M.SC. I

Paper – I (Physical Chemistry – I)[Cy- 501]

1. Atomic Structure and Bonding:

Atomic orbital, electronic configuration of atoms(L-S coupling) and periodic properties of elements, ionic radii, ionization potential, electron affinity, electronegativity, concept of hybridization, homo and hetero nuclear diatomic molecules

2. Quantum Chemistry:

Wave particle duality, Schrodinger wave equation, postulates of quantum mechanics, eigen values and eigen function, discussion of solution, Schrodinger wave equation to some model system viz. particle in a box, the harmonic oscillator, the rigid rotor, application of variation method and perturbation theory to the hydrogen atom.

3. Thermodynamics:

Brief resume of concept of laws of thermodynamics, entropy and entropy changes, free energy and work function, Gibbs's Helmholtz equation, Maxwell's thermodynamic relations, partial molar quantities, chemical potential, Gibbs's duhem equation, concept of fugacity and its determination

4. Electrochemistry:

Electrochemical cells, cell reactions, reference electrodes, indicator electrodes, glass electrode, ion selective electrodes, measurement of EMF, concentration cells with & without liquid junction potential, use of EMF in determination of activity & pH, Potentiometric titrations, Polarography, Ilkovic equation, half wave potential and its significance. Amperometric titrations, Electrokinetic phenomenon, electrode- electrolyte interface, electrical double layer, structure of double layer (Helmholtz , Goy –Chapman , Stern and Graham Devanathan model) Over potential, exchange current density. Derivation of Butler-Volmer equation, Tafel plot.

5. Conductimetry:

Conductance, equivalent & molar conductance, measurement of conductance, Ostwald dilution law, Deby-Huckel limiting law, relaxation& electrophorectic effects, Onsager equation , ionic

& hydrogen chlorine) fluoremetry, chemical laser & practical laser, application c laser in chemistry, a brief discussion of photo electron spectroscopy.

4. Gaseous State:

Kinetic gas equation , deviation from ideal behavior, real gases, Vander wall's equation, virial equation of state, distirbution of molecular speed.

5. Liquid & Solid State:

Physical properties of liquids (surface tension ,viscosity & refractive index) structure of liquid, lattice and unit cell, identification of lattice planes, X ray elecrtron, neutron diffraction.

6. Gas Liquid Chromatography and High Performance Liquid Chromatograph

Basic principles of GLC, HPLC and their applications

References:

1. *Physical chemistry,P.W.Atkins,ELBS*
2. *Introduction to quantum chemistry, A.K. Chadda, Tata Mc graw HIll*
3. *Advance physical chemistry, Puri, Sharma & Pathania*
4. *Advance physical chemistry, K.L. Kapoor, Mac millan India.*
5. *Chemical kinectics ,K.J.Laidlar, Mc graw Hill*
6. *Modernelectro chemistry ,Bockris & Reddy, Planum.*
7. *Basic concepts of analytical Chemistry: S. M. Khopkar, Wiley Eastern Ltd.*

Paper –III(Inorganic Chemistry- I)[CY- 503]

1. Chemistry Of Non-Transition Elements :

General discussion on the properties of non-transition elements; preparation, properties and structure of boric acid, borates, boron nitrides, borohydrides (diborane), carboranes, oxides and oxyacids of nitrogen, phosphorous, sulphur and chlorine; interhalogen compounds, polyhalide ions, pseudohalogens, fluorocarbons and basic of noble gases, preparation, structure and bonding of noble gas compounds

2. Chemistry of Transition Elements:

General characteristics, variable oxidation states, complex formation,colour, magnetic and catalytic properties. Comparative study of 4d and 5d transition elements with 3d analogues with respect to their ionic radii, oxidation states and magnetic properties.

3. **General Chemistry Of " f " Block Elements**:

Lanthanides and actinides; separation, oxidation states, magnetic and spectral properties, lanthanide contraction.

