

DEPARTMENT OF CHEMISTRY

Tulasi Women's College, Kendrapara

PROGRAM OUTCOMES: - B.Sc. Chemistry

“Better things for better Living through Chemistry.”

Chemistry teaching gears to the goals of education that covers a wide range of intended targets in the intellectual, personal and social domains. Conceptual learnings in the subject needs to be approached in a relevant manner, but also the teaching must not lose sight fact that the attitude, communication abilities and personal attributes such as creativity, initiative, safe working need to be developed.

B.Sc. Chemistry curriculum is so designed to provide the students a comprehensive understanding about the fundamentals of chemistry covering all the principles and perspectives.

The branches of Chemistry such as Organic Chemistry, Inorganic Chemistry, Physical Chemistry and Analytical Chemistry expose the diversified aspects of chemistry where the students experience a broader outlook of the subject.

The syllabi of the B.Sc. Chemistry course are discretely classified to give stepwise advancement of the subject knowledge right through the three years of the term that compose of six Semesters.

The practical exercises done in the laboratories impart the students the knowledge about various chemical reagents and reactions. Thereby, sharpen their skills of handling the corrosive, poisonous, explosive and carcinogenic chemicals making themselves employable in any kind of chemical industries. They are also trained about the adverse effects of the intolerable chemicals and the first aid treatment.

Degree students learn the chemistry knowledge and concept important for understanding and appreciating socio-scientific issues within the society. Chemistry graduates have job opportunity. Chemistry graduates are recruited by pharmaceutical companies as medical representative. Those who have studied chemistry may enter many different sectors including the food and drink industry and research, health, medical organization and scientific research organization and agencies.

The business of chemistry transforms the natural raw materials of the earth, sea and air into the products that we use every day. It creates the products that bring major societal benefits to the quality of life, health, productivity convenience and safety. Indeed, our food, safe water supply, clothing, shelter, healthcare, computer technology transportation and every other fact of modern life, all depend upon the business of chemistry. Studying chemistry allows developing subject specific and transferable skills which are valued by employers.

After course completion of Chemistry, the students can pursue MSc. course in various Universities, eligible for appearing JAM entrance, P.G Diploma in Analytical Chemistry, BEd etc.

The main employers of chemistry graduates are in chemical and related industries such as agrochemicals, pharmaceutical, petrochemicals, toiletries and plastic polymer. Chemistry graduates are eligible for entrance examination in OICL, ONGC etc. for recruitment as scientists.

A chemistry graduate may get job as:-

- ❖ Analytical Chemist
- ❖ Chemical Engineer
- ❖ Health care Scientist
- ❖ Clinical Biochemistry
- ❖ Forensic scientist
- ❖ Pharmacologist
- ❖ Research Scientist
- ❖ Toxicologist
- ❖ Environmental consultant
- ❖ Higher Education Lecturers
- ❖ Biochemist
- ❖ Food Scientist
- ❖ Environmental chemist
- ❖ Crystallographers
- ❖ Process Chemists
- ❖ Drug Designer
- ❖ Marine chemist
- ❖ Petroleum chemist etc.
- ❖ Senior Process Analytical Scientist
- ❖ Science Writer
- ❖ Secondary school teacher etc.

PROGRAM SPECIFIC OUTCOMES

To impart knowledge on different topics of Chemistry as Inorganic, Organic, Physical and Analytical; Polymer Chemistry, Green Chemistry and Industrial Chemicals and Environment. Importance of the level is expected from a Graduate Honours in Chemistry.

CORE	PSCOS	COURSE OUT COMES
Core -I	Inorganic Chemistry-I	To educate students on topics: Structure of the atom, Periodic Classification of Elements , Types of Chemical Bonding within the elements, molecules, compounds and metals , Redox reactions involved in volumetric analysis
Core-II	Physical Chemistry-I	To impart knowledge on states of matter – Solid, Liquid and Gaseous, To impart the knowledge of Acid – Base Indicators and Applications of PH and Buffer in Everyday life.
	Chemistry Practical (C-I & C-II)	To know the calibration and use of Burette and pipette in volumetric analysis for determination of Equivalent mass of base and percentage of acid in a mixture. Determination of surface tension and viscosity of liquids. Titration of Acid- Base by pH Meter.
Core- III	Organic Chemistry-1	To know the Basic concepts of Organic Chemistry of Saturated and Unsaturated Hydrocarbons along with introduction to different types of reactions. To know the stereochemistry of organic compounds involving Geometrical and Optical isomerism. Relative stability of cycloalkanes and Conformational isomerism of alkanes. To know the Aromaticity of Aromatic compounds and application of Huckel's rule. Also to know the types of Electrophilic substitution reactions and their mechanism.

