and deactivating groups with examples.

UNIT- 5: STEREOCHEMISTRY OF CARBON COMPOUNDS (9 h)

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

Optical isomerism: Optical activity, optical rotation and specific rotation. Chiral molecules-Symmetry elements-enantiomers and diastereomers, Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, and Tartaric acid. Relative configuration (D, L-notation), CIP rules, Absolute configuration (R, S-Configuration).

REFERENCES:

1. R.N. Morrison, R.N. Boyd, Organic Chemistry, Pearson Education, 7th edition, 2010.
2. S.P. Singh, O. Prakash, Reaction mechanism in organic chemistry, Laxmi Publications, 2017.
3. T.W.G. Solomons, C.B. Fryhle, S.A. Snyder, Organic Chemistry, 12th Edition, Wiley, 2016.
4. P.S. Kalsi, Stereochemistry, New Age International, 2015.
5. D. Nasipuri, Stereochemistryof organic compounds, New Age International, 2020.

II. PROPOSED ACTIVITIES:

1. Mechanism writing exercises- Electrophilic aromatic substitution, electrophilic additions.
2. Group quiz on directive effects and reactive intermediates.
3. Concept mapping-Properties of alkane, alkene, alkyne, benzene.

III. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning
2. Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.

CLO-PLO Mapping:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2	2	2	2	2	2	3	2	1
CO2	3	2	3	2	2	2	2	2	2	2	3	2	2
CO3	3	2	2	2	2	2	2	2	2	2	3	2	2
CO4	3	1	3	2	2	2	1	2	3	2	3	2	2
Average	3	1.75	2.5	2	2	2	1.75	2	2.25	2	3	2	1.75

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR

I B.Sc. CHEMISTRY (Hons.) **SEMESTER–II 2025-26**

CHEMISTRY COURSE-1 : ORGANIC CHEMISTRY-I

QUESTION PAPER BLUE PRINT

TIME: $2^1/_2$ hrs. **MAX. MARKS: 70**

PART – A

Answer any **FIVE** of the following questions. **5x4 = 20 M**

1. Questions from UNIT-I
2. Questions from UNIT-I
3. Questions from UNIT-II
4. Questions from UNIT-II
5. Questions from UNIT-III
6. Questions from UNIT-III
7. Questions from UNIT-IV
8. Questions from UNIT-IV
9. Questions from UNIT-V
10. Questions from UNIT-V

PART – B

Answer **ALL** the following questions. **5x10= 50 M**

11a Question from UNIT-I

(OR)

11b. Question from UNIT-I

12a. Question from UNIT-II

(OR)

12b Question from UNIT-II

13a Question from UNIT-III

(OR)

13b Questions from UNIT-III

14a Question from UNIT-IV

(OR)

14b Question from UNIT-IV

15a Question from UNIT-V

(OR)

15b Question from UNIT-V

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR

I B.Sc. CHEMISTRY (Hons.) SEMESTER–II 2025-26

CHEMISTRY COURSE : ORGANIC CHEMISTRY-I

MODEL QUESTION PAPER

TIME: $2^1/_2$ hrs. **MAX. MARKS: 70**

PART – A

Answer any FIVE questions (5 x 4 = 20 Marks)

1. Define electrophiles and nucleophiles with examples.
2. Explain the inductive effect and its influence on the acidity of carboxylic acids.
3. Write a note on Corey-House synthesis of alkanes.
4. Describe Baeyer strain theory in cycloalkanes.
5. Explain Markownikoff's rule in electrophilic addition reactions.
6. What is Huckel's rule? Explain with reference to benzene.
7. Differentiate between ortho, meta, and para directing groups with examples.
8. Draw Newman projection for staggered and eclipsed conformations of ethane.
9. Define optical activity and explain specific rotation.
10. Explain the concept of enantiomers and diastereomers with examples.

PART – B

Answer ALL questions. Each question carries 10 marks.

11a. Discuss different types of bond fission with suitable examples.