4. **Coordination Chemistry**:

Double salts and Coordination compounds, Werner's theory of Coordination compounds, IUPAC nomenclature, Effective atomic number (EAN), Isomerism in coordination compounds, Valence bond theory and its limitations, crystal field theory. Crystal field splitting of d- orbitals in octahedral, tetrahedral and square planar complexes, Calculation of stabilization energies (CFSE) for d^1 to d^9 in weak and strong fields, octahedral complexes, spectrochemical series. Electronic spectra of 3d transition metal complexes, types of electronic transitions, selection rules for electronic transitions spectroscopic ground states for d^1 to d^{10} systems. Magnetism; Dia-, Para-, Ferro-, and ant ferromagnetism, quenching of orbital angular moment, spin orbital coupling, inorganic reactions mechanism; substitution reactions, trans effect and electron transfer reactions

5. **Nuclear chemistry**:

Nuclear reactions; Mass defect and Binding energy, Nuclear fission and fusion. Nuclear reactions; Radioisotopes and their applications.

References:

1. *Inorganic Chemistry: Cotton & Wilkinson*
2. *Advanced inorganic chemistry: J. D. Lee*
3. *Selected topics in Inorganic Chemistry: W.U. Malik, G. D. Tuli and R. D. Madan*
4. *Advanced Inorganic Chemistry vol I & II: Gurdeep Raj*
5. *Advanced Inorganic Chgemistry: Cotton & Wilkinson, Wiley*

Paper-IV(Inorganic Chemistry- II)[CY- 504]

1. **Bio- inorganic chemistry**:

Essential and trace elements in biological processes, Metalloporphyrins with special reference to hemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with reference to Ca^{2+}.

2. **Non-aqueous solvents**:

Reactions in liquid NH_3, HF, SO_2 and H_2SO_4. Failure of solvent system concepts, coordination model of non-aqueous solvents. Some highly acidic media, fluorosulphuric acid and super acids.

3. Pollution and its control:

Air pollution, types of air pollutants; control of air and water pollution, radioactive pollution. Depletion of O_3 layer, effects of oxides of nitrogen, fluorochlorocarbons and their effect on O_3 layer, Greenhouse effect, Acid rain.

4. Solid state chemistry:

Classification of solids, seven crystal systems, elements of symmetry in crystals, space lattice and unit cell, classification of solids on the basis of bond types; ionic solid, metallic solids, covalent solids, and molecular solids. The close packing of spheres, hcp, ccp, and bccp. Coordinatio0n number, radius ratio rules, calculation of some limiting radius ratio values. Structures of NaCl, ZnS, CsCl, CaF_2, CdI_2, and rutile. Imperfection in crystals, stoichiometric and nonstoichiometric defects, impurity defects, semiconductors. Elementary study of liquid crystals

5. Acids and bases:

Bronsted and Lewis theories of acids and bases. Hard and soft acids and bases, HSAB principle, relative strengths of acids and bases and the effect of substituents and solvents on their strength

References:

1. *Inorganic Chemistry:* ***Cotton & Wilkinson***
2. *Advanced inorganic chemistry:* ***J. D. Lee***
3. *Selected topics in Inorganic Chemistry:* ***W.U. Malik, G. D. Tuli and R. D. Madan***
4. *Advanced Inorganic Chemistry vol I & II:* ***Gurdeep Raj***
5. *Advanced Inorganic Chgemistry:* ***Cotton & Wilkinson, Wiley***
6. *Environmental Chemistry and Pollution control: S. S. Dara*
7. *Environmental Chemistry: C. baird, W. H. Freeman & Co.Newyark*
8. *Chemical pollution: A Global Overview: UNEP*
9. *Environmental Chemistry: A. K. Day, New Age International Ltd.*
10. *Environmental Chemistry: B. K. Sharma& H. Kaur, Goel Publishing House*
11. *Pollution Science: Pepper, Gebra& Brusseam, Academic Press*

Paper-V(Organic Chemistry- I)[CY- 505]

1. Nature of bonding in organic molecules:

Delocalized bonding, aromaticity, Huckel rule, Homoaromatic and anti aromatic systems, steric hinderance, hydrogen bonding, Charge transfer complexes

2. **Substitution and elimination reactions:**
S_{N2}, S_{N1} and S_{Ni} Change, Solvent effect, Competition between S_{N1} and S_{N2} mechanism, elimination reactions, E_1, E_2 and E_1CB mechanism, Hofmann elimination, cyclic elimination, Competition between elimination and substitution reactions, aromatic nucleophilic substitution, rearrangements involving nucleophilic aromatic substitution, Bombarger rearrangement, Bucherer reaction, Smiles rearrangement and Sommlett Hauser rearrangement

3. **Reactive intermediates:**
Classical and non classical carbocation, Carbanions, radicals, radical anions, radical cations, carbenes, arynes and nitrenes, general methods of generetion, detection and reactivity of these intermediates, singlet oxygen, its generation and reaction with organic compounds.

