



**A.S.D. Government Degree College for Women**  
**An Autonomous Institution**  
Jagannaickpur, Kakinada, Andhra Pradesh-533002  
Affiliated to Adikavi Nannaya University, Rajamahendravaram



## **INTERNAL QUALITY ASSURANCE CELL**

2.6.1. The institution has stated learning outcomes (programme and course outcome)/graduate attributes which are integrated into the assessment process and widely publicized through the website and other documents and the attainment of the same are evaluated by the institution.

శ్రీ విద్యా ప్రవర్ధనాం

**CHEMISTRY**  
**COURSE OUTCOMES**  
**(2018-23)**

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

**Department of Chemistry**

**COURSE OUTCOMES**

**B. Sc 2018-2019**

**SEMESTER-1**

**Paper- INORGANIC & ORGANIC CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Gains knowledge of importance of p-block elements & synthetic applications of organometallic compounds.
<b>CO2</b>	Understands the role of reagents and reaction mechanism, basics of organic compounds
<b>CO3</b>	The student will demonstrate knowledge of the principles of unsaturated hydrocarbons ( alkenes, alkynes and aromatic compounds)
<b>CO4</b>	Acquire knowledge on Concept of Benzene and it's aromaticity, orientation of Benzene.
<b>CO5</b>	Understand the basic Concepts of isomerism and physical properties

**SEMESTER-II**

**Paper- PHYSICAL & GENERAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Explain the difference between solid, liquid and gases in terms of intermolecular interactions. Apply the concepts of gas equations
<b>CO2</b>	Understand the relationship between concentration, Volume, moles and colligative properties of solutions
<b>CO3</b>	understand the formation of bonds and interaction between the atoms, molecule ions crystals and other substances. Useful for the Quantum mechanics.
<b>CO4</b>	chemical bonding mainly give information to know the bonding order and bond strength of the molecules.
<b>CO5</b>	stereochemistry is useful in understanding the special arrangements of atoms to determine the structure

**SEMESTER -III**  
**Paper-INORGANIC AND ORGANIC CHEMISTRY**  
**SEMESTER -IV**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Understand the basic concepts of P-block, D-block and F- block elements.
<b>CO 2</b>	Acquire theoretical knowledge about metals and how they help in the preparation of various useful products
<b>CO3</b>	Get the knowledge of the bond nature of C-OH and C-X and how they are used in daily life and industries.
<b>CO4</b>	Acquire the knowledge about carbonyl compounds, carboxylic acids and how they become backbone of organic chemistry.

**Paper-SPECTROSCOPY AND PHYSICAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Able to understand various phase diagrams and apply them to new systems
<b>CO 2</b>	Gains knowledge of principles of electrolysis and galvanic cells
<b>CO3</b>	Under stands the application of colligative properties in determination of molecular weight
<b>CO4</b>	Acquire the knowledge of analysis of materials by using UV and Visible light which helps in identification of m and conjugation in organic compounds and biological macro molecules
<b>CO5</b>	Capable of identifying the functional groups present in organic molecules by using I.R spectroscopy and molecular structure determination by using NMR spectroscopy which are useful in research

**SEMESTER-V**  
**Paper- Inorganic, Organic & Physical Chemistry-V**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Acquire knowledge about basic concepts and applications of Organic, Inorganic and Physical Chemistry, these are very useful in synthesis of different important organic and inorganic compounds.
<b>CO2</b>	Get knowledge on bonding theories of Complex Compounds, Stability of complexes. and the feasibility of a reaction. Acquire knowledge about the preparation, applications of Nitro hydrocarbons and Nitrogen compounds
<b>CO3</b>	Apply the thermodynamics related knowledge predicting the direction of spontaneous chemical transformations.
<b>CO4</b>	Analyse the organic compounds in qualitatively.
<b>CO5</b>	Create new routes for the preparation of organic and inorganic compounds.

**Paper- Inorganic, Organic & Physical Chemistry-VI**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge on the reactivity of Complex Compounds, preparation and applications of Hetero Cyclic Compounds and Carbohydrates, these enables to design and synthesis of new organic compounds.
<b>CO2</b>	Acquire knowledge about the preparation, applications of Nitro hydrocarbons and Nitrogen compounds. Understand the role of light in effecting chemical change and its applications.
<b>CO3</b>	Apply the Chemical kinetics knowledge to set conditions to speed up a chemical reaction and to get high yields of desired products. Predict the direction of a chemical reaction.
<b>CO4</b>	Can analyse the importance of natural products in biological system.

