GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES(A)

DEPARTMENT OF CHEMISTRY

B.SC.(HONORS) COURSE STRUCTURE FOR ADMITTED BATCH 2023-24

SEMESTER-I

Sl. No	Sem	Course	Name of the Course	Hours /Week	Credits	Marks		
						Internal	External	Total
1	I	English	English	4	3	40	60	100
2	I	Languages	Telugu/Hindi/Sanskrit	4	3	40	60	100
3	I	SEC-I	Communication Skills	2	2	---	50	50
4	I	SEC-II	Analytical Skills	2	2	---	50	50
5	I	Multidisciplinary-I	Indian History	2	2	---	50	50
6	I	Major-I	Essentials and Applications of Mathematical, Physical and Chemical Sciences	5	4	40	60	100
7	I	Major-II	Advances in Mathematical, Physical and Chemical Sciences	5	4	40	60	100
			Total	**24**	**20**	**160**	**390**	**550**

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES(A)

DEPARTMENT OF CHEMISTRY

B.SC.(HONORS) COURSE STRUCTURE FOR ADMITTED BATCH 2023-24

SEMESTER-II

Sl. No	Sem	Course	Name of the Course	Hours /Week	Credits	Marks		
						Internal	External	Total
1	II	English	English	4	3	40	60	100
2	II	Languages	Telugu/Hindi/Sanskrit	4	3	40	60	100
3	II	SEC-III	Food Adulteration/Solar Energy	2	2	---	50	50
4	II	SEC-IV	Business Writing	2	2	---	50	50
5	II	Major-3	General and Inorganic Chemistry	3	3	40	60	100
	II	Major Lab-3	Qualitative Analysis of Simple Salt	2	1	25	25	50
6	II	Major-4	Inorganic Chemistry-I	3	3	40	60	100
	II	Major Lab-4	Preparation of Inorganic Compounds	2	1	25	25	50
7	II	Minor-1	General and Inorganic Chemistry	3	3	40	60	100
		Minor Lab-1	Qualitative Analysis of Simple Salt	2	1	25	25	50
			Total	**27**	**22**	**275**	**475**	**750**

GAYATRI VIDYA PARISHAD
COLLEGE FOR DEGREE AND PG COURSES(A)
B.Sc. FIRST YEAR REVISED SYLLABUS BY APSCHE
SEMESTER-I, PAPER-I

(ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES)
common for B.Sc(Mathematics), B.Sc(Physics), B.Sc(Chemistry), B.Sc(Statistics), B.Sc(Electronics), B.Sc(Computer Science), B.Sc(Data Science) Major Courses
(w.e.f. the admitted batch of 2023-24)

5hrs per week **CREDITS : 4**

Course outcomes:
At the end of the course, the student will be able to
1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.
2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations
3. To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life.
4. Understand the interplay and connections between mathematics, physics,and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
5 To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

UNIT-I (CO 1): (9 hrs)
ESSENTIALS OF MATHEMATICS :
Complex Numbers: Introduction of the new symbol i – General form of a complex number –Modulus- Amplitude form and conversions
Trigonometric Ratios: Trigonometric Ratios and their relations – Problems on calculation of angles Vectors-Definition of vector addition – Cartesian form – Scalar and vector product and problems
Statistical Measures: Mean, Median, Mode of a data and problems

UNIT-II (CO 2): (9 hrs)
ESSENTIALS OF PHYSICS :
Definition and Scope of Physics- Measurements and Units-Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions-Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle-Theories and understanding of universe

UNIT-III (CO 3): (9 hrs)
ESSENTIALS OF CHEMISTRY :
Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes, classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

UNIT-IV (CO 4): (9 hrs)
APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY :
Applications of Mathematics in Physics & Chemistry: Calculus , Differential Equations & Complex Analysis
Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.
Application of Chemistry in Industry and Technology: Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry.

UNIT-V (CO 5): (9 hrs)
ESSENTIALS OF COMPUTER SCIENCE :
Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.
Ethical and social implications: Network and security concepts- Information Assurance, Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection

List of Reference Books :

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

STUDENT ACTIVITIES :

UNIT I: ESSENTIALS OF MATHEMATICS :

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

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

3. Vector Operations and Applications: Provide students with a set of vectors in Cartesian form. Students will perform vector addition and subtraction operations to find the resultant vectors. They will also calculate the scalar and vector products of given vectors.