Core- IV	Physical Chemistry-II	To educate students on the topics: Study of Chemical Thermodynamics involving First Law of Thermodynamics, Thermo Chemistry, types of heat of reactions, Kirchhoff equation at constant pressure and volume. Carnot Cycle, Second law of Thermodynamics & third law of Thermodynamics involving mathematical derivation of Entropy. Gibbs Free Energy and Work function. Chemical Equilibrium and its applications to various types of reactions involving mathematical expression for K_p , K_c , K_x . To know the types of solutions and colligative properties involving Osmotic pressure, relative lowering of vapor pressure, Depression in Freezing point and Elevation of Boiling point and associated with numerical.
	Chemistry Practical(C- III & C- IV)	To provide the checking the calibration of the thermometer. To identify the functional groups present in organic compounds and Determination of melting point of the unknown organic compound. To provide the students for determination of Heat capacity of calorimeter and enthalpy of neutralization of acid with base. Determination of enthalpy of hydration by means of calorimeter.
Core- V	Inorganic Chemistry- II	To educate students about the general principles of metallurgy, Concepts of acids and bases on the basis of various theories. To impart the understanding of S & P Block elements-I & II and their anomalous behavior and also to study of their compounds with emphasis on structure, bonding, preparation, properties and uses. Providing knowledge of occurrence and uses of Noble gases. To Know the preparation, properties, uses and structure of compounds of Xenon with Fluorine. To give the idea about Inorganic polymer as Silicones, Borazine and Phosphazenes.
Core-VI	Organic Chemistry -II	To educate students on chemistry of Halogenated Hydrocarbons, Phenols, Alcohols. Ethers and Epoxies, Carbonyl compounds and Active methylene

		compounds. To provide the chemistry of Carboxylic Acids and their Derivatives. To know the chemistry of Sulphur containing compounds.
Core- VII	Physical Chemistry-III	<p>To impart the knowledge about Phase Equilibria- I involving phase diagram of one component system (water and Sulphur), Phase diagram of solid-liquid equilibria.</p> <p>To provide the knowledge of Phase Equilibria-II involving three component systems, Binary solutions and Nernst distribution law: Its applications.</p> <p>To impart the Chemical Kinetics of simple and complex reactions.</p> <p>To provide basic understanding about Catalysis and Surface Chemistry</p>
	Chemistry Practical (C-V,VI,VII)	<p>. To provide laboratory experience on selected experiments related to topics taught in theory. To know the preparation of standard solution and preparation of inorganic compounds.</p> <p>To provide laboratory experience to the student's experiments based on organic compounds synthesis and their purification methods.</p> <p>To provide the determination of distribution coefficient and study of kinetics experimentally</p>
Core- VIII	Inorganic Chemistry-III	<p>To offer an advanced course on theories of coordination compounds and its nomenclature.</p> <p>To impart understanding of the characteristics of 1st, 2nd, & 3rd row transition series. To study the chemistry of Transition Elements –II (Ti, V, Cr, Mn, Fe etc. and knowledge about the characteristics of Lanthanoids and Actinoids.</p> <p>To impart advanced knowledge on Bioinorganic Chemistry & its applications to Bio system.</p>

Core- IX	Organic Chemistry- III	<p>To offer the preparation, reactions of Nitro Alkanes, Nitriles and Aliphatic amines.</p> <p>To study the preparation and synthetic application of Diazonium Salts, Preparation of Polynuclear Hydrocarbons and their chemical properties.</p> <p>To provide the classification, nomenclature, structure, synthesis and Aromaticity of Heterocyclic Compounds.</p> <p>To offer the knowledge about the natural occurrence and Importance of Alkaloids and Terpenes</p>
Core- X	Physical Chemistry- IV	<p>To impart the knowledge about Conductance-I involving variation with dilution for weak and strong electrolytes.</p> <p>Conductance-II involving conductometric titrations and applications of conductance to calculate solubility and solubility product of sparingly soluble salts</p> <p>Electrochemistry-I offers Quantitative aspects of Faraday's laws of electrolysis and applications of EMF measurement in determining of Free energy and Entropy of a chemical reaction.</p> <p>Electrochemistry –II gives the idea about concentration cells with and without transference, Potentiometric titration of acid and base. It imparts the knowledge about electrical properties of atoms and molecules.</p>
	Chemistry Practical- (C-VIII,IX,X)	<p>To provide the laboratory preparation of complexes and gravimetric analysis of the elements</p> <p>To provide the laboratory experiments about the qualitative organic analysis of compounds, melting points, boiling points and preparation of the derivatives.</p> <p>To impart the practical knowledge about conductometric titrations and potentiometric titrations.</p>
Core-XI	Organic Chemistry-IV	<p>It offers Organic Spectroscopy –I which gives the knowledge about UV Spectroscopy and its applications.</p> <p>To provide a course of Organic Spectroscopy –II which gives an idea about IR Spectroscopy for analysis of</p>

