MSc -Inorganic Chemistry-2022-23

Odd Sem	MSc 1st Sem	MSc 3rd Sem
Sept 05-10, 2022	Def init ions of group, subgroup, relation between orders of a finite group and its subgroup. Conjugacy relation and classes. Symmetry elements and symmetry operation,	Chemical composition of water bodies - lakes, streams, rivers and wet lands, Hydrological cycle.
Sept 12-17, 2022	Def init ions of group, subgroup, relation between orders of a finite group and its subgroup. Conjugacy relation and classes. Symmetry elements and symmetry operation,	Wa ter pollution – inorganic, organic , pesticide, agr icultural, industrial and sewage, detergents , oil spills and oil pollutants.
Sept 19-24, 2022	Character of a representation, reducible and irreducible representations,The grea t orthogonality theor em (without proof) and its importance, De rivation ofchara cter tables of C2 v, C3 v and D2 h Cha ra cter tables and their use.	Wa ter quality parameters – dissolved oxygen, biochemical oxygen demand, solids, metals, cont ent of chloride, sulphate, phosphate, nitrate and micro-organisms. Water quality standards.
Sept 26- Oct 01, 2022	Molecula rasymmetry, dissymmetry and optica l activity.	Chemical composition of atmosphere – particles, ions and radicals and their formation, Chemical and photochemical reactions in atmosphere, smog formation
Oct 03-08, 2022	VSEPR Theory, Wa lsh diagrams (tri- a tomic molecules), d p-p p bonds,	oxides of N, C, S and their effect, pollut ion by chemicals, petroleum, minerals, chlorofluorohydrocarbons. Green house effect, acid rain, air pollution controls and their chemistry.

Oct 10-15, 2022	Bent rule and energet ics of hybridiz ation, Hucke l theory with reference to ethylene and butadiene,	Metal Ions in Biological Systems Essential and trac e metals.Na+/K+ Pump Role of metals ions in biological processes
Oct 17-21 2022	Some simple substitution rea ctions of covalently bonded molecules of boron, silicon and nitrogen.	Heme proteins and oxygen uptake, structure and function of hemoglobin, myoglobin, hemocyanins and hemerythrin model synthetic complexes of iron and cobalt
Oct 27- Nov 05, 2022	Stepwise and overall formation constants and the int eraction, trends in stepwise constants, factors affecting the stability of metal complexes with referencetothe nature of metal ion and ligand,	Structure and function of meta lloproteins in electron transport processes - cytochromes and iron-sulphur proteins, synthetic models.
Nov 07-12, 2022	chelate effect and its thermodynamic origin, determinat ion of binary formation constants by pH-metry and spectrophotometry.	General principles , diffus ion controlled current, Ilkovic equation, Half-wave potentials, overpotential, theories of hydrogen overvoltage
Nov 14-19, 2022	Substitution rea ctions in octahedral complexes, theories of trans effect with respect to Pt(II) complexes	Tafel's theory / Recombination theory and Volmer , Erdy & Gruss theory / theory of slow discharge of ions
Nov 21-26, 2022	brief a ccount of electron transfer reactions , inert and labilecomplexes.	Symmetry and shapes, and no. of IR modes AB2 , AB3, AB4 , AB5 and AB6 (Group Theoretical t reatment) mode of bonding of ambidentate ligands and diketonato complexes,
Nov 28- Dec 03, 2022	Limitation of crystal field theory, crystal field ef fects,	application of resonance Raman spectroscopy particularly for the study of active sites of metalloproteins

Dec 05- 10, 2022	John Teller distortion,nephelauxetic series , spin-orbital coupling,	Mössbauer Spe ctroscopy, Basic principles, spectral parameters and spectrumdisplay. Application of the technique to the studies of bonding and structures of Fe + 2 and Fe+ 3 compounds including those of intermediate spin,
Dec 019- 20, 2022	molecular orbital theory of octahedral,tetrahedral and square planar complexes	Sn+2 and Sn+ 4 compounds – nature of M-L bond, coordination number, structure and detect ion of oxida tion state
Dec 021- 24, 2022	Doubts Classes	Photoelectron Spectroscopy,Basic principles; photo-electric effect, ioniza tion process, Koopman's theorem. Photoelect ron spectra of simple molecules , ESCA, chemical information from ESCA.