OR

11b. Explain resonance effect and its application to the acidity of phenol.

12a. Describe the substitution reactions of alkanes.

OR

12b. Explain the conformations of cyclohexane with energy diagrams.

13a. Explain the electrophilic addition reactions of alkenes with mechanism for addition of HX.

OR

13b. Discuss the preparation and acidity of terminal alkynes.

14a. Describe electrophilic aromatic substitution reactions of benzene, focusing on nitration and halogenation.

OR

14b. Explain the effect of ring activating and deactivating groups on aromatic substitution with examples.

15a. Discuss optical isomerism with reference to glyceraldehyde and lactic acid.

OR

15b. Explain CIP rules and determine the absolute configuration of a chiral molecule.

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **I B.Sc.** **Chemistry (H)** **Semester – II**			
Course Code 25CHE203P	TITLE OF THE COURSE **ORGANIC PREPARATIONS**				
Teaching	Hours Allocated: 30 (**Theory**) (3 hrs. / Week.)	L	T	P	C
Pre-requisites:	Basic knowledge on handling of glassware and chemicals	-	-	2	1

COURSE OBJECTIVES:

1. Understand mechanisms and conditions for common organic synthesis reactions (nitration, bromination, esterification, acetylation).
2. Perform organic synthesis usingappropriate techniques such as heating, reflux, crystallization, and filtration.
3. Develop safe laboratory practices and chemical handling procedures.

COURSE OUTCOMES:

On Completion of the course, the students will be able to	
CO1	Perform the synthesis of various important organic compounds following standard organic lab protocols.
CO2	Demonstrate proper handling of reagents, apparatus, and laboratory safety during organic synthesis experiments.
CO3	Record, analyze, and interpret experimental observations and physical properties of synthesized compounds.
CO4	Understand the reaction mechanisms and chemical principles underlying the preparation of pharmaceutical compounds.

SYLLABUS:

1. Preparation of tribromo aniline
2. Preparation of p-nitroacetanilide
3. Preparation of nerolin
4. Preparation of aspirin (Acetylsalicylic acid)
5. Preparation of paracetamol (Acetaminophen)

REFERENCES:

6. B.S. Furniss, A.J. Hannaford, P.W.G. Smith, A.R.Tatchell, Vogel's Textbook of Practical Organic Chemistry, Pearson, 2012.
7. V.K. Ahluwalia, R. Agarwal, Comprehensive Practical Organic Chemistry, University Press, 2010.

CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

8. Internal Practical Assessment
9. Lab Record Evaluation
10. Final Practical Examination
11. Oral/Viva Voce

CLO-PLO Mapping:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	2	2	2	2	2	2	3	2	2
CO2	2	2	2	3	2	2	2	3	2	2	3	1	2
CO3	3	2	3	2	2	2	1	2	2	2	3	2	2
CO4	3	2	2	2	2	2	2	2	2	2	3	2	2
Average	2.75	2	2.5	2.5	2	2	1.75	2.25	2	2	3	1.75	2

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **II B.Sc.** **Chemistry (H) Semester – II**			
Course Code 25CHE204T	TITLE OF THE COURSE **PHYSICAL CHEMISTRY – 1** **(States of Matter, Phase Rule & SurfaceChemistry)**				
Teaching	Hours Allocated: 45 (**Theory**) (3 hrs. / Week.)	L	T	P	C
Pre-requisites:	Basic knowledge about organic chemistry	3	-	-	3

COURSE OBJECTIVES:

- To understand the theoretical principles governing gases, liquids, solids, and colloidal systems.
- To apply gas laws and interpret the behavior of real and ideal gases.
- To describe physical properties of matter in various states and relate them to structural features.
- To interpret phase diagrams and apply Gibbs' phase rule to one- and two-component systems.