		<p>simple functional group analysis?</p> <p>To provide NMR Spectroscopy involving Basic principles and Interpretation of NMR of simple organic compounds.</p> <p>To impart the knowledge about Carbohydrates:- occurrence, classification and biological importance. It gives an idea about monosaccharide and disaccharides.</p>
Core- XII	Physical Chemistry-V	<p>To impart understanding on advanced topics of Quantum Chemistry involving Schrodinger wave equations and simple harmonic oscillator model of vibrational motion</p> <p>To offer about the chemical bonding involving VBT, MOT and LCAO.</p> <p>To provide the knowledge about the chapter Molecular Spectroscopy –I including rotational spectroscopy and vibrational spectroscopy.</p> <p>It offers Molecular Spectroscopy-II involving Raman Spectroscopy, Electronic Spectroscopy that emphasis about fluorescence and phosphorescence. To provide the idea about Photochemistry consisting of the laws and chemiluminescence.</p>
	Chemistry Practical(C-XI &XII)	<p>To insist the experimental work about the qualitative analysis of unknown organic compounds containing bifunctional groups.</p> <p>To learn the laboratory work about the titration of acid and base Spectrophotometrically.</p>
Core-XIII	Inorganic Chemistry- IV	<p>To offer about the Theoretical principles in qualitative analysis involving basic principles. To know the study of catalysis by organometallic compounds by industrial processes.</p> <p>To impart the knowledge about the chapter Organometallic Compounds–I including the classifications and the structures.</p> <p>To provide the chapter about Organometallic</p>

		<p>compounds-II involving role of triethyl Aluminum in polymerization of ethane. To know the structure and preparation of Ferrocene.</p> <p>To educate on advanced topics of inorganic reaction mechanism and non-aqueous solvents.</p>
Core- XIV	Organic Chemistry- V	<p>To provide the classification, synthesis, reactions of Amino Acids, Peptides and Proteins.</p> <p>To offer the classification and characteristics of Enzymes and Nucleic Acids.</p> <p>To give an idea about the Oils, fats and Lipids:- applications</p> <p>To study about the synthesis and application of Pharmaceutical compounds.</p>
	Chemistry Practical-(C- XIII& XIV)	To provide laboratory experience to the students by performing experiments based on topics taught in theory.
DSE-I	Polymer Chemistry	<p>To impart the knowledge about the classification, nomenclature, functionality and importance of Polymers.</p> <p>To study the mechanism and kinetics of various types of Polymerization reactions. To study the Crystallization and crystallinity of polymers.</p> <p>To study about the Molecular weight of Polymers including glass transition temperature.</p> <p>To impart the knowledge about the preparation, structure, properties and applications of Polymers.</p>
DSE-II	Green Chemistry	<p>To offer the twelve principles of Green Chemistry and their applications</p> <p>To provide the principles of Green Chemistry and designing a chemical synthesis.</p> <p>To impart the knowledge of synthesis of organic</p>