Even Sem	MSc 2nd Sem
Feb 01-06, 2023	Electronic arrangements of microstates, calculation of the number of microstates in var ious electronic ar rangements, spectroscopic term symbols ,
Feb 07-13, 2023	vector diagrams to indicates coupling of orbital angular momenta in p 2, p 3, d 2 configurations and spin orbit coupling for p2 arrangement,
Feb 14-18, 2023	spectroscopic terms, spectral terms of d 2 to d8 meta l ions, determining the ground state terms -Hund's rules, derivation of the term symbol for a closed subshell.
Feb 20-25, 2023	Interpretation of electronic spectra, Orgel diagrams,
Feb 27- March 04, 2023	Tanabe-Sugano diagrams for transition metal complexes (d1 -d9 states) ,
March 13-18, 2023	calculations of Dq, B and b parameters,charge transfer spectra,
March 20-25, 2023	spectroscopic method of a ssignment of absolute configurationin optically active metal chelates and their stereochemical information,
March 27-31, 2023	anoma lousmagnet ic moments, magnet ic exchange coupling and spin crossover.
April 03-08, 2023	Circular Dichroism and Optical Rotatory Dispersion
April 10-15, 2023	Polarized light, fundamental symmetry requirements, for optical activity, interaction of polarized light with optically active matter,
April 17-22 2023	optical rotation, Cotton effect,configuration of Tris -chelated complexes.
April 24-26 , 2023	Metal carbonyls, structure and bonding, vibrational spectra of metal carbonyls for bonding and structural elucidation,
April 27-29 , 2023	Important reactions of metal carbonyl s;prepa ration, bonding, structure and important reactions of transit ion metal nitrosyl,dinitrogen and dioxygen complexes; tertiary phosphine as ligand.
May 01-02 , 2023	Higher boranes,
May 03-04, 2023	carboranes, meta lloboranes and metallocarboranes.
May 05,2023	Metalca rbonyl and halide clusters, compounds with meta l-meta l multiple bonds.
May 06,2023	Revisions

MSc -Physical Chemistry-2022-23

Odd Sem	MSc 1st Sem	MSc 3rd Sem
Sept 05-10, 2022	Recapitulation of thermodynamic laws. Concept of fugacity, methods for determining the fugacity of a real gas, its variation with temperature and pressure	Electromagnetic radiation, Interaction of electromagnetic radiation with matter- absorption, emission , transmission, reflection, refraction, dispersion, polarization and scattering. Uncertainty relation and natural line width and line broadening
Sept 12-17, 2022	Activity, choice of standard states, dependence of activity on temperature and pressure, determination of activity by (i) measurement of vapour pressure, (ii) distribution of solute between two immiscible solvents, (iii) emf measurement and (iv) activity of one component from known value of the activity of the other.	Transition probabilities, results of the time dependent perturbation theory, transition moment, selection rule, intensity of spectral lines, Born-Oppenheimer approximation
Sept 19-24, 2022	Partial molar quantities, chemical potential and Gibbs-Duhem equation,variation of chemical potential with temperature and pressure, chemical potential for an ideal gas, chemical potential in ideal gas mixture,	Rotational, vibrational and electronic energy levels, The rotation of molecules, rotational spectra of rigid diatomic molecules
Sept 26- Oct 01, 2022	Determination of partial molar volume, thermodynamic functions of mixing (free energy, entropy, volume and enthalpy), concept of escaping tendency and chemical potential.	Intensities of rotational spectral lines, isotopic effect, non-rigid rotator, spectra of polyatomic linear molecules and symmetric top molecules.
Oct 03-08, 2022	Collision theory of reaction rates, the steric requirement, Arrhenius equation and activated complex theory (ACT), comparison of collision and activation complex theory, Potential energy surfaces (Only basic Idea), thermodynamic formulation of	The vibrating diatomic molecule, force constant, zero point energy, simple harmonic vibrator, anharmonicity, Morse potential, overtones, hot bands, diatomic vibrating rotators, P,Q,R branches,

	activated complex theory,	
Oct 10-15, 2022	Chain reactions (hydrogen-halogen reaction), unimolecular reactions, Lindemann – Hinshelwood mechanism of unimolecular reactions.	Vibration of polyatomic molecules, normal mode of vibrations. Fourier transform spectroscopy. Classical and quantum theories, pure rotational Raman spectra of linear molecules,
Oct 17-21 2022	Debye-Hückel theory of ion-ion interaction and activity coefficient, applicability and limitations of Debye-Hückel limiting law, its modification for finite-sized ions, effect of ion-solvent interaction on activity coefficient, Physical significance of activity coefficients,	Vibrational Raman spectra, mutual exclusion principle, polarization of the light and Raman effect, depolarization of Raman lines, technique.
Oct 27- Nov 05, 2022	Mean activity coefficient of an electrolyte, Debye-Huckel-Onsager (D-H-O) theory of electrolytic conductance , Debye - Falkenhagen effect, Wein effect.	Basic principles of NMR, theory of nuclear magnetic resonance, spin lattice relaxation, spin-spin relaxation, experimental techniques chemical shift,the -scale of chemical shift, the origin of shielding constant, pattern of coupling , origin of spin-spin coupling, the nuclear overhauser effect.
Nov 07-12, 2022	D-H-O equation - its applicability and limitations, Pair-wise association of ions (Bjerrum treatment), Modification of D-H-O theory to account for ion-pair formation.	Basic principles of ESR, experimental technique, the g -value hyperfine structure, applications of ESR spectroscopy to the study of free radicals and fast reactions, spin densities and Mc Connell relationship.
Nov 14-19, 2022	Metal/Electrolyte interface, Concept of electrical double layer and its structure: Helmholtz-Perrin , Gouy-Chapman, and Stern models, electrokinetic phenomena,determination of zeta potential.	Basic principles of NQR, experimental techniques, Zeeman effect in NQR spectra, quadrupole interactions in molecules, applications.

