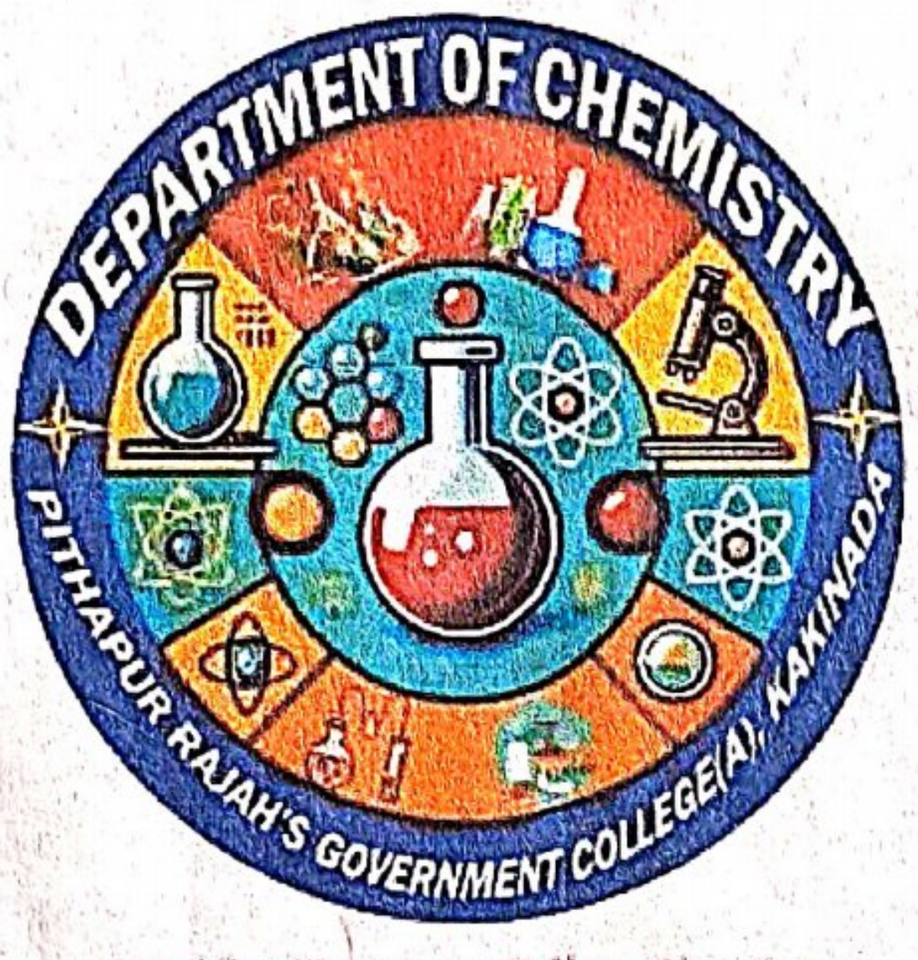
D/C

P.R. Government College (Autonomous)

Kakinada

(Affiliated to Adikavi Nannaya University)



Inspiring Tomorrow College Chemists

Department of Chemistry

B. Sc., Chemistry (Hons)

Board of Studies

2025-2026

PROCEEDINGS OF THE PRINCIPAL (FAC), PITHAPUR RAJAH's GOVT. COLLEGE [A], KAKINADA
Present: Dr. Kandula Anjaneyulu, M.A, Ph.D.

Rc.No.9/A.C/BOS/2025-26 **Dt.31 July 2025**

Sub: Pithapur Rajah's Government College[A] Kakinada--Academic Cell- Conduct of BOS Meetings for the Academic Year 2025-26 - Guidelines issued - Regarding.

ORDER:

The autonomous colleges, in alignment with their vision, mission, stated objectives, and core values, are mandated to design and develop their own outcome-based curricula. This must be done with due consideration for societal, local, and global industry requirements, employability, and the development of industry-ready and transferable skills. Accordingly, every programme shall prescribe Course Outcomes (COs), Programme Outcomes (POs), and Programme Specific Outcomes (PSOs) along with a suitable learning outcome assessment management system, supported by a robust and transparent evaluation mechanism to measure attainment levels among students.

Further, the A.P. State Council of Higher Education (APSCHE) has introduced a revised curricular framework effective from the Academic Year 2025-26, incorporating Skill Enhancement Courses, Multi-Disciplinary courses, the Indian Knowledge System and a revised credit structure.

Our institution, from the Academic Year 2022–23 onwards, has defined a renewed vision and mission along with updated objectives and core values, necessitating the design and reorientation of its academic and research administration in line with these directives.

In light of the above responsibilities prescribed by the institution's vision and mission, NEP–2020, NAAC, NIRF, and the APSCHE's revised and new UG and P.G. curricular framework, it is imperative to customize, design, and re-orient our academic and research activities to meet the expectations of students, industries, and government stakeholders.

Accordingly, the Chairpersons of the U.G and P.G Boards of Studies (BoS) of various departments are hereby requested to make necessary arrangements to convene their BoS meetings before **09 Aug 2025**.

The Chairpersons are further instructed to:

1. Prepare the curricula and extracurricular activities for the Academic Year 2025–26 in line with the institution's vision, mission, NEP–2020, and NIRF norms.
2. Devise an appropriate evaluation system to ensure effective learning outcomes and holistic student development.
3. Ensure that the curriculum design includes a mandatory *20% revision* of the syllabus each year without deviating from the APSCHE prescribed syllabus.
4. If the syllabus is not prescribed by APSCHE/Affiliating University, then the syllabus is to be

framed by the BOS committee concerned with duly following the mandate prescribed above.

5. Engage stakeholders viz employers, parents, and alumni, to obtain feedback on the existing curricula and to invite suggestions for improvements.
6. Invite the University nominee, subject experts, industry representatives, student representatives, and parent representatives well in advance. The meeting notice shall clearly specify the date, venue, and agenda, and a soft copy of the agenda and relevant documents shall be circulated for their perusal.
7. Ensure that the subject experts invited preferably hold a Doctorate with at least 10 years of teaching experience and have relevant expertise in designing industry-related, market- and job-oriented curricula.
8. Facilitate thorough deliberations on curriculum design, evaluation methods, incorporation of research components, measures to enhance learning experiences, and optimal utilization of existing human, physical, and ICT resources.
9. Conduct all BoS meetings in offline mode. Online participation shall be permitted only under exceptional circumstances.
10. Prescribe benchmarking and quality initiatives in pedagogy and learning, including strategies for curriculum design and teaching-learning processes, in collaboration with the IQAC Coordinator, prior to the BoS meeting.
11. Ensure that a minimum student attendance of 75% shall be required for eligibility to appear for I & II Mid-Term Examinations under the CIA component; this shall be formally approved in the BoS meeting.
12. Approve any new programmes to be introduced for the Academic Year 2025–26, the number and frequency of certificate courses, and SWAYAM MOOCs courses.
13. Submit the approved BOS copies in the prescribed format, in **quadruplicate (hard copies)** to the Academic Cell for onward submission to the IQAC, Examination Cell, and Library, within **three days** of the meeting and upload the soft copy in their respective department web pages in the college website.
14. Ensure strict alignment of all recommendations and curriculum changes with the institution's vision and mission.
15. Submit a request to receive advance funds from the Examination cell through Principal for conducting BoS meetings.

The details of honorarium to be paid to the University Nominee and Subject Experts attending the Board of Studies (BOS) meeting are as follows

UG BOS for AY 2025-26

S.No	Designation	Honorarium (Rs)	TA
1	University Nominee	1000	Below 20 Km @Rs.200/- (Local Conveyance) Above 20 Km, Bus fare/Train fare (Whichever is less)
2	Subject Expert	500	Below 20 Km @Rs.200/- (Local Conveyance) Above 20 Km, Bus fare/Train fare (Whichever is less)
3	Industrialist	500	Below 20 Km @Rs.200/- (Local Conveyance) Above 20 Km, Bus fare/Train fare (Whichever is less)

PG BOS for AY 2025-26

S.No	Designation	Honorarium (Rs)	TA
1	University Nominee	1000	Below 20 Km @Rs.200/- (Local Conveyance) Above 20 Km, Bus fare/Train fare (Whichever is less)
2	Subject Expert	500	Below 20 Km @Rs.200/- (Local Conveyance) Above 20 Km, Bus fare/Train fare (Whichever is less)
3	Industrialist	500	Below 20 Km @Rs.200/- (Local Conveyance) Above 20 Km, Bus fare/Train fare (Whichever is less)

- Binding charges limited to Rs.250/- per program.
- The Bills/Vouchers shall be in compliance with applicable rules and norms..