4. **Named reactions:**
Claisen condensation, Hoffmann- bromide degradation, Beckmann's rearrangement, Pinacole- Pinacolone rearrangement, Cannizaro and crossed Cannizaro reaction, Favorskii rearrangement, Arndt- Eistert synthesis, Baeyer-Villiger reaction, Perkin , stobbe, Dieckmann condensation, Schmidt, Lossen, Curtius, Fries Rearrangement, Reimer-Tiemann reaction, Reformatsky and Grignard reaction, Diels – alder reaction, Claisen rearrangement, Friedal Crafts reaction, Wittig reaction, and Robinson annulation, routine functional group transformations and interconversion of simple functionalities, hydroboration. Oppenaur oxidation, Clemmenson, wolff- Kishner, Meerwein-Pondorf- Varley and Birch reductions

5. **Stereochemistry:**
Conformational analysis of acyclic systems and cycloalkanes(6-8 membered), Optical isomerism, Chirality, Chiral synthesis, Geometrical isomerism in acyclic, cyclic, condensed and bridged systems, methods of interconversion E to Z and Vice- versa.

References:

1. *Reactions and reagents in organic Synthesis: O. P. Agarwal, Goel Publishing House*
2. *Stereochemistry of carbon compounds: Eliel, TMH Publishing Co. Ltd.*
3. *Synthetic Organic Chemistry: O. P. Agarwal, Goel Publishing*
4. *Mechanism in Organic Chemistry: Peter Syke*
5. *Advanced Organic Chemistry: March, Wiley*
6. *Synthetic reactions: House*

Paper-VI(Organic Chemistry- II)[CY-506]

1. **Alkaloids:**
General methods of isolation, structure of coniine. Nicotine, piperine and papaverine

2. **Carbohydrates:**

Introduction, Classification and chemistry of monosaccharides, disaccharides, polysaccharides etc.

3. **Heterocyclic compounds:**
Introduction, nomenclature, Synthesis, reactions and structure of 5 and 6 membered heterocyclics having one heteroatom e.g. Pyrrole, Furan, Thiophene, Pyridine,quinoline , isoquinoline, indoles and acridines

4. **Purines:**
Structure and sunthesis of Uric acid, adenine guanine, caffeine, threobromine, theophylline and xanthine

5. **Terpenoids:**
Isolation , general method of structure determination with particular emphasis on (a). Acyclic monoterpenoids: Myrcene, Ocimene and Citral (b).Monocyclic monoterpenoids: α-Terpeneol, Carvone (c). Bicyclic monoterpenoids: α- Pinene and Camphor

6. **Dyes:**
Introduction, Colour and constitution, nomenclature, classification, nitrodyes, nitrosodyes, azodyes, diarylmethanedyes, triarylmethane dyes, xanthen dyes, acridine dyes, quinoline dyes, azine dyes, vat dyes, anthraquinonoid dyes, Phthalocyanines, fluoroscent brightening agents

References:

1. *Organic Chemistry: R.T. Morrison and R.N. Boyd P. H. Ltd.*
2. *Topics in Organic Chemistry:Fieser & Fieser, Reinhold*
3. *Organic Chemistry Vol I& II: I. L. Finar, Elbs with Longmann Pub.*

Paper IV(Chemistry of natural Products)[CY-604]

1. **Proteins**: Amino acids, Classification of amino acids, Synthesis of amino acids, properties of amino acids, Classification of Proteins, peptide linkage, primary structure of Proteins, Synthesis of peptides, Oxytocin, Insulins, Vasopressin, Spatial arrangement of Protein molecules, Nucleoproteins, Nucleic acids, structure of nucleosides& nucleotides, Structure of DNA

2. **Alkaloids:** Definition, general methods for determining structure , classification of alkaloids, Pyrrolidine group- Hygrine,Cuscohygrine Pyridine & Piperidine group- Ricinine, Pyrrolidine-Pyridine group- Atropine, Quinoline group- Quinine, Isoquinoline group-Berberine, Indole group- Reserpine

3. **Terpenoids:** Introduction , General methods for determining structure, diterpenoids- Phytol, Sesqueterpenoids-Farnesol, zingiberine, cadinene, Triterpenoid- Squalene polyterpenoids: Rubber

