K.T.S.P.Mandal's
Hutatma Rajguru Mahavidyala
Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHP-110 Fundamentals of Physical Chemistry
Section-I

Teacher Name: Shirsagar K.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.22	Thermodynamics	State function, path function, exact differential and inexact differential, internal energy and enthalpy, temperature dependent internal energy and enthalpy, reversible and irreversible adiabatic expansion. The entropy of irreversible changes, the Helmholtz and Gibbs function, Entropy and entropy change in an ideal gas with temperature and pressure, Clausius inequality, chemical potential, chemical potential of a substance in a mixture.	06
2	Nov.22	Change of State	Partial molar quantities, methods for determination of molar quantities, ideal solutions, Raoult's and Henery's law, Thermodynamics of Gibbs function of mixing, colligative properties: Elevation in boiling point, depression in freezing point and osmosis.	05
3	Dec.22	Quantum Chemistry	Applications of quantum chemistry- blackbody radiation, photoelectric effect, de Broglie hypothesis and uncertainty principle and its experimental evidence. Schrödinger wave equation, particle in one dimensional box, Normalization and orthogonality of wave function, particle in three dimensional box, hydrogen like atoms (no derivation).Operators: algebra of operators, commutative property, linear operators, commutator operator, the operator ∇ and ∇2.	10
4	Jan.23	Chemical Bonding	Valence bond theory, hybrid orbitals, geometry and hybridization, molecular orbital theory for di and tri atomic molecule.	06
5	Feb.23	Chemical Bonding	linear variation method, approximations underlying Huckel theory, applications to simple π-systems.	04

Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1	Oct.22	Rate Laws	Recapitulations of basic concept, the temperature dependent reaction rates, reaction moving towards equilibrium, consecutive reaction, parallel reactions, pre-equilibria, unimolecular reactions.	06
2	Nov.22	Kinetics of Complex Reactions	Fast reactions: flash photolysis, flow technique, stopped flow technique, relaxation method, the steady state approximation, chain reactions - free radical polymerization reaction between H2 and Br2, explosive reaction.	06
3	Dec.22	Molecular Reaction Dynamics	Collision theory of bimolecular gas phase reactions, diffusion controlled and activation controlled reaction in solution, activated complex theory of reaction rate, Eyrings equation.	06
4	Jan.23	Enzyme Catalysis	Michaelis mechanism, effect of pH and temperature on enzyme catalyzed reactions, limiting rate, Lineweaverburk and Eadie equation and plots, inhibition of enzyme action, competitive inhibition and non- competitive inhibition.	06
5	Feb.23	Molecular Thermodynamics	Molecular energy levels, Boltzmann distribution law, partition functions and ensembles, translational, rotational and vibrational partition function of diatomic molecule, obtaining energy, heat capacity, entropy and equilibrium constants from partition functions, Maxwell- Boltzmann, Fermi-Dirac and Bose-Einstein statistics.	06

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-130 Molecular Symmetry
Section-I

Teacher Name: Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Molecular Symmetry and Symmetry Groups	Symmetry elements and operations, Symmetry planes and reflections, the inversion centre, proper axes and proper rotations, improper axes and improper rotation, products of symmetry operations, equivalent symmetry elements and equivalent atoms, general relations among symmetry elements and symmetry operations, classes of symmetry operations, symmetry elements and optical isomerism, symmetry point groups, classification of molecular point groups. Defining properties of a group, group multiplication table, some examples of group, subgroups and classes.	08
2	Nov.-22	Representations of Groups	Matrix representation and matrix notation for geometric transformation, The Great Orthogonality Theorem and its consequence, character tables (No mathematical part),wave function as basis for irreducible representations.	04
3	Dec.-22	Symmetry Adapted Linear Combinations	Projection operators and their use of construct SALC (Construction of SALC for sigma bonding for molecules belonging point groups: D2h, D3h D4h, C4v, Td., Oh., normalization of SALC, transformation properties of atomic orbital, MO's for sigma bonding,ABn molecules, tetrahedral AB4 and Oh AB6 cases.	06
4	Jan.-23	Application of Group theory to Infrared Spectroscopy	Introduction, selection rules, polyatomic molecules, possible vibrations in a linear molecule, bending modes,	06
5	Feb.-23	Application of Group theory to Infrared Spectroscopy	symmetry of vibrations and their IR activity, Group vibration concept and its limitations, IR spectra related to symmetry of some compounds, IR spectra	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-130 Molecular Symmetry
Section-II

Teacher Name:Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Hydrogen and its compounds	Hydrides: Classification, electron deficient, electron precise and electron rich hydrides. PH3 , SbH3 , AsH3 , Selenides, TelluridesSolutions in non-aqueous Media,	08
2	Nov.-22	Alkali and Alkaline Earth Metals	Solutions innon - aqueous media, application of crown ether in extraction of alkali and alkaline earth metal	06
3	Dec.-22	Oxygen Group Halogen Group: Noble gases	Metal Selenides and Tellurides, oxyacids, and oxoanions of Sulphurand nitrogen. Ring, Cage and Cluster compounds of p-block elements Interhalogens, pseudohalagen, Synthesis, Properties and Applications, Structure, Oxyacid's andOxyanions of Halogens. Occurrence, Compounds ofXenon-with fluorine andOxygen and its uses	06
4	Jan.-23	Boron Group	Boron Hydrides, preparation, structure and Bonding with reference to LUMO,HOMO, interconversion of lower and higher boranes, Metalloboranes, Carboranes, Reactionof Organoboranes	06
5	Feb.-23	Carbon Group	Allotropes of Carbon, C60 and compounds (fullerenes), Intercalation compounds of Graphite, Carbon nanotubes, synthesis, properties, structure-single walled, multi walled, applications	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-150 Organic Reactiom Mechanism
Section-I& II