Following contents shall be presented in the BOS document in the order

1. Proceedings of the Principal pertaining to BOS
2. Composition of BOS
3. Vision and Mission of the department
4. Agenda: It shall include ATR on the previous BOS meeting first, resolutions, etc., later.
5. Table showing the Allocation of Credits in the following table for both theory and Practicals' in case of science subjects

S. No	Semester	Title of the Course (Paper)	Hrs./week	Max. Marks (SEE)	Marks in CIA	Credits
1	III	Physical Chemistry-1	3	50	50	4

6. Resolutions adopted in the meeting with detailed discussion that took place during the meeting.
7. Each BOS Chairman shall, immediately after syllabus, tabulate the changes made in the syllabus/ paper along with justification.
8. Attendance of Members present with signatures in the tabular form.
9. List of Examiners & Paper setters (Minimum 20 members and at least 02 members from other states)
10. Syllabus for each course (both theory & Practical in case of Science subjects) followed by model question papers (theory & practical) and allocation of CIA (50marks) for each course with structure.
11. Each student (2025-26 AB) has to complete one MOOCS course from SWAYAM in any subject per year.

CIA structure for Single Major system

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- Mid examinations are to be conducted in offline mode at college level
- Mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **three short** answer questions with five marks each out of five questions
- The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Seminar- 5M	Assignment- 5M	Viva on theory- 3M	Clean & green and Attendance- 2M

TEMPLATE FOR BOS COMPOSITION

PROCEEDINGS OF THE PRINCIPAL(FAC), P.R. GOVERNMENT COLLEGE(A), KAKINADA

Present: Dr. Kandula Anjaneyulu, M.A, Ph.D.

R.C.No.2/A.C/BOS – Members Nomination/2025-26 Dated: 31.07.2025

SUB: P.R. Government College(A), Kakinada- UG/PG Board of Studies (BOS) - Nomination of Members - Orders issued.

REF: Proc.RC.No.1/A.C/BOS/2025-26 dated:31 July 2025 of the Principal, Pithapur Rajah's Government College(A) Kakinada.

ORDER:

The Principal, P.R. Government College(A), Kakinada is pleased to constitute UG/PG Boards of Studies in ----------for framing the syllabi in respective Subject for all Semesters duly following the norms of the UGC Autonomous guidelines.

S. No	Name of the Person	Designation
1		Chairman & Lecturer Incharge, Department.
2		University Nominee
3		Subject Expert -I Lecturer in.
4		Subject Expert - II Lecturer in
5		Representative from Industry
6		Member
7		Member
8		Member
9		Member
10		Member
11		Member
12		Member
13		Member
14		Member
15		Student Alumni Member
16		Student Member
17		Student Member

The above members are requested to attend the BoS meeting on - -2025 and share their valuable reviews, and suggestions on the following functionaries.

- Prepare syllabi for the subject keeping in view the objectives of the college and interest of the stake holders for consideration and approval of the IQAC and Academic Council.
- Suggested methodologies for innovative teaching and evaluation techniques.
- Suggest the panel of Names to the academic council for appointment of Examiners.
- Coordinate research, teaching, extension and other activities in the Department.

PRINCIPAL

P. R. Government College(A), Kakinada

The Chairpersons of all Boards of Studies are hereby instructed to comply with these directives in letter and spirit to ensure the highest standards of academic and administrative excellence.

PRINCIPAL
P.R. Govt. College (Autonomous)
Kakinada-533 001.

Copy to:

1. Lecturers-in-Charge (BOS Chairmen) of all the departments
2. Academic Coordinator
3. IQAC coordinator
4. Controller of Examinations
5. Office

Vision and Mission – Department of Chemistry

Vision:

To empower and equip learners with comprehensive knowledge, advanced skills, and a strong research culture in emerging fields of chemistry, positioning them at the forefront of global scientific advancements. By integrating high-quality pedagogy, ethical values, and cutting-edge technology, we aim to create a transformative teaching-learning environment that enhances employability opportunities and prepares students for success in both academia and industry.

Our vision is to establish the Department of Chemistry as a centre of excellence, fostering a passion for chemistry in professional courses, and becoming a leading institution known for igniting curiosity, nurturing talent, and driving innovation. By creating a dynamic and inclusive academic community, we aim to inspire students to push the boundaries of knowledge and contribute meaningfully to the field of chemistry in both regional and global contexts.

Mission:

1. Innovative Teaching and Learning Practices.
2. Hands-on Experience and Practical Training.
3. Collaboration with Industry and Research Institutions
4. Community and Regional Development.
5. Research Excellence.
6. Holistic Development of Students.
7. Commitment to Sustainable Practices.

PITHAPUR RAJAH'S GOVERNMNET COLLEGE (A) :: KAKINADA

DEPARTMENT OF CHEMISTRY

MEMBERS ATTENDED FOR BoS MEETING FOR THE AY 2025-26

GENERAL CHEMISTRY

DATE: 07-08-2025

SNO	Name of the Member	DESIGNATION	SIGNATURE
1	Sri V. Sanjeev Kumar	Chairman, BoS Head of the department	
2.	Dr. T. Narsimha Murthy Government Arts College, RJY	University Nominee	
3.	Dr. K. Anitha A.S.D College for Women (A)	Subject Expert	
4.	Dr. V. Anantha Lakshmi GDC, Pithapuram	Subject Expert	
5.	P. Karuna Raman Ideal Organics, HYD	Industrialist	Dr P Karuna Raman
6.	Sri. T.V.V. Satyanarayana	Member	
7.	Sri. P. Vijaya Kumar	Member	
8.	Sri. V. Rambabu	Member	
9.	Smt. G. Pavani	Member	
10.	Dr. N. Bujji Babu	Member	
11	Dr. A. Chandra leela	Member	
12.	Dr. Ch. Praveen	Member	
13.	Sri. V. Venkateswara Rao	Member	
14.	Sri. U.S.N. Prasad	Member	
15.	Dr. D. S. V. N. Ramamurthy	Member	
16.	M. S. S. V. Uma Gayathri	Member	
17.	D. Bhavya sri	Alumni member	
18.	D. Venkata Raju III B.Sc Chemistry (H)	Student member	
19.	Ch. S. L. Manasa II B.Sc Chemistry (H)	Student member	

B. Sc., Chemistry (Hons)

About the Programme

The B.Sc. Chemistry programme is an undergraduate course introduced by the Department of Chemistry to develop in-depth understanding and practical competence in modern analytical techniques. The programme aims to provide students with strong theoretical knowledge, laboratory proficiency, and data interpretation skills essential for chemical analysis in industrial, environmental, and research contexts.

Through a combination of core courses and fundamental chemistry papers, the curriculum ensures a balance between conceptual learning and hands-on experimentation. It emphasizes precision, accuracy, and instrumental expertise—preparing students for diverse roles in industry, academia, and applied research.

Academic Rationale

Chemistry serves as the foundation of chemical sciences, enabling qualitative and quantitative determination of materials across all branches of science. The programme has been designed to keep pace with rapid advancements in instrumentation, automation, and environmental monitoring. It aligns with the National Education Policy (NEP) objectives of interdisciplinary learning, skill development, and outcome-based education.

1. Relevance to Regional and Industrial Needs

- The Kakinada region, being an industrial hub with organisations such as ONGC, GAIL, HPCL, Dr. Reddy's Laboratories, and several food and chemical industries, demands skilled analytical chemists for process control and quality assurance.
- The Kakinada SEZ and nearby industrial and petrochemical corridors further increase the need for trained personnel in analytical testing and environmental compliance laboratories.
- The course provides region-specific skill training, linking academic learning directly to local employment potential.

2. Skill Development and Employability Focus

- The programme emphasizes instrumental analysis using UV-Visible, IR, NMR, AAS, TLC, GC, and HPLC methods to build industry-ready competence.
- Students are trained in sample preparation, data interpretation, method validation, and quality control—skills that are highly valued in analytical, pharmaceutical, food, and environmental laboratories.

