# PITHAPUR RAJAH'S GOVERNMENTCOLLEGE (AUTONOMOUS)
# KAKINADA - 533 001, AP.

Affiliated to Adikavi Nannaya University

NAAC Accredited with "A" Grade (3.17 CGPA)

**BOARD OF STUDIES OF CHEMISTRY**

**B.Sc. CHEMISTRY MAJORS & B.Sc. CHEMISTRY UNDER CBCS**

**Meeting Minutes/Resolutions**

## *Convened on 30 April 2024*AY 2024-25

**DEPARTMENT OF CHEMISTRY**

**PITHAPUR RAJAH'S GOVERNMENTCOLLEGE (AUTONOMOUS)**

**Opp. Mc Laurin High School, Raja Ram Mohan Roy Road, Kakinada**

**www.prgc.edu.in; e-mail: chemistry@prgc.edu.in**

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

**Present: Dr. B. V. Tirupanyam, M. Sc; Ph.D.**

**R.C.No.2/A.C./BOS/2024-25, Dated: 23.04.2024**

**SUB:** P.R. Government College (A), Kakinada-UG Board of Studies (BOS)- B.Sc-Chemistry- Nomination of Members-Orders issued.

**REF:** 1. UGC Guidelines for Autonomous Colleges-2018.

**ORDERS:**

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

| S. No | Name of the Person | Designation |
|---|---|---|
| 1 | V. Sanjeeva Kumar | Chairman & Lecturer In charge |
| 2 | Dr. K. Jhansi Lakshmi<br>ASD Govt. Degree College for Women (Autonomous)<br>Kakinada | University Nominee |
| 3 | Dr. D. Chenna Rao<br>Lecturer in Chemistry,<br>Govt. Degree College, Yeleswaram | Subject Expert -I |
| 4 | U. Sai Krishna<br>Lecturer in Chemistry, Govt. College, (Autonomous)<br>Rajamahendravaram | Subject Expert - II |
| 5 | Dr.N. Ratnakar, AARKISH PHARMACEUTICALS INS NJ, NEW JERSEY | Subject Expert - III |
| 6 | Dr. P. KARUNA RAMAN MD, IDEAL ORGANICS HYDERABAD. | Representative from Industry |
| 7 | T. V. V. Satyanarayana | Member |
| 8 | P. Vijay Kumar | Member |
| 9 | V. Ram babu | Member |
| 10 | G. Pavani | Member |
| 11 | Dr. N. Bujji Babu | Member |
| 12 | Dr. Ch. Praveen | Member |
| 13 | V. Venkateswara Rao | Member |
| 14 | U.S.N. Prasad | Member |
| 15 | K.N.S. Swamy | Member |
| 16 | S. Vijaya Lakshmi | Member |
| 17 | D.Bhavyasri | Member |
| 18 | K.Umamaheswari | Student Alumni Member |
| 19 | Deepthi Anusha II FBC | Student Member |
| 20 | BVNagendra Kumar, II MCCS | Student Member |
| 21 | J.Veera Durga I CHEMISTRY MAJORS | Student Member |

The above members are requested to attend the BoS meeting on 30-04-2024 and share their valuable reviews, and suggestions on the following functionaries.

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

PRINCIPAL
P. R. Government College(A),
Kakinada

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A)DEPARTMENT OF CHEMISTRY**

Meeting of Board of Studies in Chemistry is convened on 30 April 2024 throughoffline/ online at P.R. Govt. College (A), Kakinada, at 10.00 AM.

**Venue:** JKC AC HALLS , Dt: 30-04-2024, Tuesday – 10.00 A.M.

The Principal Dr. B.V. Tirupanyam; Chairman V. Sanjeeva Kumar; University Nominee Dr. K. Jhansi Lakshmi, Lecturer in Chemistry, ASD Govt. Degree College for Women (Autonomous), Kakinada; Dr. P. KARUNA RAMAN MD, IDEAL ORGANICS HYDERABAD. Industrialist; Subject Experts Dr. D. Chenna Rao, Lecturer in Chemistry, Govt. Degree College, Yeleswaram and U. Sai Krishna Lecturer in Chemistry, Govt. College, (Autonomous), Rajamahendravaram all the faculty members of the Chemistry Department and student alumni attended the meeting.

**Agenda:**

1. To discuss the I,II,III, IV semesters of a Single major system as B.Sc. Chemistry (Hons), B.Sc. OrganicChemistry (Hons), B.Sc. Analytical Chemistry (Hons) from the academic year 2024-25. & V ,VI semesters of CBCS System
2. To discuss 4$^{th}$ year B.Sc. Honours to the students who were admitted in the academicyear 2021-22.
3. To discuss the Semester System and revised Choice Based Credit System (CBCS)being implemented for the past 04 years, i.e., w.e.f. 2020-21.
4. To discuss and approve the Continuation/Modifications of the syllabus for the Odd& Even Semesters of I, II, III & IV Years for 2024-25.
5. Grant of Extra credits for Online SWAYAM MOOCs, edX, Coursera etc.
6. Syllabus, Model Question Papers and Model Blue Prints, Cos, POs, & PSOs mappingfor I, II, III, IV, V, VII and VIII Semesters.
7. Teaching-learning methodology by 50:50 (External: Internal) ratio I, II, I I I & IV Year Students commenced w.e.f. 2021-22.
8. Minimum attendance of 75% for both I mid-term examination, and II mid- term examination under CIA component shall be the benchmark for attendance and itshall be approved in the BOS.