Teacher Name:Dr. Walunj Y.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Structure and Reactivity	Aromaticity: Benzenoid and non-benzenoid compounds, Huckel's rule, antiaromaticity, Application to carbocyclic and heterocyclic systems, annulenes, azulenes, current concepts of aromaticity.	04
2	Nov.-22	Heterocyclic Chemistry	Five and six membered heterocycles with one and two hetero atoms: Synthesis, reactivity, aromatic character and importance of following heterocyclic compounds, Furan, Pyrrole, Thiophene, Pyrazole, Imidazole, Pyridine, Pyrimidine	08
3	Dec.-22	Stereochemistry	a) Sterochemical principles, enantiomeric relationship, distereomeric relationship, R and S, E and Z nomenclature in C, N, S, P containing compounds, Prochiral relationship, stereospecific andstereoselective reactions, optical activity in biphenyls, spiranes, allenes, Topicity. b) Conformational analysis of di, tri, tetra-substituted 5 -6 membered rings and decalins.	12

Section -II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	Jan.-23	Structure, Stability and Reactions of Reactive Intermediates	a) Carbocation, Carbanion, Free Radical, Carbenes and nitrenes b) NGP : Neighbouring group participation	06
2.	Jan.-23	Rearrangements	Beckmann, Hofmann, Curtius, Schmidt, Wolff, Lossen, Bayer-villiger, Sommelet, Favorskii, Pinacol-pinacolone, Benzil-benzilic acid, Fries, Tiffeneau Demjanov.	06
3.	Feb.-23	Ylides Oxidation and Reduction Reactions	Phosphorus, Nitrogen and Sulphur ylides Oxidising agents: CrO_3, PDC, PCC, $KMnO_4$, MnO_2, Swern, SeO_2, $Pb(OAc)_4$, Pd-C, RuO_4, OsO_4, m-CPBA, O_3,$NaIO_4$, HIO_4, TEMPO, IBX, CAN, Dess-Martin, DDQ, Ag_2O Reducing agents: Boranes and hydroboration reactions,MPV reduction and reduction with H_2/Pd-C, Raney-Ni, $NaBH_3CN$, Willkinsons catalyst, DIBAL and Wolff-Kishner reduction, Birch, Clemmenson, Dissolving metal	12

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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHG-190 General chemistry –Introduction to solid states of matter
Section-I

Teacher Name: Prof. Gundal N.V.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.22	Bonding in Solids and Electronic Properties	Recollect the concepts: Crystalline solids, unit cell, and types of unit cells Introduction, Bondingin Solids—Free Electron Theory, Electronic Conductivity, Bonding In Solids—Molecular Orbital Theory, Simple Metals, Semiconductors—Si And Ge, Photoconductivity, The P-N Junction—Field-Effect Transistors, Bands In Compounds—Gallium Arsenide, Bands In D-Block Compounds—Transition Metal Monoxides.	05
2	Nov.22	Defects and Non-Stoichiometry	Introduction, point defects—an introduction, defects and their concentration, intrinsic defects, extrinsic defects the concentration of defects, ionic conductivity in solids, solid electrolytes, fast-ion conductors: oxygen ion conductors, fast-ion conductors: sodium ion conductors, Applications: 1) fuel cells, 2) sensors, 3) electrochromic devices, nonstoichiometric compounds, introduction, non-stoichiometry in wustite, the titanium monoxide structure.	07
3	Dec.22	Superconductivity	Introduction, Discovery, The Magnetic Properties Of Superconductors, Josephson Effects, The Bcs Theory Of Superconductivity, High Temperature Superconductors, Theory Of High Tc Superconductors, Uses Of High Temperature Superconductors	04
4	Jan.23	Synthesis of Solids	Introduction, Common Reactions Employed in Synthesis, Soft-Chemistry Routes, Ceramic Methods, Decomposition of Precursor Compounds, Combustion Synthesis, Mechano-chemical and	04

			Sono-chemical methods, Soft Chemistry Routes(Ion Exchange Reactions, Use of Fluxes, Sol–Gel Synthesis, Electrochemical Methods,	
5	Feb.23	Synthesis of Solids	Hydrothermal, Solvothermal and Ionothermal Synthesis), Chemical Vapour Deposition and Atomic Layer Deposition, Procedures of synthesis of some nano-materials- Gold and Silver nanoparticles, CdS nanoparticles, ZnO, TiO2 and Fe2O3 nanoparticles and Porous Silica	04

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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHG-190 Inorganic Chemistry material, analysis, Synthesis

Teacher Name: Prof. Gundal N.V.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	28/10/21	Determination of Silica and Manganese from pyrolusite ore	04
2	18/11/21	Determination of silica and iron from hematite ore.	04
3	20/12/21	Determination of tin and lead from solder alloy.	04
4	03/01/22	Determination of iron and chromium from stainless steel alloy	04
5	27/01/22	Synthesis of ZnO from zinc oxalate - precursor method and determine band gap by absorption spectroscopy	04
6	01/02/22	Synthesis of TiO2 TiCl4 or Ti-Isopropoxide by Sol-gel method and determine band gap by absorption spectroscopy	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHP-107Physical Chemistry Practical
Teacher Name: Prof. Gundal N.V.