- The course supports the Skill India and Atmanirbhar Bharat initiatives by promoting applied learning and entrepreneurship in chemical analysis.

3. Career Prospects and Opportunities

Graduates of Analytical Chemistry are well-positioned for employment in

- Quality Control and Quality Assurance (QC/QA) divisions of chemical, pharmaceutical, and petrochemical industries,
- Environmental monitoring and pollution control laboratories,
- Forensic, food testing, and water quality labs,
- Analytical research and development (R&D), as well as technical service roles in instrumentation companies.

The programme also provides a pathway for higher education such as M.Sc. in Analytical Chemistry, Industrial Chemistry, or integrated M.Sc.–Ph.D. programmes.

4. Research and Experiential Learning

- Students undertake mini-projects, seminars, and industrial visits to gain practical exposure and research orientation.
- Emphasis is placed on problem-solving, data analysis, and reporting accuracy—core competencies for research laboratories.
- Opportunities are provided for participation in student research, internships, and collaborative analytical workshops to foster critical and innovative thinking.

5. Community Outreach and Environmental Awareness

- The course encourages students to apply analytical techniques for community-based environmental assessments, including water, soil, and air quality evaluation.
- Green Chemistry and sustainable analytical practices are integrated into the curriculum to promote eco-conscious laboratory work.
- Students engage in extension lectures, study tours, and awareness programmes that link scientific education with societal well-being.

6. Contemporary and Interdisciplinary Dimensions

Analytical Chemistry naturally bridges chemistry, environmental science, biology, and computational data analysis. The programme addresses modern challenges such as pollution monitoring, food adulteration detection, and pharmaceutical residue analysis.

By integrating instrumental training, digital literacy, and sustainability principles, it ensures that graduates remain relevant to current industrial and societal needs.

ADIKAVI NANNAYA UNIVERSITY RAJAMAHENDRAVARAM
OFFICE OF THE DEAN, ACADEMIC AFFAIRS

No.ANUR PR (A)/BoS/2025/38 Dt.17.06.2025

PROCEEDINGS OF THE VICE-CHANCELLOR

Sub: ANUR – University Nominees – UG Board of Studies of Pithapur Rajah's Government College (A) Kakinada – Orders – Issued
Read: -Note orders of the Vice-Chancellor dated 13.06.2025

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ORDER:

With reference to above, the Vice-Chancellor is pleased to order that the following members be nominated as University Subject Experts for constitution of UG Board of Studies of Pithapur Rajah's Government College (A) Kakinada, for a period of 3 years from the date of orders issued as detailed against each subject.

Sl. No	BOS	Name of the expert nominated
1	English	Prof.S.Prasanthi Sree, M.S.N Campus Kakinada
2	Telugu	Dr.S.Gopalayya, GDC Tadepalligudem
3	Hindi	Dr.N.V.Ramana, GDC Ramachandrapuram
4	Sanskrit	Dr.P.Umamaheswara Rao, Dr.V.S Krishna GDC (A), Visakhapatnam
5	Mathematics	Ms.Y.Padmaja GDC Ramachandrapuram
6	Statistics	Dr.N.Madavi GDC(A) RJY
7	Physics, Electronics & Renewable energy	Dr.M.V.K.Mehar, GDC, K.Perupalem
8	Chemistry, Organic Chemistry, Analytical Chemistry	Dr.T.Narasimha Murthy, GDC (A) RJY
9	Pharmaceutical Chemistry	P.Sai Kiran, Adithya University Kakinada
10	Botany	Dr.K.Usha sri GDC Pithapuram
11	Zoology	Dr.K.Ramaneswari, AKNU, RJY
12	Aquaculture	Dr.D.Kalyani, AKNU, RJY
13	Biotechnology	Dr.B.Nageswari, GDC (A) RJY
14	Microbiology	Dr.D.Aruna, SRR & CVR GDC (A) Vijayawada
15	Artificial Intelligence	N.Naga Subrahmanyeswari, ASD College for Women (A), Kakinada
16	Data Science	Sri.K.Rasmi Ranjan, GDC(A), Tuni
17	Internet of Things	Smt.Dr.K.Sobha Rani, GDC, Ramachandrapuram
18	Computer Applications	Smt.Dr.K.Sobha Rani, GDC, Ramachandrapuram
19	Information Technology	Smt.N.Naga Subrahmanyeswari, ASD College for Women (A), Kakinada
20	Economics	Dr.K.Yamuna, ASD GDC(W), Kakinada
21	History	Ch.Padmavathi, GDC, Pithapuram
22	Political Science & International relations	Dr.K.Swamiji, Ideal DC(A), Kakinada
23	Commerce & Management	Dr.G.Arun Kumar, Dr.VS Krishna GDC(A) Visakhapatnam
24	Philosophy	Dr.Ch.Lalitha, GDC(A) Tuni

(BY ORDER)

Dean,
Academic Affairs 17.6.25

To
The Principal, Pithapur Rajah's Government College (A) Kakinada
The Above Members
The Principals concerned
PS to VC.
PA to R,
OOF

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A), KAKINADA

DEPARTMENT OF CHEMISTRY

BOS MEETING FOR BSc., CHEMISTRY Dt.07-08-2025

The meeting of Board of studies in B.Sc. Chemistry (Hons) is convened on 07-08-2025 12.10PM in offline and Online mode through Virtual Conference by Google Meet. **V. Sanjeeva Kumar** Chairman BOS, **Dr. T. Narasimha Murthy**, University Nominee, GDC(A), Rajahmundry. **Dr.K.Anitha**, Lecturer in chemistry, Subject Expert A.S.D.Govt Degree College for Women(A), Kakinada, **Dr.V.Anantha Lakshmi**, Lecturer in chemistry, Subject Expert, Govt Degree College, Pithapuram, **Dr.P.Karuna Raman**, Industrialist, Ideal Organics, Hyderabad. **Ms.D.Bhavya Sri**, Alumni, all faculty members of department of Chemistry and student representatives attended the meeting. The Board discussed the following Agenda Points and Resolved the subsequent Resolutions.

AGENDA

1. ATR on previous BoS Resolutions
2. Approval of Syllabus of both Theory and Practical courses for Semesters - III, IV and V
3. Syllabus for I and II semesters of B Sc Honors in Chemistry will be ratified as and when the APSCHE release.
4. Approval of Continuous Internal assessment of each course which comprises of 50 Marks

A) Out of 50 marks, 25 marks were allocated for mid - term examinations (Average of 2 mid-term examinations).

B) Approval of Model Question paper for Mid term examination which comprises of two Long Answer Questions (LAQs) in which student has to attempt one LAQ which carries 10 marks and out of five Short Answer Questions (SAQs), student has to attempt three SAQs with 5 marks each.

C) The remaining 25 marks will be distributed as 10 marks for project, 5 marks for Student Seminar, 5 marks for Assignments, 3 marks for Viva on theory and 2 marks for Clean & Green and Attendance.

5. Approval of List of Question Paper setters and Examiners & (Minimum 20 members with at least 02 members from other states)
6. Approval of Semester End Examination model paper for each course
7. Each student (2025-26 AB) has to complete one MOOCS course from SWAYAM in any subject per year

Department of Chemistry B. Sc., Chemistry (Hons) Board of Studies

2025-26 Meeting dt.07-08-2025

RESOLUTIONS TO AGENDA ITEMS

1. **Approval of Syllabus for Semesters-I, II, III, IV, V & VI**

Resolution: The Board unanimously approved the proposed syllabus for Semesters- I, II, III, IV, V & VI of B.Sc. Honors in Chemistry for implementation from the academic year 2025–26.

2. **Continuous Internal Assessment (CIA) for Each Course (50 Marks Structure)**

Resolution: The proposed CIA structure comprising 50 marks per course was approved.

- Term exams (average of two midterms): 25 marks
- Project: 10 marks
- Seminar: 5 marks
- Assignments (5): 5 marks
- Viva (theory): 3 marks
- Clean & Green + Attendance: 2 marks

3. **Approval of List of Examiners and Paper Setters (Minimum 20 Members, Including at Least 2 from Other States)**

Resolution: The Board approved the submitted list of examiners and paper setters with the recommendation to include a minimum of two members from institutions outside the state for greater academic diversity and quality.