9. Minimum of 50% integration of ICT into a transaction of curriculum.
10. Remedial coaching and assignments for slow learners, project works, research, Conferences, Industrial /academic tours & PG Entrance Coaching etc., for advanced learners.
11. Panel of paper setters and examiners.
12. Implementation of compulsory Community Service Project (CSP)/ Internships/ Apprenticeship and Extension activities for the benefit of the society.
13. Department action plan for 2024-25.
14. To discuss and resolve the minor modifications/refinement if any, in the I, II, III, IV, V, VII,&VIII Semester.
15. Any Other Proposal with the permission of the Chairman.
16. Proposal to start new UG honours course i.e, BSc., Pharmaceutical Chemistry for the AY 24-25

**Signature of the members who attended the board of studies in B.sc Honors Chemistry and B.sc Three major system chemistry on 30th April 2024 at 10 a.m. Mode of conduct of meeting offline / online**

| SL.NO | NAME | SIGNATURE | CONTACT NO. |
|---|---|---|---|
| 1 | V. Sanjeeva Kumar | V. S. | 9849324968 |
| 2 | Dr. K. Jhansi Lakshmi | K. Jhansi Lakshmi | 9441256409 |
| 3 | Dr. P. KARUNA RAMAN MD, IDEAL ORGANICS, HYDERABAD. | Dr. P. Karuna Raman | 9398249493 |
| 4 | Dr. D. Chenna Rao | | 9560740108 |
| 5 | U. Sai Krishna | U. Sai Krishna | 9347334707 |
| 6 | T. V. V. Satyanarayana | T. V. V. Satya | 9490876913 |
| 7 | P. Vijay Kumar | P. Vijay | 9652023082 |
| 8 | V. Ram babu | | 9948485537 |
| 9 | G. Pavani | | 9912526493 |
| 10 | Dr. N. Bujji Babu | | 9441394792 |
| 11 | Dr. Ch. Praveen | Praveen | 9491185518 |
| 12 | V. Venkateswara Rao | V. Venkateswara Rao | 9885165588 |
| 13 | U.S.N. Prasad | USNP | 6300882584 |
| 14 | K.N.S. Swamy | KNS Swamy | 9908900962 |
| 15 | S. Vijaya Lakshmi | S. Vijaya Lakshmi | 9133941966 |
| 16 | D.Bhavyasri | D. Bhavyasri | |
| 17 | Ch. Veni | Ch Veni | |
| 18 | Deepthi Anusha II FBC | P. Deepthi Anusha | 7382468859 |
| 19 | Syamala, II MCCS | A. Syamala | 6300192780 |
| 20 | | | |

**ADDITIONS/DELETIONS IN COURSESCHEMISTRY**

**2024-25**

| Year | SEMESTER & PAPER | ADDITIONS | DELETIONS |
|---|---|---|---|
| I | I & I | Adopted the same from APSCHE | |
| I | I & II | Adopted the same from APSCHE | |
| I | II & III | Adopted the same from APSCHE | |
| I | II & IV | Adopted the same from APSCHE | |
| II | III & III | Adopted the same from APSCHE | |
| II | IV & IV | Adopted the same from APSCHE | |
| II | IV & V | Adopted the same from APSCHE | |
| III | V & VIA | Added Green synthesis of pyrimidine | Green synthesis of Adipic acid |
| III | V & VIIA | NIL | NIL |
| III | VI | APPERENTICESHIP | |
| IV HONOURS | VII & VIIIA/B | Adopted the same from APSCHE | |
| IV HONOURS | VII & IXA/B | Adopted the same from APSCHE | |
| IV HONOURS | VII & XA/B | Adopted the same from APSCHE | |
| IV HONOURS | VII & XIA/B | Adopted the same from APSCHE | |
| IV HONOURS | VII & XIIA/B | Adopted the same from APSCHE | |
| IV HONOURS | XIII | ONLINE COURSE | |
| IV HONOURS | VIII & XIV A/B | Adopted the same from APSCHE | |
| IV HONOURS | VIII & XV A/B | Adopted the same from APSCHE | |
| IV HONOURS | VIII & XVIA/B | Adopted the same from APSCHE | |
| IV HONOURS | VIII & XVIIA/B | Adopted the same from APSCHE | |
| IV HONOURS | VIII & XVIIIA/B | Adopted the same from APSCHE | |
| IV HONOURS | XIX | ONLINE COURSE | |

**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 will be conducted and the average of the two is considered.
- I mid-examination is to be conducted in offline mode at the college level and II mid-examination is to be conducted in online mode at the 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** answerquestions with five marks each out of four questions and five objective questionswith 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 | 0 | 1 |
| II | 1 | 0 | 1 |
| III | 0 | 2 | 1 |
| IV | 0 | 2 | 1+ one question from any unit with more syllabus weightage |

- For I mid examination to be conducted in offline mode, Question paperis to be given as per the following structure for the courses with **5 units**

| S.No | Unit No | Long Answer Question(10M) | Short Answer Question (5 M) | ObjectiveQuestions (1M) |
|---|---|---|---|---|
| 1 | I | 1 | 0 | 1 |
| 2 | II | 1 | 0 | 1 |
| 3 | III | 0 | 1 | 1 |
| 4 | IV | 0 | 1 | 1 |
| 5 | V | 0 | 1+ one question from any unit(III or IV or V) with more syllabus weightage | 1 |

- The remaining 25 marks for CIA are allocated as per the followingstructure.

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

**CIA structure for 3 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 beconsidered
  .
- 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
- The remaining 25 marks for CIA are allocated as per the following structure.

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

**CIA structure for 3 Major system for Honors programmes**
**(2020-21AB)**

- Out of 40 marks for CIA, 20 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be 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 **Two essay** questions for ten marks each out of three questions, **four short** answer questions with five marks each out of six questions.