4. **Vitamins:** Introduction, Classification and Chemistry of Vitamin A, B_1, B_2, B_6, Folic acid, Vitamin C, D, E and K

5. Steroids: Introduction, classification and Chemistry of Cholesterol, Oesterone, Testosterone, Androgens& Progesterone

6. Antibiotics: Introduction, Structure of Major Antibiotics eg Penicillin,Cephalosporins, Tetracyclines, Chloramphenicol, Streptomycin and Quinolone antibiotics (Ciprofloxacin and Norfloxacin)

7. Lipids: Fats, Oils and Waxes, Fattyacids,Characterizationand their Physico-Chemical properties, Introduction to Phosolipids- Lecithins, Cephalins, Sphingomyleins& glycolipids

Paper-V Medicinal Chemistry-I(CY-605)

1. **Basic Principles of medicinal Chemistry:** Introduction, Characteristic of drugs, therapeutic index, Mechanism of chemotherapeutic action, metabolic antagonism with examples
2. **Principles of Drug Design:** Introduction, relationship between Molecular structure & biological activity,, physiological properties of Drugs,viz acid base properties, relative acid strength(pKa), Degree of ionization, water solubility, of drug, Hydrogen bond, Stereochemistry, & Drug action, , Optical isomerism,& biological activity, geometrical isomerism & biological activity, Bicisosterism and isosteric modifications in drug design,(classical & non classical isosteric modifications,, general introduction of QSAR.

   Synthetic procedures for selected drugs, mode of action, Structure Activity Relationship(SAR) including Physicochemical and steric aspects etc.

3. **CNS stimulants:** Nikethiamide, Ethamivan, Benigride, Doxipram,Biphenyl ethylamine derivatives,eg. Amphetamine, Fenfluramine hydrochloride, Chlorophentermine hydrochloride, Phenmetrazinehydrochloride, Caffeine, Theophylline,
4. **Antihelmintics:** Phenolic compounds viz 4.-N Hexyl Resorcinol, Bithional, Piperazine derivatives, Heterazan, Antepar, Thiabenidazole viz Mintezole
5. **AntiSpasmodic& antiulcer:** Dicycloamine, Piperidolate(Dactil), Propantheline, Mepiperphenidol, H_2 Receptor antagonist eg Cimetidine & Ranitidine
6. **Adrenergic Harmones& Drugs:** Adrenoreceptor agonist and SAR of Adrenomimetics, Main clinical use of adrenoreceptor- Bronchodialatorsviz Salbutamol,Isoprenatine, Ephedrine, Adrenaline
7. **AntiHistaminics:** H_1 receptor antagonists, Mepyramine, Thiopylamine, Zolamine, Carbinoxamine, Doxylamine, Propylamine derivatives vizPheniramine maleate. Chloropheniramine maleate, unsaturated derivatives eg. Triprolidine7 Pyrobutamine
8. **Autocoids:** Ephedrine, Epinephrine, Isoprenaline, Methoxamine hydrochloride, Metaraminol, Oxymetazoline, phenylpropylamine hydrochloride,
9. **Nonsteroidal AntiInflammatory Drugs:** Hetero aryl acetic acid analogues viz Indomethacin,Tolwetin, Aryl acetic acid analogues eg Ibuprofen, Naphthalene acetic acid analogues viz Naproxen, Anthranilic acis analogues eg. Mefenamic acid& Flufenamic acid, Pyrazoles eg. Phenyl butazones& Oxyphenbutazones, Salicylic acid analogues eg. Aspirin,p- amino phenolAnalogues eg. Paracetamol
10. **Diuretic agent:** Thiazide, Chlorothiazide, Benzthiazide, Cyclothiazide, Hydro chlorthiazide, Methylclothiazide, TrichlorMethiazide, Bendroflumothiazide

Paper VI(Medicinal Chemistry-II) [CY- 606]

Synthetic procedures for selected drugs, mode of action, Structure Activity Relationship(SAR) including Physicochemical and steric aspects etc.