Nov 21-26, 2022	Gibbs adsorption equation, Langmuir adsorption isotherm and its kinetic derivation for non-dissociative and dissociative adsorption,	Symmetry elements in crystals, criteria for determining unit cell of lattice, stereographic projections, point groups (illustration of R, R-b ar, Rm, R/m, R-bar/m point groups only), miller indices for planes
Nov 28- Dec 03, 2022	BET adsorption isotherm, its kinetic derivation and applications, Study of surfaces by STM, SEM.	Space lattices, space groups P1, Pbar1, P2, P21, Pm, Pc, Cc, C2, Cm, C2 /m. Defects in crystal. Derivation of equilibrium concentration of Schottky and Frenkel defects.
Dec 05- 10, 2022	Heterogeneous catalysis, surface heterogeneity, surface catalyzed unimolecular and bimolecular reactions,	Production of X-rays, X-ray spectra, absorption edges, X-ray filters, Reciprocal lattice concept and its importance, Definition of Reciprocal lattice vector. Interplanar spacing using reciprocal lattice concept for cubic, tetragonal, orthorhombic and hexagonal crystal systems.
Dec 019- 20, 2022	Temporary and permanent catalytic poisons, activation energy for surface reactions. Comparison of homogeneous and heterogeneous reaction rates.	Equivalence of Bragg's and Laue condition. Structure factor calculations for primitive, base-centered , body-centered and face centered unit cells. Relation of structure factor to electron density and intensities
Dec 021- 24, 2022	Revision	Data collection and data reduction, Phase problem –Patterson method and Heavy-atom method, refinement of structure by su ccessive and difference fourier synthesis. Correctness of a structure (Discrepancy index). Electron diffraction: Basics, Measurement technique, Comparison with X-ray diffraction technique. Applications in structure determination. Neutron diffraction: Basics, measurement techniques, Applications and comparison with X-ray diffraction technique.

Even Sem	MSc 2nd Sem
Feb 01-06, 2023	The postulates of quantum mechanics, Linear and Hermitian operators, Commutation of operators and Uncertainty Principle, Schrodinger equation
Feb 07-13, 2023	Eigen function and eigen values, free particle, Schrodinger equation for a particle in a box, the degeneracy, particle in a box with a finite barrier
Feb 14-18, 2023	Schrodinger equation for linear harmonic oscillator and its solution, zero point energy, Tunneling Problem: Tunneling through a rectangular barrier.
Feb 20-25, 2023	Energy levels and wave-functions of Rigid rotator, Hydrogen atom: Complete solution (separation of variables in spherical polar coordinates and its solution).
Feb 27- March 04, 2023	Radial distributions, Angular momentum and its directional quantization, Angular momentum operators, commutation relation
March 13-18, 2023	Revision of Basic concepts, Kinetics of Polymerization: Mechanism and Kinetics of chain growth polymerization: free-radical, cationic, anionic and coordination polymerization.
March 20-25, 2023	Mechanism and Kinetics of step-growth polymerization. Comparison between step-growth and chain polymerization.
March 27-31, 2023	Molecular mass of polymers: Significance of average molecular mass, Poly-dispersity, Molecular mass distribution curves, Determination of molecular mass by osmometry and viscosity methods.
April 03-08, 2023	Electrically conducting polymers, Fire resistant polymers, Liquid crystal polymers.
April 10-15, 2023	Nuclear stability and binding energy. Mass and binding energy, Nuclear fission and nuclear fusion,
April 17-22 2023	Fission cross section, chain fission, fission product and fission yield. Interaction of nuclear radiation with matter,
April 24-26 , 2023	Detectors (Proportional, Geiger-Muller and Scintillation counters) and their principles. Units for measuring radiation absorbed, radiation dosimetry
April 27-29 , 2023	Doubt Session
May 01-02 , 2023	Radiotracer technique, Activation analysis, isotope dilution technique,
May 03-04, 2023	Radiochromatography, radiometric titrations, Neutron absorptiometry, Some applications
May 05,2023	Revision of Syllabus
May 06,2023	Class test

MSc -Organic Chemistry-2022-23

Odd Sem	MSc 1st Sem	MSc 3rd Sem	MSc 3rd Sem	MSc 3rd Sem
2021-2022	Paper -III	Paper - XIV	Paper -XV	Paper -XVI
Sept 05-10, 2022	Types of mechanisms , types of reactions, thermodynamic and kinetic requirements, effect of structure on reactivity - Resonance and field effects,	Various electronic transitions (185 -800 nm), Beer Lambert law, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds,	Principle , preparations, properties and applications of the reagents of the following metals/non-metals in organic synthesis with mechanistic details Li, Mg, Cd, Zn,	CMolecular orbital symmetry, frontier orbital of ethylene , 1,3-butadiene, 1,3,5 - hexatriene and allyl system classification of pericyclic react ions,
Sept 12-17, 2022	steric effect , quantitative treatment. The Hammett equation and linear free energy relationship, substituent and reaction constants.	Fieser-Woodward rules for conjugateddienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls.	Principle , preparations, properties and applications of the reagents of the following metals/non-metals in organic synthes is with mechanistic details, B and I	Woodward - Hoffmann correlation diagram. FMO & PMO approach, Electrocylic rea ction - conrotatory and disrotatory motions. 4n, 4n+2, allyl systems,
Sept 19-24, 2022	Taft equation, kinetic $ thermodynamic control, Hammond's postulate, Curtin - Hammett principle .	Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes , aromatic compounds, alcohols, ethers, phenols and	Principle , preparations, properties and applications of the reagents of the following metals in organic synthesis with mechanistic details Pd,	Ring opening of cyclopropyl halides and tosylates, cycloadditions- antarafacia l and supa rafacial additions,