- The remaining 20 marks for CIA are allocated as per the following structure.

| | | |
|---|---|---|
| **Assignment- 10M** | **Seminar- 5M** | **Quiz -5M** |

**Allotment of Extra credits guidelines**

| Sl.No. | Activity | Details of achievement | Credits |
|---|---|---|---|
| 1 | **MOOC Course** | *SWAYAM /NPTEL /CEC etc., (Course Completion certificate with credits should be produced for the claim of extra credits)* | *Total credits achieved will be considered* |
| 2 | **NCC** | ***B CERTIFICATE*** | *2* |
| | | *Participation in National Camp after 'B' certificate* | *3* |
| | | ***C CERTIFICATE*** | *4* |
| | | *Adventure camp/RD parade along with 'B'* | *5* |
| | | *Failed in B certificate Examination* | *1* |
| 3 | **Sports** | *Intercollegiate selection* | *2* |
| | | *South zone selection* | *3* |
| | | *All India participation* | *4* |
| | | *Winning medals in all India competitions* | *5* |
| 4 | **NSS** | *40% attendance in regular NSS activities* | *1* |
| | | *50% attendance with Community Service* | *2* |
| | | *Conduct of survey/Youth exchange/RD* | *3* |
| 5 | **JKC** | *Enrollment and training* | *1* |
| | | *Campus recruitment local level* | *2* |
| | | *MNCs/reputed companies* | *3* |
| 6 | **Community service** | *Participation in community service by departments (outreach programmes)* | *2* |
| 7 | **Culturalactivity** | *Winning medals at state level-2,District level-1* | *2*<br>*1* |
| 8 | **COP/Add on Course** | *Pass in Certificate Exam-1,*<br>*Diploma-2* | *1*<br>*2* |
| 9 | **Support services** | *Lead India, Health club, RRC and Eco Club etc.,participation in various programmes* | *1* |

| | PITHAPUR RAJAH'S GOVERNMENT COLEGE(A)<br>Kakinada<br>DEPARTMENT OF CHEMISTRY | Program & Semester<br>Gen Chemistry<br>I B.Sc.<br>(II Semester) | | | |
|---|---|---|---|---|---|
| Course Code<br>CHE-3 | TITLEOFTHECOURSE<br>**GENERAL AND INORGANIC CHEMISTRY-(MAJOR)** | | | | |
| Teaching | HoursAllocated:45 (**Theory**) | L | T | P | C |
| Pre-requisites | Atomic models and chemical bonding | 45 | 10 | 30 | 3+1 |

**Course Objectives:**

1. Atomic Structure and Periodic table
2. Ionic bond
3. The Covalent Bond
4. Metallic and Weak Bonds
5. Acids and Bases.

**Course Outcomes:**

| On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understand the structure of atom and the arrangement of elements in the periodic table |
| CO2 | Understand the properties of Ionic bond. |
| CO3 | Identify the structure of a given inorganic compound. |
| CO4 | Explain the existence of special types of compounds through weak chemical forces. |
| CO5 | Define acids and bases and predict the nature of salts |

**Course with focus on Skill Development/Employability/Entrepreneurship modules**

| Skill Developement | | Employability | | Entrepreneurship | |
|---|---|---|---|---|---|

**Syllabus:**

**UNIT-I: Atomic Structure and Periodic table** **9 h**

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

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

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

Properties of ionic compounds, factors favouring the formation of ionic compounds ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation 4 2 of ionic compound and stability. Stability of ionic compounds in terms of ΔHf and Uo. Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds-polarization and Fajan's rules; effects of polarization-solubility, melting points, and thermal stability of typical ionic compounds.

**UNIT-III: The Covalent Bond** **12 h**

Valance Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules-BeCl2, BF3, CH4, PCl5, SF6– VSEPR model effect of bonding and nonbonding electrons on the structure of molecules, effect of electronegativity, isoelectronic principle, illustration of structures by VSEPR model-$NH_3$, $H_2O$, $SF_4$, $ICl_4^-$, $XeF_4$, $XeF_6$

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 Weak Bonds** **9 h**

The Metallic bond: metallic properties, free electron theory, Valence Bond Theory, band theory of metals. Explanation of conductors, semiconductors and insulators. Weak bonds: hydrogen bonding-intra- and intermolecular hydrogen bonding, influence on the physical properties of molecules, comparison of hydrogen bond strength and properties of hydrogen bonded N, O and F compounds; associated molecules-ethanol and acetic acid; Vanderwaals forces, ion dipole-dipole interactions.

**Unit-5: Acid Bases** **9h**

Theories of acids and bases: Arrhenius theory, Bronsted-Lowry theory, Lewis theory, the solvent system, Nonaqueous solvents: classification-protonic and aprotic solvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia. Types of chemical reactions: acid-base, oxidation-reduction, calculation of oxidation number. Definition of pH, pKa, pKb. Types of salts, Salt hydrolysis. Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard andSoft-Soft combinations.

**Reference books**

| S.NO | AUTHOR | TITLE | PUBLISHER |
|---|---|---|---|
| 1 | J. D. Lee | Concise Inorganic Chemistry | Blackwell Science |
| 2 | B. R. Puri, L. R. Sharma, K. C. Kalia, | Principles of Inorganic Chemistry | Shoban Lal Nagin Chand and Co |
| 3 | D. F. Shriver and P. W. Atkins, | Inorganic Chemistry | W. H. Freeman and Co |

**WebLinks:**

**Course outcome & Program outcome mapping**

| On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understand the structure of atom and the arrangement of elements in the periodic table |
| CO2 | Understand the structure of atom and the arrangement of elements in the periodic table |
| CO3 | Identify the structure of a given inorganic compound. |
| CO4 | Explain the existence of special types of compounds through weak chemical forces. |
| CO5 | Define acids and bases and predict the nature of salts |

**CO-PO Mapping:** **1: Low =1 ; 2: Moderate = 2 ; 3: High = 3 ; 4: No Correlation = 0**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| CO3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 1 |
| CO4 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 3 | 2 | 1 |
| CO5 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |

**PROGRAMME OUTCOMES**

At the completion of the B.Sc. Chemistry program, the students of our Department will be able to:

**(PO1) Knowledge:** Attain in depth knowledge about the fundamental principles, essential facts, conclusions and applications of chemical and scientific theories in various domains of chemistry.