Sr. No.	Month	Name of Experiment's	No. of hours
1	17/11/22	Determination of an order of a reaction	04
2	23/11/22	Brönsted primary salt effect	04
3	29/11/22	Glycerol radius by viscosity	04
4	01/12/22	Partial Molar Volume (Polynometry) Determination of the densities of a series of solutions and to calculate the molar volumes of the components	04
5	07/12/21	Statistical treatment of experimental data (calculation of mean and standard deviation for given data and least square method for calibration curve method)	04
6	13/12/22	Simultaneous determination of Ni and Co by colorimetry	04
7	22/12/22	Estimation of Cu(II) by titration with Na2 EDTA by colorimetry	04
8	07/01/23	Kinetics of oxidation of ethanol by K2Cr2O7	04
9	02/02/23	Simulations determination of KMnO4 and K2Cr2O7 by colorimetry	04

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M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHP-210 Molecular Spectroscopy and Nuclear Chemistry)
Section-I
Teacher Name: Prof. Shirsagar K.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	March.23	Microwave Spectroscopy	Types of molecule on the basis of moment of inertia and rotational spectra of di- and polyatomic molecules	03
2	March.23	Infra-red Spectroscopy	The vibrating diatomic molecule, harmonic and Anharmonic oscillator, The diatomic vibrating rotator, breakdown of the Born-Oppenheimer approximation, The vibrations of polyatomic molecule, Fourier transform spectroscopy and its advantages, The carbon dioxide laser, Applications.	05
3	March.23	Raman Spectroscopy	Quantum and classical theory of Raman effect, pure rotational Raman spectra, vibrational Raman spectra, polarization of light and Raman effect, structure determination from Raman and Infra-red spectroscopy, applications	05
4	March.23	Electronic Spectroscopy of molecules	Electronic spectra of diatomic molecules - The Born-Oppenheimer approximation, Vibrational coarse structure, Frank- Condon principle, dissociation energy and dissociation product, Rotational fine structure of electronic-vibration transition, The fortrat diagram, Pre-dissociation, molecular photoelectron spectroscopy.	07
5	March.23	Mossbauer Spectroscopy	Principle, Instrumentation and Applications of Mossbauer Spectroscopy	04

Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	April. 23	Radioactivity	Types of radioactive decay, general characteristics of radioactive decay, decay kinetics, general expression for the activity of a daughter nuclide, Geiger- Nuttalis law, α-decay: A problem in classical physics, Internal conversion and the Auger effect	04
2	April.23	Elements of Radiation	Chemistry: Interaction of radiation with matter, interaction of γ radiation with matter, units for measuring radiation absorption, Radiation dosimetry, Radiolysis of water, free radicals in water radiolysis, Radiolysis of some aqueous solutions.	06
3	April.23	Nuclear Fission	The discovery of nuclear fission, the process of nuclear fission, fission fragments and their mass distribution, charge distribution, Ionic charge of fission fragments, fission energy, M. Sc. [I] Chemistry Savitribai Phule Pune University 7 fission cross-section and threshold, fission neutrons, theory of nuclear fission, Neutron evaporation and spallation.	06
4	May.23	Applications of Radioactivity	Typical reaction involved in the preparation of radioisotopes, The Szillard- Chalmers reaction, Radiochemical principles in the use of tracers, Isotopes in elucidating reaction mechanism and structure determination, physic-chemical research - The solubility of a sparingly soluble substances, surface area of a powder or precipitate rates of diffusion, Analytical applications- Isotope dilution analysis,	08
5	May.23		Neutron activation analysis, Radiometric titrations, Medical applications-Thyroiditis, Assessing the volume of blood in a patient, Industrial applications thickness measurements and control, friction and wear out, gamma radiography.	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHI-230-Coordination and Bioinorganic Chemistry
Section-I

Teacher Name: Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	1. Concept& Scope of Ligand Fields:	Quantum numbers, Free ion Configuration, Term and States, Energy levels of transition metal ions, free ion terms, microstates, term wave functions, spin-orbits coupling.	02
2.	March-2023	2. Ligand Field Theory of Coordination Complexes	Effect of ligand field on energy levels of transition metal ions, weak cubic ligand field effect on Russell- Saunders terms, Orgel diagrams, strong field effect, correlation diagrams,Tanabe-SuganoDiagrams,Spin-Pairingenergies.	05
3.	April-2023	3. Electronic spectra of Transition Metal Complexes	Introduction, band intensities, band energies, band width and shapes, transition metal spectra of 1^{st}, $2^{nd}$and 3^{rd} row ions and complexes, electronic spectra of Lanthanide and Actinide, spectrochemical and nephelauxetic series, charge transfer and luminescence spectra, calculations of Dq, B, β parameters, percentage of covalent character for metal complexes.	06
4.	May-2023	4. Magnetic Properties of Coordination on Complexes	Origin magnetism ,types of magnetism, Curie law, Curie-Weiss Law, Magnetic properties of complexes-Para magnetism1^{st} and 2^{nd} Ordered Zeeman effect, quenching of orbital angular momentum by Ligand fields ,Magnetic properties of A, E and T ground term in complexes, spin free and spin paired equilibria, temperature dependence of magnetism.	06