4. **Approval of Syllabus Structure, Model Question Papers (Theory & Practical) for Each Course**

Resolution: The Board reviewed and approved the syllabus for each course along with practical components, model question papers (theory & practical) for effective assessment and transparency.

5. **Mandatory Completion of One MOOC Course Per Year (SWAYAM) for 2025-26 Admitted Batch**

Resolution: The BoS approved the requirement for students to complete one online MOOC course (from SWAYAM or other UGC-approved platforms) per academic year to improve self-learning, digital literacy, and employability.

Resolution: Reinforced and approved as a compulsory academic requirement for all students from the 2025–26 batch onwards.

6. **Other Learning Enhancement Programs**

Resolution: The Board encouraged the implementation of additional skill-development programs, certificate courses, industrial training, soft skills workshops, and collaborative activities with placement cells to enhance employability and knowledge levels.

The Board appreciated the proactive initiatives of the Department of Chemistry in curriculum design, student engagement, and academic excellence. All agenda items were discussed and resolved positively.

7. **Organizing National Seminars/Workshops/Conferences and Guest Lectures**

Resolution: The following academic events were approved to promote awareness and exposure:

- National Seminar/Workshop on Ozone Awareness
- Celebrations for National Chemistry Day and National Science Day
- Guest Lectures – Minimum 2 (Experts from Industry/Academia)
- National-level Seminar in Chemistry
- Skill-based Training Program in Water Analysis

8. **Industrial/Study Tours**

Resolution: The Board approved organizing industrial visits/study tours to:

- Hetero Laboratories, Nakkapally
- Dr. Reddy's Laboratories, Yanam
- National Institute of Hydrology, Kakinada
- Venky Parenterals, Yanam

9. **Community Outreach Programs**

Resolution: The proposal for organizing subject-oriented community outreach programs (such as health camps, awareness drives, rural education workshops) was accepted to strengthen social responsibility and student engagement.

10. **Institution of New Medals/Incentives/Prizes from Alumni, Philanthropists, Parents, and Faculty**

Resolution: The Board supported the initiative and recommended forming a committee to approach and mobilize potential sponsors for instituting awards and incentives for meritorious students.

11. **MOOC Course – Online (SWAYAM) – One Course per Student**

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
KAKINADA 533 001-ANDHRA PRADESH
An AUTONOMOUS and NAAC Accredited Institution (B++ Grade- 2.82 CGPA)
(Affiliated to ADI KAVI NANNAYA UNIVERSITY, Rajamahendravarm.)

ACADEMIC CELL

(Certificate to be issued by the University Nomine/Subject Expert/Member of BOS)

Department Name: Chemistry

Name of the BOS Member : Dr. T. Narasimha Murthy

(University Nominee /Subject Expert/Industrialist / Member)

I certify that the syllabus submitted by the ....Chemistry..... Department is verified by me and I recommend the following suggestions:

1. To implement APSCHE proposed syllabus as it is
2. To implement Co-curricular activities
3. To increase no of field works
4.
5.

The syllabus is approved with the above suggested modification

Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
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An AUTONOMOUS and NAAC Accredited Institution (B++ Grade- 2.82 CGPA)
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ACADEMIC CELL

(Certificate to be issued by the University Nomine/Subject Expert/Member of BOS)

Department Name: Chemistry

Name of the BOS Member : Dr. K. Anitha

(University Nominee /Subject Expert/Industrialist / Member)

I certify that the syllabus submitted by the .....Chemistry..... Department is verified by me and I recommend the following suggestions:

1. To be complete all the proposed practicals in time.
2. Choose 1st term internship and CSP should be
3. Related to the subject.
4.
5.

The syllabus is approved with the above suggested modification

7/08/2025
Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
KAKINADA 533 001-ANDHRA PRADESH
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ACADEMIC CELL

(Certificate to be issued by the University Nomine/Subject Expert/Member of BOS)

Department Name: Chemistry

Name of the BOS Member : Dr. V. Anantha Lakshmi

(University Nominee /Subject Expert/Industrialist / Member)

I certify that the syllabus submitted by the .....Chemistry.... Department is verified by me and I recommend the following suggestions:

1. Use ecofriendly reagents wherever required.
2. Prepare the Student to participates in Various
3. ~~Govt~~ Competitions at National level.
4.
5.

The syllabus is approved with the above suggested modification

Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus

Department activities Proposed for the academic year 2025-2026

1. Proposed to Organize 1 National seminars/Workshop/ Conference

   (Mandatory for each Department)

   i) Awareness on OZONE protection

   ii) National Chemistry Day

   iii) National Science Day 2025

   iv) Guest lectures-2

   v) National seminar in chemistry

   vi) Training in water analysis

2. Plan for organizing Study / Industrial Tours to the following Organizations

   I. Hetero Laboratories, Nakkapally

   II. Dr. Reddy's Laboratories, Yanam.

   III. National Institute of Hydrology, Kakinada.

   IV. Venky Parenterals, Yanam

3. Plan for organizing subject oriented community outreach programs

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

5. Online MOOCS course-1.

6. Any other program that enhances the learning capacity of students and their employable & knowledge s

CURRICULAR FRAMEWORK B.Sc., CHEMISTRY HONOURS FROM THE A.Y. 2025-26
(Major + Minor with CSP)

I Year – I Semester

S. No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major – Core	I	3	2	5	3	1	4
2	Major – Core	II	3	2	5	3	1	4
3	AECC- English	I	4	0	4	3	0	3
4	AECC- MIL(Tel/Hin/San)	I	4	0	4	3	0	3
5	Skill Enhancement Course-Introduction to Artificial Intelligence	I	4	2	6	4	0	4
End of Semester I of I Year		**5**	**18**	**6**	**24**	**16**	**2**	**18**

I Year – Semester II								
S.No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major – Core	III	3	2	5	3	1	4
2	Major – Core	IV	3	2	5	3	1	4
3	AECC- English	II	4	0	4	3	0	3
4	AECC- MIL(Tel/Hin/San)	II	4	0	4	3	0	3
5	Skill Enhancement Course- Application of Artificial Intelligence	II	4	2	6	4	0	4
6	Multidisciplinary Course	I	2	0	2	2	0	2
7	Indian Knowledge System	I	2	0	2	2	0	2
8	Community Service Project (Minimum of 80 hours)							1
End of Semester II of I Year		**7**	**22**	**6**	**28**	**20**	**2**	**23**

CURRICULAR FRAMEWORK B.Sc HONOURS FROM THE A.Y. 2025-26
(Major + Minor with CSP & VI Semester Internship)

2nd Year - Semester III

Sl. No	Category	Course No	No. of Hours		Total No.of Hours	No. of Credits		Total No.of Credits
			Theory	Practical		Theory	Practical	
1	Major –FUNDAMENTALS IN ORGANIC CHEMISTRY	V	3	2	5	3	1	4
2	Major – ORGANIC CHEMISTRY	VI	3	2	5	3	1	4
3	Major – PHYSICAL CHEMISTRY-I	VII	3	2	5	3	1	4
4	Major- INORGANIC AND PHYSICALCHEMISTRY	VIII	3	2	5	3	1	4
5	Minor-Fundamentals in Organic chemistry	II	3	2	5	3	1	4
6	Multidisciplinary Course	III	2	0	2	2	0	2
7	Skill Enhancement Course (SEC) Design Thinking/Problem Solving / Others	IV	2	0	2	2	0	2
End of Semester III of 2nd Year		**7**	**19**	**10**	**29**	**19**	**5**	**24**

2nd Year - Semester IV								
Sl. No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major – PHYSICAL CHEMISTRY-II	IX	3	2	5	3	1	4
2	Major – GENERAL AND PHYSICAL CHEMISTRY	X	3	2	5	3	1	4
3	Major – NITROGEN CONTAINING ORGANIC COMPOUNDS & SPECTROSCOPY	XI	3	2	5	3	1	4
4	Minor-Physical chemistry-II	III	3	2	5	3	1	4
5	Minor-General and Physical chemistry	IV	3	2	5	3	1	4
6	Multidisciplinary Course	IV	2	0	2	2	0	2
7	Skill Enhancement Course (SEC) Design Thinking/Problem Solving / Others	VI	2	0	2	2	0	2
End of Semester IV of 2nd Year		**7**	**19**	**10**	**29**	**19**	**5**	**24**

3rd Year - Semester V								
Sl. No	Category	Course No	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
			Theory	Practical		Theory	Practical	
1	Major – Environmental chemistry	XII	3	2	5	3	1	4
2	Major – Chromatography and instrumental methods of Analysis	XIII	3	2	5	3	1	4
3	Major – Synthetic Organic chemistry	XIV	3	2	5	3	1	4
4	Major-Analysis of Organic Compounds	XV	3	2	5	3	1	4
5	Minor-5 Environmental chemistry	IV	3	2	5	3	1	4
6	Minor-6 Chromatography and Instrumental Methods of Analysis	V	3	2	2	3	1	4
End of Semester IV of 2nd Year		**6**	**18**	**12**	**30**	**18**	**6**	**24**
Semester-VI								
Apprenticeship								**12**

CIA structure for Single Major system (w.e.f 2024-25AB)

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations will be conducted and the average of the two is considered.