**(PO2) Critical Thinking:** Carry out experiments in the area of organic analysis, estimation, derivative process, inorganic semi micro analysis, preparation, Kinetic, conductometric and potentiometric experiments and spectral analysis applying the domain of critical thinking.

**(PO3) Problem Solving:** Define the background of reaction mechanisms, complex chemical structures, instrumental method of chemical analysis, and separation techniques and apply appropriate techniques for analyzing specific problems both qualitatively and quantitatively in laboratories and in industries

**(PO4): Usage of modern tools:** Create data using modem chemical tools and ICT for modeling and analyze the data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, GCMS, Fluorescence, SEM, TEM and XRD) for chemical analysis

**(PO5): Communication:** Develop Skills to evaluate, analyze and interpret the chemical information and data and to communicate effectively within the chemical community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**(PO6): Life-long Learning:** Demonstrate scholarly attitude to pursue a career in the field of chemical education and research and have the zeal and vision to engage in independent and life-long learning in the broadest context of technological and social change.

**(PO7) Ethical Practices and Social Responsibility:** Generate ideas and solutions for green and sustainable chemistry and approach towards planning and execution of research in frontier areas of chemical sciences.

**PROGRAM SPECIFIC OUTCOMES (PSO's)**

At the time of graduation, our under graduates would be able to:

**PSO 1-** Evaluate, analyze, interpret and effectively apply the basic laws, principles, phenomena, processes and mechanisms involved in the domain of organic, inorganic, physical and analytical Chemistry

**PSO2 -** Demonstrate the knowledge of Chemistry in the domain of research, education and perspective entrepreneurship.

**PSO3 -** Evaluate distinct problems in the field of chemical data analysis, scientific interpretation and reaction mechanisms with an understanding on basic tools to be employe

**Weightage to content**

**Semester -II**

**Course - 3**

| S.No | CourseContent | Long Answer | ShortAnswer | Totalmarks | As per Blooms Taxonomy |
|---|---|---|---|---|---|
| 1 | Atomic Structure and Periodic table | 2 | 2 | 30 | Understanding, Application |
| 2 | Ionic bond | 1 | 1 | 15 | Remembering, Understanding |
| 3 | Covalent bond | 1 | 1 | 15 | Analysizing & Creation |
| 4 | Metallic and Weak bonds | 1 | 1 | 15 | Evaluation, Understanding |
| 5. | ACIDS & BASES | 1 | 2 | 20 | Understanding, Application |
| | **TOTAL** | **6** | **7** | **95** | |

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

General Chemistry (Hons) AB - 2024-25

**I YEAR B.Sc (Examination at the end of II semester)**

**(COURSE – 3 - Inorganic and General Chemistry)**

**MODEL PAPER**

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

## Section -I

**Answer any three of the following questions. Must attempt atleast one question from each part.**

**Each question carries 10 Marks.** **3 X 10 = 30M**

**Part – A**

1. What are postulates of Bohr's theory and explain limitations of his theory
2. Define lattice enthalpy. Determine lattice enthalpy by using born Haber cycle take an example.
3. Define Ionization Potential and Electronegativity and Explain trend across the periods and down the group ?

**Part - B**

4. Construct MO diagrams for $N_2$ and CO
5. Explain the Band theory of Metals
6. Explain the Pearson's concept of HSAB principle & its importance

## Section II

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

7. Explain Hund's and Aufbau principles
8. Explain Heisenberg uncertainty principle.
9. Define Polarization and write the Fajan' rules
10. Explain the structure and hybridization of $PCl_5$ using Valence bond theory
11. Compare strength of hydrogen bonding strength In o-Nitrophenol and p- Nitro phenol.
12. Explain the concept of PH in Acids and Bases
13. What are oxidation and Reduction reactions

.

**SEMESTER-II**
**COURSE 3: GENERAL AND INORGANIC CHEMISTRY**

Practical Credits: 1 2 hrs/week

## Practical- I Qualitative Analysis of SIMPLE SALT

Qualitative inorganic analysis (Minimum of Six simple salts should be analysed) 50 M

### I. Course outcomes:

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

1. Understand the basic concepts of qualitative analysis of inorganic simple salt.
2. Use glassware, equipment and chemicals and follow experimental procedures inthe laboratory
3. Apply the concepts of common ion effect, solubility product and concepts relatedto qualitative analysis

**Laboratory course syllabus: Analysis of SIMPLE SALT 50 M**

**I.**

Analysis of simple salt containing ONE anion and ONE cation from the following:
Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

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

### Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning.
2. Class Tests, Work sheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout theSEMESTER

## SCHEME OF VALUATION

| | |
|---|---|
| a. Preliminary Tests | 05 M |
| b. Identification of anion | 08 M |
| c. Conformation tests for anion | 10 M |
| d. Identification cation(Group separation table) | 10 M |
| e. Conformation of Cation | 05 M |
| f. Report | 02 M |
| g. Viva voce | 05 M |
| h. Record | 05 M |
| **TOTAL** | **50 marks** |

QUESTION BANK

UNIT-1

LONG ANSWER QUESTIONS

1. What are postulates of Bohr's theory and explain limitations of his theory
2. Define Ionization Potential and Electronegativity and Explain trend across the periods and down the group ?

SHORT ANSWER QUESTIONS

1. Explain Heisenberg uncertainty principle
2. Explain Diagonal relationship in periodic table
3. Explain Hund's and Aufbau principles
4. Explain measurement of Electronegativity by any two scales

UNIT-2

LONG ANSWER QUESTIONS

1. Define lattice enthalpy. Determine lattice enthalpy by using Born -Haber cycle
2. What are Ionic compounds write their properties and factors affecting them?