		amines.	Ni, Fe	
Sept 26- Oct 01, 2022	Potential energy diagrams , transition states and intermediates, methods of determining mechanisms	Detailed study of vibrational frequencies of carbonyl compounds (ketones, a ldehydes,esters , amides , a cids, anhydrides, lactones, lactams and conjugated carbonyl compounds) . Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones , combination bands and Fermi resonance.	Principle , preparations, properties and applications of the reagents of the following metals in organic synthesis with mechanistic details Cr and Ticompounds	4n and 4n+2 systems , 2+2 addition of ketenes, 1,3 - dipolar cycloaddit ions and cheleotropic Reactions.
Oct 03-08, 2022	Generation, structure ,stability and reactivity of carbocations,carbanions, carbenes and nitrenes.	FTIR, IR of gaseous,solids and polymeric materials .General introduction and de finition, chemical shift,spin-spin interaction,shielding mechanism,mechanism of measurement,	Introduction.Different oxidative process es.Hydrocarbons- alkenes, aromatic rings,	Sigmatropic Rearrangements- suprafa cial and entarafacial shifts of H, sigma tropic shifts involving carbon moieties,
Oct 10-15, 2022	limiting cases SN1 and SN2, detailed mechanistic description $ border line mechanisms, nucleophilicity and solvent effects, competition between nucleophilicity $ basicity, ambident nucleophiles,	chemical shift values and correlation for protons bonded to carbon (aliphatic, olef inic, aldehydic and aromatic) and other nuc lei(alcohols , phenols, enols , carboxylic acids , amines, amides & mercapto), complex	saturated C-H groups (activated and una ctivated) . Alcohols, diols, aldehydes, ketones,	retention and inversion of configuration, [3,3] and [5,5] sigmatropic rearrangements, deta iled treatment of Sommelet - Hauser ,

		spin-spin interaction between two, thre e, four and five nucle i (f irst order spectra),		
Oct 17-21 2022	hard and soft nucleophiles and electrophiles, leaving group effects, steric and other substituent effects on substitution and ionization rates, stereochemistry of nucleophilic substitution, SNi , SN1 ', SN2 ' and SNi' mechanisms.	spin system-Pople nota tion, virtua l coupling. Stereochemistry, concept of topicity, effect of enantiomer ic and dia stereomer ic protons, hindered rota tion, Karplus curve - va riation of coupling constant with dihedra l angle	ketals and carboxylic acids .Amines, hydrazines, and sulphides .	Claisen and Cope rearrangements introduction to ene reactions. Simple problems on Pe ricyclic reactions , Group transfers and eliminations.
Oct 27-Nov 05, 2022	The El, ElcB and E2 mechanism, Orientation Effects in Elimination Reactions, Saytzeff and Hoffman rules, Stereochemistry of E2 Elimination Reaction and Eclipsing Effects in E2 Eliminations.	Four ier t ransform te chnique,. Resonance of other nuclei -F, P. Further tools for s implif ication (chemical and inst rumental) and elucida te st ructures by NMR including an ove rview of 2D NMR Techniques-Deuterat ion, changing solvents, trif luoroacetylation,	.Oxidations with ruthenium tetraoxide , and thallium (III) nitrate.	Excitation and excited states, Franck-Condon Principle, Jablonski diagram, energy transfer photsensitization, quenching, quantum efficiency and quantum yield.

Nov 07-12, 2022	Symmetry elements, D-L, R-S, E-Z and threo-erythro nomenclature,interconversion of Fischer, Newman, Sawhorse and flying wedge formulae.conformational analysis,	basif icat ion and acidification, shift reagents, spin decoupling, COSY, DEPT, INEPT, HETCOR, HSQC, HMBC and NOESY.	Introduction. Different reductive processes	Photochemistry of carbonyl compounds (Norrish type I and type II changes, photoreaction of cyclic ketones,
Nov 14-19, 2022	enantiomerism and diastereomerism of simple, cyclic (chair and boat configuration) and acyclic systems. Axial and planer chirality, optical isomerism in allenes,	Introduction, ion product ion - EI, CI, FD and FAB, factors affecting fragmenta tion, ion analysis, ion abundance. Mass spectral fragmenta tion of organic compounds, common functional grouP ,	Hydrocarbons – alkanes, alkenes , alkynes and aromatic rings.Carbonyl compounds	Paterno-Buchi reaction and Photoreducation. Photochemistry of olefins and 1,6-Butadiene (cis-trans isomerisation, dimerisation and cycloadditions) . Chemistry of vision.
Nov 21-26, 2022	biphenyls (atropoisomerism), spiranes,hemispiranes. elementary ideas about stereochemistry of tertiary amines,quaternary salts, sulphur and phosphorous compounds.	molecula r ion peak, metastable peak, Nitrogen rule, molecula r weight determination molecula r formula from isotopic ratio da ta,	Carbonyl compounds – aldehydes, ketones ,	Di-p-methane rearrangement , enone and dienone rearrangements,
Nov 28- Dec 03, 2022	Topicity of ligands and faces, their nomenclature and prostereoisomerism,stereogenecity, chirogenicity	isotope profile of halogen compounds, factors affecting reaction pathways, fragmentation pattern - simple cleavage,	acids and their derivatives. Epoxides.Nitro, nitroso, azo and oxime groups.Hydrogenolysis, Books	photochemistry of aromatic compounds (substitution, isomerization, cyclization and cycloaddition