- I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.

- I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions with one mark each for each paper.

- Question paper is to be given as per the following structure for the courses with **4 units.**

Unit No	Long Answer Question(10M)	Short Answer Question (5 M)	Objective Questions(1M)
I	1	2/1/3	3/2
II	1	2/3/1	2/3
III	1	1	1
IV	1	1	1
V	0	2	3

Note: The mid examinations if conduct in offline mode the above pattern is applicable. If anyone exam if conduct online then all the questions are given in the form of multiple choice, fill in the blanks, matching.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A), KAKINADA

DEPARTMENT OF CHEMISTRY

HONORS IN CHEMISTRY

LIST OF PAPER SETTERS AND EVALUATORS

S.NO	NAME OF THE QUESTION PAPER SETTER BY VALUATION	DESIGNATION	NAME OF THE COLLEGE
1	P.SIVAKUMAR	LECTURER IN CHEMISTRY	GDC(A),RAJAMUNDRY
2	DR.T.NARASIMHAMURTY	LECTURER IN CHEMISTRY	GDC(A),RAJAMUNDRY
3	DR.P.MALLIKARJUNA	LECTURER IN CHEMISTRY	GDC(A),RAJAMUNDRY
4	B.VENKATARAO	LECTURER IN CHEMISTRY	GDC(A),RAJAMUNDRY
5	DR.N.BABY NIRMALA	LECTURER IN CHEMISTRY	GDC(A),RAJAMUNDRY
6	DR.M.SUNITHA	LECTURER IN CHEMISTRY	SKRW-RAJAMUNDRY
7	S.DILLESWARARAO	LECTURER IN CHEMISTRY	GDC-TUNI
8	D.PALLAM RAJU	LECTURER IN CHEMISTRY	GDC-MUMMIDIVARAM
9	DR.V.ANANTHALAKSHMI	LECTURER IN CHEMISTRY	GDC-PITHAPURAM
10	K.ANAND	LECTURER IN CHEMISTRY	GDC-PITHAPURAM
11	DR.V.NARAYANA RAO	LECTURER IN CHEMISTRY	GDC-PERUMALPURAM
12	V.MALLIKARJUNA SARMA	LECTURER IN CHEMISTRY	GDC-JAGGAMPETA
13	N.V.N.B.SRINIVASARAO	LECTURER IN CHEMISTRY	GDC-KAIKALURU
14	DR.N.PADMAVATHI	LECTURER IN CHEMISTRY	GDC-KANDUKURU
15	DR.V.SHANTIKUMAR	LECTURER IN CHEMISTRY	SRMBJNR COLLEGE-KHAMMAM
16	DR.SAI KRISHNA	LECTURER IN CHEMISTRY	V.S.KRISHNA COLLEGE(A),VISAKHAPATNAM
17	DR.S.RAMAKRISHNA	LECTURER IN CHEMISTRY	GDC(M),SRIKAKULAM
18	U.SAI KRISHNA	LECTURER IN CHEMISTRY	GDC(A),RAJAMUNDRY
19	DR.A.SRINIVASARAO	LECTURER IN CHEMISTRY	GDC-TUNI

20	J.SURESH	LECTURER IN CHEMISTRY	GDC(A),RAJAMUNDRY
21	DR.P.SRINIVASARAO	LECTURER IN CHEMISTRY	GDC-ADDANKI
22	DR.V.V.RAVINDRA	LECTURER IN CHEMISTRY	GDC-REPALLE

Syllabus for 4-Year UG Honours in B.Sc. (Chemistry) as Major in consonance with Curriculum framework w.e.f. AY 2025-26

COURSE STRUCTURE (for Semester I to VI)
B.Sc., CHEMISTRY

ACADEMIC YEAR	SEMESTER	PROGRAMME	COURSE NO	NAME OF THE COURSE INTRODUCED
2025-26	1	B.Sc., CHEMISTRY	25CHE01	General Chemistry
2025-26	1	B.Sc., CHEMISTRY	25CHE01P	Qualitative Analysis of Simple Salt
2025-26	1	B.Sc., CHEMISTRY	25CHE:02	Inorganic Chemistry
2025-26	1	B.Sc., CHEMISTRY	25CHE02P	Inorganic Preparations
2025-26	2	B.Sc., CHEMISTRY	25CHE03	Organic Chemistry – I (Structural Theory & Hydrocarbons)
2025-26	2	B.Sc., CHEMISTRY	25CHE03P	Organic Preparations
2025-26	2	B.Sc., CHEMISTRY	25CHE04	Physical Chemistry – I (States of Matter, Phase rule & Surface Chemistry)
2025-26	2	B.Sc., CHEMISTRY	25CHE04	Physical Chemistry – I Practical
2023-24	3	B.Sc., CHEMISTRY	23CHE05	FUNDAMENTALS IN ORGANIC CHEMISTRY
2023-24	3	B.Sc., CHEMISTRY	23CHE05P	FUNDAMENTALS IN ORGANIC CHEMISTRY
2023-24	3	B.Sc., CHEMISTRY	23CHE06	ORGANIC CHEMISTRY
2023-24	3	B.Sc., CHEMISTRY	23CHE06P	ORGANIC CHEMISTRY
2023-24	3	B.Sc., CHEMISTRY	23CHE07	PHYSICAL CHEMISTRY-1
2023-24	3	B.Sc., CHEMISTRY	23CHE07P	PHYSICAL CHEMISTRY-1
2023-24	3	B.Sc., CHEMISTRY	23CHE08	INORGANIC AND PHYSICAL CHEMISTRY
2023-24	3	B.Sc., CHEMISTRY	23CHE08P	INORGANIC AND PHYSICAL