SHORT ANSWER QUESTIONS

1. Define Polarization and write the Fajan' rules
2. What are the factors affecting Lattice energy

UNIT-3

LONG ANSWER QUESTIONS

1. Construct MO diagrams for $N_2$ and CO
2. What are the features of Valence Bond Theory and explain with examples

SHORT ANSWER QUESTIONS

3. Explain the structure explain the structures of $NH_3$ and $H_2O$ using VSEPR theory
4. Explain the paramagnetic behaviour of $O_2$ molecule by MO theory

UNIT-4

LONG ANSWER QUESTIONS

1. Explain Free electron theory and Valence bond theory of Metals
2. Explain the Band theory of Metals

SHORT ANSWER QUESTIONS

1. Define Inter and Intra molecular Hydrogen bonding with an example each ?
2. Compare strength of hydrogen bonding strength In o-Nitrophenol and p- Nitro phenol

UNIT-4

LONG ANSWER QUESTIONS

1. Explain the Pearson's concept of HSAB principle & its importance
2. ,Explain Bronsted-Lowry and Lewis theory of Acids and Bases

SHORT ANSWER QUESTIONS

1. Brief the process of Salt hydrolysis
2. Explain the concept of PH in Acids and Bases
3. Explain the relationship between the strength of acids/bases and their pKa and pKb values.
4. What are oxidation and Reduction reactions

| | PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A)<br>KAKINADA<br>DEPARTMENT OF CHEMISTY | Program & Semester<br>Gen Chemistry Hons<br>I B.Sc.<br>(II Semester) | | | |
|---|---|---|---|---|---|
| Course Code<br>CHE-4 | TITLEOFTHECOURSE<br>**COURSE 4: INORGANIC CHEMISTRY** | | | | |
| Teaching | HoursAllocated:45 (**Theory**) | L | T | P | C |
| Pre-requisites | Fundamentals of classification of Elements. | 45 | 10 | 30 | 3+1 |

**CourseOutcomes:**

| On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understand the structures of Diborane ,interhalogen compounds and Daily life applications of silicones. |
| CO2 | Identify the Charecteristics of d – block elements particularly variable oxidation states,Magnetic properties and catalytic Properties. |
| CO3 | Understand how to separate the Lanthanoid complexes. |
| CO4 | Define n/p ratio and Binding energy and predict the types of Radioactive series. |

**Course with focus on Skill Development/Employability/Entrepreneurship modules**

| SkillDevelopment | | Employability | | Entrepreneurship | |
|---|---|---|---|---|---|

**Syllabus:**

**UNIT –I Chemistry of p-block elements – I 9 h**

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

**Unit II Chemistry of p-block elements – 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-III Chemistry of d-block elements: 9 h**

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

**UNIT-IV Chemistry of f-block elements: 9 h**

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

Separation of lanthanides by ion exchange method.

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

**Unit – V Radioactivity 9 h**

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

**Textbooks:**

| S.NO | AUTHOR | TITLE | PUBLISHER |
|---|---|---|---|
| 1 | J D Lee | Concise Inorganic Chemistry | |
| 2 | Puri and Sharma | Inorganic chemistry | |

**Reference books**

| S.NO | AUTHOR | TITLE | PUBLISHER |
|---|---|---|---|
| 1 | Cotton and Wilkinson | Basic Inorganic Chemistry | |
| 2 | Satya Prakash | Advance Inorganic chemistry vol-I | |
| 3 | Maheshwar Sharon | Nuclear Chemistry | |

**WebLinks:**

1. https://www.slideshare.net/terencepereira58/diborane
2. https://www.youtube.com/watch?v=xKzaHJAEPeA
3. https://www.idc-online.com/technical_references/pdfs/chemical_engineering/Oxides.pdf
4. https://www.youtube.com/watch?v=4aoUwJ5COpg
5. https://byjus.com/jee/lanthanides/
6. https://www.youtube.com/watch?v=PNQVovRfIoA
7. https://web.pdx.edu/~pmoeck/lectures/modern/TRM-13.ppt
8. https://www.toppr.com/ask/en-np/question/state-soddyfajans-displacement-laws-for-radioactive-transformations/

**Course outcome & Program outcome mapping**

| On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understand the structures of Diborane ,interhalogen compounds and Daily life applications of silicones. |
| CO2 | Identify the Charecteristics of d – block elements particularly variable oxidation states,Magnetic properties and catalytic Properties. |
| CO3 | Understand how to separate the Lanthanoid complexes. |
| CO4 | Define n/p ratio and Binding energy and predict the types of Radioactive series. |

**CO-PO Mapping: 1: Low =1 ;2: Moderate = 2 ; 3: High = 3 ; 4: No Correlation = 0**

| CO | PO1 | PO 2 | PO3 | PO 4 | PO 5 | PO6 | PO 7 | PSO1 | PSO2 | PSO 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 3 | 2 | 2 | | |
| CO2 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 2 | | |
| CO3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | | |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | | |

**PROGRAMME OUTCOMES**

At the completion of the B.Sc. Chemistry program, the students of our Department will be able to:

**(PO1) Knowledge:** Attain in depth knowledge about the fundamental principles, essential facts, conclusions and applications of chemical and scientific theories in various domains of chemistry.

**(PO2) Critical Thinking:** Carry out experiments in the area of organic analysis, estimation, derivative process, inorganic semi micro analysis, preparation, Kinetic, conductometric and potentiometric experiments and spectral analysis applying the domain of critical thinking.