		retro-Diels Alder,		
Dec 05- 10, 2022	pseudoasymmetry and prochiral centre. stereospecific and stereoselective reaction.	Hydrogen transferrea rrangement like scrambling, ortho effect, McLafferty rea rrangement, fragmentation patterns of hydrocarbons, alcohols, phenols , ethers, aldehydes, ketones, esters,	Principle , preparations, properties and applications of the reagents of the following metals in organic synthesis with mechanistic details Co, Rh, compound	Photo-Fries rearrangement, photolysis of nitrile esters
Dec 019-20, 2022	Elementary idea of principle categories of asymmetric synthesis, Cram's rule and its modification, Prelog rule and horeaus rule	carboxylic acids, amines, nitro, amides, nitriles.	Principle , preparations, properties and applications of the reagents of the following metals/non-metals in organic synthesis with mechanistic detailsB and I	Barton reaction , Hoffman-Loef ller-Freytag reaction.
Dec 021-24, 2022	Stereochemistry of sugars- C1 and 1C conformations of hexoses, c 2'-endo and c3'-endo conformation of pentoses,	General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroa roma tic and carbonyl carbon),	Introduction.Different oxidative process es.Hydrocarbons- alkenes, aromatic rings,	Application of photochemistry-photosynthesis, phototherapy.
	homomorphous sugars, abnormal mutarotation and Δ-2 instability factor.Stereochemistry of decalins.	coupling constants. nuclear Overhausere ffect NOE Problems pertaining to sections A, B and C.	saturated C-H groups (activated and una ctivated) . Alcohols, diols, aldehydes, ketones,	Simple problems on Pericyclic reactions , Group transfers and eliminations
	Revisions	Revisions	Revisions	Revisions

Even Sem	MSc 2nd Sem	MSc 4th Sem	MSc 4th Sem	MSc 4th Sem	MSc 4th Sem
2022-2023	**Paper(VII)**	**Paper(XVII)**	**Paper(XVIII)**	**Paper(XIX)**	**Paper (XX)**
Feb 01-06, 2023	Theoretical treatment of aromatic substitution reactions, structure -rea ctivity	An introduction of synthons and synthet ic equivalents, general princ iples of the disconne ct ion approach, functiona l group interconversions	A detailed study including mechanism or Arndt-Eist ert synthesis Beckmann,	Introduction and historical perspective, chemical and biological catalysis , remarkable properties of enzymes like catalytic power,	Classif ication and dis covery of new drugs, history and development of chemotherapeutic agents, therapeutic index, LD50 and ED50, naming of (new) drugs .
Feb 07-13, 2023	relationship in mono substituted benz ene r ing, or ienta tion in other ring syst em, energy profile diagram, Vilsmeir-Haak react ion, Reimer-Tiemann reaction,	the importance of order of events in organic synthesis, one group C-X and two group C-X disconne ct ions	Hofmann, Curtius , Lossen, Schmidt, Favorskii, Neber,	specificity and regulation. Nomenclature and classification, extraction and purification.	Elementa ry idea about drug action: the receptor role, neurotransmitters and re ceptors, ion channels and their control, membrane bound enzymes -activa tion/dea ct iva tion,
Feb 14-18, 2023	Mechanism of Nucleophilic substitution in aromatic systems via diazonium ions , by addition-elimination and elimination-addition machanism (involving a rynes);	the importance of order of events in organic synthesis, one group C-X and two group C-X disconne ct ions	Fritsch -Butenberg-Wiechell, Baeyer-Villiger,	Fischer's lock and key and Koshland's induced f it hypothes is, concept and ident ification of active site by the use of inhibitors, affinity labeling.	chemical basis of messenger induced change of shape by the receptor, design of agonists, antagonists and partial agonists
Feb 20-25, 2023	Richter rearrangement, Sommelet-Hauser and Stevens rea rrangements. General aspects of genera tion, structure, stability and rea ctivity of arynes	Reversal of polarity, amine synthesis,Synthesis of alkenes -use of wittig reagents,use of acetylene and aliphatic nitro compounds in organic	Benzilbenzillic acid rearrangements.	Fischer's lock and key and Koshland's induced f it hypothes is, concept and ident ification of active site by the use of inhibitors, affinity labeling.	Drug development: screening of natural products, isolation and purification, structure determination, structure-activity relationships (SAR),

