

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020 (Odd)

**Learning Objective & Outcome**

**M..Sc.(Chemistry) 1<sup>st</sup> Semester**

**Subject: Inorganic chemistry**

**Subject Code: CHE-101**

### **Learning Objective**

1. The students should be able to describe various types of isomerism which can occur in coordination complexes.
2. The students should be able to give the systematic names of simple coordination compounds.
3. The students should be able to explain what is meant by the Spectrochemical Series and list the approximate order of common ligands in the spectrochemical series.
4. The students should be able to explain the terms stepwise stability constant and overall stability constant.
5. The students should be able to give appropriate definitions of the terms inert and labile and state which d-electron configurations are associated with inertness.
6. The students should be able to explain the use of terms Hard and Soft in relation to metal ions and ligands and discuss the stability of complexes in terms of hard and soft interactions.

### **Learning Outcomes**

1. Students should be able to explain atomic structure based on quantum mechanics and explain periodic properties of the atoms.
2. Students should be able to explain selected crystal structures explain what kind of parameters that affect the crystal structure of a compound and perform calculations of the lattice enthalpy of ionic compounds.
3. Students should be able to explain the periodic properties of the different groups of compounds focusing on production methods and application of selected elements and compounds.
4. Students should be able to explain the band structure of solids and determine the electrical properties.
5. Students should be able to explaining the theory of the determination of the electron structure of d-metal complexes and explain the properties of these complexes.
6. Students should be able to explain the structure and bonding in molecules and predict the structure of molecules.

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**Department of Chemistry**

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## **Learning Objective & Outcomes**

**M.Sc. (Chemistry) 1<sup>st</sup> Semester**

**Subject-Physical Chemistry**

**Subject Code : CHE 102**

### **Learning Objective**

1. To understand the concept of quantum mechanics.
2. To understand the concept of thermochemistry.
3. To understand the concept of different laws of thermodynamics.
4. To understand the Debye Huckel Theory of ion-ion interactions.
5. To understand the effect of temperature on reaction rates.
6. To understand the different theories of chemical kinetics.

### **Learning outcomes**

1. Able to solve the problems related to 1D box.
2. Able to explain role of operators in quantum.
3. Able to solve problems of Carnot cycle.
4. Able to solve questions basis on rates of different reactions.
5. Able to explain temperature and pressure effect on mountains.
6. Able to differentiate between different theories of kinetics.

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## **Learning Objective & Outcomes**

**M.Sc. (Chemistry) 1<sup>st</sup> Semester**

**Subject-Organic Chemistry**

**Subject Code : CHE 103**

### **Learning Objective**

1. To understand the difference between conformation and configurations.
2. To understand the principles used in asymmetric synthesis.
3. To understand the stereochemistry of sugar conformations.
4. To understand the mechanisms involved in aliphatic nucleophilic substitution reactions.
5. To understand the topicity of ligands.
6. To understand the concept of aromaticity.

### **Learning Outcomes**

1. Able to recognize either molecule is aromatic, non-aromatic or antiaromatic.
2. Able to describe mechanism of different aliphatic nucleophilic substitution reactions.
3. Able to draw potential energy diagrams.
4. Able to assign R and S to given molecules.
5. Able to do interconversion of Fischer to Newmann, Newmann to Sawhorse and vice versa.

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## **Learning Objective & Outcomes**

**M.Sc. (Chemistry) 1<sup>st</sup> Semester**

**Subject-Sustainable and Green Chemistry**

**Subject Code : CHE 106**

### **Learning Objectives**

1. Student will be able to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data cases.
2. Student will be able to apply discrete and continuous probability distributions to various business problems.
3. Student will be able to Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-values.
4. Student will Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.
5. Student will be able to Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting and also perform ANOVA and F-test. Further, understand both the meaning and applicability of a dummy variable and the assumptions which underline a regression model.
6. Student will be able to perform a multiple regression using computer software

### **Learning outcomes**

1. Students are prepared for working with correlation and regression
2. Students are aware about the concept of hypothesis testing in research.
3. They know about t-test, chi-square test etc. with various numerical.
4. They also describe the characteristics of population on the basis of sample.
5. Students are aware about the concept of sampling method which are practically used.
6. Student will be able to Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-values.

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**Learning Objectives & Outcomes**  
M.Sc. (Chemistry) 1<sup>st</sup> Semester

**Subject: Self Study Paper**

**Subject Code: CHE-111**

**Learning Objectives**

1. Students will demonstrate competency in research skills related to the use of the field's professional literature and in systematic research design and implementation.
2. Students will demonstrate an understanding of multiple theoretical perspectives and diverse intellectual traditions in Communication.
3. Students will demonstrate competency in human relational interaction.
4. Students will demonstrate competency in the analysis and practice of ethical communication.
5. Students will demonstrate an understanding of the importance of free expression and the responsibilities it entails.
6. Students will demonstrate competency in effective communication with diverse others and an understanding of the impact of culture on communication

**Learning outcomes**

After completion of the course Students will be able to

1. Demonstrate critical and innovative thinking
2. Display competence in oral, written, and visual communication.
3. Apply communication theories.
4. Show an understanding of opportunities in the field of communication.

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**Department of Chemistry**

2019-2020 (Even)

## **Learning Objective & Outcomes**

**M.Sc.(Chemistry) 2<sup>nd</sup> Semester**

**Subject : Inorganic Chemistry**

**Subject Code : CHE-201**

### **Learning Objective**

1. The objective of the course is to appraise the students about the organometallic Chemistry.
2. To learn about the 18 e rule and its violation.
3. To identify the basic concept, terms, and important events in the development of organometallic chemistry.
4. To learn methods, including spectroscopy techniques, used to determine the structure of organometallic complexes and to probe reaction mechanism.
5. To develop an appreciation for the scope, diversity, and application of organometallic chemistry.
6. To learn about the common organometallic reactions and to be able to draw reasonable reaction mechanisms.

### **Learning Outcomes**

After the completion of the course, Students will be able to

1. Have a good overview of the fundamental principles of organotransition-metal chemistry and know how chemical properties are affected by metals and ligands.
2. Be able to use knowledge about structure and bonding issues to understand the stability and reactivity of simple organometallic complexes.
3. Have insight into the use of modern methods to characterize organometallic compounds.
4. Understand fundamental reaction types and mechanisms and how to combine these to understand efficient catalytic processes
5. Know important applications of organometallic homogeneous catalysis in the production of large-scale (bulk) and smaller-scale (fine chemicals) production.

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**Department of Chemistry**

2019-2020 (Even)

**Learning Objective & Outcomes**

**M.Sc.(Chemistry) 2<sup>nd</sup> Semester**

**Subject: Physical Chemistry**

**Subject Code : CHE-202**

### **Learning Objective**

1. To learn about the concept of phase and derivation of phase rule.
2. To understand the Phase diagram for one component system and for two completely miscible component systems.
3. To study eutectic systems and calculation of eutectic point.
4. To understand ClausiusClapeyron equation and its applications.
5. To study kinetics of reaction in solution and influence of pressure, ionic strength, solvent on reaction rates.
6. To learn about kinetics of catalytic reactions i.e. acid-base catalysis, heterogeneous catalysis and enzyme catalysis.
7. To evaluate Michaelis's constant for enzyme-substrate binding by Lineweaver-Burk plot.
8. To understand the concept of distribution and thermodynamic probability.
9. To evaluate most probable distribution state for all type of statics i.e. for Maxwell-Boltzmann, Fermi dirac and Bose –Einstein statistics.
10. To understand the concept of partition function, its physical significance and calculation of molar and atomic partition function.
11. To study Angular momentum and space quantization.
12. To evaluate commutation relation between total orbital angular momentum operator and its components.
13. To study the concept of ladder operators and their application to an eigen function of Z- component of angular momentum.
14. To solve Schrodinger wave equation for Rigid rotor and Linear harmonic oscillator and calculate their respective energies.

## Learning Outcomes

Upon successful completion of this course, the student will be able to

1. Understand the concept of Phase and Gibb's Phase rule.
2. Study Phase diagram for one component and two component systems and calculate eutectic point, congruent and incongruent melting points.
3. Describe Kinetics of reaction in solution and in catalytic reactions.
4. Calculate Michaelis's constant for enzyme-substrate binding by Lineweaver-Burk plot.
5. Understand the concept of distribution and thermodynamic probability.
6. Evaluate most probable distribution state for all type of statics i.e. for Maxwell-Boltzmann, Fermi dirac and Bose –Einstein statistics.
7. Understand the concept of partition function, its physical significance and calculation of molar and atomic partition function.
8. Solve Schrodinger wave equation for Rigid rotor and Linear harmonic oscillator and calculate their respective energies.
9. Evaluate commutation relation between total orbital angular momentum operator and its components.
10. Study the concept of ladder operators and their application to an eigen function of Z-component of angular momentum.