**(PO3) Problem Solving:** Define the background of reaction mechanisms, complex chemical structures, instrumental method of chemical analysis, and separation techniques and apply appropriate techniques for analyzing specific problems both qualitatively and quantitatively in laboratories and in industries.

**(PO4): Usage of modern tools:** Create data using modem chemical tools and ICT for modeling and analyze the data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, GCMS, Fluorescence, SEM, TEM and XRD) for chemical analysis

**(PO5): Communication:** Develop Skills to evaluate, analyze and interpret the chemical information and data and to communicate effectively within the chemical community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**(PO6): Life-long Learning:** Demonstrate scholarly attitude to pursue a career in the field of chemical education and research and have the zeal and vision to engage in independent and life-long learning in the broadest context of technological and social change.

**(PO7) Ethical Practices and Social Responsibility:** Generate ideas and solutions for green and sustainable chemistry and approach towards planning and execution of research in frontier areas of chemical sciences.

**PROGRAM SPECIFIC OUTCOMES (PSO's)**

At the time of graduation, our under graduates would be able to:
**PSO 1-** Evaluate, analyze, interpret and effectively apply the basic laws, principles, phenomena,
processes and mechanisms involved in the domain of organic, inorganic, physical and analytical Chemistry
**PSO2 -** Demonstrate the knowledge of Chemistry in the domain of research, education and perspective entrepreneurship.

**PSO3 -** Evaluate distinct problems in the field of chemical data analysis, scientific interpretation
and reaction mechanisms with an understanding on basic tools to be employed.

**Weightage to contentSemester -II**
**Course - 4**

| S.No | CourseContent | Long Answer | ShortAnswer | Total marks | As per Blooms Taxonomy |
|---|---|---|---|---|---|
| 1 | Chemistry of p – block elements. | 1 | 2 | 20 | Understanding, Application |
| 2 | Chemistry of p – block elements. | 2 | 1 | 25 | Remembering, Understanding |
| 3 | Chemistry of d- block elements. | 1 | 1 | 15 | Analysizing & Creation |
| 4 | Chemistry of f-block elements. | 1 | 1 | 15 | Evaluation, Understanding |
| 5. | Radioactivity | 1 | 2 | 20 | Understanding, Application |
| | **TOTAL** | **6** | **7** | **95** | |

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) : KAKINADA**

**BOARD OF STUDIES 2023-24**

**DEPARTMENT OF CHEMISTRY**

I B.Sc, CHEMISTRY(Hons)

SEMESTER– II

**COURSE-4 – Inorganic Chemistry**

Question Bank

## Unit-I

**Essay questions:**

1. Explain the synthesis and structure of diborane?
2. What are silicones write their classification & applications?

**Short Answer questions:**

3. What is inorganic benzene explain its structure?
4. Elaborate the structure of Boran nitride.
5. Write the preparation and structure of $P_3N_3Cl_6$.

## Unit- II

**Essay questions**

1. What are oxides explain their classification based on oxygen content and chemical nature?
2. Discuss the classification and structure of interhalogen compounds?

**Short answer questions**

3. Explain the structure of oxides of sulfur.
4. Write a short note on pseudo halogens.
5. Write a short on the oxy acids of sulfur?

## Unit-III

**Essay questions:**

1. Explain the characteristics of d- block elements with reference to following.
   a) Electronic configuration
   b) Variable oxidation states
2. Write a short note on the following properties of d- block elements.
   a) Magnetic properties
   b) catalytic properties

**Short answer questions**

3. Explain the complex formation of transition elements with an example?

4. Discuss the stability of various oxidation states of 3d-series elements.
5. Write a short note on Latimer diagrams.

## Unit-IV

**Essay questions:**

1. How to separate the lanthanides by using ion exchange method?
2. Compare lanthanides and actinides?

**Short answer questions**

3. Explain the electronic configuration of lanthanide elements.
4. What is lanthanide contraction write its consequences?
5. Calculate the spin only and effective magnetic moment of $Pr^{+3}$
6. Write the electronic configuration of actinides?

## Unit-V

**Essay questions**

1. Explain Soddy- Fajan's displacement law and law of Radioactivity.
2. Elaborate nuclear fission and nuclear fusion reactions with suitable examples?

**Short answer questions**

3. Define binding energy and n/p ratio.
4. What are isotopes and give three examples?
5. Write a short note on applications of Radioactivity?
6. Discuss radioactive decay series?

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) :: KAKINADA**

**I YEAR B.Sc CHEMISTRY Hons (Examination at the end of II semester)**

**(COURSE – 4 Inrganic Chemistry)**

**MODEL PAPER**

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

**Section – 1**

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

**Part –A**

1. Explain any two preparation methods of diborane and deduce its structure. [BT1, CO1]
2. what are oxides and explain their classification based on oxygen content and nature [BT2, CO1]
3. Define interhalogen compounds and draw the structure of ClF3 and BrF5. [BT2, CO1]

**Part – B**

4. Elaborate the characteristics of d- block elements with reference to Magnetic properties and Variable oxidation states [BT3 CO2]
5. How to separate the lanthanides by using ion exchange method. [BT4 CO3]
6. Explain the following. [BT1, CO4]

a) Soddy- Fajan's displacement law.

b) law of Radioactivity

**Section – II**

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

7. Why Borazine is called inorganic Benzene. Support your answer with proof? [BT3, CO1]
8. Write the Daily life applications of silicones? [BT2, CO1]
9. Explain the structure and hybridization of $SO_3$. [BT1, CO1]
10. Why Particularly d- block elements act as catalysts. Explain with suitable examples? [BT4, CO2]
11. Brief Lanthanide contraction and write its consequences? [BT3, CO3]
12. Define Isotopes, n/p ratio and Binding energy? [BT1, CO4]
13. Write a short note on applications of Radioactivity? [BT2, CO4]

| | PITHAPUR RAJAH'S GOVERNMENT COLEGE(A)<br>Kakinada<br>DEPARTMENT OF CHEMISTRY | Program & Semester<br><br>I B.Sc.<br>(II Semester) | | | |
|---|---|---|---|---|---|
| Course Code<br>CHE-3 | TITLEOFTHECOURSE<br>**GENERAL AND INORGANIC CHEMISTRY-(MINOR)** | | | | |
| Teaching | HoursAllocated:45 (**Theory**) | L | T | P | C |
| Pre-requisites | Atomic models and chemical bonding | 45 | 10 | 30 | 3+1 |