## ELECTIVE PAPER – VII-(B) : ENVIRONMENTAL CHEMISTRY

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge about Renewable/ Non renewable energy resources of environment, toxic chemicals in the environment and their impact. How environment is affected by human activities.
<b>CO2</b>	Understand the energy crisis and different aspects of sustainability. Learn criteria for finding of water quality and how to convert hard water into soft water and purification of sewage waste water.
<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
<b>CO4</b>	Analyse key ethical challenges concerning biodiversity

## SEMESTER – VI

### CHEMISTRY CLUSTER ELECTIVE-VIII-A-1

#### PAPER – VIII-A-1: POLYMER CHEMISTRY

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge about Renewable/ Non renewable energy resources of environment, toxic chemicals in the environment and their impact. How environment is affected by human activities.
<b>CO2</b>	Understand the energy crisis and different aspects of sustainability. Learn criteria for finding of water quality and apply this for analysis of water. How to convert hard water into soft water and purification of sewage waste water.
<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
<b>CO4</b>	Analyse key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life.

**CHEMISTRY CLUSTER ELECTIVE-VIII-A-2****PAPER – VIII-A-2: INSTRUMENTAL METHODS OF ANALYSIS**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge about UV-VISIBLE, IR, NMR spectroscopy, Mass spectrometry and Chromatographic techniques.
<b>CO2</b>	Predict structure of given organic compound by spectroscopy techniques. Identify which functional group present in the given organic compound by IR spectroscopy, molecular weight of the compound by Mass spectrometry, Bonding connectivity by NMR and presence of conjugation by UV-VISIBLE spectroscopy.
<b>CO3</b>	Predict purity of organic compound, Progress of reaction and separation of mixture by Chromatographic techniques.
<b>CO4</b>	Knowledge gained in this course is preliminary to work in pharmaceutical industry, research and development of Industry and Nation.

**CHEMISTRY CLUSTER ELECTIVE-VIII-A-3****PAPER – VIII-A-3 : ANALYSIS OF DRUGS, FOODS , DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Acquire knowledge about analysis , formulation and therapeutic uses of various drugs like analgesics, antipyretics, antimalarials, anti tuberculous , antihistamines
<b>CO2</b>	Identify adulterants present in food materials. Analyse constituents present in Milk and milk products and blood.
<b>CO3</b>	Predict purity of organic compound, Progress of reaction and separation of mixture by Chromatographic techniques.
<b>CO4</b>	Knowledge gained in this course is preliminary to work in pharmaceutical industry, research and development of Industry and Nation.

**SEMESTER-VI**  
**CHEMISTRY CLUSTER ELECTIVE-VIII-B-1**  
**PAPER-VIII-B1 : FUEL CHEMISTRY AND BATTERIES**

Course Outcomes	DESCRIPTION
<b>CO1</b>	To Introduce importance and components of fuels, concept of coal current scenario and allied process in industries
<b>CO2</b>	Understand of Fuel Chemistry and Batteries and its relation to other disciplines
<b>CO3</b>	Ability to list of chemical process and corresponding equipment performing fractional distillation and cracking.
<b>CO4</b>	Introduction with the Petroleum refinery world wide.
<b>CO5</b>	Student can aware of primary and secondary batteries ,Battery components and their role, characteristics. (For example Pb Acid, Lithium battery)

**CHEMISTRY CLUSTER ELECTIVE -VIII-B-2**  
**PAPER-VIII-B2 : INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE**

Course Outcomes	DESCRIPTION
<b>CO1</b>	Students can understand important sources of raw materials used in the manufacturing of certain Inorganic Chemicals.
<b>CO2</b>	Students can learn various industrial methods of preparations like Glass, Ceramics.
<b>CO3</b>	Students gain knowledge in manufacturing of different types of fertilizers like Urea, Ammonium nitrate.
<b>CO4</b>	Student can also distinguish between paints and pigments of their formulation, composition and properties.
<b>CO5</b>	Students can understand important sources of raw materials used in the manufacturing of certain Inorganic Chemicals.

### CHEMISTRY CLUSTER ELECTIVE-VIII -B-3

#### PAPER-VIII-B-3 : ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS VIII-B-3

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Students understand various identification tests for Oils & Fats
<b>CO2</b>	Students acquire identification skills in saturated and unsaturated fats.
<b>CO3</b>	Students acquire practical skill to perform the experiment in the real lab.
<b>CO4</b>	The students will distinguish between soaps and detergents of cleansing action and be able to their structure and properties.
<b>CO5</b>	Students empower the knowledge about fertilizers and pesticides.
<b>CO6</b>	Students can understand the chemical reactivity of the powerful pesticides like DDT,BHC used in agricultural field.

### CHEMISTRY CLUSTER ELECTIVE-VIII -C-1

#### PAPER-VIII-c-1 : ORGANIC SPECTROSCOPIC TECHNIQUES

<b>Course Outcomes</b>	<b>Description</b>
CO 1	Acquires knowledge to interpret the spectra and use the information to determine the structure of various complex molecules
CO 2	Able to understand various energy levels, electronic transitions and electronic spectra of di atomic molecule and polyatomic molecules.
CO3	Analyse the study of molecules with greater sensitivity and speed along with greater resolution
CO4	Acquires Knowledge to apply in the research of biological free radicals for quantitative and qualitative analysis of reactive oxygen species.



**CHEMISTRY CLUSTER ELECTIVE-VIII -C-2**

**PAPER-VIII-C-2 : ADVANCED ORGANIC REACTIONS**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO1</b>	Acquires Knowledge to formulate the macroscopic and quantum laws of the absorption of light by molecules
<b>CO2</b>	Gains knowledge to characterize the kinetics of molecular excited states and their role in the photochemical reactivity
<b>CO3</b>	Create new routes for the preparation of compounds depending on the requirement
<b>CO4</b>	Understands the background of organic reaction mechanisms, structure elucidation of organic molecules, molecular rearrangements

**CHEMISTRY CLUSTER ELECTIVE-VIII -C-3**

**PAPER-VIII-C-3 : PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO1</b>	Gains complete knowledge about all fundamental aspects of Pharmaceutical chemistry
<b>CO2</b>	Get the knowledge on Chemotherapeutic drugs, Psychotherapeutic drugs and Pharmacodynamic drugs
<b>CO3</b>	Understands the mechanism of drug action and synthesis of the various classes of drug molecules
<b>CO4</b>	Acquires knowledge on prevention of AIDS, action of CD4 and CD8 cells, drugs available with structures



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**A.S.D.Govt.Degree College for Women(A), Kakinada**

**Department of Chemistry**

**COURSE OUTCOMES**

**B.Sc 2019-2020**

**SEMESTER-1**

**Paper- INORGANIC & ORGANIC CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Gains knowledge of importance of p-block elements & synthetic applications of organometallic compounds.
<b>CO2</b>	Understands the role of reagents and reaction mechanism, basics of organic compounds
<b>CO3</b>	The student will demonstrate knowledge of the principles of unsaturated hydrocarbons ( alkenes, alkynes and aromatic compounds)
<b>CO4</b>	Acquire knowledge on Concept of Benzene and it's aromaticity, orientation of Benzene.
<b>CO5</b>	Understand the basic Concepts of isomerism and physical properties

**SEMESTER-II**

**Paper- PHYSICAL & GENERAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Explain the difference between solid, liquid and gases in terms of intermolecular interactions. Apply the concepts of gas equations
<b>CO2</b>	Understand the relationship between concentration, Volume, moles and colligative properties of solutions
<b>CO3</b>	understand the formation of bonds and interaction between the atoms, molecule ions crystals and other substances. Useful for the Quantum mechanics.
<b>CO4</b>	chemical bonding mainly give information to know the bonding order and bond strength of the molecules.
<b>CO5</b>	stereochemistry is useful in understanding the special arrangements of atoms to determine the structure

**SEMESTER -III**  
**Paper-INORGANIC AND ORGANIC CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Understand the basic concepts of P-block, D-block and F- block elements.
<b>CO 2</b>	Acquire theoretical knowledge about metals and how they help in the preparation of various useful products
<b>CO3</b>	Get the knowledge of the bond nature of C-OH and C-X and how they are used in daily life and industries.
<b>CO4</b>	Acquire the knowledge about carbonyl compounds, carboxylic acids and how they become backbone of organic chemistry.

**SEMESTER -IV**  
**Paper- SPECTROSCOPY AND PHYSICAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Able to understand various phase diagrams and apply them to new systems
<b>CO 2</b>	Gains knowledge of principles of electrolysis and galvanic cells
<b>CO3</b>	Under stands the application of colligative properties in determination of molecular weight
<b>CO4</b>	Acquire the knowledge of analysis of materials by using UV and Visible light which helps in identification of m and conjugation in organic compounds and biological macro molecules

<b>CO5</b>	Capable of identifying the functional groups present in organic molecules by using I.R spectroscopy and molecular structure determination by using NMR spectroscopy which are useful in research
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**SEMESTER – V**  
**Paper –V INORGANIC, PHYSICAL & ORGANIC CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Acquire knowledge about basic concepts and applications of Organic, Inorganic and Physical Chemistry, these are very useful in synthesis and design (to Create) of new important organic and inorganic compounds.
<b>CO2</b>	Get knowledge on bonding theories of Complex Compounds, Stability of complexes. Able to predict the feasibility of a reaction by HSAB principle. Acquire knowledge about the preparation, applications of Nitro hydrocarbons and Nitrogen compounds
<b>CO3</b>	Apply the thermodynamics knowledge entropy, enthalpy and free energy in predicting the direction of chemical transformations, spontaneity and equilibrium of a chemical process.
<b>CO4</b>	Analyse the organic compounds in qualitatively.
<b>CO5</b>	Create new routes for the preparation of organic and inorganic compounds.

**PAPER -VI INORGANIC, ORGANIC & PHYSICAL CHEMISTRY-VI**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge on the reactivity of Complex Compounds, preparation and applications of Hetero Cyclic Compounds and Carbohydrates, these enables to design and synthesis of new organic compounds.
<b>CO2</b>	Acquire knowledge about the preparation, applications of Nitro hydrocarbons and Nitrogen compounds Understand the role of light in

	effecting chemical change and its applications.
<b>CO3</b>	Apply the Chemical kinetics knowledge to set conditions to speed up a chemical reaction and to get high yields of desired products. To predict the direction of a chemical reaction.
<b>CO4</b>	Can analyse the importance of natural products like amino acids, proteins and carbohydrates in biological system and synthesize them.

### **ELECTIVE PAPER – VII-(B) : ENVIRONMENTAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge about Renewable/ Non renewable energy resources of environment, toxic chemicals in the environment and their impact. How environment is affected by human activities.
<b>CO2</b>	Understand the energy crisis and different aspects of sustainability. Learn criteria for finding of water quality and how to convert hard water into soft water and purification of sewage waste water.
<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
<b>CO4</b>	Analyse key ethical challenges concerning biodiversity

### **SEMESTER – VI**

#### **CHEMISTRY CLUSTER ELECTIVE-VIII-A-1**

#### **PAPER – VIII-A-1: POLYMER CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge about Renewable/ Non renewable energy resources of environment, toxic chemicals in the environment and their impact. How environment is affected by human activities.
<b>CO2</b>	Understand the energy crisis and different aspects of sustainability. Learn criteria for finding of water quality and apply this for analysis of water. How to convert hard water into soft water and purification of sewage waste water.
<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
<b>CO4</b>	Analyse key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life.

### CHEMISTRY CLUSTER ELECTIVE-VIII-A-2

#### PAPER – VIII-A-2: INSTRUMENTAL METHODS OF ANALYSIS

Course Outcomes	DESCRIPTION
CO1	Get knowledge about UV-VISIBLE, IR, NMR spectroscopy, Mass spectrometry and Chromatographic techniques.
CO2	Predict structure of given organic compound by spectroscopy techniques. Identify which functional group present in the given organic compound by IR spectroscopy, molecular weight of the compound by Mass spectrometry, Bonding connectivity by NMR and presence of conjugation by UV-VISIBLE spectroscopy.
CO3	Predict purity of organic compound, Progress of reaction and separation of mixture by Chromatographic techniques.
CO4	Knowledge gained in this course is preliminary to work in pharmaceutical industry, research and development of Industry and Nation.

### CHEMISTRY CLUSTER ELECTIVE-VIII-A-3

#### PAPER -VIII-A-3 : ANALYSIS OF DRUGS, FOODS , DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS

Course Outcomes	DESCRIPTION
CO1	Acquire knowledge about analysis , formulation and therapeutic uses of various drugs like analgesics, antipyretics, antimalarials, anti tuberculous , antihistamines
CO2	Identify adulterants present in food materials. Analyse constituents present in Milk and milk products and blood.
CO3	Predict purity of organic compound, Progress of reaction and separation of mixture by Chromatographic techniques.
CO4	Knowledge gained in this course is preliminary to work in pharmaceutical industry, research and development of Industry and Nation.

**SEMESTER-VI**  
**CHEMISTRY CLUSTER ELECTIVE-VIII-B-1**  
**PAPER-VIII-B1 : FUEL CHEMISTRY AND BATTERIES**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	To Introduce importance and components of fuels, concept of coal current scenario and allied process in industries
<b>CO2</b>	Understand of Fuel Chemistry and Batteries and its relation to other disciplines
<b>CO3</b>	Ability to list of chemical process and corresponding equipment performing fractional distillation and cracking.
<b>CO4</b>	Introduction with the Petroleum refinery world wide.
<b>CO5</b>	Student can aware of primary and secondary batteries ,Battery components and their role, characteristics. (For example Pb Acid, Lithium battery)

**CHEMISTRY CLUSTER ELECTIVE -VIII-B-2**  
**PAPER-VIII-B2 : INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Students can understand important sources of raw materials used in the manufacturing of certain Inorganic Chemicals.
<b>CO2</b>	Students can learn various industrial methods of preparations like Glass, Ceramics.
<b>CO3</b>	Students gain knowledge in manufacturing of different types of fertilizers like Urea, Ammonium nitrate.
<b>CO4</b>	Student can also distinguish between paints and pigments of their formulation, composition and properties.
<b>CO5</b>	Students can understand important sources of raw materials used in the manufacturing of certain Inorganic Chemicals.

**CHEMISTRY CLUSTER ELECTIVE-VIII - B - 3****PAPER-VIII-B-3:ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS VIII - B - 3**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Students understand various identification tests for Oils & Fats
<b>CO2</b>	Students acquire identification skills in saturated and unsaturated fats.
<b>CO3</b>	Students acquire practical skill to perform the experiment in the real lab.
<b>CO4</b>	The students will distinguish between soaps and detergents of cleansing action and be able to their structure and properties.
<b>CO5</b>	Students empower the knowledge about fertilizers and pesticides.
<b>CO6</b>	Students can understand the chemical reactivity of the powerful pesticides like DDT,BHC used in agricultural field.

**CHEMISTRY CLUSTER ELECTIVE-VIII - C - 1****PAPER-VIII-C-1 : ORGANIC SPECTROSCOPIC TECHNIQUES**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Acquires knowledge to interpret the spectra and use the information to determine the structure of various complex molecules
<b>CO 2</b>	Able to understand various energy levels, electronic transitions and electronic spectra of di atomic molecule and polyatomic molecules.
<b>CO3</b>	Analyse the study of molecules with greater sensitivity and speed along with greater resolution
<b>CO4</b>	Acquires Knowledge to apply in the research of biological free radicals for quantitative and qualitative analysis of reactive oxygen species.



**CHEMISTRY CLUSTER ELECTIVE-VIII -C-2**

**PAPER-VIII-C-2 : ADVANCED ORGANIC REACTIONS**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO1</b>	Acquires Knowledge to formulate the macroscopic and quantum laws of the absorption of light by molecules
<b>CO2</b>	Gains knowledge to characterize the kinetics of molecular excited states and their role in the photochemical reactivity
<b>CO3</b>	Create new routes for the preparation of compounds depending on the requirement
<b>CO4</b>	Understands the background of organic reaction mechanisms, structure elucidation of organic molecules, molecular rearrangements

**CHEMISTRY CLUSTER ELECTIVE-VIII - C - 3**

**PAPER-VIII-C-3 : PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO1</b>	Gains complete knowledge about all fundamental aspects of Pharmaceutical chemistry
<b>CO2</b>	Get the knowledge on Chemotherapeutic drugs, Psychotherapeutic drugs and Pharmacodynamic drugs
<b>CO3</b>	Understands the mechanism of drug action and synthesis of the various classes of drug molecules
<b>CO4</b>	Acquires knowledge on prevention of AIDS, action of CD4 and CD8 cells, drugs available with structures



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**Department of Chemistry**

**COURSE OUTCOMES**

**B.Sc 2020-2021**

**SEMESTER-1**

**Paper- INORGANIC & PHYSICAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Understand the basic concepts of p-block elements
<b>CO2</b>	Explain the difference between solid, liquid and gases in terms of intermolecular interactions.
<b>CO3</b>	Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.
<b>CO4</b>	Understand the relationship between concentration, Volume, moles and colligative properties of solutions

**SEMESTER-II**

**Paper- ORGANIC & GENERAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
<b>CO2</b>	Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
<b>CO3</b>	Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
<b>CO4</b>	Correlate and describe the stereochemical properties of organic compounds and reactions
<b>CO5</b>	chemical bonding mainly give information to know the bonding order and bond strength of the molecules.

**SEMESTER -III**  
**Paper-INORGANIC AND ORGANIC CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Understand the basic concepts of P-block, D-block and F- block elements.
<b>CO 2</b>	Acquire theoretical knowledge about metals and how they help in the preparation of various useful products
<b>CO3</b>	Get the knowledge of the bond nature of C-OH and C-X and how they are used in daily life and industries.
<b>CO4</b>	Acquire the knowledge about carbonyl compounds, carboxylic acids and how they become backbone of organic chemistry.

**SEMESTER -IV**  
**Paper- SPECTROSCOPY AND PHYSICAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Able to understand various phase diagrams and apply them to new systems
<b>CO 2</b>	Gains knowledge of principles of electrolysis and galvanic cells
<b>CO3</b>	Under stands the application of colligative properties in determination of molecular weight
<b>CO4</b>	Acquire the knowledge of analysis of materials by using UV and Visible light which helps in identification of m and conjugation in organic compounds and biological macro molecules

<b>CO5</b>	Capable of identifying the functional groups present in organic molecules by using I.R spectroscopy and molecular structure determination by using NMR spectroscopy which are useful in research
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**SEMESTER – V**  
**Paper –V INORGANIC, PHYSICAL & ORGANIC CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Acquire knowledge about basic concepts and applications of Organic, Inorganic and Physical Chemistry, these are very useful in synthesis and design (to Create) of new important organic and inorganic compounds.
<b>CO2</b>	Get knowledge on bonding theories of Complex Compounds, Stability of complexes. Able to predict the feasibility of a reaction by HSAB principle. Acquire knowledge about the preparation, applications of Nitro hydrocarbons and Nitrogen compounds
<b>CO3</b>	Apply the thermodynamics knowledge entropy, enthalpy and free energy in predicting the direction of chemical transformations, spontaneity and equilibrium of a chemical process.
<b>CO4</b>	Analyse the organic compounds in qualitatively.
<b>CO5</b>	Create new routes for the preparation of organic and inorganic compounds.

**PAPER -VI INORGANIC, ORGANIC & PHYSICAL CHEMISTRY-VI**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge on the reactivity of Complex Compounds, preparation and applications of Hetero Cyclic Compounds and Carbohydrates, these enables to design and synthesis of new organic compounds.
<b>CO2</b>	Acquire knowledge about the preparation, applications of Nitro hydrocarbons and Nitrogen compounds Understand the role of light in

	effecting chemical change and its applications.
<b>CO3</b>	Apply the Chemical kinetics knowledge to set conditions to speed up a chemical reaction and to get high yields of desired products. To predict the direction of a chemical reaction.
<b>CO4</b>	Can analyse the importance of natural products like amino acids, proteins and carbohydrates in biological system and synthesize them.

### **ELECTIVE PAPER – VII-(B) : ENVIRONMENTAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge about Renewable/ Non renewable energy resources of environment, toxic chemicals in the environment and their impact. How environment is affected by human activities.
<b>CO2</b>	Understand the energy crisis and different aspects of sustainability. Learn criteria for finding of water quality and how to convert hard water into soft water and purification of sewage waste water.
<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
<b>CO4</b>	Analyse key ethical challenges concerning biodiversity

### **SEMESTER – VI**

#### **CHEMISTRY CLUSTER ELECTIVE-VIII-A-1**

#### **PAPER – VIII-A-1: POLYMER CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Get knowledge about Renewable/ Non renewable energy resources of environment, toxic chemicals in the environment and their impact. How environment is affected by human activities.
<b>CO2</b>	Understand the energy crisis and different aspects of sustainability. Learn criteria for finding of water quality and apply this for analysis of water. How to convert hard water into soft water and purification of sewage waste water.
<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
<b>CO4</b>	Analyse key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life.

### CHEMISTRY CLUSTER ELECTIVE-VIII-A-2

#### PAPER – VIII-A-2: INSTRUMENTAL METHODS OF ANALYSIS

Course Outcomes	DESCRIPTION
CO1	Get knowledge about UV-VISIBLE, IR, NMR spectroscopy, Mass spectrometry and Chromatographic techniques.
CO2	Predict structure of given organic compound by spectroscopy techniques. Identify which functional group present in the given organic compound by IR spectroscopy, molecular weight of the compound by Mass spectrometry, Bonding connectivity by NMR and presence of conjugation by UV-VISIBLE spectroscopy.
CO3	Predict purity of organic compound, Progress of reaction and separation of mixture by Chromatographic techniques.
CO4	Knowledge gained in this course is preliminary to work in pharmaceutical industry, research and development of Industry and Nation.

### CHEMISTRY CLUSTER ELECTIVE-VIII-A-3

#### PAPER -VIII-A-3 : ANALYSIS OF DRUGS, FOODS , DAIRY PRODUCTS & BIO-CHEMICAL ANALYSIS

Course Outcomes	DESCRIPTION
CO1	Acquire knowledge about analysis , formulation and therapeutic uses of various drugs like analgesics, antipyretics, antimalerials, anti tuberculous , antihistamines
CO2	Identify adulterants present in food materials. Analyse constituents present in Milk and milk products and blood.
CO3	Predict purity of organic compound, Progress of reaction and separation of mixture by Chromatographic techniques.
CO4	Knowledge gained in this course is preliminary to work in pharmaceutical industry, research and development of Industry and Nation.

**SEMESTER-VI**  
**CHEMISTRY CLUSTER ELECTIVE-VIII-B-1**  
**PAPER-VIII-B1 : FUEL CHEMISTRY AND BATTERIES**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	To Introduce importance and components of fuels, concept of coal current scenario and allied process in industries
<b>CO2</b>	Understand of Fuel Chemistry and Batteries and its relation to other disciplines
<b>CO3</b>	Ability to list of chemical process and corresponding equipment performing fractional distillation and cracking.
<b>CO4</b>	Introduction with the Petroleum refinery world wide.
<b>CO5</b>	Student can aware of primary and secondary batteries ,Battery components and their role, characteristics. (For example Pb Acid, Lithium battery)

**CHEMISTRY CLUSTER ELECTIVE -VIII-B-2**  
**PAPER-VIII-B2 : INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Students can understand important sources of raw materials used in the manufacturing of certain Inorganic Chemicals.
<b>CO2</b>	Students can learn various industrial methods of preparations like Glass, Ceramics.
<b>CO3</b>	Students gain knowledge in manufacturing of different types of fertilizers like Urea, Ammonium nitrate.
<b>CO4</b>	Student can also distinguish between paints and pigments of their formulation, composition and properties.
<b>CO5</b>	Students can understand important sources of raw materials used in the manufacturing of certain Inorganic Chemicals.

**CHEMISTRY CLUSTER ELECTIVE-VIII - B - 3****PAPER-VIII-B-3:ANALYSIS OF APPLIED INDUSTRIAL PRODUCTS VIII - B - 3**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Students understand various identification tests for Oils & Fats
<b>CO2</b>	Students acquire identification skills in saturated and unsaturated fats.
<b>CO3</b>	Students acquire practical skill to perform the experiment in the real lab.
<b>CO4</b>	The students will distinguish between soaps and detergents of cleansing action and be able to their structure and properties.
<b>CO5</b>	Students empower the knowledge about fertilizers and pesticides.
<b>CO6</b>	Students can understand the chemical reactivity of the powerful pesticides like DDT,BHC used in agricultural field.

**CHEMISTRY CLUSTER ELECTIVE-VIII - C - 1****PAPER-VIII-C-1 : ORGANIC SPECTROSCOPIC TECHNIQUES**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO 1</b>	Acquires knowledge to interpret the spectra and use the information to determine the structure of various complex molecules
<b>CO 2</b>	Able to understand various energy levels, electronic transitions and electronic spectra of di atomic molecule and polyatomic molecules.
<b>CO3</b>	Analyse the study of molecules with greater sensitivity and speed along with greater resolution
<b>CO4</b>	Acquires Knowledge to apply in the research of biological free radicals for quantitative and qualitative analysis of reactive oxygen species.



**CHEMISTRY CLUSTER ELECTIVE-VIII -C-2**

**PAPER-VIII-C-2 : ADVANCED ORGANIC REACTIONS**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO1</b>	Acquires Knowledge to formulate the macroscopic and quantum laws of the absorption of light by molecules
<b>CO2</b>	Gains knowledge to characterize the kinetics of molecular excited states and their role in the photochemical reactivity
<b>CO3</b>	Create new routes for the preparation of compounds depending on the requirement
<b>CO4</b>	Understands the background of organic reaction mechanisms, structure elucidation of organic molecules, molecular rearrangements

**CHEMISTRY CLUSTER ELECTIVE-VIII - C - 3**

**PAPER-VIII-C-3 : PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
<b>CO1</b>	Gains complete knowledge about all fundamental aspects of Pharmaceutical chemistry
<b>CO2</b>	Get the knowledge on Chemotherapeutic drugs, Psychotherapeutic drugs and Pharmacodynamic drugs
<b>CO3</b>	Understands the mechanism of drug action and synthesis of the various classes of drug molecules
<b>CO4</b>	Acquires knowledge on prevention of AIDS, action of CD4 and CD8 cells, drugs available with structures



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**Department of Chemistry**

**COURSE OUTCOMES**

**B.Sc 2021-2022**

**SEMESTER-1**

**Paper- INORGANIC & PHYSICAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Understand the basic concepts of p-block elements
<b>CO2</b>	Explain the difference between solid, liquid and gases in terms of intermolecular interactions.
<b>CO3</b>	Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.
<b>CO4</b>	Understand the relationship between concentration, Volume, moles and colligative properties of solutions

**SEMESTER-II**

**Paper- ORGANIC & GENERAL CHEMISTRY**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
<b>CO2</b>	Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
<b>CO3</b>	Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
<b>CO4</b>	Correlate and describe the stereochemical properties of organic compounds and reactions
<b>CO5</b>	chemical bonding mainly give information to know the bonding order and bond strength of the molecules.

**SEMESTER -III**  
**PAPER: ORGANIC CHEMISTRY & SPECTROSCOPY**

<b>Course Outcomes</b>	<b>Description</b>
CO 1	Acquire the knowledge of analysis of materials by using UV and Visible light which helps in identification of impurities and conjugation in organic compounds and biological macro molecules
CO 2	Capable of identifying the functional groups present in organic molecules by using I.R. spectroscopy and molecular structure determination by using NMR spectroscopy which are useful in research
CO3	Get the knowledge of the bond nature of C-OH and C-X and how they are used in daily life and industries.
CO4	Acquire the knowledge about carbonyl compounds, carboxylic acids and how they become backbone of organic chemistry.

**SEMESTER -IV, COURSE - IV**  
**INORGANIC ,ORGANIC & PHYSICAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
CO 1	Acquire some knowledge about organic and organometallic compounds, their structures, properties which are very useful in manufacturing of different important organic compounds
CO 2	Apply the thermodynamics related knowledge predicting the direction of spontaneous chemical transformations.
CO3	Analyse the organic compounds qualitatively.
CO4	Create new routes for the preparation of compounds depending on the requirement

**SEMESTER -IV, COURSE - V  
INORGANIC & PHYSICAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
CO 1	Understand the theories of bonding in complex compounds and their stability, reaction mechanisms of complex compounds able to understand about bioinorganic compounds and their role in human metabolism.
CO 2	Acquires knowledge on various phase diagrams and apply them to new systems
CO3	Able to understand the concepts of chemical kinetics and able to apply draw solutions to various mathematical problems.
CO4	Able to understand the concepts of electrochemistry

**THIRD YEAR, SEMESTER – V  
ELECTIVE PAPER – VII-(B)- (ENVIRONMENTAL CHEMISTRY)**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Understand the environment segments and how it is affected by human activities. Apply simple and advanced analytical tools to measure the different types of pollution
<b>CO2</b>	Understand the energy crisis and different aspects of sustainability. Learn criteria for finding of water quality and apply this for analysis of water. How to convert hard water into soft water and purification of sewage waste water.
<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
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**CHEMISTRY CLUSTER ELECTIVE-VIII - C - 1**  
**PAPER-VIII-C-1 : ORGANIC SPECTROSCOPIC TECHNIQUES**

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**CHEMISTRY CLUSTER ELECTIVE-VIII - C - 3**

**PAPER-VIII-C-3 : PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

<b>Course Outcomes</b>	<b>Description</b>
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**COURSE OUTCOMES**

**B.Sc 2022-2023**

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**THIRD YEAR, SEMESTER – V  
ELECTIVE PAPER – VII-(B) - (ENVIRONMENTAL CHEMISTRY)**

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<b>CO3</b>	Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services
<b>CO4</b>	Analyse key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life.

**SEMESTER-V**  
**Course VII- (GREEN CHEMISTRY & NANO TECHNOLOGY)**

<b>Course Outcomes</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Understand principles of Green Chemistry, Green synthesis and its application to the manufacture of chemical products and sustainable development.
<b>CO2</b>	Get knowledge in Microwave and Ultrasound assisted green synthesis, Green Catalysis and Green solvents. Analyse alternative sources of energy to carry out green synthesis.
<b>CO3</b>	Plan Chemical reactions by adopting Green synthesis which has maximum atom economy.
<b>CO4</b>	Get knowledge about Nanomaterial synthesis, Properties and Application. Apply Chemical methods for synthesis of nanomaterial.



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