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2019-2020 (Even)

## **Learning Objective & Outcomes**

**M.Sc. (Chemistry) 2<sup>nd</sup> Semester**

**Subject: Organic Chemistry**

**Subject Code: CHE-203**

### **Learning Objective**

1. To understand the activating and directing effects of substituent on ring.
2. To understand the mechanisms of different aromatic nucleophilic substitution reactions.
3. To understand the mechanism of elimination reactions.
4. To understand the addition of Grignard Reagent on carbonyl compounds.
5. To understand the mechanism of different types of rearrangements.

### **Learning Outcomes**

1. Able to recognize effect of different groups on ring.
2. Able to describe mechanism of different rearrangement reactions.
3. Able to practically find different groups present in different organic compounds,
4. Able to explain reactivity of different carbonyl compounds.
5. Able to recognize mechanism of given chemical reactions

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2019-2020 (Even)

## **Learning Objective & Outcomes**

**M.Sc.(Chemistry) 2<sup>nd</sup> Semester**

**Subject: Supramolecular & Photochemistry**

**Subject Code : CHE-204**

### **Learning Objective**

1. To Study the principles of supramolecular chemistry and host-guest chemistry using “lock and key” analogy.
2. To determine the nature of supramolecular interactions, cation binding hosts, anion binding, ion pairs receptors, molecular guests in solution, self-assembly
3. To establish molecular recognition as the fundamental of supramolecular chemistry.
4. To study the synthesis and structure of various supramolecular system such as crown ethers, coronads, cryptands, spherands, rotaxanes etc.
5. To explain the cocept of photochemistry and study Beer-Lambert law.
6. To describe and explain photochemical and photophysical processes using Jablonski diagram and their quantum yield expressions.
7. To study the selection rules for electronic transitions and develop quantum mechanical formulation of Franck-Condon principle.

### **Learning Outcomes**

After the completion of the course, Students will be able to

1. Have a good overview of the core concepts in supramolecular chemistry and explain non covalent interactions, molecular recognition and self-assembly.
2. Be able to describe some of the applications of supramolecular chemistry including industrial applications and supramolecular catalysis.
3. Understand fundamentals of photochemistry and laws governing it such as Beer-Lambert law.
4. Describe and distinguish between radiative and non-radiative transitions with the help of Jablonski diagram.
5. Understand photophysical kinetics of unimolecular and bimolecular processes and Stern-Volmer

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**Learning Objective & Outcomes**

**M.Sc.(Chemistry) 2<sup>nd</sup> Semester**

**Subject : Group Theory & Molecular Spectroscopy**

**Subject Code : CHE-205**

### **Learning Objective**

1. To learn about the selection rule for infrared-active transitions.
2. To Determine the vibrations for a triatomic molecule and identify whether they are infrared-active.
3. To Justify the difference in intensity between Stokes and anti-Stokes lines.
4. To learn about symmetry elements and symmetry operations.
5. To learn about the point groups and character table
6. To learn about the Application of group theory i.e. Hybridization .

### **Learning Outcomes**

1. Describe the selection rule for infrared-active transitions.
2. Determine the vibrations for a triatomic molecule and identify whether they are infrared-active.
3. Determine whether the molecular vibrations of a triatomic molecule are Raman active.
4. Explain the difference between Stokes and anti-Stokes lines in a Raman spectrum. 3. Justify the difference in intensity between Stokes and anti-Stokes lines.
5. Draw the Stokes and anti-Stokes lines in a Raman spectrum of a compound when given the energies of the different transitions.
6. Students will be able to analyse the hybridization of given compounds.
7. Students will be able to Draw character table and point groups. Students will be able to

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**Learning Objective & Outcomes**

**M.Sc.(Chemistry) 3rd Semester**

**Subject :Inorganic chemistry-I**

**Subject Code : 17CHE23GA1**

**Learning Objective**

1. To determine the (most important) quantum states of a given material (atoms, small molecules) and can assign these states to energy Terms.
2. To determine which quantum state(s) belong(s) to the ground stat and which state belongs to the excited state.
3. To determine the structure of inorganic and organic compounds by using different types of spectroscopy technics.
4. To determine the masses of atoms or molecules in which an electrical charge is placed on the molecule and the resulting ions are separated by their mass to charge ratio.
5. To determine the hyperfine parameters, recoil energy , quadrupole splitting and chemical shift / isomer shift by using mossbauer spectroscopy.

**Learning Outcomes**

After the completion of the course, Students will be able to

1. Understanding the various ways organic chemical structures are depicted.
2. Drawing organic chemical structures from names (and vice-versa)
3. Naming Structures including stereoisomers and geometric isomers
4. Understand the concepts of equivalent and non-equivalent hydrogens.
5. Understand the effect of structure on chemical shift and coupling constants.
6. Construct splitting diagrams (“trees”) and be able to measure coupling constants an NMR spectrum, or predict coupling constants and trees from a structure.
7. Recongnize and know how to test for exchangeable hydrogens in a molecule.
8. Deduce unknown structures and fully assign an IR spectrum to the structure.
9. Apply mass spectroscopy (exact mass, and fragmentation patterns) to organic structural analysis.

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## **Learning Objective & Outcomes**

**M.Sc.(Chemistry) 3rd Semester**

**Subject : Inorganic chemistry-II**

**Subject Code : 17CHE23GA2**

### **Learning Objective**

1. Objectives for Nuclear Chemistry.
2. Define radioactivity and distinguish between natural and artificial.
3. Explain transmutation.
4. Radioactive emissions: alpha, beta, gamma.
5. Describe what each emission is composed of and how they differ from each other with respect to mass, charge, penetrating power, and ionizing power.
6. Tell what happens to an element that undergoes alpha decay, beta decay, or gamma decay.
7. Discuss the process used to separate the three types of radioactive emissions.
8. Define and explain mass defect.
9. Define binding energy.
10. Explain the basic difference between a fission reaction and a fusion reaction.
11. Explain how a chain reaction works.
12. Discuss the difference between a fission reaction in a nuclear bomb and the one in a nuclear fission reactor.
13. Give the details of a fusion reaction.
14. List the three places fusion occurs: fusion reactors, the sun, hydrogen bomb.

### **Learning Outcomes**

After the completion of the course, Students will be able to

1. Identify and define various types of nuclear transmutation including fission, fusion and decay reactions.
2. Use proper isotopic notation to write down and balance a nuclear reaction.
3. State and compare the differences and similarities between a nuclear change and a chemical change.
4. Recall and properly use Einstein's theory of relativity equation,  $E = mc^2$ , to calculate the amount of energy released upon a nuclear change.
5. Define binding energy and mass defect and be able to calculate each for a given nucleus.
6. Understand and explain the concept of ionizing radiation and distinguish between the three different types of radiation.
7. Understand and explain the concept of isotopic stability including the band of stability.
8. Be familiar with the units used to quantify nuclear decay.
9. Understand the concept of rate of change and half life in the context of nuclear decay.
10. Understand the basics of nuclear chemistry applications: nuclear power, medical treatment, isotopic labelling, and carbon dating.

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## **Learning Objective & Outcomes**

**M.Sc.(Chemistry) 3<sup>rd</sup> Semester**

**Subject: Inorganic Chemistry III**

**Subject Code: 17CHE23GA3**

### **Learning Objectives**

1. To understand the different classes of drugs.
2. To understand the role of metal ions in biological system.
3. Come to know about contribution of metal ion in enzymes.
4. To understand the structure of Hb.
5. To understand the role of carriers in muscle contraction.
6. To understand the essential and trace metals.

### **Learning Outcomes**

After the completion of the syllabus, students will be:

1. Able to understand the mechanism of oxygen transport in body.
2. Able to understand positive and negative impacts of drugs.
3. Able to understand various pumps in the body and their significance.
4. Able to know about the phenomenon of muscle contraction.

Able to draw the structure of myoglobin

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## **Learning Objective & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject : Inorganic Chemistry-IV**

**Subject Code : 17CHE24GA1**

### **Learning Objective**

1. The objective of the course is to appraise the students about the organometallic Chemistry.
2. To learn about the 18 e rule and its violation.
3. To identify the basic concept, terms, and important events in the development of organometallic chemistry.
4. To learn methods, including spectroscopy techniques, used to determine the structure of organometallic complexes and to probe reaction mechanism.
5. To develop an appreciation for the scope, diversity, and application of organometallic chemistry.
6. To learn about the common organometallic reactions and to be able to draw reasonable reaction mechanisms.

### **Learning Outcomes**

After the completion of the course, Students will be able to

1. Have a good overview of the fundamental principles of organotransition-metal chemistry and know how chemical properties are affected by metals and ligands.
2. Be able to use knowledge about structure and bonding issues to understand the stability and reactivity of simple organometallic complexes.
3. Have insight into the use of modern methods to characterize organometallic compounds.
4. Understand fundamental reaction types and mechanisms and how to combine these to understand efficient catalytic processes
5. Know important applications of organometallic homogeneous catalysis in the production of large-scale (bulk) and smaller-scale (fine chemicals) production.