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHI-230-Coordination and Bioinorganic Chemistry
Section-II
Teacher Name: Prof.Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	April-2023	1. Overview of Bioinorganic Chemistry	Historical Background and current relevance, role of Cu, Fe, Mn and Mo in metalloprotein, and metalloenzymes.	02
2.	April-2023	**2**)Conceptsof Inorganic Chemistry inBioinorganic Chemistry	Thermodynamic aspects - HSAB concept, chelate effect and Irving-William series, pKa values of coordinated ligands, Tuning of redox potential, Biopolymer effects. Kinetic aspects- Electron transfer reaction, Electronic substitution reaction. Reactions of coordinated ligands and Template effect, concept of spontaneous self-assembly model compounds.	10
3.	May-2023	3) Functions and Transport of Alkali and Alkaline Earth Metal Ions	Importance of alkali and alkaline earth metals, Distribution of cationic and anionic electrolytes in blood plasma and intracellular fluid, Ionophores: Natural and Synthetic, Application of ionophores, Different mechanism involved in exchange of ions across cell wall,Na+/K+-ATPase ion pump for active transport of Na+ and K+.	06
4.	May-2023	4) Biochemistry of following Elements:	(a) Ca in Blood coagulation. (b) Magnesium in Photosystem I (c) Manganese in Photosystem II (d) Iron in Ferritin, Transferrin, Fe-S clusters, Porphyrin based system	06

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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-250-Photochemistry and Pericyclic Reactions
Section-I

Teacher Name:Prof.Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	Photochemistry	Principles of Photochemistry, photochemistry of carbonyl compounds, alkenes,dienes, and aromatic compounds, photo rearrangements, Barton reaction	12
	March-2023	Pericyclic Reactions	Cycloaddition reactions, Analysis by correlation diagrams, FMO approach,	
3.	April-2023	Pericyclic Reactions	Electrocyclic, sigmatropic and ene reactions, 1,3-dipolar additions,	06

Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	UV and IR Spectroscopy	UV: Recapitulation of UV spectroscopy, spectra of important functional groups 1.With and without conjugation, 2. Ring size effect 3. Effect of H-bonding, 4. Resonance effect,5. Inductive effect. 4. [04L] Basic principle of MS, significance of M+ (m/z) in determination of molecular formula, Rule of 13. Genesis of m/z fragments: alkanes (cyclic and acyclic), alcohols, amines Problems: Based on 2-3 fragments of above mentioned functional groups should be discussed. Combined problems:	04

			Problems based on UV, IR, MS, 1H-NMR, 13C-NMR should be solved.	
	March-2023	1H-NMR	Understanding of basic principle, chemical and magnetic nonequivalence, Homotopism, Enantiotopism, diastereotopism, chemical shifts and factors influencing chemical shift: electronegativity, NMR solvent polarity, temperature, anisotropic effect, chemical shifts of acidic protons, D2O exchange, Multiplicity patterns and Coupling Constants: Pascal's triangle, understanding of tree diagram, complex splitting patterns in aromatic, vinylic, saturated monocyclic compounds, bicyclic compounds (fused and bridged rings), Integration: NMR of racemic mixture, relationship between integration and ee% in diasterotomers.	12
3.	April-2023	13C-NMR	Basic of 13C-NMR: Chemical shift and factors affecting chemical shifts in 13C NMR, off resoanance and proton decoupled spectra. Simpleproblems on 13C-NMR.	06
4.	April-2023	Mass spectrometry (MS)	Basic principle of MS, significance of M+ (m/z) in determination of molecular formula, Rule of 13. Genesis of m/z fragments: alkanes (cyclic and acyclic), alcohols, amines	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHI-290-Elective Option - B: Organometallic and Inorganic Reaction Mechanism
Teacher Name: Prof.Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	Organometalic Chemistry	Organic ligands and nomenclature, 18 electron rule: counting electrons, ligands having extended pi system, bonding between Metal Atoms and organic pi systems: linear pi system, cyclic pi system, **s**pectral analysis and characterization of organometallic complexes: IR and NMR, examples.	08
2.	March-2023	Organometallic Reactions& Catalysis	Reactions involving gain and loss of ligands: ligand dissociation and substitution, oxidative addition, reductive elimination, nucleophelic displacement, **r**eactions involving modification of ligands: insertion, carbonyl insertion, 1-2 insertion, hydride elimination, abstraction, organometallic catalysis: Hydroformylation, Monsanto acetic acid process, Wacker Process, Hydrognation by Willkinsons catalyst, Olefin metathesis, heterogeneous catalysis: Ziegler Natta Polymerization, Water gas reduction	08
3.	April-2023	Coordination Compounds: Reactions and Mechanism	History and principles, Substitution reactions: Inert and labile complexes, mechanism of substitution, Kinetics Consequences of reaction pathway: dissociation, interchange, association, Experimental evidences in Octahedral Substitution: dissociation, linear free energy relationship, associative mechanism, the conjugate base mechanism, the kinetic chelate effect, Stereochemistry of reactions: substitution in trans complexes, substitution in cis complexes, isomerisation of chelate rings, substitution reactions in Sq. Pl. Complexes.	10

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHP-227: Practical Course-II: Semester -II Basic Practical Chemistry
Prof.Jasud J.S.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	07/03/23	Synthesis and Purity of [Mn(acac)3]	04
2	14/03/23	Synthesis and Purity Chloropentaamminecobalt(III) chloride.	04
3	21/03/23	Synthesis and Purity Bis[TrisCu(I)thiourea]	04
4	03/03/23	Synthesis and Purity Bis[TrisCu(I)thiourea]	04
5	28/03/23	Structural determination of metal complexes by conductometric measurement.	04
6	04/04/23	To study complex formation between Fe(III) with sulfosalicylic acid by conductometry .	04
7	11/04/23	To verify the Debye Huckel theory of ionic conductance for strong electrolytes KCl, BaCl2, K2SO4 and [K3Fe(CN)6]	04
8	18/04/23	Determination of equilibrium constant of M – L systems Fe(III)–Sulphosalicylic acid or Fe(III)–β–resorcilic acid by Job's continuous variation method.	04
9	25/04/23	Solution state preparation of [Ni(en)3]S2O3, [Ni(H2O)6]Cl2, [Ni(NH3)6]Cl2. Record absorption spectra in solution of all three complexes and calculate 10 Dq. Arrange three ligands according to their increasing strength depending on your observation	04
10	02/05/23	Synthesis and photochemistry of K3[Fe(C2O4)3].3H2O.	04
11	09/05/23	Kinetics of substitution reaction of [Fe(Phen)3] 2+	04