		<p>compounds by Microwave, Ultrasonic method.</p> <p>To offer the Green synthesis of organic compounds.</p> <p>It provides the Future Trends in Green Chemistry.</p>
DSE- III	Industrial Chemicals and Environment	<p>To offer the knowledge about industrial gases and inorganic chemicals.</p> <p>To provide the study of environment and its segments.</p> <p>To acquire the learnings about environmental pollutions as water pollution and air pollution and also its measures.</p> <p>To impart the knowledge about energy and environment.</p>
DSE- IV	Project	The research project forms part of the final year Honours curriculum for students on any of the BSc degree programmes in chemistry.
GEA-I	Inorganic Chemistry and Organic Chemistry	<p>It offers about Atomic Structure,</p> <p>To know the types of Chemical bonding involved in inorganic simple molecules.</p> <p>To offer the Fundamentals of Organic Chemistry. Types of Stereochemistry including geometrical isomerism, optical isomerism and conformational isomerism.</p> <p>To provide the chemistry of Aliphatic Hydrocarbons.</p>
GEA -II	Physical Chemistry and Organic chemistry	<p>To offer the knowledge about Chemical Energetics, Chemical Equilibrium.</p> <p>Ionic Equilibrium involving Ionic product of water, Buffer solution. To study the chemistry of Aromatic hydrocarbons, Alkyl halides and Aryl Halides.</p> <p>To impart the chemistry of Alcohols, Phenols, Ethers, Aldehydes and Ketones</p>

COURSE OUT COMES

SEMESTER-1

CORE-I

1. Give the postulates of Bohr's model of atom. Give its applications.
2. Discuss Schrodinger wave equation.
3. State and explain Heisenberg's uncertainty principle. Describe its experimental verification.
4. State and explain Pauli's exclusion principle.
5. Explain normal wave functions and orthogonal wave functions.
6. State and explain Vander Waal's radius.
7. Define first ionization energy. Describe the trend of first ionisation energies of elements along a period on down the group in the periodic table.
8. Discuss the various factors that affect either electron affinity or electronegativity?
9. Discuss Born-Harber cycle? Give its applications.
10. Discuss Heitler-london's valence bond theory.
11. Explain hybridisation.
12. Discuss postulates of VSPER theory.

PRACTICAL- C-I(Course out comes)

1. Estimate the amount of sodium carbonate & sodium hydroxide present in the supplied mixture solution using standard hydrochloric acid solution.
2. Estimate the amount of sodium carbonate and sodium bicarbonate present in the supplied mixture solution using standard hydrochloric acid solution.

CORE- II

1. Discuss the postulates of kinetic theory of gases and kinetic gas equation.
2. Derive Vander wall's equation of state and explain its applications.
3. Define collision diameter, collision number and collision frequency.
4. Explain the term viscosity.

5. Discuss common ion effect and its application.
 6. Derive Ostwald's dilution law for a weak electrolyte.
 7. Define ionic product of water.
 8. Give an account of powder of powder pattern method for the study of crystal.
 9. Distinguish between schottky and frankel defect.
10. Derive Henderson's equation for acidic and the basic buffer mixtures.

PRACTICAL- C-II(Course out comes)

1. Determine the surface tension of the supplied liquid by drop weight method at room temperature.
2. Determine the viscosity of the supplied aqueous ethanol at room temperature using Ostwald's viscometer.

SEMESTER –II

CORE –III

1. Explain inductive effect.
2. Discuss electrophilic and nucleophilic addition reaction.
3. Describe full form of SN1 and SN2 reactions and give one example for each.
4. Difference between Enantiomers and Diastereomers.
5. How will you proceed to assign R and S configuration from planner formula? Explain with examples.
6. Explain biological method for the resolution of the racemic modification.
7. Explain that Kharasch effect is shown by HBr only and not by HCl or HI.
8. Alkenes are more reactive towards electrophilic addition compared to alkynes.
9. Alkynes are more reactive towards nucleophilic addition as compared to alkenes.
10. How will you account for the fact that an OH group in the benzene ring is the ortho and para directing group while CHO group is meta directing in nature.

PRACTICAL- C-III

1. Identification of the supplied organic compound.
2. Separate two amino acids in the given mixture by ascending paper chromatography.

CORE-IV

1. Derive Kirchoff's equation and indicate some of its applications.
2. State and explain first law of thermodynamics .Give its limitations.
3. Explain $C_p - C_v = R$ for one mole of an ideal gas.
4. State and explain the law of chemical equilibrium. Determine K_p for the various types of chemical reactions.
5. Explain the effect of temperature in the state of equilibrium.
6. State law of mass action and derive it from collision theory
7. State and explain Le-Chateliers principle.
8. Derive the relation between ΔG and K_p .
9. Prove that Elevation in boiling point is a colligative property.
10. Explain the terms osmosis and osmotic pressure.
11. Explain Raoult's law of ideal solution.

PRACTICAL- C-IV

1. Determine the heat capacity of the given calorimeter.
2. Determine the heat of neutralisation of supplied hydrochloric acid with sodium hydroxide at room temperature.

SEMESTER-III

CORE-V

1. Use Ellingham diagram to explain the reduction of metal oxides with either carbon or carbon monoxide.
2. Explain with an example the electrolytic reduction process for the extraction of metals.
3. Describe the Van-Arkel de-Boer process to purify metals.
4. Describe the relative stability of different oxidation states of S and P-block elements.
5. Describe the general trend in the oxidation states of P-block elements.
6. Describe the preparation, properties and structure orthoboric acid.
7. Give the preparation, properties, uses and structure of boron nitride.
8. Explain silicons and give their uses.
9. Discuss the preparation and structure of phosphazene.
10. Define Co-polymer resins and give their structure and uses.

PRACTICAL- C-V

1. Preparation of Potash alum.
2. Preparation of Cuprous chloride.

CORE-VI

1. Explain SN^2 mechanism with example.
2. Compare SN^1 and SN^2 reaction in alkyl halide.
3. Write detailed account of Pinacol-pinacolone rearrangement.
4. Brief notes on (i) Reimer-Tiemann reaction.
(ii) Schotten-Baumann reaction.
5. Write a note on Witting reaction.
6. Describe Meerwein-Ponndorf-Verley reduction and Clemmensen reduction.
7. Explain Perkin's reaction and Reformatsky reaction with mechanism.
8. Give an example of Claisen condensation with mechanism.
9. Give the mechanism of Hoffmann-bromide degradation reaction.
10. Discuss Cannizzaro reaction and its mechanism with example.

PRACTICAL- C-VI

1. Preparation of Benzoyl derivative of aniline.
2. Preparation of Benzoyl derivative of phenol.

CORE-VII

1. Derive Clausius-Clapeyron equation for the equilibrium liquid \rightleftharpoons vapour.
2. Discuss congruent and incongruent melting points.
3. Discuss partially miscible liquid system and critical solution temperature.
4. Discuss the phase diagram of one component water systems and explain the followings with the help of diagram.
(i) Bivariant system (ii) Univariant system
(iii) Metastable equilibrium (iv) Invariant or triple point
5. Distinguish between maximum and minimum boiling azeotrope.
6. Derive Gibb's-Duhem-Margules equation.

7. Derive an expression for the Kinetics of the first order reaction.
8. Describe in detail about the collision theory of reaction.
9. Explain Freundlich isotherm. Give a brief account of Langmuir theory of adsorption.

PRACTICAL- C-VII

1. Determine the distribution co-efficient of benzoic acid between water and cyclohexane.
2. Determine the rate constant of acid catalysed hydrolysis of methyl acetate with hydrochloric acid at room temperature.

SEMESTER– IV

CORE-VIII

1. Discuss postulates of Werner's theory of co- ordination compound.
2. Discuss the optical isomers of the co- ordination compound with co-ordination number 4 and 6 with an example.
3. Discuss the important postulates of VBT about the formation of complex compound and write its application.
4. Discuss the important postulates of crystal field theory.
5. Write the difference between 1st, 2nd and 3rd row transition series.
6. Explain stability of oxidation state by Latimer diagram.
7. Explain the oxidation state, complex formation of titanium group.
8. Discuss the important characteristics of lanthanides.
9. Explain the lanthanide contraction.
10. Discuss the variable oxidation state of Titanium with suitable example of compound.
11. Briefly classify the elements according to their action in biological system.

PRACTICAL- C-VIII

1. Estimation of nickel (II) using dimethyl glyoxime.
2. Estimation of calcium and magnesium using EDTA solution.

CORE-IX

1. Write the reduction of Nitroalkanes in different medium.
2. Discuss Sandmeyer reaction and explain the mechanism.
3. Draw orbital structure of pyridine and pyrrole and compare their basicity.
4. Explain briefly aromatic character of furan, Thiophene and Pyrrole.
5. Discuss the structure and property of nicotine.
6. How can you proceed to determine structure of alkaloids.
7. Why pyridine is weaker base than aliphatic tertiary amine.
8. Write preparation of nitrobenzene and its mechanism.
9. What happens when Furan is heated with sulphur dioxide in presence of pyridine?

PRACTICAL- C-IX

1. Qualitative analysis of unknown organic compound (C,H,N & C, H, O System).

CORE-X

1. Explain Arrhenius theory of electrolytic dissociation.
2. Define equivalent conductance, write the relationship between equimolar and specific conductance.
3. Give Kohlrausch's law of independent migration of ion, write one of its applications.
4. Derive degree of dissociation of weak electrolyte for conductance measurement.
5. Derive solubility and solubility product of sparingly soluble salt.
6. Determine the transport number by moving boundary method.
7. Derive the relationship between entropy and free energy of same reaction.
8. Determination of P^H by using hydrogen electrode.
9. Define liquid junction potential, derive its mathematical expression.
10. Determine the dipole moment of a substance from EMF measurement.

PRACTICAL- C-X

1. Determine the strength of the supplied strong acid by conductometric titration with strong base.
2. Determine the strength of strong acid\strong base by potentiometric titration.

SEMESTER-V

CORE-XI

1. Write down the structure of nucleoside which is present only in RNA.
2. Explain nucleotide.
3. Write down the structure of sugar present in DNA.
4. Explain nucleoside.
5. Explain enzymes and co-enzymes.
6. Discuss active site and specificity.
7. Discuss Fischer's Lock and key model.
8. Explain enzyme kinetics and also explain the factors which effect the rate of enzymatic reactions.
9. Explain the zwitter ion structure of protein.
10. Discuss Gabriel phthalimide synthesis.
11. Define and explain detergents and their washing action.
12. Define iodine and acid values.
13. Sketch the saponification of triglycerides.
14. Define and explain the term antibiotic.
15. Describe the synthesis of chloroamphenicol.

PRACTICAL- C-XI

1. Preparation of pure sample of Aspirin.
2. Preparation of Aluminum hydroxide Gel.

CORE-XII

1. Write the expression for Schrodinger wave equation.
2. Explain Hamiltonian function.
3. Write the various postulates of quantum mechanics.
4. State and explain normalised wave function.
5. State and explain orthogonal wave function.
6. Draw the molecular diagram of HF.
7. Give the electron charge density diagram for bonding and antibonding orbitals.
8. Explain localised and non-localised molecular orbitals.
9. Write points to give a clear comparison between VBT and MOT.
10. Describe Born-oppenheimer approximation with its importance.
11. Define a normal mode of molecule.

12. Explain why H_2 and N_2 molecules do not show rotational spectrum.
13. Explain singlet and triplet state
14. State and explain Franck Condon principle.
15. Define and explain Einstein's law of photochemical equivalence.

PRACTICAL- C-XII

1. Determine the concentration of HCl against 0.1N NaOH Spectrophotometrically.
2. Determine the concentration of Cu(II) & Fe(II) solution photometrically by titrating with EDTA.

SEMESTER - VI

CORE- XIII

1. Discuss the basic principle involved the analysis of cation and anion by application of solubility product and common ion effect.
2. Describe the principle and involved in separation of cations in to groups and choice oh group reagents.
3. Note on interfering anions.
4. Describe the classification of organometallic compounds on the basis of bond type.
5. Discuss the structures of mono nuclear and binuclear carbonyl of Cr, Mn and Co.
6. Describe preparation and structure of Zeises salts.
7. Role of triethylaluminium in polymerization of Ethene by using Ziegler –Natta catalyst.
8. Preparation and reaction of Ferrocene.
9. Describe the substitution reaction and mechanism in square planar complexes.
10. Discuss the mechanism and kinetic study of octahedral complexes.
11. Note on trans effect and describe the theory of trans effect.

PRACTICAL- C-XIII

1. Systematically analyze & identify the two acid radicals and two basic radicals of the supplied salt mixture.

CORE-XIV

1. Describe the basic principle of NMR and factor affecting shielding and deshielding mechanism.
2. Discuss Anisotropic effects in alkene , alkyne and aldehyde.
3. Interpretation NMR spectra of aqueous 1,3 –dichloropropane.
4. Basic principle , instrumentation of mass spectroscopy.
5. Note on Mc-Lafferty and retrodiels Alder rearrangement.
6. Application of Mass spectroscopy on methane, Benzene and alcohols.
7. Note on Haworth projection of glucose and fructose.
8. Convert Aldose to Ketose and vice versa.
9. Note on Kiliani –Fischer synthesis.
10. Note on classification of Dyes with example.

PRACTICAL- C-XIV

1. Preparation of pure and dry sample sodium polyacrylate.
2. Extraction of caffeine from the tea leaves.

DSE-I

1. Differentiate between thermosetting polymers and thermoplastic polymers.
2. Briefly discuss the texture of polymers.
3. Briefly discuss the criteria for polymer formations.
4. Explain suspension polymerisation.
5. Explain emulsion polymerisation.
6. Discuss the kinetic of linear step growth polymerisation.
7. Discuss about the different types of free radicals used for the free radical polymerization.
8. Calculate the rate of polymerisation by using dilatometric method.
9. Discuss and derive the rate expression for a ternary co-polymer system.

10. Briefly discuss the measurement of crystalline melting point by DSC.
11. Explain how structure of a polymer affects its mechanical properties.
12. Briefly discuss the characteristic properties of plastics.
13. Discuss Osmometry method for the determination of the high polymers.
14. Discuss LDPE and HDPE.
15. Write the preparation, properties and uses of epoxy resin.

DSE-II

1. Discuss the twelve principles of green chemistry given by P. Anastas and J.C. Warner.
2. Explain super critical carbon dioxide state by the phase diagram.
3. Explain super critical state of water by the help of a phase diagram.
4. Write the characteristics of comparing the greenness of solvents.
5. Explain why sticker synthesis is replaced by Monsanto process for the synthesis of Disodiumiminodiacetate.
6. Discuss Hoffmann elimination.
7. Discuss Diels –Alder reaction.
8. Explain how super critical CO₂ replaces Ozone depleting and smog forming solvents for precision cleaning and dry cleaning of garments.
9. Mention a green oxidation reaction with reference to synthesis of adipic acid.
10. Explain how right-fit pigments are environment friendly.
11. How green chemistry helps creating a sustainable development.
12. Discuss the importance of green chemistry in day to day life.
13. Explain why Dimethyl carbonate is a better reagent than methyl sulphate for methylation of active methylation group.

DSE-III

1. Describe Bosch process for preparation of hydrogen.
2. Describe manufacture of acetylene.
3. Discuss the problem of storage and handling of acetylene gas.
4. Describe the hazards associated with chlorine gas.
5. Explain the effect of ozone in troposphere.
6. Describe the effects of global warming.
7. Discuss the effect of air pollution on plants.
8. Describe sewage treatment methods in detail.
9. Describe the desalinization method for purification of water.
10. Describe various forms of chlorination.
11. Describe different methods of sewage disposal.

DSE- IV

The project is carried out in the laboratory of a member of the academic staff. A project is selected for four students. The student is required to review the background of the research area assigned, write a literature survey and references that give an oral presentation on this as a formative exercise.

To carry out appropriate analytical or experimental work before subsequently writing a report and making an oral presentation of the research before a small audience. The aim is to acquire the necessary skills to perform chemical research in a professional environment

GEA-1

1. Explain Planck's quantum number of radiation. Give also the applications of quantum theory.
2. Explain normal wave functions and orthogonal wave functions.
3. Give the postulates of Bohr's model of atom. Give its limitations.
4. Explain quantization of energy and give its evidence.
5. State and explain Pauli's exclusion principle.
6. Explain Aufbau principle .Give its limitations.
7. State and explain Born-Haber cycle .Give its application.
8. Write the rules for filling molecular orbitals.
9. Give the difference between VBT and MOT.
10. Explain inductive effect.
11. Explain mesomeric effect.
12. Distinguish between enantiomers and diastereoisomers.
13. Explain D and L Notation.
14. Discuss the conformation of cyclopentane.
15. Draw Newman projection for chair and boat conformation of cyclohexane.
16. Discuss the mechanism of addition of carbenes to alkenes.
17. Discuss the stability of the various types of dienes.
18. Explain that Kharasch effect is shown by HBr only and not by HCl or HI.

GEA-2

1. Define and explain integral and differential enthalpies of dilution.
2. Derive Kirchoff's equation.
3. Distinguish between bond energy and bond dissociation energy.
4. Define and explain the term Buffer solution.
5. Briefly describe the theory of acid –base indicators.
6. State the Henderson's equation.
7. Explain buffer solution .Give its application.
8. Define Saytzev rule with an example.
9. Discuss the mechanism of dehydrohalogenation of ethyl chloride.
10. Explain with mechanism S_N1 reactions.
12. Write the mechanism of esterification reaction.
13. Distinguish primary, secondary and tertiary alcohols by Lucas test.
14. Explain the acidic nature of phenols.
15. Give an example of Reimer – Tiemann reaction with mechanism.
16. Write the mechanism of benzoin condensation.
17. Discuss Aldol condensation with mechanism giving suitable examples.
18. Write a note on witting reaction.