**Course Objectives:**

1. Atomic Structure and Periodic table
2. Ionic bond
3. The Covalent Bond
4. Metallic and Weak Bonds
5. Acids and Bases.

**Course Outcomes:**

| On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understand the structure of atom and the arrangement of elements in the periodic table |
| CO2 | Understand the properties of Ionic bond. |
| CO3 | Identify the structure of a given inorganic compound. |
| CO4 | Explain the existence of special types of compounds through weak chemical forces. |
| CO5 | Define acids and bases and predict the nature of salts |

**Course with focus on Skill Development/Employability/Entrepreneurship modules**

| Skill Developement | | Employability | | Entrepreneurship | |
|---|---|---|---|---|---|

**Syllabus:**

**UNIT-I: Atomic Structure and Periodic table** **9 h**

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

Periodicity: periodic law and arrangement of elements in the periodic table, diagonal relationships in the periodic table. General

properties of atoms: size of atoms and ions-atomic radii, ionic radii, covalent radii; trend in ionic radii, ionization potential, electron affinity; electronegativity - Pauling, Mulliken-Jaffe, Allred-Rochow inert-pair effect

**Additional Inputs** : significance of wave functions, normalization of wave

function, radial and angular wave functions, oxidation states and variable valency; isoelectronic relationship

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

Properties of ionic compounds, factors favouring the formation of ionic compounds- ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation of ionic compound and stability. Stability of ionic compounds in terms of ΔHf and Uo.. Covalent character in ionic compounds-polarization and Fajan's rules; effects of polarization- solubility, melting points, and thermal stability of typical ionic compounds.

**UNIT-III: The Covalent Bond** **12 h**

Valance Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules-$BeCl_2$, $BF_3$, $CH_4$, $PCl_5$, $SF_6$– VSEPR model-effect of bonding and nonbonding electrons on the structure of molecules, , illustration of structures by VSEPR model-$NH_3$, $H_2O$, $SF_4$, $ICl^-$, $XeF_4$, $XeF_6$

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)

**Additional Inputs** : effect of electronegativity, isoelectronic principle

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

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

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

**Additional Inputs** Vander Waals forces, ion dipole-dipole interactions.

**Unit-5: Acid Bases** **9h**

Theories of acids and bases: Arrhenius theory, Bronsted-Lowry theory, Lewis theory,

Types of chemical reactions: acid-base, oxidation-reduction,

Definition of pH, $pK_a$, $pK_b$. Types of salts, Salt hydrolysis. Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations

**Additional Inputs** :. The solvent system, Non-aqueous solvents: classification-protonic and aprotic solvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia. calculation of oxidation number.

**Reference books**

| S.NO | AUTHOR | TITLE | PUBLISHER |
|---|---|---|---|
| 1 | J. D. Lee | Concise Inorganic Chemistry | Blackwell Science |
| 2 | B. R. Puri, L. R. Sharma, K. C. Kalia, | Principles of Inorganic Chemistry | Shoban Lal Nagin Chand and Co |
| 3 | D. F. Shriver and P. W. Atkins, | Inorganic Chemistry | W. H. Freeman and Co |

**WebLinks:**

**Course outcome & Program outcome mapping**

| On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understand the structure of atom and the arrangement of elements in the periodic table |
| CO2 | Understand the structure of atom and the arrangement of elements in the periodic table |
| CO3 | Identify the structure of a given inorganic compound. |
| CO4 | Explain the existence of special types of compounds through weak chemical forces. |
| CO5 | Define acids and bases and predict the nature of salts |

**CO-PO Mapping:** **1: Low =1 ; 2: Moderate = 2 ; 3: High = 3 ; 4: No Correlation = 0**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| CO3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 1 |
| CO4 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 3 | 2 | 1 |
| CO5 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |

**PROGRAMME OUTCOMES**

At the completion of the B.Sc. Chemistry program, the students of our Department will be able to:

**(PO1) Knowledge:** Attain in depth knowledge about the fundamental principles, essential facts, conclusions and applications of chemical and scientific theories in various domains of chemistry.

**(PO2) Critical Thinking:** Carry out experiments in the area of organic analysis, estimation, derivative process, inorganic semi micro analysis, preparation, Kinetic, conductometric and potentiometric experiments and spectral analysis applying the domain of critical thinking.

**(PO3) Problem Solving:** Define the background of reaction mechanisms, complex chemical structures, instrumental method of chemical analysis, and separation techniques and apply appropriate techniques for analyzing specific problems both qualitatively and quantitatively in laboratories and in industries

**(PO4): Usage of modern tools:** Create data using modem chemical tools and ICT for modeling and analyze the data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, GCMS, Fluorescence, SEM, TEM and XRD) for chemical analysis

**(PO5): Communication:** Develop Skills to evaluate, analyze and interpret the chemical information and data and to communicate effectively within the chemical community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**(PO6): Life-long Learning:** Demonstrate scholarly attitude to pursue a career in the field of chemical education and research and have the zeal and vision to engage in independent and life-long learning in the broadest context of technological and social change.

**(PO7) Ethical Practices and Social Responsibility:** Generate ideas and solutions for green and sustainable chemistry and approach towards planning and execution of research in frontier areas of chemical sciences.