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CHP-227: Practical Course-II: Semester -II Basic Practical Chemistry

Prof.Jasud J.S.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	08/03/23	Base catalyzed aldol condensation using LiOH.H2O as a Catalyst.	04
2	15/03/23	Bromination of trans-stilbene using sodium bromide and sodium bromate	04
3	22/03/23	[4+2] cycloaddition reaction in aqueous medium at room temperature	04
4	29/03/23	BenzilBenzilic acid rearrangement under solvent free condition	04
5	05/03/23	Clay catalyzed solid state synthesis of 7-hydroxy-4-methylcoumarin	04
6	12/04/23	Ecofriendly nitration of phenols and its derivatives using Calcium nitrate	04
7	19/04/23	Bromination of acetanilide using ceric ammonium nitrate in aqueous medium	04
8	26/04/23	Green approach for preparation of benzopinacolone from bezopinacol using iodine catalyst	04
9	10/05/23	Preparation of 1, 1-bis-2-naphthol under grinding at room temperature	04
10	17/05/23	Solvent free aldol condensation between 3,4-dimethoxybenzaldehyde and 1-indanone	04
11	24/05/23	Preparation of azlactone from hippuric acid	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-350 Organic Reaction Mechanism and Biogenesis
Section-I

Teacher Name: Dr. Kulkarni P. S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.	Methods for determining Reaction Mechanisms	Kinetic and non-kinetic methods	04
2	Nov.	Free Radicals	Generation, stability, reactivity, Free radical substitution, addition to multiple bonds, radicals in synthesis, Inter- and intra-molecular bond formation via mercury hydride, tin hydride, thiol donors,	08
3	Dec.	Free Radicals	cleavage of C-X , C-Sn, C-S, O-O bonds, Oxidative coupling, C-C bond formation in aromatics, SNAr reactions, Free Radicals in Organic Synthesis.	04
4	Jan.	Linear Free Energy Relationships	Hammet plots, Hammet equation, substituent constants, reaction constants, use of Hammet plots,	06
5	Feb.	Linear Free Energy Relationships	calculation of k and K, Deviations from straight line plots, Taft equation, solvent	04

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M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-350 Biogenesis
Section-II

Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.	Terpenoids	Mono-, Sesqui-, Di-, tri-terpenoids and cholesterol,	08
2	Nov.	Alkaloids	Derived from ornithine, lysine, nicotinic acid, tyrosine and tryptophan.	06
3	Dec.	The Shikimate pathway	Cinnamic acids, lignans and lignin, coumarins, flavonoids and stilbens.	08
4	Jan.	The Shikimate pathway	isoflavanoids and terpenoidquinones.	08
5	Feb.	A case study	Alkaloids isolated from the Roots of Piper nigrum	04

K.T.S.P.Mandal's
Hutatma Rajguru Mahavidyala
Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-351: Structure Determination of Organic Compounds by Spectroscopic Methods
Section-I

Teacher Name: Dr.Walunj Y.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.	NMR in Stereochemistry Determination	Homotopic, enatiotopic and distereotopic protons, Chemical and Magnetic equivalence; First and second order splitting, Complex multiplicity patterns and coupling constants in asymmetric compounds; Simplification of complex spectra, NOE, Diastereomerism, Atrop or axial chirality, % Enantiomeric excess, chiral NMR solvents etc in structure elucidation.	10
2	Nov.	13C NMR spectroscopy	13C NMR spectroscopy- APT, DEPT and INEPT	06
3	Dec.	15N, 19F and 31P NMR spectroscopy	Fundamentals and applications in structure elucidation of organic compounds, catalysts and biomolecules.	04
4	Jan.	2D NMR spectroscopy	a)Homonuclear: COSY, TOCSY, 2DINADEQUATE, 2D- ADEQUATE, NOESY, ROESY	04
5	Feb.	2D NMR spectroscopy	(b) Heteronuclear: HSQC, HMQC, HMBC [8 L]	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-351 Mass Spectrometry
Section-II

Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.	Mass Spectrometry	Principle, ionization methods like EI, CI, ES, MALDI and FABFragmentation of typical organic compounds, stability of fragments,	06
2	Nov.	Mass Spectrometry	Rearrangements, factors affecting fragmentation, ion analysis, ion abundance, High-Resolution mass spectrometry in determination of molecular formula.	06
3	Dec.	Applications of Mass Spectrometry	Determination of the elemental composition, Isotopic Abundance in structure establishment	04
4	Jan.	Analysis of Biomolecules	Proteins and Peptides, Oligonucleotides and Oligosaccharides	08
5	Feb.	Problems solving	Structure elucidation using UV, IR, 1D (1H and13C) NMR and 2D NMR (1H-1H, 13C- 1H COSY /HETCOR only), APT, DEPT and MS data as well as spectra.	12

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M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-352(Organic Stereochemistry)
Section-I

Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1	Oct.	Actual Shape of six membered rings &it'srelation to properties &reactivity.	Conformations of polysubstituted cyclohexane, six membered rings with SP2 carbon, heterocycles with N and O, anomeric effect, stereochemical principles involved in reactions of six membered rings and other than six membered rings, concept of I-Strain. Stereochemistry of a polymer chain – Types and examples of TacticityDecalols, Decalones, Octahydronaphthalenes, decahydroquinolines	10
2	Nov.	Stereochemistry of fused and bridged ringsystems	Nomenclature, synthesis; stereochemical aspects of Perhydrophenanthrene, Perhydroanthracene, hydrindane, Steroids; Bridged system (bi, tri and polycyclo system) including heteroatoms, Bredt's Rule.	05
3	Dec.	Conformations of following compounds with justification of each	cis and trans -1,3- and l,4-di-t-butyl-cyclohexanes; Cis-4-di-t-butylcis-2,5-dihydroxycyclohexane; Twistane; bicyclo- [2.2.2]octane; Trans-anti-transPerhydro-anthracene and the lactone; cyclohexane-l,4-dione; 1,2,2,6,6-penta-methyl-4hydroxy-4-phenylpiperidine; ψ-tropine; 2-hydroxy-2-phenyl quinolizidine; 4-t-butyl-4methyl-l,3-dioxane; cis- and trans-2,5-di-t-butyl-l,3-dithianes;cis-2,5-di-t-butyl-l,3,2dioxaphosphorinan-2-one.	04
4	Jan.	Determination of configuration by using Cram's model	Cram's rule, Cram's cycle model, Cram's dipolar model, Felkin-Anh Model.	05
5	Feb.	Racemic Modification	Resolution and analysis of stereomers - formation of racemization and methods of resolution.	05

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-352Asymmetric Synthesis
Section-II

Teacher Name: Prof. Pawar R.Y

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.	Introduction of Asymmetric Synthesis.	Asymmetric Synthesis, Definationof Chirol pool and Chiral auxillaries with examples. Simple derivatives of amino acids , chiron approach of asymmetric synthesis, Alkylation of enolates by using chiral auxillary , Diel's Alder Reaction ,	08
2	Nov.	Asymmetric Organocatalysis	Corey -Bakshi Shibata Catalyst , Asymmetric Epoxidation by using MnSalen complex , (DHQ)2PHAL , (DHQD)2PHAL ,	06
3	Dec.	Asymmetric Aldol Reaction,	Chiral Auxillary controlled Aldolreaction The Evans aldol reaction, Aldol reaction catalyzed by prolineEnantioselective, diastereoselective and double diastereoselectiveAldol reactions.	06
4	Jan.	Transition Metal-Catalyzed Homogeneous Asymmetric Hydroxylation and Epoxidation	Asymmetric Sharplessepoxidation, DIPT Synthesis of L-Menthol from R-citronellal , Synthesis of Chloramphenical , Asymmetric conjugate addition by using BINAP , Noyori Hydrogenation H_2Pd/c, OSO4	06
5	Feb.	Asymmetric Phase-Transfer and Ion Pair Catalysis	Asymmetric hydrogenation , Asymmetric catalyzed asymmetric hydrogenation of carboxylation	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-353 Designing Organic Synthesis & Heterocyclic Chemistry
Section-I

Teacher Name: Prof. Pawar R.Y

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
01	Oct.	1. Concepts of Retro synthesis	Retrosynthetic analysis, disconnection approach, Synthons, multiple step synthesis, functional group intercoversion, , 1,5 related functional group disconnection.	04
03	Dec.	2. Application of Retrosynthetic Approach:	Umpolung, convergent synthesis, special methods for small rings, Heteroatom and Heterocyclic compounds, problems.	08
04	Jan.	2. Application of Retrosynthetic Approach:	Retrosynthesisand synthesis of following Molecules: Strychnine, Reserpine, Thienamycin, Asteltoxin, Indolizomycin, Erythronolide	06
05	Feb	Application of Retrosynthetic Approach:	Retrosynthesisand synthesis of following MoleculesAsteltoxin, Indolizomycin, ErythronolideS	04

SECTION-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
01	Oct.	Synthesis, reactions and structural effects of heterocyclic rings	Systematic nomenclature (Hantzch – Widmann system) for monocyclic fused , bridged heterocycles , Tautomerism , in aromatic hetrocycles , Strain bond angles , Toursional strain & their consequences in small ring heterocycles .	08
02	Nov.	General chemical behaviour of heterocyclic compounds and their applications.	Biological systems (Anthocyanins, Flavones, Neurotransmitters), Natural Products (Alkaloids: Nicotin, Quinine), Drugs and Medicines (Omeprazole, Amlodipine, Cilostazol)	12
03	Dec.	Five & six membered heterocyclesSynthesis&Reactivity.	Common Methods in Ring Synthesis of Aromatic Heterocyclic Systems: Typical ring synthesis involving C – Heteroatom, C – C bond formations, Electrocyclic processes in heterocyclic Synthesis: 1,3 - dipolar cycloadditions producing five - membered heterocycles, Nitrenes in heterocyclic synthesis, Palladium catalysis in the synthesis of Benzo - Fused heterocycles, Fischer synthesis, Epoxidation, Use of SulphurYlides, Azidesfor small rings	10
04	Jan.	Three and four, Five-membered and benzo-fused fivememberedheterocycles Synthesis&Reactivity.	Aziridines, Oxiranes, Thirienes, Azetidines, Oxitanes and Thietanes ,Oxazole,Isoxazole, Thiazole, Pyrazole, Imidazole , Benzothiazole ,Benzimidazole , Indole , Benzofuran .	06
05	Feb.	Six membered and benzo-fused six memberedheterocycles: Synthesis &Reactivity.	Six membered and benzo-fused six memberedheterocycles:Pyrazine, Pyridazine, Pyrimidine, Quinazoline, Quinoxaline, Aziridines, Quinoline	04

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M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-354 Solvent Free Organic Synthesis

Teacher Name: Prof. Pawar R.Y& Prof. Walunj K.A.