		synthesis			
Feb 27-March 04, 2023	Bimolecular mechanisms - SE2 and SEi. The SE1 mechanism, electrophilic substitution accompanied by double bond shifts . Effect of substrates	synthes is of three membered rings, photochemistry in organic synthesis-synthesis of four membered rings ,	A detailed study including mechanism Darzens synthes is , stroke enamine synthesis,	Transition-sta te theory, or ienta tion and steric effect, ac id-base catalysis, covalent ca ta lys is , stra in or distort ion	synthetic analogues, isoste res and bioisost er es, conc ept of lead compounds. Brief overview of pha rmacokinet ics and pharma codynamics , concept of prodrugs and synergism.
March 13-18, 2023	Leaving group and the solvent polarity on the reactivity. Neighbouring Group Participation and Carbocation Rearrangements Anchimeric assistance, neighbouring group participation by non-bonding electrons, sigma and p-bonds, classical and non-classical carbocation, carbocations rearrangements, migratory aptitudes, Wagner Meerwein rearrangement	synthes is of three membered rings, photochemistry in organic synthesis-synthesis of four membered rings ,	Shapiro react ion; Sharplcss asymmetric epoxidation,Prevost and Woodward hydroxylation	Mechanism of a ction of chymotrypsin, carboxypeptida se A and papain.	Antineoplastic Agents: Mechlorethamine, Chlorambucil, cyclophosphamide, ca rmustine, aminopter in, 6-mercaptopurine, paclitaxel (synthes is of pa clitaxel excluded)
March 20-25, 2023	pincol pinacolone r ea rrangement, Demjanove rea rrangement, Tif feneau -Demjanove r ing expansion, a ldehyde -ketone rearrangement, dienone-phenol r ea rrangement and trans -annular rearrangements.	synthesis of three membered rings, photochemistry in organic synthesis-synthesis of four membered rings ,	Flavonoids Occurrence, nomenc la ture, genera l (chemical and spectroscopic) methods of structure determinat ion of f lavonoids	Cofactors a s derived from vitamins, coenzymes, prosthetic groups, apoenzymes. Structure and biological funct ions of coenz yme A,	Antima la ria ls: Chloroquine , pr imaquine, chloroguanide, pyrimethamine' Ana lgesics, Ant ipyrics and Antiinflammatory agents: Morphine and related compounds (codeine and heroin),
March 27-31, 2023	General aspects of genera tion, structur e, stability and rea ctivity of free radica ls,	1,3-difunctiona lized compounds and unsatura ted ca rbonyl	Isolat ion and synthesis of Cyanin, Quercet in, Diadzein	thiamine pyrophospha te, pyr idoxal phosphate, NAD+,	meper idine , methadone, a spirin, a cetaminophen,

	types of free radical r eactions	compounds, control in carbonyl condensations,	and Chrysin	NADP+ , FMN, FAD,	indomethac in, phenylbutazone, mef enamic ac id, ibuprofen, diclofena c, naproxen, ce lecoxib.
April 03-08, 2023	General aspects of genera tion, structur e, stability and rea ctivity of free radica ls, types of free radical r eactions	difunct ionaliz ed compounds- Michael addition, and Robinson Annela tion.	Biosynthesis of Flavonoids : Acetate pa thway and Shikimic acid pathway, biosynthes is of catechin.	Mechanisms of reactions catalyzed by the above cofactors	Antifertility agents: Ovulat ion inhibitors and rela ted hormona l contrac eptives - norethindrone , norethynodrel, est radiol, mest ranol, non hormonal contraceptive - centchroman (synthesis of all the drugs excluded).
April 10-15, 2023	coupling of alkynes, homolytic aromatic substitut ion, Sandmeyer reaction and Hunsdie cke r react ion.	disconnect ion approach towards the synthes is of Juvabione and their relative merits and demerits.	Systematic (Hantzsch-Widman) nomencla ture for monocylic and fused ring systems. Methods of synthesis	Prostaglandins : Gene ra l Introduction, nomenclature and biologica l roles of prostaglandins. Synthes is of PGE2 and PGF2 α .	Cardiova scula r Drugs: Ca lc ium channe l blockers and b-blockers : sorbitrate, dilt iazem, atenolol and verapamil
April 17-22 2023	Hydration and Addition of Alcohols to Aldehydes , Ketones and Acids . Addition - Elimination Reactions of Ketones and Aldehydes	Basic Principle and ne ed of green chemistry, Dif fe rent too ls for green synthesis (Elementa ry idea of gr een reagent , green solvent,	Reactions including mechanism of the following. Five - membered heterocycles:	General aspects of structure dete rminat ion of terpenoids,	AIDS and drugs against HIV: How HIV infects the system, structure and mode of action of important drugs aga inst HIV (nucleoside revers e transcr iptase inhibitors) - AZT, ddI, ddC, d4T and 3TC (synthesis only of AZT).
April 24-26 , 2023	Reactivity of carbonyl compounds towards Addition. Mannich Reaction, lithium a luminium hydride , reduct ion of ca rbonyl	Basic Principle and ne ed of green chemistry, Dif fe rent too ls for green synthesis (Elementa ry idea of gr	pyrazole, imida zole, oxazole, isooxa zole, thiazole, isothiazole; the ir basic chara ct er	structure and synthesis of Geraniol, a-terpineol,	Cell wall biosysnthes is and protein synthesis inhibitors: Penicillins and semi - synthetic penicillins,