				CHEMISTRY
2023-24	3	B.Sc., CHEMISTRY	23MINOR02	FUNDAMENTALS IN ORGANIC CHEMISTRY
2023-24	3	B.Sc., CHEMISTRY	23MINOR02P	FUNDAMENTALS IN ORGANIC CHEMISTRY
2023-24	4	B.Sc., CHEMISTRY	23CHE09	PHYSICAL CHEMISTRY-II
2023-24	4	B.Sc., CHEMISTRY	23CHE09P	PHYSICAL CHEMISTRY-II
2023-24	4	B.Sc., CHEMISTRY	23CHE10	GENERAL AND PHYSICAL CHEMISTRY
2023-24	4	B.Sc., CHEMISTRY	23CHE10P	GENERAL AND PHYSICAL CHEMISTRY
2023-24	4	B.Sc., CHEMISTRY	23CHE11	NITROGEN CONTAINING ORGANIC COMPOUNDS AND SPECTROSCOPY
2023-24	4	B.Sc., CHEMISTRY	23CHE11P	NITROGEN CONTAINING ORGANIC COMPOUNDS AND SPECTROSCOPY
2023-24	4	B.Sc., CHEMISTRY	23MINOR03	PHYSICAL CHEMISTRY-1
2023-24	4	B.Sc., CHEMISTRY	23MINOR03P	PHYSICAL CHEMISTRY-1
2023-24	4	B.Sc., CHEMISTRY	23MINOR04	GENERAL AND PHYSICAL CHEMISTRY
2023-24	4	B.Sc., CHEMISTRY	23MINOR04P	GENERAL AND PHYSICAL CHEMISTRY
2023-24	5	B.Sc., CHEMISTRY	23CHE12B	ENVIRONMENTAL CHEMISTRY
2023-24	5	B.Sc., CHEMISTRY	23CHE12BP	ENVIRONMENTAL CHEMISTRY
2023-24	5	B.Sc., CHEMISTRY	23CHE13	CHROMATOGRAPHY AND INSTRUMENTAL METHODS OF ANALYSIS
2023-24	5	B.Sc., CHEMISTRY	23CHE13P	CHROMATOGRAPHY AND INSTRUMENTAL METHODS OF ANALYSIS
2023-24	5	B.Sc., CHEMISTRY	23CHE14A	SYNTHETIC ORGANIC CHEMISTRY
2023-24	5	B.Sc., CHEMISTRY	23CHE14AP	SYNTHETIC ORGANIC CHEMISTRY
2023-24	5	B.Sc., CHEMISTRY	23CHE15A	ANALYSIS OF ORGANIC COMPOUNDS
2023-24	5	B.Sc., CHEMISTRY	23CHE15AP	ANALYSIS OF ORGANIC COMPOUNDS
2023-24	5	B.Sc., CHEMISTRY	23MINOR05	ENVIRONMENTAL CHEMISTRY
2023-24	5	B.Sc., CHEMISTRY	23MINOR05P	ENVIRONMENTAL CHEMISTRY
2023-24	5	B.Sc., CHEMISTRY	23MINOR06	CHROMATOGRAPHY AND INSTRUMENTAL METHODS OF ANALYSIS
2023-24	5	B.Sc., CHEMISTRY	23MINOR06P	CHROMATOGRAPHY AND INSTRUMENTAL METHODS OF ANALYSIS

PITHAPUR RAJAH'S GOVERNMNET COLLEGE (A) :: KAKINADA

DEPARTMENT OF CHEMISTRY

GENERAL CHEMISTRY BOARD OF STUDIES 2025-26

ADDITIONS AND DELETIONS

DATE: 07-08-2025

APSCHE syllabus is implemented as it is for I and II Semeste students & B.S Honos in chemisty and for III, IV, V and VI Semester followed Previous B.OS. With out any addition and deletions.
One important change is due to heirarchy in syllabus & physical chemisty Course-9 Changes into Course 7 and vice versa.

Chairman BoS | University Nominee | Subject Expert | Subject Expert

Members

SEMESTER-I

	PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA DEPARTMENT OF CHEMISTY	Program & Semester I B.Sc.Chemistry (Honours) (I Semester)			
Course Code CHE-1	TITLEOFTHECOURSE **MAJOR 1: GENERAL CHEMISTRY**				
Teaching	HoursAllocated:45 (**Theory**)	L	T	P	C
Pre-requisites	Atomic structure, Periodicity ,Nature of chemical bonds, Radio activity	45	10	30	3+2

CourseOutcomes:

On Completion of the course, the students will be able to	
CO1	Describe the electronic configuration of elements and periodic trends.
CO2	Analyze the formation and properties of ionic and covalent compounds.
CO3	Apply VSEPR, hybridization, and MOT to predict molecular geometry and bonding.
CO4	Explain metallic bonding, hydrogen bonding, and intermolecular forces in relation to physical properties.
CO5	Explain types of radioactivity, nuclear reactions, and their practical applications.

Syllabus:

UNIT-I ATOMIC STRUCTURE AND PERIODIC TABLE (9 Hrs.)

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-II IONIC BOND (9 Hrs.)

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

UNIT-III COVALENT BOND (9 Hrs.)

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 - NH3, H2O, 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-IV: METALLIC AND HYDROGEN BONDS (9 Hrs.)

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.

(9 Hrs)

UNIT-V: NUCLEAR CHEMISTRY

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.

Textbooks:

S.NO	AUTHOR	TITLE	PUBLISHER
1	J.D. Lee	Concise Inorganic Chemistry	Blackwell Science, London
2	James E. Hughey	Inorganic Chemistry: Principles of Structure and Reactivity	Pearson publications

Reference books

S.NO	AUTHOR	TITLE	PUBLISHER
1	B. R. Puri, L.R. Sharma, K.C. Kalia	Principles of Inorganic Chemistry	Shoban Lal Nagin Chand and Co
2	W.U. Malik, G.D Tuli, R.D Madan	Selected Topics in Inorganic Chemistry	S. Chand Publishing,
3	H.J. Arnikar	Essentials of Nuclear Chemistry	New Age International Publishers,

WebLinks:

1. https://www.pbslearningmedia.org/subjects/science/physical-science/matter-and-interactions/atoms-and-atomic-structure/
2. https://www.youtube.com/watch?v=Ef9605V0wz8
3. https://wayground.com/library/lessons/high-school/science/chemistry/chemical-bonding/covalent-bonding-and-molecules
4. https://www.youtube.com/watch?v=ileXLAvDXIU
5. https://www.khanacademy.org/science/hs-chemistry/x2613d8165d88df5e:nuclear-chemistry-hs

CO-PO Mapping:

CO	PO1 Knowledge	PO2 Develop skills	PO3 Usage of Modern Tools	PO4 Scientific interpretation	PO5 Apply chemical knowledge	PO6 Ethical Practices and Social Responsibility	PO7 Communication
CO1	3	3	2	2	2	1	2
CO2	3	3	3	2	2	1	2
CO3	3	3	3	3	2	2	2
CO4	3	2	2	3	3	2	2
CO5	3	2	2	2	3	2	2

1: Low =1 ; 2: Moderate = 2 ; 3: High = 3

UNIT-I ATOMIC STRUCTURE AND PERIODIC TABLE

CO1: Describe the electronic configuration of elements and periodic trends

Mapping to POs:

- **PO1 (Knowledge):** Enables students to apply fundamental chemical principles to interpret atomic structure and periodic behaviour of elements.
- **PO2 (Analytical, Logical, and Problem-Solving skills):** Enhances analytical and logical skills by correlating periodic properties with atomic structure and predicting element behaviour..
- **PO4 (Data Interpretation, and Experimental Design.):** Develops scientific reasoning to explain observed periodic trends like ionization energy or electronegativity through empirical data

UNIT-II IONIC BOND

CO2: Analyse the formation and properties of ionic and covalent compounds

Mapping to POs:

- **PO1 (Knowledge):** Builds on chemical principles to explain bonding types using atomic and electronic structure concepts.
- **PO2 (Analytical, Logical, and Problem-Solving skills):** Requires analytical reasoning to evaluate bond strength, polarity, and resulting compound stability
- **PO3 (Usage Modern Tools and Techniques):** Applies theoretical models and visualization tools (Lewis, VSEPR, molecular models) to understand compound structures

UNIT-III: COVALENT BOND

CO3: Apply VSEPR, hybridization, and MOT to predict molecular geometry and bonding.

Mapping to POs:

- **PO1 (Knowledge):** Integrates core scientific concepts to explain geometry and bonding behaviour.
- **PO2 (Analytical, Logical, and Problem-Solving skills):** Strengthens analytical thinking by requiring stepwise application of bonding theories to predict geometry and bond order.

- **PO3 (Usage Modern Tools and Techniques):** Involves use of modeling kits, computational chemistry software, and diagrammatic techniques.

- **PO4 (Data Interpretation, and Experimental Design):** Fosters reasoning through evaluation of molecular symmetry and structure-property relationships.

UNIT-IV: METALLIC AND HYDROGEN BONDS
CO4: Explain metallic bonding, hydrogen bonding, and intermolecular forces in relation to physical properties.

Mapping to POs:

- **PO1 (Knowledge):** Reinforces chemical principles that connect bonding to observable macroscopic properties like conductivity and melting points
- **PO4 (Data Interpretation, and Experimental Design):** Enhances reasoning by interpreting experimental and theoretical results that explain macroscopic physical behaviour
- **PO5 (Applications Environment, Medicine, Industry etc):** Connects to applications in metallurgy, material science, and biochemistry (e.g., hydrogen bonding in DNA

Unit 5: NUCLEAR CHEMISTRY
CO5 Explain types of radioactivity, nuclear reactions, and their practical applications.