COURSE OUTCOMES:

On Completion of the course, the students will be able to-	
CO1	Explain the behavior of gases using gas laws, critical phenomena, and real gas equations.
CO2	Describe physical properties of liquids and the classification and applications of liquid crystals.
CO3	Understand crystal structures, symmetry, and defects in solids with knowledge of X-ray diffraction techniques.
CO4	Apply phase rule concepts to analyze phase diagrams of single and binary component systems and study adsorption and colloidal systems.

SYLLABUS:

UNIT-1: GASEOUS STATE (9 h)

Gas laws, Ideal Gas equation, Vander Waal's equation of state, Andrew's isotherms of carbon dioxide, Critical phenomena, Relationship between critical constants and van der Waal's constants, Law of corresponding states, Joule-Thomson effect, Inversion temperature.

UNIT-2: LIQUID STATE (9 h)

Physical properties of liquids: Definition of vapour pressure, boiling point, surface tension and coefficient of viscosity, Effect of temperature and addition of solutes on surface tension and viscosity.

Liquid crystals: Mesomorphic state, Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic, Application of liquid crystals as LCD devices.

UNIT-3: SOLID STATE (9 h)

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

UNIT-4: PHASE RULE (9 h)

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

UNIT-5: SURFACE CHEMISTRY (9 h)

Colloids: Definition and classification of Colloids, Coagulation of colloids, Hardy-Schulze rule. Stability of colloids, Protection of Colloids-Gold number.

Adsorption: Physical and chemical adsorption, Freundlich and Langmuir adsorption isotherm, applications of adsorption.

REFERENCES:

- P.W. Atkins, J.de., Paula, Atkin's Physical Chemistry, 10th Edition, Oxford University Press, 2014.
- D.W. Ball, Physical Chemistry, 2nd Edition, Cengage Learning, 2017.
- G.W. Castellan, Physical Chemistry, 4th Edition, Narosa, 2014.
- K.L. Kapoor, A Textbook of Physical Chemistry, 6th Edition, McGraw-Hill Education, 2015.

PROPOSED ACTIVITIES:

- Model building: Bravais lattices and symmetry in crystals
- Chart preparation of phase diagrams (Water, Pb-Ag, NaCl-H2O)
- PPT: Adsorption isotherms or colloidal behavior.
- List out applications of Liquid crystals in different display devices.

CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

- Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning
- Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
- Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

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CO1	3	1	3	2	2	2	2	2	2	2	3	2	1
CO2	3	2	2	2	2	2	2	2	2	1	3	2	1
CO3	3	2	3	2	2	2	2	2	2	2	3	2	2
CO4	3	1	3	2	2	2	2	2	2	2	3	3	2
Average	3	1.5	2.75	2	2	2	2	2	2	1.75	3	2.25	1.5

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR

I B.Sc. CHEMISTRY (Hons.) **SEMESTER–II** **2025-26**

CHEMISTRY COURSE-1 : PHYSICAL CHEMISTRY-I

QUESTION PAPER BLUE PRINT

TIME: $2^1/_2$ hrs. **MAX. MARKS: 70**

PART – A

Answer any **FIVE** of the following questions. **5x4 = 20 M**

1. Questions from UNIT-I
2. Questions from UNIT-I
3. Questions from UNIT-II
4. Questions from UNIT-II
5. Questions from UNIT-III
6. Questions from UNIT-III
7. Questions from UNIT-IV
8. Questions from UNIT-IV
9. Questions from UNIT-V
10. Questions from UNIT-V

PART – B

Answer **ALL** the following questions. **5x10 = 50 M**

11a Question from UNIT-I

(OR)

11b. Question from UNIT-I

12a. Question from UNIT-II

(OR)

12b Question from UNIT-II

13a Question from UNIT-III

(OR)

13b Questions from UNIT-III

14a Question from UNIT-IV

(OR)

14b Question from UNIT-IV

15a Question from UNIT-V

(OR)