4: Statistical Measures and Data Analysis: Give students a dataset containing numerical values. Students will calculate the mean, median, and mode of the data, as well as other statistical measures if appropriate (e.g., range, standard deviation). They will interpret the results and analyze the central tendencies and distribution of the data.

UNIT II: ESSENTIALS OF PHYSICS:

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

2. Laboratory Experiment: Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields. Provide the necessary materials, instructions, and safety guidelines for conducting the experiment. Students will work in small groups to carry out the experiment, collect data, and analyze the results.

After the experiment, students will write a lab report summarizing their findings, observations and conclusions.

UNIT III: ESSENTIALS OF CHEMISTRY:

1. Chemistry in Daily Life Presentation: Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine, or environmental issues.

Students will research and create a presentation (e.g., PowerPoint, poster, or video) that showcases the importance of chemistry in their assigned aspect.

2. Periodic Table Exploration: Provide students with a copy of the periodic table.

Students will explore the periodic table and its significance in organizing elements based on their properties. They will identify and analyze trends in atomic structure, such as electronic configuration, atomic size, and ionization energy.

3. Chemical Changes and Classification of Matter: Provide students with various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction. Students will observe and describe the chemical changes that occur,
including changes in color, temperature, or the formation of new substances.
4. Biomolecules Investigation: Assign each student or group a specific biomolecule category, such as carbohydrates, proteins, fats, or vitamins. Students will research and gather information about their assigned biomolecule category, including its structure, functions, sources, and importance in the human body. They can create informative posters or presentations to present their findings to the class.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY
1. Interdisciplinary Case Studies: Divide students into small groups and provide them with interdisciplinary case studies that involve the interdisciplinary application of mathematics, physics, and chemistry.
Each case study should present a real-world problem or scenario that requires the integration of concepts from all three disciplines.
2. Design and Innovation Project: Challenge students to design and develop a practical solution or innovation that integrates mathematics, physics, and chemistry principles.
Students can choose a specific problem or area of interest, such as renewable energy, environmental conservation, or materials science.
3. Laboratory Experiments: Assign students laboratory experiments that demonstrate the practical applications of mathematics, physics, and chemistry.
Examples include investigating the relationship between concentration and reaction rate, analyzing the behavior of electrical circuits, or measuring the properties of materials.
4. Mathematical Modeling: Present students with real-world problems that require mathematical modeling and analysis.

UNIT V: ESSENTIALS OF COMPUTER SCIENCE:
1. Identifying the attributes of network (Topology, service provider, IP address and bandwidth of your college network)
2. Prepare a report on covering network architecture.
3. Identify the types of malwares and required firewalls to provide security.
4. Latest Fraud techniques used by hackers.

GAYATRI VIDYA PARISHAD
COLLEGE FOR DEGREE AND PG COURSES(A)
B.Sc. SINGLE MAJOR FIRST YEAR REVISED SYLLABUS BY APSCHE
SEMESTER-I, PAPER-II

(ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES)

common for B.Sc(Mathematics), B.Sc(Physics), B.Sc(Chemistry), B.Sc(Statistics), B.Sc(Electronics), B.Sc(Computer Science), B.Sc(Data Science) Major Courses
(w.e.f. the admitted batch of 2023-24)

5hrs per week **CREDITS : 4**

Course outcomes:
At the end of the course, the student will be able to
1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.
2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations.
3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.
4. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.
5. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
6. Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics.Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite)

UNIT-I (CO 1): (9 hrs)
ADVANCES IN BASIC MATHEMATICS :
Straight Lines: Different forms – Reduction of general equation into various forms –Point of intersection of two straight lines.
Limits and Differentiation: Standard limits – Derivative of a function –Problems on product rule and quotient rule.
Integration: Integration as a reverse process of differentiation – Basic methods of integration.
Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose of a matrix and determinants.

UNIT-II (CO 2): (9 hrs)
ADVANCES IN PHYSICS :
Renewable energy : Generation, energy storage, and energy-efficient materials and devices. Recent advances in the field of nanotechnology: Quantum dots, Quantum Communication recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

UNIT-III (CO 3): (9 hrs)
ADVANCES IN CHEMISTRY :
Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method

UNIT-IV (CO 4): (9 hrs)
ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY
Mathematical Modelling : Applications in physics and chemistry
Application of Renewable energy : Grid Integration and Smart Grids
Application of Nanotechnology : Nanomedicine
Application of Biophysics : Biophysical Imaging, Biomechanics, Neurophysics
Application of Medical physics : Radiation Therapy, Nuclear medicine
Application of Chemistry : Solid waste management, Environmental remediation- Green Technology, Water treatment

UNIT-V (CO 5): (9 hrs)
ADVANCED APPLICATIONS OF COMPUTER SCIENCE :
Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway.