	compounds	een reagent , green solvent,			synthesis,
April 27-29 , 2023	acids, esters, nitriles, additions of Grignard reagents. Reformatsky react ion, Wittig reaction, Claisen condensation	synthes is involving ba sic principle of green chemistry-synthesis of adipic acid and BHC synthes is of Ibuprofen	Methods of synthesis of the following six - membered heterocyles	a-pinene, camphor and squalene	structure elucidat ion and medicina l uses of penicillin G, problems of sensitivity to acids, b-la ctamases and narrow spectrum of activity, solving these problems leading to the development of penic illin V,
May 01-02 , 2023	Dieckman reaction, Aldol condensat ion	An idea of supramolecular chemistry	pyrimidines and purines . Aromaticity, Metallocenes and Nonbenzenoid Aromatics Compounds Aromaticity	Biogenetic isoprene rule and biogenes is of terpenoids.	oxacillin, cloxacillin, ampicillin, amoxycillin, carbenicill in and carfecillin. Cephalosporins - Discovery, st ructure elucidation and synthesis of cephalosporin -C.
May 03-04, 2023	Knoevenagal condensation, Perkin reaction, Cannizzaro reaction, Benzoin condensation, Robinson-Mannich reaction	An idea of supramolecular chemistry	aromatic , non-aromatic, and antiaroma tic), aromaticity incharged rings, homoaromaticity, psuedo-aromaticity	Steroids Isolation and nomenclature of steroids,	Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation,
May 05,2023	Ester hydrolysis, aminolysis of esters, amide hydrolysis	Crown ethers, cryptates,	HMO and PMO for determining aromatic, non - aromatic and anti-aromatic character of annulenes	structure, synthesis (Woodward) and stereochemist ry of cholesterol	general methods of structure elucidation, degradation,
May 06,2023	Revision	micelles	having various p-electron systems, application of 1H-NMR in determining aromatic character of annulenes.	methods for the following convers ions. i) Cholesterol ® Testosterone ii) Cholesterol ®	classification based on nitrogen heterocyclic ring, role of alkaloids in plants.

				Progesterone	
	Test	Revision, Test	General considerat ions, synthesis and reactions of representa tive compounds Ferrocene, Azulene, Tropones and Tropolones.	iii) Cholest erol ® 5-a and 5-b cholanic ac ids. iv) Johnson's hydrochrysene approa ch towards the synthesis of, Androsterone .	Structure, stereochemistry, synthes is and biosynthesis of the following : Ephedrine, (+)-Coniine, Nicotine, Quinine and Reserpine. Books Suggested

MSc

Odd Sem	MSc 1st Sem Mathematics	MSc 1st Sem Life Sciences
Sept 05-10, 2022	Examples of sca la r and vectors, definitions of ve ctors in two, three spaces,representation and s imple properties of vectors, addit ion and subtraction of vectors,vector addit ion by the method of t riangles ,	Structure of prokaryotic and euka ryotic c ells , intracellular organelles and their functions, comparison of plant and animal cells.
Sept 12-17, 2022	resolut ion of vectors into rectangula r components, addition of vectors by components,	Overview of metabolic processes -catabolism and anabolism. ATP - the biologica l energy currency. Carbohydrate metabolism-glycolysis,
Sept 19-24, 2022	multiplication and diffe rentiat ion of vectors . Scalar product of vectors, ve ctor product , conc ept of norma liza tion,orthogonality and complete set of unit vectors.	Kreb's cycle, glycogenolysis, glycogenesis pentose phosphate
Sept 26- Oct 01, 2022	Illustra tion of applications to spectroscopy and quantum chemistry.	pathway and gluconeogenes is ,

Oct 03-08, 2022	Def init ion of matr ix, types of ma trices, viz . row matrix, column ma tr ix,null matrix, square matrix, diagonal matrix, addition, subtra ction and mult iplicat ionby a number, matrix mult iplication.	Structure and functions of important derivatives of monosaccharides like
Oct 10-15, 2022	Transpose and adjoint of matr ix, elementary transforma tion, r epresentation and applications (without deve lopment of theory) tosolution of linea r equa tions. Definition of determinant,	glycosides , deoxy sugars, myoinositol
Oct 17-21 2022	properties of determinants, evaluation of determinants. Illust ration or applicat ions to group theory, problems inchemistry.	amino sugars-N-acetylmuramic acid and sialicacid, disacharides Structure and biologica l functions of Structura l polysaccharides - cellulose and
Oct 27- Nov 05, 2022	Need for logarithm in chemist ry. Theory and application of logar ithms forsolving genera l and chemical problems.	chitin.Storage polysacchar ides -star ch and glycogen. Heteropolysacchides-glucosaminoglycans
Nov 07-12, 2022	Rectangular coordinates, straight lines, slope and interc ept of the equa tion,slope and point equation, two point equation,	mucopolysacchaides .Glycoconjugates- glycoproteins and glcolipids.
Nov 14-19, 2022	paralle l lines , points of intersection, distance between two points, change of or igin.Examples from problems in chemistry, curve f itting for least squares method.	Role of suga rs in biological recognition. Blood group substances.
Nov 21-26, 2022	The binomial expansion, some example from chemistry, sines, cosines andtangents, t rigonometric ident it ies, pola r coordina tes in t rigonometric functions	Fatty acids , essential fatty acids, structure and function of triacylglyce rols, glycerophospholipids, sphingolipids, cholesterol,