Mapping to POs:

- **PO1 (Knowledge):** Strengthens core understanding of atomic and nuclear chemistry fundamentals.
- **PO2 (Analytical, Logical, and Problem-Solving skills):** Involves analytical evaluation of nuclear reactions and decay processes through quantitative problem-solving
- **PO3 (Applications Environment, Medicine, Industry etc):** Links nuclear chemistry to societal and industrial applications (medicine, agriculture, energy).

Weightage to content

Semester -I

Course - 1

S.No	Course Content	Long Answer	Short Answer	Total marks
1	ATOMIC STRUCTURE AND PERIODIC TABLE	1	2	20
2	IONIC BOND	1	2	20
3	COVALENT BOND	2	1	25
4	METALLIC AND HYDROGEN BONDS	1	1	15
5.	NUCLEAR CHEMISTRY	1	1	15
	TOTAL	**6**	**7**	**95**

P.R. GOVERNMENT COLLEGE (A), KAKINADA

I YEAR B.Sc Chemistry (Examination at the end of I semester) (MAJOR – 1 GENERAL CHEMISTRY)

MODEL PAPER

Duration: 2hr **Max.Marks:50M**

Section – 1

Answer any three of the following questions. Must attempt at least one question from each part. Each question carries 10 Marks. **3 X 10M = 30M**

Part -A

1. UNIT 1
2. UNIT 2
3. UNIT 3

Part-B

4. UNIT3
5. UNIT4
6. UNIT 5

Section - II

Answer any four of the following questions. Each carries 5 marks. **4 X 5M= 20M**

7. UNIT 1
8. UNIT 1
9. UNIT 2
10. UNIT 2
11. U INIT 3
12. UNIT 4
13. UNIT 5

SEMESTER-I
MAJOR – 1 GENERAL CHEMISTRY

Practical — Credits: 1 — 2 hrs/week

Learning Out comes:

1. To understand the theoretical principles behind classical qualitative analysis of cations and anions.
2. To develop the ability to identify common cations and anions in inorganic salts.
3. To practice laboratory safety and correct handling of reagents.
4. To record and interpret observations accurately in systematic salt analysis

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

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

Cations: Lead, copper, iron, aluminum, zinc, nickel, manganese, calcium, strontium, barium, ammonium.

SCHEME OF VALUATION

Practical Paper – 1:: General Chemistry(at the end of semester I)

Systematic analysis of each component which involves following	
a. Systematic Analysis for Cation	15 marks
b. Systematic Analysis for Anion	15 marks
c. Confirmation of Cation	05 marks
d. Confirmation of Anion	05 marks
d. Viva voce	05 marks
e. Record	05 marks
TOTAL	**50 marks**

Lab References:

S.NO	AUTHOR	TITLE	PUBLISHER
1	G. Svehla	Vogel's Textbook of Qualitative Inorganic Analysis	Pearson Education, 2008
2	K. Nagaraj, S. Kamalesu, S. Lokhandwala, N.M. Parekh	Textbook of Semi-micro Inorganic Qualitative Analysis	Notion Press
3	G. Pass, H. Sutcliff	Practical Inorganic Chemistry	John-Wiley & Sons

QUESTION BANK

UNIT-1 LONG ANSWER QUESTIONS 10 MARKS

1. Discuss the concept of electronic configuration and explain the rules Aufbau principle, Pauli Exclusion Principle, Hund's Rule?
2. Explain periodic trends of atomic radii, Ionization Potential, Electron Affinity, and Electronegativity?

SHORT ANSWER QUESTIONS 5 MARKS

1. Explain the concept of variable valency with examples
2. Write a short note on the inert pair effect.
3. Explain the diagonal relationship in the periodic table

UNIT-2 LONG ANSWER QUESTIONS 10 MARKS

1. Define lattice energy. Explain the factors affecting lattice energy
2. Discuss the factors that favour the formation of ionic compounds and how lattice energy influences stability
3. Describe the Born-Haber cycle with its application to the formation of an ionic compound

SHORT ANSWER QUESTIONS 5 MARKS

1. What are Fajan's rules?
2. Define ionic bond and give two examples
3. Write short notes on polarization.

UNIT-3 LONG ANSWER QUESTIONS 10 MARKS

1. Define Valence Bond Theory and describe the concept of hybridization with examples like BF_3, CH_4, and PCl_5
2. Explain the Molecular Orbital Theory and draw the MO diagrams for N_2, and CO molecules.
3. Discuss the types of hybridization and their relation to molecular geometry with examples
4. Discuss the VSEPR theory and predict the shapes of NH_3, H_2O, SF_4, IC_2, and XeF_4 molecules

SHORT ANSWER QUESTIONS 5 MARKS

1. What are sigma and pi bonds?
2. Apply VSEPR model to predict the geometry of NH_3 and H_2O molecules
3. How MOT explains magnetic behaviour of molecules
4. Give differences between VBT and MOT
5. Define hybridization and give examples

UNIT-4 LONG ANSWER QUESTIONS 10 MARKS

1. Explain the free electron theory and band theory of metals.
2. Describe different types of hydrogen bonding with suitable examples and discuss their significance in physical properties of molecules

SHORT ANSWER QUESTIONS 5 MARKS

1. What are Van der Waals forces?
2. What are semiconductors and insulators
3. Define metallic bond and mention its characteristics.
4. . Differentiate between intra- and intermolecular hydrogen bonding, giving examples

UNIT-5 LONG ANSWER QUESTIONS 10 MARKS

1. Discuss nuclear fission and fusion reactions with examples
2. Explain types of radioactivity, radioactive decay series, and Soddy's law of radioactive displacement.

SHORT ANSWER QUESTIONS 5 MARKS

1. Define isotopes and give examples.
2. Discuss the applications of radioactivity in agriculture and medicine
3. What is binding energy and its significance in nuclear stability

Co-Curricular Activities:

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

1. For Teacher: Training of students by teacher in laboratory and field for not lessthan15 hourson the field techniques/skills of identification of Cations and Anions in the given mixture

2. For Student: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the techniques used for theseparation of organic compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding10 pages in the given format to the teacher.

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

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

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students' by related industrial experts.

2. Assignments, Seminars and Quiz (on related topics), collection of videos and other material

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

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

	PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA DEPARTMENT OF CHEMISTY	Program & Semester I B.Sc. Chemistry (Honors) (I Semester)			
Course Code CHE-2	TITLEOFTHECOURSE **MAJOR 2: INORGANIC CHEMISTRY**				
Teaching	HoursAllocated:45 (**Theory**)	L	T	P	C
Pre-requisites	Properties of P and d block elements, characteristics of lanthanides and Actinides	45	10	30	3+1

CourseOutcomes:

On Completion of the course, the students will be able to	
CO1	Explain the structures and preparation of key p-block compounds.
CO2	Interpret and classify oxides, oxoacids, interhalogens, and pseudo halogens of Groups 16–17..
CO3	Analyze magnetic, catalytic, and color properties of transition metals.
CO4	Compare and contrast lanthanides and actinides based on electronic configuration.
CO5	Explain and differentiate various metallurgical processes used in the extraction of metals.

Syllabus:

UNIT-I CHEMISTRY OF p-BLOCK ELEMENTS – I (9 Hrs.)

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 $P_3N_3C1_6$.

UNIT-II CHEMISTRY OF p-BLOCK ELEMENTS – II (9 Hrs.)

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 Hrs.)

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-IV: CHEMISTRY OF f-BLOCK ELEMENTS (9 Hrs.)

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

UNIT-V: GENERAL PRINCIPLES OF METALLURGY (9 Hrs)

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.