Sr. No.	Month	Name of Experiment's	No. of hours
1	16/11/22	Solvent Free Carbon–Carbon Bond Formation by usingPechmannreaction	04
2	17/11/22	To Study C-C bond formation using Claisen condensation reaction reaction	04
3	18/11/22	To study phenol bromination using NBS	04
4	22/11/22	To Study C-C bond formation using Claisen condensation reaction reaction (Diethyl malonate)	04
5	23/11/22	To Study C-C bond formation using Biginelli reaction	04
6	23/11/22	To Study C-C bond formation using Biginellireaction(KSF)	04
7	24/11/22	To Study C-C bond formation usingPinacol coupling reaction	04
8	29/11/22	To Study C-C bond formation usingKnoevenagel reaction	04
9	13/12/22	To Study C-N bond formation usingBeckmann rearrangement	04
10	14/12/22	2-Hydroxybenzaldehyde oxidation using urea-hydrogen peroxide complex	04
11	15/12/22	To Study C-C bond formation using calix[4]resorcinarene	04
12	20/12/22	Alumina-supported permanganate oxidation	04
13	27/12/22	Pyrrocatechol protection using phenylboronic acid	04
14	28/12/22	2-Hydroxybenzaldehyde oxidation using urea-hydrogen peroxideComplex	04
16	29/12/22	To Study C-C bond formation usingKnoevenagel reaction	04
17	04/01/23	To Study C-C bond formation usingReformatsky reaction	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-450 Chemistry of Natural Products
SECTION-I

Teacher Name: Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March	1. Understanding & planning of total synthesis while maintaining the stereochemistry.	1. A case study : Longifolene 2. Synthesis of Longifolene by J. E. McCurry & S. J. Isser 3. Synthesis of Longifolene by S.Karimi & P.Tavares 4. Synthesis of Longifolene by E.J. Corey , R.B.Mitra& P. A.Vatakencherry 5. Synthesis of Longifolene by R.A.Volkmann , G.C. Andrew's& W. S. Johnson 6. Synthesis of Longifolene by W. Oppolzer & T. Gödel 7. Synthesis of Longifolene by A.G. Schultz & S.Puig 8. Synthesis of Longifolene by B.Lei&A.G.Fallis	12
2.	April	2.Total Synthesis	1. HirsutelloneB (Angew.Chem.Int.Ed.2009, 48,6870–6874.) Introduction , The Nicolaou synthesis (+) HirsutelloneB i) Synthesis of ring C ii) Synthesis of decahydro Fluorene skeleton iii) Synthesis of Intramolecular Diel's Alder reaction adduct iv) Synthesis of γ-siloxy nitrile 2. RibisinsAandB:(J.Org.Chem. 2019,84,15165−15172) 1. Introduction 2. Structures of RibisinsAandB 3. Total synthesis of RibisinsA 4. Total synthesis of RibisinsB 3. SubincanadineE:(J.Org.Chem.2017,82,11126-11133) 1. Introduction 2. Structures of Subincanadine E 3. Retrosynthetic analysis of Subincanadine E 4. Synthesis of Subincanadine E 5. Mechanism of coupling of Grignard reagent with maleimide & allylic rearrangement & pictet-spenger cyclization	04 04 04

3.	May	3.Total Synthesis Pinnaic Acid	**SECTION-II** **A) Pinnaic acid** 1. Introduction 2. Structures 3. Retro synthesis of Pinnaic acid 4. Total synthesis of Pinnaic acidUsing 1-Pyrolidine ,1-cyclopentene 5. Synthesis of Piperidine derivative from carbamate 6. Synthesis of Die none derivative from Piperidine derivative References: 1. Angew. Chem.Int. Ed. 2001, 40 (23), 4450-4452. 2. Angew. Chem.Int.Ed. 2001, 40,(23), 4453-4456. 3. Angew. Chem.Int. Ed.2007, 46,5746–5	06
4.	May		**A)** Vannusals 1. Introduction 2. Structures 3. Retro synthesis of Pinnaic acid **B)** Total synthesis of Vannusals	06

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Syllabus Completion Report
M.Sc. –II(Organic Chemistry) A.Y.-2022-2023
Subject-CHo-451-Organometallic Reagents in Organic Synthesis

Teacher Name: Prof.Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1.	April	2. C-C coupling reactions	Transition metal complexes in organic synthesis; Pd, Ni, Ru, Fe, Ir and Cu only (C-C, CN, C-O bond formation reactions with catalytic cycle, ligand and % mole concepts)	20 L
2.	May	2. C=C formation reactions:	Wittig, Horner-Wordworth-Emmons, Shapiro, BamfordStevens, McMurry, Julia-Lythgoe and Peterson olefination reactions	10L

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M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-452 Concepts & Applications of Medicinal Chemistry

Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March	1.Introduction to Medicinal Chemistry	Introduction to Peptides and proteins P roteins as biological catalyst Nucleic acids, Metabolism, Chemistry of cofactors/coenzymes, Chemistry of TPP, , Folic Acid and other vitamins, Principle of drug design, Chemistry of diseases and Drug development ,Proton pump inhibitors and Problem solving.	06L
2.	April	2. Peptides	Sequencing and applications in therapeutics, Solution phase and solid phase peptide synthesis and Modern techniques for biomolecules and disease diagnosis	04L
3.	April	3. Introduction to medicinal Chemistry.	History, drug targets, Drug discovery, design and development, Case Study : Design of Oxamniquine.	04L
			Pharmacokinetics and Pharmacodynamics Of drug: Drug absorption, distribution, metabolism, elimination and toxicity, drug metabolism, biotransformation, Drug receptor interactions, Hansch Equation and significance of terms involved in it	04L
4	May	**1.** Structure and activity Relationship	QSAR, Applications of SAR and QSAR in drugdesign, physio-chemical parameters lipophilicity, partition coefficient, electronic ionization constant, Case Study: Statins	09L

5	May	4.Actual Study of Drug molecule	Introduction, Developments, SAR, Mode of action, limitations and adverse effect ofAnti-infective Agents, Beta lactam antibacterial agents (Penicillins, Cephalosporins),Tetracyclins,Macrolides,Chloramphenicol,Polyenes,Amphotrecin-B,Azoles,Amantadine,Acyclovir, Quinine,	02L
6	May		Quinolines, Quinolones, Refamycine, Sulphonamides	06L

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M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
CHO-453: Practical-III
Section-I:Ternary Mixture Separation

Prof. Pawar R.Y. & Prof. Walunj K.A.

Sr. No.	Month& Date	Name of Experiment's	
1	17/03/2023	a) Salicylic acid b) M-nitro aniline c) Acetanilide	04
2	31/03/2023	a) o-chlorobenzoic acid b) Thiourea c) m-dinitrobenzene	04
3	23/03/2023	a) Oxalic acid b) Salicylic acid c) P-nitrotoluene	04
4	01/04/2023	a) O-cresol b) Methyl acetate c)Nitrobenzene	04
5	24/03/2023	a) B –naphthol b) Urea c) Ethyl benzoate	04
6	31/03/2023	a) Urea b) Salicylic acid c) M-nitroaniline	04
7	30/03/2023	a) Cinnamic acid b) O-cholrophenol c) Aniline	04
8	25/03/2023	a) P- chlorophenol b) N,N-Dimethyl aniline c) Acetophenone	04

9	26/03/2023	a) Benzoic acid b) P-nitroaniline c) Acetanilide	04
10	23/03/2023	a) Phenyl acetic acid b) P-Chloroaniline c) Benzophenone	04
11	28/03/23	a) Salicylic acid b) M-dinitro benzene c) Choroform	04
12	29/03/23	a) Ethyl acetate b) M-Chloroaniline c) Ethyl benzoate	04

Section-II: Carbohydrates Synthesis and Isolation Natural Products

Sr. No.	Month & Date	Name of Experiment's	
1	09/05/23 10/05/23 11/05/023	UnitI:Carbohydrate Synthesis 1. Synthesis and structural determination of α-and β-D-glucose penta-acetate. 2. Selective deacylation of α-and β-D-glucosepenta-acetate. 3. Benzoylation of D-glucose. To D-glucosepenta-benzoate.	12
2	12/05/23	Unit II : Isolation of pigments from the natural products 1. OrangeMarigold 2. Rose 3. Hibiscus	12
3	13/05/23	Unit III: Isolation of essential oils from the natural products 1. Ginger 2. Lemongrass 3. Garlic	12

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-23
CHO-454:Practical-II:Convergent and Divergent Organic Synthesis

Prof. Pawar R.Y. &Prof. Walunj K.A.

Sr. No.	Month & Date	Name of Experiment's	No. of Lect. Taken
		SET-IV **A).Convergent Synthesis 2(Three Stage Synthesis)**	
1	10/05/23	Stage II:4-Nitrochlorobenzene into 4-aminochlorobenzene (Reduction by using hydrazine)	04
2	10/05/23	Stage III: Quinoline synthesis by using acetophenone,4-amino chlorobenzene and styrene (One pot synthesis:[3 +2 +1] cycloaddition reaction)	04
		Divergent Synthesis-4(5Single Stage Synthesis from Acetophenone)	
3	10/05/23	1. Acetophenone to Ethylbenzene by Wolf Kishner reduction	04
4	30/03/23	2. Acetophenone to Chalcone using aromatic aldehyde	04
5	31/03/23	3. Acetophenone into Schiff base using aromatic amine	04
6	10/05/23	4. Acetophenoneto m-Nitroacetophenone by nitration	04
		<u>SET-II</u> **A).Convergent Synthesis 2(Three Stage Synthesis)**	
7	05/04/23	1. Stage I: 4-Nitro toluene to 4-amino toluene(Reduction by using Sn/HCl)	04
8	26/04/23	2. Stage II: Phenol into2-hydroxy benzaldehyde (Reimer-Tiemann reaction)	04
9	23/04/23	3. Stage III: Synthesis of amidoalkyl-2-naphthols from β-Naphthol,4-aminotoluene and of 2-hydroxybenzaldehyde (One pot synthesis: MCR)	04
		B). Divergent Synthesis (5Single Stage Synthesis from β-	

		Naphthol)	
10	27/04/23	1. β-Naphthol to Synthetic dye (By diazonium coupling)	04
11	29/04/23	2. β-Naphthol to β-Naphthyl methy lether (Methylation reaction)	04
12	09/05/23	3. β-Naphthol to)Binol then Resolution of□(Binol (Resolution technique)	04
		SET-III **A).Convergent Synthesis-3(Three Stage Synthesis)**	
13	11/05/23	1. o-Anisidineto2-methoxy-4-nitroaniline	04
		B).Divergent Synthesis-3(5Single Stage Synthesis from Salicyaldehyde)	
14	29/04/23	2. Salicylaldehyde to Salicylaldehyde phenyl hydrazine	04
15	09/05/23	3. Salicylaldehyde to o-Formyl phenoxyacetic acid	04

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