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## **Learning Objective & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject : Inorganic Special -V**

**Subject Code : 17CHE24GA2**

### **Learning Objective**

1. To understand the basic concepts electroanalytical chemistry
2. To understand the terms AC and DC Polarography
3. To understand the working of different types of electrodes
4. To understand the concepts of voltametry amperometry
5. To understand the working and reaction of electrochemical cells

### **Learning Outcomes**

After the completion of the course, Students will be able to

1. Recognize the basic concepts of electroanalytical chemistry
2. Able to predict the AC and DC Polarography
3. Able to understand the physical and chemical significance of electrodes
4. Able to detect the chemical compounds in various solutions
5. Able to predict the organic and inorganic compounds

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject: Inorganic Special- VI**

**Subject Code: 17CHE24GA3**

### **Learning Objective**

1. To understand the roles of metals in the pathological basis for disease and medical treatments through the development of new systems and optimization of existing technologies.
2. To provide qualitative data suggesting that the key differentiating variable in satisfaction might be the strength and quality of therapeutic relationship.
3. The specific objective addressed using a mixture of quantitative and qualitative methods.
4. The aim of dietary nutrients intake by which we obtain the substances to fulfil our bodies need to grow and keep functioning properly.
5. The main aim to study dietary intake will be able to understand that different foods have different nutritional value and their deficiency causing various health problems.

### **Learning Outcomes**

1. The students will be able to predict a drug properties based on its structure.
2. The students will be able to describe the common methods of spectroscopic and chromatographic analysis, and discuss how they can be applied to pharmaceuticals.
3. To describe the factors that affect its absorption, distribution, metabolism and excretion and hence the considerations to be made in drug design.
4. To explain the relationship between drug's chemical structure and its therapeutic properties.
5. The students will be introduced to further chemical principles that are required to understand the action and behaviour of drug compounds .

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 3<sup>rd</sup> Semester**

**Subject: Physical Special- I**

**Subject Code: 17CHE23GB1**

### **Learning Objectives**

The course enables the students to:

1. Understand the concept of surface tension, CMC, surfactants.
2. Understand the concept of fast reactions and methods of studying fast reactions.
3. Understand double layer concept and various models depicting pi double layer.

### **Learning Outcomes**

Upon the successful completion of the course it is intended that a student will be able to:

1. Explain electrified interfaces.
2. Understand ionic liquids and their importance.
3. Understand adsorption and various theories of determining rate of reaction.

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**Learning Objective & Outcomes**

**M.Sc. (Chemistry) 3rd Sem.**

**Subject: Physical Special-II**

**Subject Code: 17CHE23GB2**

**Learning Objective**

This Course Enables the Student to

1. Understand the concept of statistical thermodynamics concept of distribution and probability of distribution.
2. Understand the concept of partition function and relation between partition function and various thermodynamic properties of the system.
3. Understand the concept of approximation methods in calculation of energy of multi electron system.
4. Understand the basic concept of valence bond theory and Molecular orbital theory.
5. Understand the concept of Pauli exclusion principle and concept of hydrogen.

**Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Explain the difference between classical and quantum and statistical mechanics.
2. Explain the various types of partition function and thermodynamic properties.
3. Explain the various energy functions, chemical potential etc.
4. Explain the energy and wave function of multi electron systems.

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 3<sup>rd</sup> Semester**

**Subject: Physical Special- III**

**Subject Code: 17CHE23GB3**

### **Learning Objectives**

1. To learn significance of spectroscopic techniques to study the structure of compounds.
2. To understand mechanism of corrosion and preventive methods.
3. To understand concept of semi conductivity, superconductivity and liquid crystal and solar energy.
4. To provide an understanding of the corrosion principles and engineering methods used to minimize and prevent the corrosion.

### **Learning Outcomes**

The students will be able to:

1. Solve problems involving various types of corrosion.
2. Select corrosion resistant materials for a given application.
3. Select technique for corrosion prevention.
4. Knowledge of spectroscopic techniques to analyse core structure of any compound.

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject: Physical Special- IV**

**Subject Code: 17CHE24GB1**

### **Learning Objective**

This Course Enables the Student to

1. Understand the concept of polarography.
2. Various types of polymers and polymerization.
3. Know about free volume theory and free energy of mixing of polymers.
4. Understand the concept of electricity storage and device used for electricity storage.

### **Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Various types of polymerization and kinetics and mechanism of that polymerization.
2. Understand various method of determining molecular mass of polymers.
3. Know various types of fuel cells.
4. Explain the process of polarographic techniques.

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2019-2020 (Even)

## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject: Physical Special- V**

**Subject Code: 17CHE24GB2**

### **Learning Objective**

This Course Enables the Student to

1. Understand the concept of statistical thermodynamics, concept of distribution and probability of distribution.
2. Understand the concept of all the three types of statistics.
3. Understand the concept of non-equilibrium thermodynamics.
4. Understand the basic concept of Huckel Molecular Orbital theory for simple and cyclic conjugated systems.
5. Understand the concept of operator algebra, spin and angular momentum operators.

### **Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Explain the difference between quantum and statistical mechanics and also the difference between all the three types of statistical mechanics.
2. Explain the various types operators, eigen functions and eigen values of Ladder operators.
3. Explain the bonding and anti bonding molecular orbitals, energy of Linear and Cyclic conjugated systems.
4. Explain the stability of cyclic conjugated cation, anion and free radical on the basis of Huckel molecular orbital theory.

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject: Physical Special- VI**

**Subject Code: 7CHE24GB3**

### **Learning Objectives**

1. To impart the knowledge of electronic, rotation, vibration. NMR, ESR, spectroscopy and their applications.
2. To introduce the concepts and importance of symmetry and group theory in solving chemical problems.
3. The main aim of this course is to provide students a concept about how these commonly used molecular spectroscopy techniques work, a theoretical knowledge of each of these methods and their usage in molecular and electronic structure determination.

### **Learning Outcomes**

On successful completion of the course, students will be able to

1. Explain the behaviour of molecular systems in external electromagnetic field.
2. Understand the principles and theories of rotational, vibrational, UV-Vis, Fluorescence, Mass and NMR spectroscopy methods.
3. Interpret the molecular spectra and find molecular properties from molecular spectra.
4. Understand about the hybridization, geometry, spectral activity and structure of various organic as well as inorganic compounds.

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 3<sup>rd</sup> Semester**

**Subject: Organic Special- I**

**Subject Code: 17CHE23GC1**

### **Learning Objectives**

**This Course enables the student to**

1. Get deep insight into various spectroscopic methods used for characterization of Organic compounds.
2. Understand conventional equipment, instrumentation, working principle, and techniques of different types of spectroscopy.
3. Provide a broad detailed overview of the state of art of spectroscopic methods used in chemistry.

### **Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Identify organic compounds using UV, IR, NMR and Mass Spectroscopy.
2. Understand and Interpret spectra (IR, NMR, UV Visible, and Mass) of organic molecules.
3. Elucidate the structure of compounds by analyzing spectral data.

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 3<sup>rd</sup> Semester**

**Subject: Organic Special- II**

**Subject Code: 17CHE23GC2**

### **Learning Objectives**

**This Course enables the student to**

1. Understand how to elucidate the structure of biomolecules like vitamins, carotenes and porphyrins.
2. Understanding the importance of enzymes and vitamins in human life cycle.
3. Provides tools for understanding and testing ideas that are applicable throughout science.

### **Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize biomolecules like vitamins, and enzymes.
2. Understands the use of bio-catalyst in biosynthesis.
3. Can find the difference between vitamins and enzymes and how importance are these biomolecules for the growth and maintenance of life.

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## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 3<sup>rd</sup> Semester**

**Subject: Organic Special- III**

**Subject Code: 17CHE23GC3**

### **Learning Objectives**

**This Course enables the student to**

1. Understand how to synthesis structure of ylides, heterocyclic drugs like paracetamol quine chloroquine imidazole oxazole thiazole phosphorus sulphur and nitrogen ylides.
2. Understanding the importance of drugs in human life cycle.
3. Provides tools for understanding and testing ideas that are applicable throughout science.

### **Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize drugs like paracetamol and aspirin.
2. Understands the use of heterocyclic compounds in drugs.
3. Can find the differences and similarities between drugs and hetrocyclic compounds and how these drugs are important for the life.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020 (Even)

## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject: Organic Special- IV**

**Subject Code: 17CHE24GC1**

### **Learning Objectives**

1. To study synthesis & applications of various photochemical Reactions
2. To develop interest and understanding of the theoretical basis for Pericyclic reactions and skills for the utilization of these reactions in the organic synthesis.
3. To know the importance of retrosynthesis in designing the synthesis of organic compounds.
4. To impart knowledge about the mechanism & importance of the new synthetic reactions.

### **Learning Outcomes**

At the end of the course the students will able to understand

1. The underlying mechanism for all photochemical processes.
2. The enhance a detailed understanding of the concept of the processes of pericyclic reactions and the stereochemical outcomes of these highly stereospecific reactions

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020 (Even)

## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject: Organic Special- V**

**Subject Code: 17CHE24GC2**

### **Learning Objectives**

**This Course enables the student to**

1. Understand how to elucidate the structure of biomolecules like terpenoids, alkaloids and hormones.
2. Understanding the importance of hormones and vitamins in human life cycle.
3. Provides tools for understanding and testing ideas that are applicable throughout science.

### **Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize biomolecules like terpenoids, alkaloids and hormones.
2. Understands the importance of hormones in our body.
3. Understands the importance of antibiotics and how to synthesize these antibiotics.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020 (Even)

## **Learning Objectives & Outcomes**

**M.Sc. (Chemistry) 4<sup>th</sup> Semester**

**Subject: Organic Special- VI**

**Subject Code: 17CHE24GC3**

### **Learning Objectives**

**This Course enables the student to**

1. Understand how to synthesize structure of organometallic reagents like grignard reagent Gilman reagent and other chromium aluminum silicon titanium reagents.
2. Understanding the importance of synthetic reagents in synthetic organic chemistry and how to understand some organic name reactions.
3. Provides tools for understanding and testing ideas that are applicable throughout science.

### **Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize reagents like Grignard and Gilman etc.
2. Understands the importance of reagents in synthetic organic chemistry.
3. Understands the importance of drugs and how to synthesize these drugs.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning objectives and Outcomes**

**B.Sc.-1<sup>st</sup> Semester**

**Subject-Inorganic Chemistry**

**Subject Code CH-101**

**Learning Objectives**

1. To understand the shapes of different orbitals.
2. To understand different principles for filling electrons.
3. To understand how to draw energy diagrams.
4. To understand how to calculate bond order.
5. To understand how to calculate lattice energy through Born Haber Cycle.

**Learning Outcomes**

1. Able to write electronic configuration of given atomic number.
2. Able to tell the name of orbitals by recognizing shapes of orbitals.
3. Able to calculate bond order of different molecules.
4. Able to draw MO diagrams of different molecules.
5. Able to draw structures of different ionic solids.
6. Able to calculate effective nuclear charge using Slaters Rule.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2017-2018(Odd)

**Learning Objective & Outcome**

**B..Sc.- 1st Semester**

**Subject: Physical Chemistry**

**Subject Code: CH-102**

**Learning Objective**

1. Students will be able to describe the concept of pressure from a macroscopic and microscopic perspective.
2. Students will describe the relationship between partial pressures and total pressure as described in Dalton's Law of partial pressure.
3. Students will be able to explain the quantitative relationship between T,V,n & P as described by kinetic molecular theory.
4. The students will be able to compare and contrast the chemical behaviour and physical properties of common substances.
5. The students will be able to classify matter by its state and bonding behaviour using the periodic table as a reference.

**Learning Outcomes**

1. Students should be able to describe the characteristic of the three states of matter.
2. Students should be able to describe the different physical properties of each state of matter.
3. Students should be able to determine the difference between solids, liquids and gases.
4. Students will be able to define what matter is and where you can find it.
5. Students will be able to give examples of solids, liquids and gases.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcomes**

**B.Sc - 1<sup>st</sup> Semester**

**Subject : Organic Chemistry**

**Subject Code : CH-103**

**Learning Objective**

1. To understand the core concepts of organic chemistry i.e. resonance, hyperconjugation, inductive effect etc. and their application.
2. To study about the isomerism and types of isomerism.
3. To understand optical isomerism, geometric isomerism and conformational isomerism.
4. To acquire basic knowledge of reactive intermediates and mechanism of organic reactions.
5. To study about nomenclature, synthesis, isomerism and physical properties of alkanes and cycloalkanes.

**Learning Outcomes**

Upon successful completion of this course, the student will be able to

1. Recognize and draw constitutional isomers, stereoisomers, including enantiomers and diastereomers, racemic mixture and meso compounds .
2. Know the fundamental principles of organic chemistry and predict outcomes and derive mechanism of various types of organic reactions.
3. Understand various types of reactive intermediates and factors affecting their stability .
4. Understand the nomenclature, synthesis, isomerism and physical properties of alkanes and cycloalkanes

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcomes**

**B.Sc. - 2<sup>nd</sup> Semester**

**Subject: Inorganic Chemistry**

**Subject Code: CH-201**

**Learning Objective**

1. The purpose of study semiconductor devices and materials is to familiarize students with P-N junction and transistors.
2. The students will be able to understand general trends in the chemistry behind p-block elements.
3. The students will be able to know the important compounds and important applications of compounds of boron and carbon.
4. The students will understand the biological significance of sodium, potassium, magnesium and calcium.
5. The students will be able to explain large scale preparation and properties of industrially viz., cement, plaster of Paris, sodium hydroxide, sodium carbonate and bicarbonate etc.
6. The students will be able to describe the salient features of alkali and alkaline earth metals.

**Learning Outcomes**

1. The students will be able to design and carry out scientific experiments as well as accurately record and analyse the results of experiments.
2. Students will be able to explain why chemistry is an integral activity for addressing social, economic and environmental problems.
3. Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
4. The students will be able to describe the periodic table as a list of elements arranged so as to demonstrate trends in their physical and chemical properties.
5. The students will be able to state the principle resemblances of elements within each main group in particular alkali metals, alkaline earth metals, halogens and noble gases.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcomes**

**B.Sc.(Chemistry) 2<sup>nd</sup>Semester**

**Subject : Physical Chemistry**

**Subject Code : CH-202**

**Learning Objective**

1. To describe a reaction rate in terms of a change in concentration divided by a change in time (at constant volume) and a general form of a (differential) rate law.
2. To write a general form of the rate law for any chemical reaction and define the order of a chemical reaction.
3. To determine integrated rate expression for zero order, first order, second and third order reaction and their respective half life period expressions.
4. To study the various factors which affect the rate of a chemical reaction such as concentration ,temperature, solvent, catalyst etc. And theories of chemical kinetics.
5. acquire basic knowledge of electrode conduction.
6. determine the solubility of sparingly soluble salts.
7. explain the various methods for the determination of transport number.

**Learning Outcomes**

Upon successful completion of this course, the student will be able to

1. State the basic principles electrochemistrys
2. Mention and explain various methods for the determination of transport number.
3. Explain the concepts of electrolytic conduction and dilution
4. Understand rate of reaction and factors affecting it.
5. Derive integrated rate expressions for zero order ,first order ,second order and third order reaction.
6. Understand theories of reaction kinetics and differentiate them.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning objectives and Outcomes**

**B.Sc.-2<sup>nd</sup> Semester**

**Subject-Organic Chemistry**

**Subject Code: CH-203**

**Learning objectives**

1. To identify addition reactions for alkenes and alkynes.
2. To understand the nature of double and triple bonds for addition reactions.
3. To identify the difference between dienes and alkenes.
4. To understand the mechanism of attack of electrophiles and nucleophiles.
5. To understand the preparation methods for alkenes, alkynes, alkyl halides.

**Learning outcomes**

1. Recognize the basic practical skills for the synthesis of alkenes, alkynes, alkyl halides.
2. Able to predict the reactivity of organic compound from its structure.
3. Able to understand the rules for naming different organic compounds
4. Able to recognize mechanism for given chemical reaction.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**B.Sc.- 3<sup>rd</sup> Semester**

**Subject: Inorganic chemistry**

**Subject Code: CH-301**

**Learning Objective**

1. In order to study transition metals to understand the trends in properties and reactivity of the d-block elements.
2. To explain the typical physical and chemical properties of the transition metals.
3. To identify simple compound classes for transition metals and describe their chemical properties.
4. To make the students understand that solutions which have water as a solvent are called aqueous solutions and those with solvent other than water are called non-aqueous solutions.
5. The students should know that that equivalent weight of an acid and base can be find out from their molecular weight and the acidity and basicity of that compound.
6. The student should understand that there are different methods of expressing concentration of a solution such as mass percent, ppm, normality, molarity, and molality.

**Learning Outcomes**

1. The students will be able to explain the fundamental concepts in coordination chemistry of transition metals.
2. The Students should be familiar with the basic knowledge of the non-aqueous solutions and applications of non-aqueous solvents in analytical chemistry.
3. The students will develop the ability of effective solving practical problem of analytical chemistry of non-aqueous solutions.
4. Students will be able to describe different quantitative methods of analysis of organic and inorganic substances.
5. Students will be able to demonstrate methods of drugs analysis and pharmaceutical calculations.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcomes**

**B.Sc. - 3<sup>rd</sup> Semester**

**Subject : Physical chemistry**

**Subject Code : CH-302**

**Learning Objective**

1. To understand thermodynamic terms: system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials.
2. To understand Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law
3. To understand the concept of equilibrium constant, free energy, chemical potential
4. To understand the Nernst distribution law – its thermodynamic derivation, modification of distribution law when solute undergoes dissociation, association and chemical combination. Applications of distribution law
5. To understand the determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride

**Learning Outcomes**

After the completion of the course, Students will be able to

1. Recognize the basic terms of thermodynamic.
2. Able to predict the energy change in heat capacities at constant volume and pressure and their relationship.
3. Able to derive Joule's law and its application.
4. Able to derive relationship between modification of distribution law when solute undergoes dissociation
5. Able to recognize the degree of hydrolysis and hydrolysis constant of aniline hydrochloride.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning objectives and Outcomes**

**B.Sc.-3<sup>rd</sup> Semester**

**Subject-Organic Chemistry**

**Subject Code: CH-303**

**Learning Objectives**

1. To understand the methods for preparation of alcohols.
2. To understand the different classes of alcohols.
3. To understand the structure of carboxylic acid and their derivatives.
4. To understand the reactivity of different carboxylic acid derivatives.
5. To understand the chemical reactions of phenols.

**Learning Outcomes**

1. Able to recognize structures of acid halides, esters, amides, acid anhydrides.
2. Able to convert given name of alcohol to structure.
3. Able to write the order of reactivity of different carboxylic acid derivatives.
4. Able to describe different classes of alcohols.
5. Able to write down structure of phenol and phenoxide ion.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**B.Sc - 4<sup>th</sup> Semester**

**Subject: Inorganic chemistry**

**Subject Code : CH-401**

**Learning Objective**

1. The students will understand the importance of periodic table of the elements, how it came to be and its role in organising chemical information.
2. The students will develop the ability to effectively communicate scientific information and research results in written and oral formats.
3. The students will learn the laboratory skills needed to design, safely conduct and interpret chemical research.
4. The primary aim of a qualitative research is to provide a complete detailed description of the research topic.
5. Quantitative research focuses more in counting and classifying features and constructing statistical models and figures to explain what is observed.

**Learning Outcomes**

1. By quantitative analysis courses, the students will be learn to understand, communicate and interpret quantitative information and mathematical ideas.
2. All should able to develop skills in the recognition of patterns, generalisation, abstraction to a formal system and application of the system to specific situations.
3. The students will be able to understand the various uses of lanthanides elements in flash light powders and in dyeing cotton.
4. The students will be able to understand about recently lanthanides have been used in lasers.
5. The students will be able to know about actinides elements are used as nuclear fuels for various purposes.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcomes**

**B.Sc. - 4<sup>th</sup> Semester**

**Subject : Physical Chemistry**

**Subject Code : CH-402**

**Learning Objective**

1. To understand the concepts of thermodynamics and its laws
2. To understand the entropy change in reversible and irreversible reaction
3. To understand the physical significance of third law of thermodynamics
4. To understand the concepts of electrochemistry
5. To understand the working and reaction of electrochemical cells

**Learning Outcomes**

After the completion of the course, Students will be able to

1. Recognize the basic concepts of thermodynamics
2. Able to predict the reversible and irreversible reaction
3. Able to understand the physical significance of third law of thermodynamics
4. Able to recognize the reaction of electrochemical cells and types

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning objectives and Outcomes**

**B.Sc.-4<sup>th</sup> Semester**

**Subject-Organic Chemistry**

**Subject Code CH-403**

**Learning objectives**

1. To understand how to name different aldehydes and ketones.
2. To understand the reactivity of different carbonyl compounds towards nucleophilic reaction.
3. To understand how to write the products of addition reaction to carbonyl compounds.
4. To understand to differentiate between primary, secondary and tertiary amines.
5. To determine the percentage composition of a liquid sample mixture by the application of Beers Law.

**Learning outcomes**

1. Students are able to recognize mechanism of different reactions related to carbonyl compounds.
2. Students are able to differentiate between given different amines.
3. Able to recognize different functional groups by given only graph of peaks.
4. Able to write mechanism of different condensation reaction.
5. Able to recognize the reactivity of substituted aromatic amines.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcomes**

**B.Sc. - 5<sup>th</sup> Semester**

**Subject : Inorganic chemistry**

**Subject Code : CH-501**

**Learning Objective**

1. To understand the concepts of metal ligand bonding in transition complex compounds.
2. To understand the thermodynamics and kinetic aspects of metal complexes.
3. To understand the nomenclature, classification, properties and preparations of coordination compounds.
4. To understand the chemistry of organometallic compounds, homogenous hydrogenation and carbonyls.
5. To understand the bioinorganic chemistry of hemoglobin, myoglobin etc.

**Learning Outcomes**

After the completion of the course, Students will be able to

1. Recognize the bonding in transition compounds by VBT and CFST theories.
2. Able to predict the geometry of coordination compounds and type of hybridization.
3. Able to determine the properties and preparations of Li, Al, Hg, Sn, Ti etc. metal compounds.
4. Able to recognize the biological reaction alkali and alkaline earth metals, nitrogen fixation, hemoglobin and myoglobin.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning objectives and Outcomes**

**B.Sc.-5<sup>th</sup> Semester**

**Subject- Physical Chemistry**

**Subject Code: CH-502**

**Learning Objectives**

1. To understand the concept of black body radiations.
2. To understand the concept of wave functions.
3. To understand different properties of molecular structure.
4. To understand the basic features of spectroscopy.
5. To understand the Harmonic Oscillator.

**Learning Outcomes**

1. Able to recognize different regions for different spectroscopy.
2. Able to explain the concept of Electromagnetic Waves.
3. Able to explain the concept use in Black Body Radiation.
4. Able to calculate dipole moment in given molecules.
5. Able to use concept of polarizability.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**B..Sc.-5<sup>th</sup> Semester**

**Subject: Organic chemistry**

**Subject Code: CH-503**

**Learning Objective**

1. In order to study the NMR spectroscopy to understand the important role of nuclear magnetic resonance spectroscopy in the study of the structures of organic compounds.
2. To develop an understanding of the significance of the number, positions, intensities and splitting of signals in nuclear magnetic resonance spectra.
3. To be able to assign structures to simple molecules on the basis of nuclear magnetic resonance spectra.
4. In order to study carbohydrates will develop the skills to recognize and draw particular carbohydrate structures.
5. To know general structural elements of cyclic monosaccharide and disaccharides and their implications for structure and function.

**Learning outcomes**

1. After study of course students have firm foundations in the fundamentals and application of current chemical and scientific theories.
2. Students are able to identify and solve chemical problems and explore new areas of research.
3. Students are skilled in probing solving ,critical thinking and analytical reasoning.
4. After completion of course students should have the ability to identify organic compounds by analysis and interpretation of spectral data.
5. Students should have the ability to explain common terms in NMR spectroscopy such as chemical shift, coupling constant and anisotropy and describe how they are affected by molecular structure.
6. Students are skilled to perform the most commonly used NMR experiments and to interpret and document their results.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning objectives and Outcomes**

**B.Sc.-6<sup>th</sup> Semester**

**Subject-Inorganic Chemistry**

**Subject Code: CH -601**

**Learning objectives**

1. To understand the role of metal ions in biological system.
2. To understand the role of metal ions in oxygen transport.
3. To understand the concept of acid and bases.
4. To understand the uses of inorganic polymers.
5. To understand the nature of bonding of different metals with carbon atom.

**Learning Outcomes**

1. Students are able to describe role of different metal ions in biological system.
2. Students are able to recognize role of porphyrin ring in haemoglobin.
3. Students are able to count total of electrons in organometallic compound.
4. Students come to know about uses of different inorganic polymers in making of tyres, toys, plastics bags.
5. Students are able to name different organometallic compounds.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcomes**

**B.Sc. - 6<sup>th</sup> Semester**

**Subject: Physical chemistry**

**Subject Code : CH-602**

**Learning Objective**

1. To understand the transitions through electronic spectroscopy
2. To understand the term symbols of diatomic molecules
3. To understand the different type of vapour pressure curves
4. To understand the ideal and non ideal solutions and their behaviour
5. To understand the thermodynamics of one and two component system.

**Learning Outcomes**

After the completion of the course, Students will be able to

1. Recognize the basic rules of electronic spectroscopy.
2. Able to predict the term symbols of diatomic molecules
3. Able to understand the behavior of ideal and non ideal solutions
4. Able to recognize the thermodynamics of one and two component system
5. Recognize the basic rules of various component system

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020 (Even)

**Learning Objective & Outcome**

**B.Sc-6<sup>th</sup> Semester**

**Subject: Organic chemistry**

**Subject Code: CH-603**

**Learning objective**

1. The main aim of Heterocyclic compounds study is to develop novel, efficient, convenient, selective and environmentally benign synthetic methods in organic chemistry.
2. The objective of the present study of heterocyclic compounds is to develop green methodologies for the synthesis of nitrogen containing heterocyclic.
3. The students will be aware about most of drugs in the present market are the compounds containing various heterocyclic moieties.
4. To enable students to acquire a specialized knowledge and understanding of selected aspects by means of lecture series and a research project.
5. The course aims to provide an advanced understanding of the core principles and topics of biochemistry and their experimental basis.