Textbooks:

S.NO	AUTHOR	TITLE	PUBLISHER
1	J.D. Lee	Concise Inorganic Chemistry	Blackwell Science, London
2	James E. Hughey	Inorganic Chemistry: Principles of Structure and Reactivity	Pearson publications

Reference books

S.NO	AUTHOR	TITLE	PUBLISHER
1	B. R. Puri, L.R. Sharma, K.C. Kalia	Principles of Inorganic Chemistry	Shoban Lal Nagin Chand and Co
2	D.F. Shriver, P.W. Atkins	Inorganic Chemistry	S W. H. Freeman and Co, London
3	A.K. Das	Fundamentals of Metallurgy.	Tata McGraw Hill Education,

WebLinks:

1. https://www.dalalinstitute.com/wp-content/uploads/Books/A-Textbook-of-Inorganic-Chemistry-Volume-1/ATOlCV1-10-1-Structure-and-Bonding-in-Higher-Boranes.pdf
2. https://www.youtube.com/watch?v=Sx7cjRjkZvU
3. https://www.khanacademy.org/science/chemistry/chemical-reactions
4. https://www.khanacademy.org/science/chemistry
5. https://www.notopedia.com/school-board

COURSE OUTCOME & PROGRAM OUTCOME MAPPING

CO-PO Mapping:

CO	PO1 Knowledge	PO2 Develop skills	PO3 Usage of Modern Tools	PO4 Scientific interpretation	PO5 Apply chemical knowledge	PO6 Ethical Practices and Social Responsibility	PO7 Communication
CO1	3	2	2	3	2	2	1
CO2	3	2	3	3	2	2	1
CO3	3	3	3	3	2	3	2
CO4	3	2	3	3	2	3	1
CO5	3	2	3	3	3	3	2

1: Low =1 ; 2: Moderate = 2 ; 3: High = 3

UNIT-I CHEMISTRY OF p-BLOCK ELEMENTS – I
CO1: Explain the structures and preparation of key p-block compounds

Mapping to POs:

- **PO1 (Knowledge):** Enables students to apply fundamental chemical principles to interpret structure and properties of P block elements.
- **PO4 (Data Interpretation, and Experimental Design.):** Develops scientific reasoning to explain observed bonding in P block elements
- **UNIT-II CHEMISTRY OF p-BLOCK ELEMENTS – II**

CO2: Interpret and classify oxides, oxoacids, interhalogens, and pseudo halogens of Groups 16–17

Mapping to POs:

- **PO1 (Knowledge):** Builds on chemical principles to explain bonding types oxides, oxoacids, interhalogens, and pseudo halogens of Groups 16–17
- **PO3 (Usage Modern Tools and Techniques):** Applies theoretical models and visualization tools to understand compound structures
- **PO4 (Data Interpretation, and Experimental Design.):** Develops scientific reasoning to explain observed bonding in pseudo halogens

UNIT-III: CHEMISTRY OF d-BLOCK ELEMENTS
CO3: Analyze magnetic, catalytic, and color properties of transition metals

Mapping to POs:

- **PO1 (Knowledge):** Integrates core scientific concepts to explain variable oxidation states, colour, magnetism, and catalytic behaviour.
- **PO2 (Analytical, Logical, and Problem-Solving skills):** Strengthens analytical thinking by requiring stepwise application of analyse the properties of d-block elements.
- **PO3 (Usage Modern Tools and Techniques):** Involves use of modeling kits, computational chemistry software, and diagrammatic techniques.
- **PO4 (Data Interpretation, and Experimental Design):** Fosters reasoning through evaluation of catalytic behaviour.

UNIT-IV: CHEMISTRY OF f-BLOCK ELEMENTS

CO4: Compare and contrast lanthanides and actinides based on electronic configuration

Mapping to POs:

- **PO1 (Knowledge):** Reinforces chemical principles in terms of electronic configuration, oxidation states, and contraction effects
- **PO3 (Usage Modern Tools and Techniques):** Involves use of modeling kits, computational chemistry software, and diagrammatic techniques
- **PO4 (Data Interpretation, and Experimental Design):** Enhances reasoning by interpreting experimental and theoretical results that explain contraction effects

Unit 5: GENERAL PRINCIPLES OF METALLURGY

CO5: Explain and differentiate various metallurgical processes used in the extraction of metals

Mapping to POs:

- **PO1 (Knowledge):** Strengthens core understanding of general principles of metallurgy
- **PO3 (Usage Modern Tools and Techniques):** Involves use of modeling kits, computational chemistry software, and refining techniques
- **PO4 (Data Interpretation, and Experimental Design):** Enhances reasoning by interpreting experimental and theoretical results that explain corrosion prevention.

Weightage to content

Semester -I

Course - 2

S.No	Course Content	Long Answer	Short Answer	Total marks
1	CHEMISTRY OF p-BLOCK ELEMENTS – I	2	1	25
2	CHEMISTRY OF p-BLOCK ELEMENTS – II	1	2	20
3	CHEMISTRY OF d-BLOCK ELEMENTS	1	2	20
4	CHEMISTRY OF f-BLOCK ELEMENTS	1	1	15
5.	GENERAL PRINCIPLES OF METALLURGY	1	1	15
	TOTAL	**6**	**7**	**95**

P.R. GOVERNMENT COLLEGE (A), KAKINADA

I YEAR B.Sc Chemistry (Examination at the end of I semester)
(MAJOR – 2 INORGANIC CHEMISTRY)
MODEL PAPER

Duration: 2hr **Max.Marks:50M**

Section – 1

Answer any three of the following questions. Must attempt at least one question from each part. Each question carries 10 Marks. **3 X 10M = 30M**

Part -A

1. UNIT 1
2. UNIT 2
3. UNIT 3

Part-B

4. UNIT3
5. UNIT4
6. UNIT 5

Section - II

Answer any four of the following questions. Each carries 5 marks. **4 X 5M= 20M**

7. UNIT 1
8. UNIT 1
9. UNIT 2
10. UNIT 2
11. U INIT 3
12. UNIT 4
13. UNIT 5

SEMESTER-I
MAJOR – 2 GENERAL CHEMISTRY

Practical Credits: 1 2 hrs/week

Learning Out comes:

1. To understand and apply stoichiometry and principles of inorganic salt preparation.
2. To learn techniques such as crystallization, filtration, and drying
3. To calculate percentage yields.
4. To handle reagents and lab apparatus safely and precisely

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.

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SCHEME OF VALUATION

Practical Paper – 2:: General Chemistry(at the end of semester I)

Systematic analysis of each component which involves following	
a. Procedure with equation	05 marks
b. lab procedure	15 Marks
b. Yield report	10 marks
c. Viva voce	10 marks
d. Record	10 marks
TOTAL	**50 marks**

Lab References:

S.NO	AUTHOR	TITLE	PUBLISHER
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 & Sons

QUESTION BANK

UNIT-1 LONG ANSWER QUESTIONS 10 MARKS

1. Discuss the preparation and structure of Diborane. Explain the nature of bonding in it
2. Describe the preparation, properties, and their classification of silicones.

SHORT ANSWER QUESTIONS 5 MARKS

1. Write the structure of Borazine
2. Give one method of preparation of P3N3Cl6..

UNIT-2 LONG ANSWER QUESTIONS 10 MARKS

1. Discuss the classification of oxides with suitable examples
2. Describe the structure of oxoacids of Sulphur with examples
3. Describe the Born-Haber cycle with its application to the formation of an ionic compound

SHORT ANSWER QUESTIONS 5 MARKS

1. Define interhalogen compounds with examples
2. What are pseudo halogens? Give one example
3. Write difference between interhalogen compounds and pseudo halogens

UNIT-3 LONG ANSWER QUESTIONS 10 MARKS

1. Explain the colour and magnetic properties of transition metals
2. Discuss the catalytic properties and complex-forming ability of transition metals.
3. Explain the general characteristics of d-block elements.

SHORT ANSWER QUESTIONS 5 MARKS

1. What are transition elements? Give examples.
2. What are coordination complexes? Give an example.
3. Write a note on variable oxidation states

UNIT-4 LONG ANSWER QUESTIONS 10 MARKS

1. Explain the similarities and differences between lanthanides and actinides..
2. Discuss the causes and consequences of lanthanide contraction

SHORT ANSWER QUESTIONS 5 MARKS

1. What is actinide contraction?
2. Write the general electronic configuration of lanthanides. And Actinides

UNIT-5 LONG ANSWER QUESTIONS 10 MARKS

1. Describe the processes of calcination and roasting with examples.

Discuss different methods of refining of metals

SHORT ANSWER QUESTIONS 5 MARKS

1. What is metallurgy? Define mineral and ore.
2. What is corrosion? How can it be prevented?

Co-Curricular Activities:

1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral/Viva Voce
5. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning.
6. 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.
7. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester