

B.Sc.-PartIII(CBCS) Chemistry

SEMESTER-V

PaperNo.DSE-E5,ChemistryPaperNo.–IX
(InorganicChemistry)

Nameofthetopic	ExpectedLearningOutcome
1.AcidsbasesandNon-aqueoussolvents	Usefulforthestudyofrole ofacidsandbasesin Chemistry. The study of non –aqueoussolvents is important to learn all chemicalpropertiesofsolutesandfromthere search pointofview.
2.Metalligandbondingintransitionmeta lcomplexes	Usefultounderstandgeometry,stabilityand natureofbondingbetweenmetalionand ligandincomplexes.
3.Metals,semiconductorsa ndSuperconductors	The topic deals with the synthesis and theapplicationsofthesemiconductorsand Superconductorsinelectricalandelectroni cdevices.
4.Organometalliccompounds	Thestructure,methodofpreparationandthe applicationsoforgano metalliccompoundinvariousfieldsareexpl ained.
5.Catalysis	The classification, types, mechanism andapplicationsofcatalystinindustrialfiel dsisexplained.

PaperNo.DSE-E6ChemistryPaperNo.X

(OrganicChemistry)

Nameofthetopic	ExpectedLearningOutcome
1. IntroductiontoSpectroscopy	Understandingof energyassociatedwith electromagneticradiation anditsuseinanalyticaltechnique.
2.UV-VisSpectroscopy	Knowledgeofchromophore,auxochromeand calculationof λ_{max} .
3. IRSpectroscopy	Knowledgeofvibrationaltransitions,regionsof IR spectrum,functionalgrouprecognition.

4. NMR Spectroscopy	Understanding of magnetic-nonmagnetic nuclei, shielding-desielding, chemical shift, splitting Pattern
5. Mass Spectroscopy.	Knowledge of molecular ion, fragmentation pattern and different types of ions produced.
6. Combined Problems based on UV-Vis, IR, NMR and Mass Spectral data	Student will predict the structure of organic compound with the help of provided spectral data.

Paper No. DSE- E7 Chemistry Paper No. XI

(Physical Chemistry)

Name of the Topics	Expected Learning Outcome
1. Elementary quantum mechanics	Learning and understanding quantum Chemistry, Heisenberg's uncertainty principle, concept of energy operators (Hamiltonian), learning of Schrodinger wave equation. Physical interpretation of the ψ and ψ^2 . Particle in a one dimensional box
2. Spectroscopy	Knowledge about spectroscopy, Electromagnetic spectrum, Energy level diagram, Study of rotational spectra of diatomic molecules: Rigid rotor model, Microwave oven, vibrational spectra of diatomic molecules, simple Harmonic oscillator model, Raman spectra: Concept of polarizability, pure rotational and pure Vibrational Raman spectra of diatomic molecules, related knowledge will be gained by the students.
3. Photochemistry	Learning and understanding photochemical laws, reactions and various photochemical phenomena.
4. Solution	Learning the various types of solutions, relations vapour pressure, temperature relations.
5. Electromotive force	Learning and understanding the knowledge of emf measurements, types of electrodes, different types of cells, various applications of emf measurements.

Paper No. DSE-E8 Chemistry paper No. XII

(Analytical Chemistry)

Name of the topic	Expected Learning Outcome
1. Theory of Gravimetric Analysis	Learning and understanding the techniques of gravimetric analysis.
2. Flame Photometry	Knowledge of instrumental analysis of alkaline earth elements.
3. Colorimetry and Spectrophotometry	Understanding, working and applications of optical methods as an analytical tool.
4. Potentiometric titrations	Understanding theory and applications of potentiometric titrations.

5. Chromatographic techniques and Quality control	Understanding the basics of ion exchange and column adsorption chromatography, Quality control practices in analytical industries /laboratories.
---	--

SEMESTER-VI

Paper No. DSE-F5, Chemistry Paper No. – XIII

(Inorganic Chemistry)

Name of the topic	Expected Learning Outcome
1. Coordination Chemistry	The topic focused on the mechanism of the reactions involved in inorganic complexes of transition metals. The students can understand the thermodynamic and kinetic aspects of metal complexes.
2. Nuclear Chemistry	The generation of nuclear power with the help of nuclear reactions is highlighted. Role of radioisotopes in medicinal, industrial and Archaeology fields is explained.
3. Chemistry of f-block Elements	The characteristics, properties and separation of lanthanides and Actinides are discussed. Synthesis and IUPAC Nomenclature of transuranic elements (TU) explained.
4. Iron and Steel	The techniques involved in iron dressing and extraction of cast iron from its ore are discussed.
5. Bio-inorganic Chemistry	Role of various metals and non-metals in our health are discussed.

Paper No. DSE-F6 Chemistry Paper No. XIV

(Organic Chemistry)

Name of the topic	Expected Learning Outcome
1. Reagents and Reactions in Organic Synthesis	Knowledge of reagents used in organic transformations and various reactions used in organic synthesis.
2. Retrosynthesis	Knowing basic terms used in retrosynthetic analysis, retrosynthesis of some organic compounds.

3. Electrophilic addition to $>C=C<$ and $-C\equiv C-$ bond	Student will learn addition reaction across $>C=C<$ bond w.r.t. hydrohalogenation, hydration, hydroxylation, ozonolysis and addition of halogen, halogen acid, hydrogen, water, etc. across $-C\equiv C-$ bond.
4. Natural Products	Knowledge of terpenoids and alkaloids w.r.t. occurrence, isolation, characteristics and classification. Analytical and synthetic evidences of Citral and Nicotine.
5. Pharmaceuticals	Understanding classification of drugs, Qualities of ideal drug. Synthesis and uses of some representative drug and Drug action of sulphadiazine.

Paper No. DSE-F7 Chemistry Paper No. XV

(Physical Chemistry)

Name of the Topics	Expected Learning Outcome
1. Phase equilibria	Learning and understanding of phase rule, learning of One component, Two component and Three component systems phase diagrams with suitable examples.
2. Thermodynamics	Knowledge about basic concept of Thermodynamics, free energy, Gibbs-Helmholtz equation and its applications, problem related with it.
3. Solid state chemistry	Learning and understanding Space lattice, lattice sites, Lattice planes, Unit cell. Laws of crystallography, Weiss indices and Miller indices, Cubic lattices and types of cubic lattice, planes or faces of a simple cubic system, Diffraction of X-rays, Derivation of Bragg's equation. Determination of crystal structure by Bragg's method. crystal structure of NaCl and KCl on the basis of Bragg's equation.
4. Chemical kinetics	Learning of kinetics, Simultaneous reactions such as i) opposing reaction ii) side reaction iii) consecutive reactions: iv) chain reaction v) explosive reaction
5. Distribution law	Learning and understanding the knowledge of distribution law, its modifications, applications of distribution laws, process of extraction, determination of solubility, distribution indicators, molecular weights.

**PaperNo.DSE-F8Chemistry PaperNo. XVI
(IndustrialChemistry)**

Nameof thetopic	ExpectedLearningOutcome
1.Sugar Industry	Learningand understandingthewholeprocess of manufacture of sugar andbyproductsofsugarindustry.
2.Manufactureofindustrialheavychemicals	Learningandunderstandingofphysico-chemical principles ofproduction ofammonia, sulfuric acid, nitric acid andsodium carbonate along with itsmanufacturingplant.
3.Syntheticpolymers	Understanding andlearning theclassification,synthesisandapplicationso fvariouspolymers.
4.Petroleumindustryandeco-friendlyfuels	Understandingthepetroleum Industry,fuelsandneedofuseofecofriendlyfu els.
5.Nanotechnology	Understanding and learning ofnanotechnology including classification,optical properties, synthesis routes,characterizationtechniquesandapplic ationsofnano-materials.