List of Reference Books :

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

STUDENT ACTIVITIES

UNIT I

ADVANCES IN BASIC MATHEMATICS :

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

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

3. Integration Exploration: Students will explore the concept of integration as a reverse process of differentiation and apply basic methods of integration, such as the product rule, substitution method, or integration by parts. Students can discuss the significance of integration in various fields, such as physics and chemistry.

4. Matrices Manipulation: Students will perform operations on matrices, including scalar multiplication, matrix multiplication, and matrix transpose. Students can apply their knowledge of matrices to real-world applications, such as solving systems of equations or representing transformations in geometry.

UNIT II

ADVANCES IN PHYSICS :

1. Case Studies: Provide students with real-world case studies related to renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials. Students will analyze the case studies, identify the challenges or problems presented, and propose innovative solutions based on the recent advances in the respective field. They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements.

2. Experimental Design: Assign students to design and conduct experiments related to one of the topics: renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials. They will identify a specific research question or problem to investigate and design an experiment accordingly. Students will collect and analyze data, interpret the results, and draw conclusions based on their findings. They will discuss the implications of their experimental results in the context of recent advances in the field.

3: Group Discussion and Debate: Organize a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology, biophysics, medical physics, and shape memory materials. Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

UNIT III

ADVANCES IN CHEMISTRY :

1. Experimental Design and Simulation: In small groups, students will design experiments or simulations related to the assigned topic. For example, in the context of computer-aided drug design, students could design a virtual screening experiment to identify potential drug candidates for a specific disease target. For nano sensors, students could design an experiment to demonstrate the sensitivity and selectivity of nano sensors in detecting specific analytes. Chemical biology-related activities could involve designing experiments to study enzyme substrate interactions or molecular interactions in biological systems. Students will perform their experiments or simulations, collect data, analyze the results, and draw conclusions based on their findings.

2. Case Studies and Discussion: Provide students with real-world case studies related to the impact of chemical pollutants on ecosystems and human health. Students will analyze the case studies, identify the sources and effects of chemical pollutants, and propose mitigation strategies to minimize their impact. Encourage discussions on the ethical and environmental considerations when dealing with chemical pollutants. For the dye removal using the catalysis method, students can explore case studies where catalytic processes are used to degrade or remove dyes from wastewater. Students will discuss the principles of catalysis, the advantages and limitations of the catalysis method, and its applications in environmental remediation.

3. Group Project: Assign students to work in groups to develop a project related to one of the topics. The project could involve designing a computer-aided drug delivery system, developing a nano sensor for a specific application, or proposing strategies to mitigate the impact of chemical pollutants on ecosystems. Students will develop a detailed project plan, conduct experiments or simulations, analyze data, and present their findings and recommendations. Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT IV

ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY :

1. Mathematical Modelling Experiment: Provide students with a mathematical modeling experiment related to one of the topics. For example, in the context of renewable energy, students can develop a mathematical model to optimize the placement and configuration of solar panels in a solar farm. Students will work in teams to design and conduct the experiment, collect data, and analyze the results using mathematical models and statistical techniques. They will discuss the accuracy and limitations of their model, propose improvements, and interpret the implications of their findings in the context of renewable energy or the specific application area.

2. Case Studies and Group Discussions: Assign students to analyze case studies related to the applications of mathematical modeling in nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment. Students will discuss the mathematical models and computational methods used in the case studies, analyze the outcomes, and evaluate the effectiveness of the modeling approach. Encourage group discussions on the challenges, ethical considerations, and potential advancements in the field. Students will present their findings and engage in critical discussions on the advantages and limitations of mathematical modeling in solving complex problems in these areas.