**Learning outcomes**

1. The students should be able to demonstrate advanced knowledge and understanding in aspect of protein structure.
2. The students will be able to introduce about basic chemistry of the heterocyclic.
3. The students will get familiar with particular properties and reactions for the most important heterocyclic as well as different systems of nomenclature.
4. The students will develop fundamental theoretical understanding of heterocyclic chemistry.
5. The students will be able to fully comprehend the chemistry of many heterocyclic products, carbohydrate, amino acids, peptides, proteins and lipids in use such as drugs and food.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -1<sup>st</sup> Semester**

**Subject: Inorganic chemistry**

**Subject Code: CH (H)-101**

**Learning objective**

1. To understand the shapes of different orbitals.
2. To understand different principles for filling electrons.
3. To understand how to draw energy diagrams.
4. To understand how to calculate bond order.
5. To understand how to calculate lattice energy through Born Haber Cycle.

**Learning Outcomes**

1. Able to write electronic configuration of given atomic number.
2. Able to tell the name of orbitals by recognizing shapes of orbitals.
3. Able to calculate bond order of different molecules.
4. Able to draw MO diagrams of different molecules.
5. Able to draw structures of different ionic solids.
6. Able to calculate effective nuclear charge using Slaters Rule.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -1<sup>st</sup> Semester**

**Subject: Physical Chemistry**

**Subject Code: CH (H)-102**

**Learning Objective**

1. Students will be able to describe the concept of pressure from a macroscopic and microscopic perspective.
2. Students will describe the relationship between partial pressures and total pressure as described in Dalton's Law of partial pressure.
3. Students will be able to explain the quantitative relationship between T,V,n & P as described by kinetic molecular theory.
4. The students will be able to compare and contrast the chemical behaviour and physical properties of common substances.
5. The students will be able to classify matter by its state and bonding behaviour using the periodic table as a reference.

**Learning Outcomes**

1. Students should be able to describe the characteristic of the three states of matter.
2. Students should be able to describe the different physical properties of each state of matter.
3. Students should be able to determine the difference between solids, liquids and gases.
4. Students will be able to define what matter is and where you can find it.
5. Students will be able to give examples of solids, liquids and gases.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -1<sup>st</sup> Semester**

**Subject: Organic chemistry**

**Subject Code : CH (H)-103**

**Learning objective**

Lesson plan takes time, dedication & an understanding of students abilities and goals. In the field of education every teacher strive to motivate students to gain as much as possible during the course of class and apply it

This Course Enables the Student to

1. Understand the structure and bonding of organic compounds, vanderwaal forces, inclusion compounds, electronic effects, aromaticity and H bonding etc.
2. Learn stereochemistry terms and their rules to find out isomerism and conformation and configuration of organic compounds.
3. Introduction of reaction intermediate and arrow notation, which help using organic reaction mechanism and their product analysis and kinetic and stereo chemical activities
4. Understand the alkane and cycloalkane and their reaction mechanism

**Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Students will demonstrate about clatherate, hybridisation, aromaticity and the actual meaning of structure and bonding in organic chemistry
2. Use of stereo chemistry terms and rules to find out isomerism and their conformation, configuration and product kinetic and stereo chemical acactivitie.
3. Easily understand and find out the chemical behaviour and mechanism of reactions in alkanes and cycloalkanes and their conversion

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC 2<sup>nd</sup> Semester**

**Subject: Inorganic chemistry**

**Subject Code : CH (H)-201**

**Learning Objective**

The student will:

1. Study s-Block Element, their diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in bio-systems, an introduction to alkyls and aryls.
2. Study theory of Precipitation, purification of precipitates.
3. Study theory of Qualitative and Quantitative Inorganic Analysis.
4. Study p-Block Elements and their compounds like hydrides, oxides, oxyacids and halides of groups 13-16, hydrides of boron - diborane and higher boranes, borazine, borohydrides.
5. Study Chemistry of fullerenes, carbides, fluorocarbons, silicates (structural principle) tetra sulphur, tetra nitride, basic properties of halogens, inter-halogens and polyhalides.
6. Study Chemistry of Noble Gases.

**Learning Outcomes**

After the completion of the course, Students will be able to

1. Define s-Block Elements p-Block Elements and their important compound like hydrides, oxides, halides.
2. Explain the properties of compound fullerenes, carbides, fluorocarbons, silicates, tetra sulphure, tetra nitride.
3. Explain Chemistry of Noble Gases and their compound.
4. Explain how precipitation occurs and how precipitates separate out.
5. Detect the Acidic or Basic radical in the Mixture by applying Qualitative Analysis.

RPS Degree College, Balana (Mahendargarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC 2<sup>nd</sup> Semester**

**Subject: Physical chemistry**

**Subject Code : CH (H)-202**

**Learning Objective**

8. To describe a reaction rate in terms of a change in concentration divided by a change in time (at constant volume) and a general form of a (differential) rate law.
9. To write a general form of the rate law for any chemical reaction and define the order of a chemical reaction.
10. To determine integrated rate expression for zero order, first order, second and third order reaction and their respective half life period expressions.
11. To study the various factors which affect the rate of a chemical reaction such as concentration, temperature, solvent, catalyst etc. And theories of chemical kinetics.
12. Acquire basic knowledge of electrode conduction.
13. Determine the solubility of sparingly soluble salts.
14. Explain the various methods for the determination of transport number.

**Learning Outcomes**

Upon successful completion of this course, the student will be able to

7. State the basic principles electro chemistry
8. Mention and explain various methods for the determination of transport number.
9. Explain the concepts of electrolytic conduction and dilution
10. Understand the rate of reaction and factors affecting it.
11. Derive integrated rate expressions for zero order, first order, second order and third order reaction.
12. Understand theories of reaction kinetics and differentiate them.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC 2<sup>nd</sup> Semester**

**Subject: Organic chemistry**

**Subject Code: CH (H)-203**

**Learning Objective**

Lesson plan takes time, dedication & an understanding of students abilities and goals. In the field of education every teacher strive to motivate students to gain as much as possible during the course of class and apply it

This Course Enables the Student to

1. Understand the method of formation of alkenes, saytzeff rule, Hoffmann elimination, physical and chemical properties of alkene, oxidation and polymerization of alkene and their applications
2. Learn about coal petroleum and petrochemicals, synthetic fuels, octane and cetane numbers, also learn about antiknock additives.
3. Introduction of cycloalkenes, dienes, and alkynes, their physical and chemical properties
4. Also Understand about polynuclear hydrocarbons, arenes and aromaticity, their aromatic substitution reactions
5. Aryl and alkyl halide and polyhalogen compound their formation and physical and chemical properties

**Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Students will demonstrate about the formation of alkenes from different methods and stability of alkene formation oxidation and polymerization product of different alkenes also students learn about their application
2. Use of coal petroleum and petrochemical their extraction and chemical behaviour students also learn about their octane number and their antiknock additives

3. Easily understand about polynuclear hydrocarbon, arenes and their aromatic nature students also find out the product formation of aromatic reactions
4. Also learn about Aryl and alkyl halide different formation techniques and their physical behaviour and chemical properties and their applications.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -3rd Semester**

**Subject: Inorganic chemistry**

**Subject Code: CH (H)-301**

**Learning objective**

1. In order to study transition metals to understand the trends in properties and reactivity of the d-block elements.
2. To explain the typical physical and chemical properties of the transition metals.
3. To identify simple compound classes for transition metals and describe their chemical properties.
4. To make the students understand that solutions which have water as a solvent are called aqueous solutions and those with solvent other than water are called non-aqueous solutions.
5. The students should know that that equivalent weight of an acid and base can be find out from their molecular weight and the acidity and basicity of that compound.
6. The student should understand that there are different methods of expressing concentration of a solution such as mass percent, ppm, normality, molarity, and molality.

**Learning Outcomes**

1. The students will be able to explain the fundamental concepts in coordination chemistry of transition metals.
2. The Students should be familiar with the basic knowledge of the non-aqueous solutions and applications of non-aqueous solvents in analytical chemistry.
3. The students will develop the ability of effective solving practical problem of analytical chemistry of non-aqueous solutions.
4. Students will be able to describe different quantitative methods of analysis of organic and inorganic substances.
5. Students will be able to demonstrate methods of drugs analysis and pharmaceutical calculations.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -3rd Semester**

**Subject: Physical chemistry**

**Subject Code : CH (H)-302**

**Learning objective**

The course enables the students to:

- Understand the thermodynamics meaning, definition, thermodynamics terms, extensive and intensive properties, concept of heat and work.
- Zeroth law, first law of thermodynamics, idea of internal energy, enthalpy, their relations, joule's Thomson coefficient etc.
- Get a knowledge about chemical equilibrium, Nernst Distribution law, colloids types, gels and sols.