15b Question from UNIT-V

Smt. NPS GOVT. DEGREE COLLEGE FOR WOMEN (A), CHITTOOR

I B.Sc. CHEMISTRY (Hons.) SEMESTER–II 2025-26

CHEMISTRY COURSE : PHYSICAL CHEMISTRY-I

MODEL QUESTION PAPER

TIME: $2^1/_2$ hrs. **MAX. MARKS: 70**

PART – A

Answer any FIVE questions (5 x 4 = 20 Marks)

1. State and explain the Ideal Gas equation.
2. Write a note on Andrew's isotherms of carbon dioxide.
3. Define surface tension and explain its dependence on temperature.
4. Differentiate between smectic and nematic liquid crystals.
5. What are Miller indices? Explain their significance in crystallography.
6. State and explain Bragg's law.
7. Write the Gibbs phase rule and define its terms.
8. Describe the phase diagram of the water system.
9. Define colloids and classify them with examples.
10. Explain the Freundlich adsorption isotherm.

PART – B

Answer ALL questions. Each question carries 10 marks.

11a. Derive the Vander Waal's equation of state and explain the significance of constants 'a' and 'b'.

OR

11b. Discuss the Joule-Thomson effect and explain the concept of inversion temperature.

12a. Explain the effect of solutes on the viscosity of liquids.

OR

12b. Describe the application of liquid crystals in LCD devices.

13a. Discuss the symmetry elements in crystals and describe the seven crystal systems.

OR

13b. Explain the concept of lattice points, unit cells, and Bravais lattices.

14a. Explain the terms phase, component, and degree of freedom in the context of phase rule. Illustrate with examples.

OR

14b. Discuss the phase diagrams of Pb-Ag system.

15a. Explain the Hardy-Schulze rule and its importance in colloid stability.

OR

15b. Compare physical and chemical adsorption and discuss applications of adsorption in industry

	Smt NPS Govt. College for Women (A), Chittoor	Program & Semester **I B.Sc. Chemistry (H) Semester – II**			
Course Code 25CHE204P	TITLE OF THE COURSE PHYSICAL CHEMISTRY-**I**				
Teaching	Hours Allocated: 30 (**Theory**) (3 hrs. / Week.)	L	T	P	C
Pre-requisites:	Knowledge about liquid properties like surface tension and viscosity, Knowledge about partition coefficient	-	-	2	1

COURSE OBJECTIVES:

- To understand the concepts of surface tension and viscosity of liquids.
- To familiarize students with using different lab equipment and glassware for the determination of the coefficient of viscosity and surface tension.
- To gain hands-on experience in preparing colloidal solutions.

COURSE OUTCOMES:

On Completion of the course, the students will be able to-	
CO1	Perform experiments to measure surface tension and viscosity of liquids using standard laboratory methods.
CO2	Prepare colloidal sols and demonstrate understanding of their properties and stability.
CO3	Investigate adsorption phenomena and verify adsorption isotherms through practical experiments.
CO4	Analyze and interpret experimental data with emphasis on accuracy, precision, and proper reporting.

SYLLABUS:

1. Determination of surface tension of liquid by drop count method.
2. Determination of surface tension of liquid by drop weight method.
3. Determination of coefficient of viscosity of an organic liquid.
4. Preparation of sols: $Al(OH)_3$, $Fe(OH)_3$ and starch.
5. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.

REFERENCES:

6. B.D. Khosla, V.C. Garg, A. Gulati, Senior Practical Physical Chemistry, R. Chand & Co, New Delhi, 2015.
7. K.L. Kapoor, A Textbook of Physical Chemistry, McGraw-Hill Education, 2019.
8. C.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8th Edition, McGraw-Hill, New York, 2003.

CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

9. Internal Practical Assessment
10. Lab Record Evaluation
11. Final Practical Examination
12. Oral/Viva Voce

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CO3	3	2	3	2	2	2	1	2	2	2	3	3	2
CO4	3	2	3	2	2	2	1	2	3	2	3	2	2
Average	3 2	2	2.75	2.5	2	2	1.5	2	2.25	2	3	2.25	2