3. Group Project Assign: Students to work in groups to develop a group project that integrates mathematical modeling with one of the application areas: renewable energy, nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment. The project could involve developing a mathematical model to optimize the delivery of radiation therapy in medical physics or designing a mathematical model to optimize waste management practices. Students will plan and execute their project, apply mathematical modeling techniques, analyze the results, and present their findings and recommendations. Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT V

ADVANCED APPLICATIONS OF COMPUTER SCIENCE :

1. Students must be able to convert numbers from other number system to binary number systems
2. Identify the networking media used for your college network
3. Identify all the networking devices used in your college premises.

GAYATRI VIDYA PARISHAD
COLLEGE FOR DEGREE AND PG COURSES(A)
B.Sc. FIRST YEAR REVISED SYLLABUS BY APSCHE
SEMESTER-II, CHEMISTRY
MAJOR PAPER-III
(GENERAL AND INORGANIC CHEMISTRY)
(w.e.f. the admitted batch of 2023-24)

45 hrs per semester **3hrs per week**
CREDITS : 3

Course outcomes:
At the end of the course, the student will be able to
1. Understand the structure of atoms and the arrangement of elements in the periodic table.
2. Understand the nature and properties of ionic compounds.
3. Identify the structure of a given inorganic compound.
4. Explain the existence of special types of compounds through weak chemical forces.
5. Define acids and bases and predict the nature of salts.

UNIT-I (CO 1): (9 hrs)

Atomic Structure and Periodic table :
Electronic configuration: Bohr theory, dual 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. 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 (CO 2): (9 hrs)

Ionic bond :
Properties of ionic compounds, factors favoring the formation of ionic compounds-ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation of ionic compound and stability. Stability of ionic compounds in terms of 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 (CO 3): (9 hrs)

The Covalent Bond :

Valence Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules-$BeCl_2$, BF_3, CH_4, PCl_5, SF_6– 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^- ICl_2^-, 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 (CO 4): (9 hrs)

Metallic and Weak Bonds :

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

UNIT-V (CO 5): (9 hrs)

Acids and Bases :

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

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

List of Reference Books :

1. J. D. Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.
2. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., 1996.
3. D. F. Shriver and P. W. Atkins, Inorganic Chemistry, 3rd ed., W. H. Freeman and Co, London,

Chemistry Major Laboratory Course -III
Major Practical Paper-III (Qualitative Analysis of Simple Salt)
(At the end of Semester-II)

30 hrs per semester **2hrs per week**
CREDITS : 1

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 in the laboratory
3. Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

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.

Reference books:
1. Vogel's Qualitative Inorganic Analysis, Seventh edition, Pearson.

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COLLEGE FOR DEGREE AND PG COURSES(A)
B.Sc. FIRST YEAR REVISED SYLLABUS BY APSCHE
SEMESTER-II, CHEMISTRY
MAJOR PAPER-IV
(INORGANIC CHEMISTRY- I)
(w.e.f. the admitted batch of 2023-24)

45 hrs per semester **3hrs per week**
CREDITS : 3

Course outcomes:
At the end of the course, the student will be able to
1. Understand the basic concepts of p-block elements.
2. Explain the concepts of d-block elements
3. Distinguish lanthanides and actinides.
4. Describe the importance of radioactivity.

UNIT-I (CO 1): (9 hrs)
Chemistry of p-block elements-I :
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 (CO 2): (9 hrs)

Chemistry of p-block elements-II :
Group 16: Classification of Oxides, structures of oxides and Oxoacids of Sulphur
Group 17: Preparation and Structures of Interhalogen compounds, Pseudohalogens.

UNIT-III (CO 3): (9 hrs)
Chemistry of d-block elements :
Characteristics of d-block elements with special reference to electronic configuration, variable valence, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d series-Latimer diagrams.

UNIT-IV (CO 4): (9 hrs)
Chemistry of f-block elements :
Chemistry of lanthanides : electronic configuration, oxidation states, lanthanide contraction, consequences of lanthanide contraction, colour, magnetic properties.
Separation of lathanides by ion exchange method.
Chemistry of actinides : electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

UNIT-V (CO 5): (9 hrs)

Radioactivity :

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

List of Reference Books :

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

Chemistry Major Laboratory Course -IV
Major Practical Paper-IV (Preparation of Inorganic compounds)
(At the end of Semester-II)

30 hrs per semester **2hrs per week**

CREDITS : 1

Course outcomes:

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

1. Understand the basic concepts of inorganic preparations.
2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
3. Apply the properties of various elements for the preparation of inorganic compounds.

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

Reference books:

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