**Learning outcomes**

Upon the successful completion of the course it is intended that a student will be able to:

- Explain the thermodynamics concepts i.e, Joule's law, heat, work concepts, state functions and path function, system and surrounding.
- After understanding the chemical equilibrium concept students are able to solve the Clausius Clapeyron equation, Van't Hoff reaction isotherms and isochore and its applications.
- Solve the problems related to colloids, gels, sols and emulsifiers and their daily use applications.

Use the distribution law in the determination of degree of hydrolysis and equilibrium constants.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

## **Learning Objective & Outcome**

**HC -3rd Semester**

**Subject: Organic chemistry**

**Subject Code : CH (H)-303**

### **Learning Objectives**

1. To understand the methods for preparation of alcohols.
2. To understand the different classes of alcohols.
3. To understand the structure of carboxylic acid and their derivatives.
4. To understand the reactivity of different carboxylic acid derivatives.
5. To understand the chemical reactions of phenols.

### **Learning Outcomes**

1. Able to recognize structures of acid halides, esters, amides, acid anhydrides.
2. Able to convert given name of alcohol to structure.
3. Able to write the order of reactivity of different carboxylic acid derivatives.
4. Able to describe different classes of alcohols.
5. Able to write down structure of phenol and phenoxide ion.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

## **Learning Objective & Outcome**

**HC 4<sup>th</sup> Semester**

**Subject: Inorganic chemistry**

**Subject Code : CH (H)-304**

### **Learning Objective**

This Course Enables the Student to

1. Understand the concept of acid and base.
2. Understand the chemistry of heavy d- block elements.
3. Understand how extraction of metals occur.
4. Understand the chemistry of lanthanides and actinides.

### **Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Students will learn the use of principles of metallurgy in daily life, how they are being used in various fields of daily life.
2. Knowledge of metallurgy will help them in the separation of different elements.
3. Students will be able to design reactions in different acids and bases can be used.
4. Students will learn use of heavier d- block elements in daily life, their use in industries, their use as catalyst and in formation of alloys and interstitial compounds.

RPS Degree College, Balana (Mahendargarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC 4<sup>th</sup> Semester**

**Subject: - Physical Chemistry.**

**Subject code:- CH (H)-305**

**Learning objectives**

The course enables the students to:

- Understand the thermodynamics meaning, definition, Carnot's theorem, concept of entropy, Nernst heat theorem, spontaneity criteria etc.
- Electrolytic and galvanic cells, liquid junction potential, application of emf measurements, hydrogen electrode etc.
- Get knowledge about chemical equilibrium, kinetics of a reaction, rate law, rate constant, enzyme catalysed reaction etc.

**Learning outcomes**

Upon the successful completion of the course it is intended that a student will be able to:

- Explain the thermodynamics concepts, variation of G and A with P, V and T, entropy concept, spontaneity criteria etc.
- Co-relate the Rate law and rate constants, Second law of thermodynamics, order of a reaction and molecularity of a reaction etc.
- Solve the problems related to Standard electrode potential, Nernst theorem, electrode reaction, potentiometric titration, solubility product, activity coefficient etc.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC 4<sup>th</sup> Semester**

**Subject: Organic chemistry**

**Subject Code : CH (H)-306**

**Learning Objective**

This Course Enables the Student to

5. Understand Infrared spectroscopy, Aldehyde and Ketones, Amines, Nitro and Diazonium Compounds etc.
6. Learn to use different chemical reactions for synthesis of useful organic compounds.
7. Introduce the Spectroscopic method to find structure of an organic molecule.

**Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

5. Students will demonstrate competence with the basic ideas of Infrared Spectroscopy including concepts of Molecular vibrations, selection rules, IR region, application of IR in structure elucidation, and to interpret the IR spectrum of different organic molecules.
6. Use the different chemical reactions of compounds containing different functional groups(aldehydic, ketonic, amino, nitro etc.) and how these reactions can be used for betterment of mankind
7. Conversion of organic compound into other one and many useful name reactions.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -5<sup>th</sup> Semester**

**Subject: Inorganic chemistry-I**

**Subject Code: CH (H)-501**

**Learning Objective**

This course enables the student

1. To understand the concepts of metal ligand bonding in transition metal complexes.
2. To understand the thermodynamic and kinetic aspects of metal complexes.
3. To understand the magnetic properties of complexes.
4. To study the reaction mechanisms of metal complexes.

**Learning Outcomes**

Upon successful completion of the course it is intended that a student will be able

1. To use Crystal Field Theory to understand the magnetic properties and color of coordination compounds.
2. To describe the stability of metal complexes by the use of stability constants.
3. To understand the nature of bonding in coordination compounds.
4. To understand the reactivity of coordination compounds.
5. To acquire knowledge on the stability of complexes.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

## **Learning Objective & Outcome**

**HC -5<sup>th</sup> Semester**

**Subject: Inorganic chemistry-II**

**Subject Code: CH (H)-502**

### **Learning objective**

6. To understand the concepts of metal ligand bonding in transition complex compounds.
7. To understand the thermodynamics and kinetic aspects of metal complexes.
8. To understand the nomenclature, classification, properties and preparations of coordination compounds.
9. To understand the chemistry of organometallic compounds, homogenous hydrogenation and carbonyls.
10. To understand the bioinorganic chemistry of hemoglobin, myoglobin etc.

### **Learning Outcomes**

After the completion of the course, Students will be able to

6. Recognize the bonding in transition compounds by VBT and CFST theories.
7. Able to predict the geometry of coordination compounds and type of hybridization.
8. Able to determine the properties and preparations of Li, Al, Hg, Sn, Ti etc. metal compounds.
9. Able to recognize the biological reaction alkali and alkaline earth metals, nitrogen fixation, hemoglobin and myoglobin.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

## **Learning Objective & Outcome**

**HC -5<sup>th</sup> Semester**

**Subject: Physical chemistry-I**

**Subject Code: CH (H)-503**

### **Learning Objective**

This Course Enables the Student to

1. Understand the concept of Polarography.
2. Various types of polymers and polymerization.
3. Know about free volume theory and free energy of mixing of polymers.
4. Understand the concept of electricity storage and device used for electricity storage.

### **Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Various types of polymerization and kinetics and mechanism of that polymerization.
2. Understand various method of determining molecular mass of polymers.
3. Know various types of fuel cells.
4. Explain the process of polarographic techniques.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

## **Learning Objective & Outcome**

**HC -5<sup>th</sup> Semester**

**Subject: Physical chemistry-II**

**Subject Code: CH (H)-504**

### **Learning Objective**

This Course Enables the Student to

1. Understand the concept of statistical mechanics , Maxwell Boltzmann distribution law , negative temperature .
2. Understand the concept of nuclear reactions , nuclear fusion , nuclear fission, scintillation counter, radioactivity, kinetics of nuclear reactions.
3. Introduce the concept of dipole moment, Clausius Mosotti equation , dielectric properties of solids and magnetic properties of solids.
4. Understand the concept of polymer , types of polymers on the basis of their occurrence and on the basis of linkage, also will be able to calculate their weight.

### **Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Differentiate between classical and statistical thermodynamics.
2. Explain the possible number of particles in a state according to Maxwell Boltzmann distribution law.
3. Explain the different types of nuclear reactions and how they are useful in our life and how they are controlled .
4. Solve the numerical based on Clausius Mosotti equation , dipole moment, distinguish between solids on the basis of their magnetic behaviour.
5. To explain occurrence and use of polymers , also calculation of the molecular weight of polymers.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -5<sup>th</sup> Semester**

**Subject: Organic chemistry-I**

**Subject Code: CH (H)-505**

**Learning Objectives**

**This Course enables the student to**

1. Understand the basic organic chemistry, carbohydrates, NMR Spectroscopy, synthetic polymer chemistry etc.
2. Understanding the mode of action of synthetic detergents.
3. Provides tools for understanding and testing ideas that are applicable throughout science.

**Learning outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize polymers, understands the use of catalyst in polymerization reaction.
2. Understands the application of carbohydrate compounds.
3. Can find the synthetic application of organic polymers in industry.
4. Synthesize carbohydrates and understands how importance they are in human body.

RPS Degree College, Balana (Mahendargarh)

**Department of Chemistry**

2019-2020(Odd)

**Learning Objective & Outcome**

**HC -5<sup>th</sup> Semester**

**Subject: Organic chemistry-II**

**Subject Code: CH (H)-506**

**Learning Objectives**

**This Course enables the student to**

1. Understand the basic organic chemistry, heterocyclic chemistry, Amino acids, synthetic polymer chemistry etc.
2. Understanding and modelling protein structure.
3. Provides tools for understanding and testing ideas that are applicable throughout science.

**Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize polymers, understands the use of catalyst in polymerization reaction.
2. Understands the application of heterocyclic compounds in biomolecules.
3. Can find the synthetic application of organic dyes in industry.
4. Synthesize peptides and understands how importance they are in human body.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC -6<sup>th</sup> Semester**

**Subject: Inorganic chemistry-I**

**Subject Code: CH (H)-601**

**Learning Objectives**

This course enables the student

1. To understand the separation techniques for biological and chemical agents as well as related analytical problems.
2. To understand the uses of inorganic polymers.
3. To understand the uses of different inorganic polymers in making of commercial applications.
4. To understand the different advantages of analytical chemistry in different fields.

**Learning Outcomes**

Upon successful completion of the course it is intended that a student will be able

1. To understand the basic operation principles of chromatographic separation
2. Recognize the basic sample preparation and purification.
3. To understand the fundamentals of analytical chemistry and steps of a characteristic analysis.
4. To evaluate the analytical data in terms of statistics.
5. To understand the uses of solvent extraction techniques in oil extraction from almonds.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC -6<sup>th</sup> Semester**

**Subject: Inorganic chemistry-II**

**Subject Code: CH (H)-602**

**Learning Objectives**

- ✓ Knowledge of various kinds of air pollution, water pollution-their source, effect on environment and preventive measures.
- ✓ Introduction to industrial wastes- their types, treatment and disposal.
- ✓ Understanding the composition of nuclei, nuclear reactions, compound nuclear theories and study of tracers in chemistry.
- ✓ Explain the crystal structure of binary compounds and factors affecting crystal structure.

**Learning Outcomes**

On successful completion of the course students will be able to:

- ✓ An understanding of chemical methods employed for environmental problem.
- ✓ An understanding of role of microorganism in purification of air.
- ✓ Developed an understanding of the range and chemistry of hazardous compounds/metals in the Environment.
- ✓ Developed an understanding of the role of the chemist in sustainable development of the Environment.
- ✓ Learning about various nuclear reactions their role in energy generation, developed an understanding of responsibilities of young generation for sustainability of the environmental.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC -6<sup>th</sup> Semester**

**Subject: Physical chemistry-I**

**Subject Code: CH (H)-603**

**Learning Objective**

This Course Enables the Student to

1. Understand the concept of spectroscopy also different types of spectroscopy studied in chemistry for the analysis of molecule.
2. Understand the concept of types of transitions which corresponds to different signals related to their motion. Students will learn vibrational rotational and Raman spectroscopy given by different types of molecules
3. Introduce the concept molecular term symbol and transitions in between different electronic levels also Franck Condon principle.
4. Understand the concept of quantum mechanics. The students will come to know about the origin of quantum mechanics what are the different postulates of quantum mechanics and how it is used to determine function of different systems such as particle in one dimensional box and three dimensional box.

**Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Differentiate between classical and quantum mechanics
2. Explain the different types of transitions and their corresponding absorption of electromagnetic radiations corresponds to give spectrum
3. Explain the structure of molecule with the help of spectroscopy
4. Solve the quantum mechanical operators which are used in solving quantum mechanical problems.

RPS Degree College, Balana (Mahendargarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC -6<sup>th</sup> Semester**

**Subject: Physical chemistry-II**

**Subject Code: CH (H)-604**

### **Learning objectives**

The course enables the students to:

- Understand the concept of catalysis, promoter, poison, enzyme catalysis.
- Understand the concept of Molecular orbital theory and Molecular orbitals.
- Understand chromatography and chromatographic analysis.

### **Learning outcomes**

Upon the successful completion of the course it is intended that a student will be able to:

- Explain different type of chromatography techniques.
- Explain black body radiation, Compton effect dual nature of matter.
- Catalytic processes and various concepts of quantum mechanics.

RPS Degree College, Balana (Mahendergarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC -6<sup>th</sup> Semester**

**Subject: Organic chemistry-I**

**Subject Code: CH (H)-605**

**Learning Objectives**

**This Course enables the student to**

1. Understand the elucidation of structure in any biomolecules and know the importance of that biomolecule in human life cycle.
2. Understanding the importance of hormones enzymes and vitamins in human life cycle.
3. Synthesise drugs like paracetamol aspirin chloroquine etc.

**Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize biomolecules like vitamins, and enzymes.
2. Understands the use of drugs and their application.
3. Can find the difference between vitamins and enzymes and how importance are these biomolecules for the growth and maintenance of life.

RPS Degree College, Balana (Mahendargarh)

**Department of Chemistry**

2019-2020(Even)

**Learning Objective & Outcome**

**HC -6<sup>th</sup> Semester**

**Subject: Organic chemistry-II**

**Subject Code: CH (H)-606**

**Learning Objectives**

**This Course enables the student to**

1. Understand the elucidation of structure in any biomolecules and know the importance of that bio molecule in human life cycle.
2. Understanding the importance of hormones and vitamins in human life cycle.
3. Gives the information about pesticides and insecticides and the harmful effects in human life.

**Learning Outcomes**

**Upon successful completion of this course it is intended that a student will be able to**

1. Synthesize biomolecules like vitamins and enzymes.
2. Understands the use of pesticides and insecticides.
3. Can find the difference between vitamins and enzymes and how important are these bio molecules for the growth and maintenance of life.

**RPS Degree College, Balana Mahendergarh**  
**Department of Life Science**  
**Learning Objective & Outcomes, 2019-2020**  
**B.Sc.(H) Chem. 2<sup>nd</sup> Semester**  
**Subject: Plant Physiology and metabolism (Paper II)**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. To study basics of Plant water relations like osmosis, diffusion etc.
2. To study concept of water transport in plants.
3. To study concept of Photosynthesis, photosynthetic pigments etc.
4. Regulation of enzyme activity and mechanism of action which are involved in metabolism of plants.
5. To study Cellular respiration and various steps involved in it.
6. Evaluate biology of nitrogen fixation, lipids, carbohydrates etc.
7. To study the physiology of flowering.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Describe biocatalysis, pathway engineering, bioprocess control and downstream Processing.
2. Explain various physical phenomenon like osmosis, diffusion, imbibitions etc.
3. Explain the theory and practice of flowering physiology based on light and temperature.
4. Select and apply experimental procedures to the spectrum of fields making use of photosynthetic pigments.
5. Explain the metabolic processes like photosynthesis and respiration.
6. Explain biology of nitrogen fixation, lipids, carbohydrates etc.

**RPS Degree College, Balana Mahendergarh**  
**Department of Life Science**  
**Learning Objective & Outcomes, 2019-2020**  
**B.Sc.(H) Chem. 2<sup>nd</sup> Semester**  
**Subject: Biodiversity II- Chordata**

**Learning objectives**

1. To understand what the chordates are.
2. To understand different categories of chordates.
3. To understand the general characters of chordates.
4. To understand the level of organization in chordate subphylum.
5. To understand the origin and evolutionary relationship in different subphylum of chordates.

**Learning outcomes**

1. Student should be able to describe unique characters of urochordates, cephalochordates and fishes.
2. Student should be able to recognize life functions of urochordates to fishes.
3. To understand the ecological role of different groups of chordates.
4. To understand the diversity of chordates.

**RPS Degree College, Balana Mahendergarh**  
**Department of Life Science**  
**Learning Objective & Outcomes, 2019-2020**  
**B.Sc.(H) Chem. 4th Semester**  
**Subject: Genomics**

The specific objectives of this course are to expose students to the following topics:

1. To study basics of Gene mapping and transposable elements etc.
2. To study concept of mutations and types of mutations.
3. To study concept DNA Repair.
4. To study Various Gene families
5. To study The Human Genome Project.
6. To study overview of prokaryotic and Eukaryotic Genome.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Describe Gene mapping and transposable elements.
2. Explain various types of mutations.
3. Explain the theory and practice of Gene families.
4. Select and apply experimental procedures to the Huma genome Project
5. Explain the metabolic processes like DNA Repair pathways.
6. Explain Mapping strategies and mitochondrial genome.

**RPS Degree College, Balana, Mahendergarh**  
**Department of Botany**  
**2019-2020**

**Learning Objective & Outcomes**  
**B.Sc. Honours (Chemistry) 4<sup>th</sup> Semester**  
**Subject: ECONOMIC BOTANY**  
**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. Investigate utilization and domestication of crop plant throughout history.
2. Investigate many uses of plants by other culture
3. Study origin, distribution, botanical description, brief idea of cultivation and economic uses of pulses
4. Analyze morphological description, brief idea of cultivation and economic uses of medicinal plants

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Learn the importance of plant identification.
2. Participate in plant identification using observation skills.