**PROGRAM SPECIFIC OUTCOMES (PSO's)**

At the time of graduation, our under graduates would be able to:

**PSO 1-** Evaluate, analyze, interpret and effectively apply the basic laws, principles, phenomena, processes and mechanisms involved in the domain of organic, inorganic, physical and analytical Chemistry

**PSO2 -** Demonstrate the knowledge of Chemistry in the domain of research, education and perspective entrepreneurship.

**PSO3 -** Evaluate distinct problems in the field of chemical data analysis, scientific interpretation and reaction mechanisms with an understanding on basic tools to be employe

**Weightage to content**

**Semester -II**

**Course - 3**

| S.No | CourseContent | Long Answer | ShortAnswer | Totalmarks | As per Blooms Taxonomy |
|---|---|---|---|---|---|
| 1 | Atomic Structure and Periodic table | 2 | 2 | 30 | Understanding, Application |
| 2 | Ionic bond | 1 | 1 | 15 | Remembering, Understanding |
| 3 | Covalent bond | 1 | 1 | 15 | Analysizing & Creation |
| 4 | Metallic and Weak bonds | 1 | 1 | 15 | Evaluation, Understanding |
| 5. | ACIDS & BASES | 1 | 2 | 20 | Understanding, Application |
| | **TOTAL** | **6** | **7** | **95** | |

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**I YEAR B.Sc (Examination at the end of II semester)**

**(COURSE – 3 - Inorganic and General Chemistry)**

**MODEL PAPER**

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

## Section -I

**Answer any three of the following questions. Must attempt atleast one question from each part.**

**Each question carries 10 Marks.** **3 X 10 = 30M**

**Part – A**

1. What are postulates of Bohr's theory and explain limitations of his theory
2. Define lattice enthalpy. Determine lattice enthalpy by using born Haber cycle take an example.
3. Define Ionization Potential and Electronegativity and Explain trend across the periods and down the group ?

**Part - B**

4. Construct MO diagrams for $N_2$ and CO
5. Explain the Band theory of Metals
6. Explain the Pearson's concept of HSAB principle & its importance

## Section II

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

7. Explain Hund's and Aufbau principles
8. Explain Heisenberg uncertainty principle.
9. Define Polarization and write the Fajan' rules
10. Explain the structure and hybridization of $PCl_5$ using Valence bond theory
11. Compare strength of hydrogen bonding strength In o-Nitrophenol and p- Nitro phenol.
12. Explain the concept of PH in Acids and Bases
13. What are oxidation and Reduction reactions

.

**SEMESTER-II**
**COURSE 3: GENERAL AND INORGANIC CHEMISTRY**
Practical Credits: 1 2 hrs/week

## Practical- I Qualitative Analysis of SIMPLE SALT

Qualitative inorganic analysis (Minimum of Six simple salts should be analysed) 50 M

### I. Course outcomes:

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

1. Understand the basic concepts of qualitative analysis of inorganic simple salt.
2. Use glassware, equipment and chemicals and follow experimental procedures inthe laboratory
3. Apply the concepts of common ion effect, solubility product and concepts relatedto qualitative analysis

**Laboratory course syllabus: Analysis of SIMPLE SALT 50 M**

**I.**

Analysis of simple salt containing ONE anion and ONE cation from the following:
Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

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

### Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning.
2. Class Tests, Work sheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout theSEMESTER

## SCHEME OF VALUATION

| | |
|---|---|
| a. Preliminary Tests | 05 M |
| b. Identification of anion | 08 M |
| c. Conformation tests for anion | 10 M |
| d. Identification cation(Group separation table) | 10 M |
| e. Conformation of Cation | 05 M |
| f. Report | 02 M |
| g. Viva voce | 05 M |
| h. Record | 05 M |
| **TOTAL** | **50 marks** |

QUESTION BANK

UNIT-1

LONG ANSWER QUESTIONS

1. What are postulates of Bohr's theory and explain limitations of his theory
2. Define Ionization Potential and Electronegativity and Explain trend across the periods and down the group ?

SHORT ANSWER QUESTIONS

1. Explain Heisenberg uncertainty principle
2. Explain Diagonal relationship in periodic table
3. Explain Hund's and Aufbau principles
4. Explain measurement of Electronegativity by any two scales

UNIT-2

LONG ANSWER QUESTIONS

1. Define lattice enthalpy. Determine lattice enthalpy by using Born -Haber cycle
2. What are Ionic compounds write their properties and factors affecting them?

SHORT ANSWER QUESTIONS

1. Define Polarization and write the Fajan' rules
2. What are the factors affecting Lattice energy

UNIT-3

LONG ANSWER QUESTIONS

1. Construct MO diagrams for $N_2$ and CO
2. What are the features of Valence Bond Theory and explain with examples

SHORT ANSWER QUESTIONS

3. Explain the structure explain the structures of $NH_3$ and $H_2O$ using VSEPR theory
4. Explain the paramagnetic behaviour of $O_2$ molecule by MO theory

UNIT-4

LONG ANSWER QUESTIONS

1. Explain Free electron theory and Valence bond theory of Metals
2. Explain the Band theory of Metals

SHORT ANSWER QUESTIONS

1. Define Inter and Intra molecular Hydrogen bonding with an example each ?
2. Compare strength of hydrogen bonding strength In o-Nitrophenol and p- Nitro phenol

UNIT-4

LONG ANSWER QUESTIONS

1. Explain the Pearson's concept of HSAB principle & its importance
2. ,Explain Bronsted-Lowry and Lewis theory of Acids and Bases

SHORT ANSWER QUESTIONS

1. Brief the process of Salt hydrolysis
2. Explain the concept of PH in Acids and Bases
3. Explain the relationship between the strength of acids/bases and their pKa and pKb values.
4. What are oxidation and Reduction reactions