Nov 28- Dec 03, 2022	Theory, rules of dif ferentiation, powers, added and subtracted funct ions,constants, products, quotients, functions of a funct ion, logar ithmic dif fe rentiation, and pa rametric funct ions. Algebra ic simplif ication, differentiat ion of implic it functions,graphical s ignif icanc e of differentiat ion,	Bile acids, prostaglandins. Lipoproteins - composition and function, role in atheroscleros .
Dec 05- 10, 2022	rate of change of slope, succ ess ive different ia tion. Examples re lated to maximally populated rotationa l energy levels, Bohr's radius and most probable ve loc ity f rom Maxwe ll's distribution. Exact and inexa ct dif ferentia l with their applica tion to thermodynamic princ iples.	Properties of lipid aggregates-micelles ,bilayers,liposomesand their possiblebiological functions. Biological membranes. Fluid mosaicmodel of membranestructure.
Dec 019- 20, 2022	The fundamental theorem, geometrica l significance of partial different ia tion, special ca ses of fundamenta l theorem, success ive pa rtia l dif fe rentiation. Integra l transforms (Fourier and Lapla ce) . Reduction formulae, applica tion to chemica l problems . Methods of Lagrangian multipliers, Sterling's approximation, probability and errors.	Essential amino acids, Isoe le ctric pH,chemical andenzymatic hydrolys is of proteins to peptides, amino acid sequencing. Se condary structure of proteins, forces responsiblefor holding of secondary structur es. α -helix, β-sheets , supersecondary structure,triple helix structure of collagen.
Dec 021- 24, 2022	Integra l theory, rules of integra tion between limits, s ignif icance of 'e' exponentia l equations, methods of integra tion, viz . algebra ic s implifications, substitution, integration by pa rts, integration by partia l fractions, coordinate transforma tion (e.g., ca rtes ian to spherical polar), curve sketching, integra l as area. Illust ra tion of applicat ion in chemistry. Eva luation of	Tertiary structur e of protein- folding and doma in structure. Quaternary structure . denaturation of proteinsNucleic Acids and Genetic Code Structure of nucleotides, nucleosides, DNA (Wa tson-Crickmode l) RNA st ructure andconformat ion,

	standard integra ls used in chemistry.	
	Simple different ia l equa tions, s epa rable variables, homogeneous equations,exact equations, linear equations, equation of the f irst and s econd order, partia ldifferent ia l equation, applica tion to phys ico-chemica l problems.	Replica tion of DNA (semi-conse rvative, conservative and dispersive replication Maselson-Stahl experiment) , transcription, translation of genetic material, genetic code, universality of the code, codon, anticodon pairing,RNA, protein biosynthesis (initiatione longation, termination and processing of the peptide cha in).

MSc

Even Sem	MSc 2nd Sem Computer
Feb 01-06, 2023	Elementary Aspects of computer , memory size/architecture.Binary, octal & hexadecimal number systems. Using Internet, word processing package; Graphics Package and visualization.
Feb 07-13, 2023	Introduct ion to Opera ting system (UNIX, Windows) and programming language. Algorithm, Flow cha rts. Writing simple programs, convert inga flow chart into a program.
Feb 14-18, 2023	Using graphics package plotting (a) y = x, x 2 , sin(x), tan(x) (b) wavefunct ions for s, p, and d – orbitals.
Feb 20-25, 2023	Numerica l Methods: Roots of Polynomials, Solut ion of Linear simultaneous equations, matrix mult iplica tion and inversion.
Feb 27- March 04, 2023	Numerical differentia tion and integration. Statistical treatment of data , variance and correlations, linear regression
March 13-18, 2023	Using ChemDraw. Writ ing programs for van der Waals equation, pH tit ra tion,kinetics, radioactive de cay,
March 20-25, 2023	evaluation of lattice energy and ionic radii from experimental data.
March 27-31, 2023	Elementa ry structura l fea tures such a s bond lengths,
April 03-08, 2023	Elementary structural features such a s bond lengths, bondangles,dihedra l angles et c.
April 10-15, 2023	of molecules extra cted from a da tabase such as Cambridgeda tabase. numerical problem on data base
April 17-22 2023	numerical problem on data base
April 24-26 , 2023	chem draw molecular representation on computer

April 27-29 , 2023	polynomials programme determination on computer
May 01-02 , 2023	Doubt session
May 03-04, 2023	Revisions
May 05,2023	Revisions
May 06,2023	class tests

HEAD
Chemistry Department
Dyal Singh College, KARNAL