1. **General Anaesthetics and Local Anaesthetics**: General Anaesthetics: Ether, Ethyl Chloride, Cyclopropane, Vinyl Ether, Fluoroxene, Halothene, Nitrous Oxide, Chloroform, Thiopental Sodium, Thiomylal Sodium, Hydroxy dione Sodium Succinate, Fentanyl Citrate, Tribromo Ethanol, Paraldehyde, Ketamine Hydrochloride Local Anaesthetics: Aminoethyl Benzoate, Butamben, Orthocaine, Procaine Hydrochloride, Tetracaine Hydrochloride,, Butacaine Sulphate, Cyclomethylcaine Sulphate, Lignocaine Hydrochloride, Prilocaine Hydrochloride, Mepivacaine Hydrochloride, Bupivacaine Hydrochloride, Pyrrocaine hydrochloride, D-Eucaine, Benzamin Hydrochloride, Euphthalamine, Dibucaine Hydrochloride, Isomethaquin Hydrochloride
2. **Opoid Analgesics**: Morphine Sulphate, Codeine, Dihydro Codeine Phpsphate, Levorphenol Tartarate, Dextro methorphine hydrobromide, Metazocine, Cycloazocine, Pentazocine, Fentanyl Citrate, Pethidine Hydrochloride, Methadone Hydrochloride, Tramadol Hydrochloride, Naloxone Hydrochloride,
3. **Antitussives:** Benzonatate, Levopropoxyphene Napsylate
4. **Anticonvulsants:** Phenobarbital, Phenytoin, Ethotoin, Methytoin, Trimethadione, Paramethadione, Phensuximide, Mesusuxinimide, Ethosuximide, Pyrimidone, Phrnacemide, Carbamazepine
5. **Antiperkinsonism drugs:** Biperiden Hydrochloride, Cycrimine Hydrochloride, Trihexyl Phenidyl Hydrochlodide, Procyclidine Hydrochloride, Benzotropine Napsylate, Ethopropazine Hydrochloride, L-Dopa
6. **Cardiovascular drugs:** Hydralzine Hydrochloride, Methyl Dopa, Captopril, Diazoxide, Quinidine Sulfate, Diisopyramide, Lorcainide, Procainamide, Propanol, BretyliumTosylate
7. **Antineoplastic agents:** Mechlorethamine Hydrochloride, Mephalan, Chlorambucil, Busulfan, Triethyenemelamine,Carmustine, Lomustine, Methotrexate, Mercaptopurine, Cytrabine, Vinblastineand Vincristine(only activity), Pipobroman, Testolactone
8. **Thyroid and antithyroid drugs:** Thyroxin, ThioImidazoles, Methylthiouracil& Propyl thiouracil
9. **Insulin and oral Hypoglycemic agents:**Insulin, Chlorpropamide, Tol butamide, Phenformin, Metformin
10. **Diagnostic agents:** Iopanoic Acid, Indigotin disulphonate Sodium, Evan blue, Fluorescein Sodium

M.Sc.II

Paper		Subject	Subject code	Lecture Hrs(per week)
I	:	Applied Organic Chemistry	CY- 601	03
II	:	Advanced Organic Chemistry	CY- 602	03
III	:	Organic Spectroscopy	CY- 603	03
IV	:	Chemistry of Natural Products	CY- 604	03
V	:	Medicinal Chemistry – I	CY-605	03
VI	:	Medicinal Chemistry –II	CY- 606	03
VII	:	Practicals	CY- 607P	18

Paper-I(Applied Organic Chemistry)[CY- 601]

1. Heterocyclic Chemistry:

Polyheterocyclic ring systems viz

(i) Azoles, Oxazoles, isoxazoles,Pyrazoles, Imidazole and Thiazole
(ii) Pyrimidines and Pteridines
(iii) Condesed ring systems: Acridine, Quinazoline, Phenothiazine
(iv) Purines: Uric acid, Adenine, Guanine, Caffeine etc.

2. Organic Reagents:

Preparation, properties and uses of following reagents:
Diisopropylamide, Diazomethane, Lithium Aluminium hydride, Ozone, Osmium tetroxide, Potassiumpermanganate, Leadtetracatate, Raney nickel, Sodiumborohydride, N- bromosuccinimide, Dicyclohexylcarbodiimide, Lithium tritert-butyloxyaluminium hydride

3. Polymers:

Illustration of principles with reference to polymeric materials, Polymer structure and physical properties,Thermoplastic and thermosetting resins, fibres, rubbers (natural and synthetic), Engineering polymers, liquid crystalline polymers, conducting polymers, structure relationship with respect to electrical and optical properties.

4. Organometallics

Principles, preparation, properties and applications of following in organic Synthesis with mechanistic details;
Li, Mg, Hg,Cd and Zn compounds

5. Pyrones

Anthocyanines, Flavones, Isoflavones, Flavanones, Depsides, Coumarins, Quinones

6. Polyaromatic hydrocarbons:

Introduction, Isolated systems or polyphenyl compounds(diphenyl, diphenic acid, Diphenylmethane, triphenylmethane,triphenylcarbinol, triphenylmethyl chloride and hexaphenylethane), condensed ring systems(Naphthalene, Anthracene,

Phenanthrene), carcinogenic hydrocarbons.

References:

1. *Reactions and reagents in organic Synthesis: O. P. Agarwal, Goel Publishing House*
2. *Stereochemistry of carbon compounds: Eliel, TMH Publishing Co. Ltd.*
3. *Synthetic Organic Chemistry: O. P. Agarwal, Goel Publishing*
4. *Mechanism in Organic Chemistry: Peter Syke*
5. *Advanced Organic Chemistry: March, Wiley*
6. *Synthetic reactions: House*
7. *Organic Chemistry: R.T. Morrison and R.N. Boyd P. H. Ltd.*
8. *Topics in Organic Chemistry:Fieser & Fieser, Reinhold*
9. *Organic Chemistry Vol I& II: I. L. Finar, Elbs with Longmann Pub.*
10. *Polymerscience:V.R.Gowariker, N.V. Vishwanathan& J. sreedhar, New Age Internation pvt Ltd.*
11. *Text book of Polymer Science: Billimayer F.W., John wiley & sons*
12. *Plastic materials: BrydsMJ.A., Butterworth- Heinmann*

Paper-II(Advance Organic Chemistry)[CY- 602]

1. Photo chemistry:

Interaction of electromagnetic radiation with matter, Types of excitations, fate of excited molecules, quantum yield, transfer of excitation energy. tochemistry of alkenes, carbonyl compounds, aromatic compounds and miscellaneous reactions

2. Pericyclic reactions:

Selection rules, Mechanism and stereo chemistry of electro cyclic, cycloaddition and sigmatropic shifts.

3. Stereochemistry:

Conformational analysis, Stereochemistry of biphenyls, allenes and spiranes, Stereoselective and stereospecific reactions, Neighbouring group participation taking example of carboxylic, phenyl, halogen, hydroxy, alkoxy, acetoxy group etc.

4. Rections involving carbanions:

Benzil- Benzilic acid rearrangement, Favorskii rearrangement, Hoffmann rearrangement, Curtius rearrangement, Schmidt rearrangement, Michael addition, Mannich reaction, aromatic nucleophilic substitution, Knoevenagel reaction.

5. **Oxidation:**

Different oxidative processes, Hydrocarbons, alkenes, aromatic rings, saturated C-H groups(activated and unactivated), alcohols, diols, aldehydes, ketones, ketals and carboxylic acids, amines, hydrazines and sulphides

References:

1. *Reactions and reagents in organic Synthesis: O. P. Agarwal, Goel Publishing House*
2. *Stereochemistry of carbon compounds: Eliel, TMH Publishing Co. Ltd.*
3. *Synthetic Organic Chemistry: O. P. Agarwal, Goel Publishing*
4. *Mechanism in Organic Chemistry: Peter Syke*
5. *Advanced Organic Chemistry: March, Wiley*
6. *Synthetic reactions: House*
7. *Organic Chemistry: R.T. Morrison and R.N. Boyd P. H. Ltd.*
8. *Topics in Organic Chemistry:Fieser & Fieser, Reinhold*
9. *Organic Chemistry Vol I& II: I. L. Finar, Elbs with Longmann Pub.*
10. *Photochemistry: Gurdeep Raj, Goel Publication*
11. *Photochemistry of heterocycles: N. J. Turro*
12. *Fundamentals of PhotoChemistry: K.K.Rohtagi- Mukherjee, Wiley Eastern Ltd.*

Paper- III(Organic Spectroscopy)[CY- 603]

1. Optical Rotatory Dispersion(ORD) and Circular Dichroism(CD):

Definition, deduction of absolute configuration, octant rule for ketones

2. Ultraviolet and Visible Spectroscopy:

Various electronic transitions(185-800 nm), Beer- Lambert law, effect of solvant on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes, Fieser- Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds, Steric effect in biphenyls

3. Infrared spectroscopy:

Instrumentation and sample handling, Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds(ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds), effect of hydrogen bonding and solvant effect

on vibrational frequencies, overtones, combination bands and fermi resonance, FT IR, IR of gaseous, solids and polymeric materials

4. Nuclear Magnetic Resonance Spectroscopy

General Introduction and definition, Chemical shift, spin- spin interaction, shielding mechanism. Mechanism of measurement, Chemical shift values and correlation for protons bonded to carbon(aliphatic, olefinic, aldehydic and aromatic) and other nuclei(alcohols , phenols, enols, carboxylic acids, amines, amidesand mercapto), chemical exchange, effect, of deuteration, complex spin-spin interaction between two, three, four and five nuclei(first order spectra), virtual coupling, stereochemistry, hindered rotation, Karplus curve- variation of coupling constant with dihedral angle, Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents, solvant effects, fourier transform technique

5. Carbon –13 spectroscopy:

General considerations, chemical shift(aliphatic, olefinic, alkyne,aromatic, heteroaromatic and carbonyl carbon), coupling constants

6. Mass spectroscopy:

Introduction, ion production- EI, CI, and FAB, factors affecting fragmentation, ion analysis, ion abundance, Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak, McLafferty rearrangement, Nitrogen rule, High resolution mass spectroscopy, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination

References:

1. *Spectroscopy: B. K. Sharma, Goel Publishing House*
2. *Molecular Spectroscopy: Sindhu, TMH Pub Co. Ltd.*
3. *Instrumental methods of chemical analysis*
4. *Organic spectroscopy: Kemp, Macmillan publication*
5. *Spectroscopy of organic compounds: P. S. Kalsi, New Age International Ltd.*
6. *Spectroscopic Identification of organic compounds: Silverstein, Bassler& Morrill, J. Wiley*
7. *Spectroscopic methods in organic Chemistry: William & Flemming, TMH Co. Ltd.*
8. *Organic Spectroscopy: Dyer*

mobility, conductometric titrations , high frequency conductometric titrations.

6. Phase Equilibrium:

Thermodynamic criterion of phase equilibria, chemical potential vs. temperature curves for different phases of a pure substance. Nernest distribution law. Gibb's phase rule, application of phase rule to three component system, Etirenfest classification of phase transition

References:

1. *Physical chemistry, P.W.Atkins,ELBS*
2. *Introduction to quantum chemistry, A.K. Chadda, Tata Mc Graw Hill*
3. *Advance physical chemistry, Puri, Sharma & Pathania*
4. *Advance physical chemistry, K.L. Kapoor ,Mac Millan ,India.*
5. *Chemical kinetics, K.J.Laidlar, Mc Graw Hill*
6. *Modernelectro chemistry,Bockris &Reddy, Planum.*

Paper-II(Physical Chemistry- II)[CY502]

1. Chemical kinetics:

Collision and activated complex theory, comparison of results with Eyring and Arrhenius equation, kinetics of III order reaction, kinetics of parallel, opposing, consecutive and chain reactions, kinetics of unimolecular reaction, Lindman theory, Hinshelwood theory, RRKM theory, primary & secondary salt effect , kinetics of fast reactions(flow, relaxation, flash photolysis & NMR method) kinetics of homogeneous catalytic reaction, kinetics of enzyme catalysed reactions.

2. Surface chemistry:

Adsorption of gases at solid surface, physical and chemical adsorption,freundlich, langmuir , temkin isotherm, BET equation and its derivation , use of Adsorption in determination of surface area, heat of adsorption , Gibbs Adsorption isotherm and its derivation, surface composition. Augur electron spectro scopy, Adsorption & catalysis (Langmuir-hinshelwood & Eley-Rideal mechanism

3. Photochemistry:

Characteristic of electronic transition , fate of electronically excited state, fluorescence & phosphorescence, jablonski diagram , laws of photochemistry, quantum yield & its determination, photosensitization. & quenching, photochemical rate law, kinetics of photochemical reaction (hydrogen –bromine

M.Sc. I

Paper		Subject	Subject code	Lecture Hrs. (per week)
I	:	Physical Chemistry-I	CY- 501	03
II	:	Physical Chemistry-II	CY- 502	03
III	:	Inorganic Chemistry-I	CY- 503	03
IV	:	Inorganic Chemistry-II	CY- 504	03
V	:	Organic Chemistry-I	CY- 505	03
VI	:	Organic Chemistry-II	CY- 506	03
VII	:	Practicals	CY- 507P	18