MSc -Inorganic Chemistry-2021-22

Odd Sem	MSc 1st Sem	MSc 3rd Sem
Oct 25-30, 2021	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.
Nov. 8-13 , 2021	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.
Nov.15-20 , 2021	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.
Nov. 22-27, 2021	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
Nov. 29-Dec. 4,2021	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.

Dec.6-11, 2021	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
Dec.13-18 , 2021	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
Dec.20- 24, 2021	Stepwise and overall formation constants and the int eraction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand,	Structure and function of meta lloproteins in electron transport processes - cytochromes and iron-sulphur proteins, synthetic models.
Dec 27, 2021 - Jan 1,2022	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
Jan 3-8, 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

Jan.10-15, 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,
Jan. 17-22, 2022	Limitation of crystal field theory, crystal field ef fects,	application of resonance Raman spectroscopy particularly for the study of active sites of metalloproteins
Jan. 24-29, 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,
Jan 31, Feb1-5, 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
Feb. 7-12,2022	Doubts Classes	Photoelectron Spectroscopy,Basic principles; photo-electric effect, ioniza tion process, Koopman's theorem.
Feb. 14-19, 2022	Revisions	Photoelect ron spectra of simple molecules , ESCA, chemical information from ESCA.
Feb. 21-22, 2022	Revisions	Revisions

Even Sem	**MSc 2nd Sem**

April 1-2, 2022	Electronic arrangements of microstates, calculation of the number of microstates in var ious electronic ar rangements, spectroscopic term symbols ,
April 4-9, 2022	vector diagrams to indicates coupling of orbital angular momenta in p 2, p 3, d 2 configurations and spin orbit coupling for p2 arrangement,
April 11-16,2022	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.
April 18-23, 2022	Interpretation of electronic spectra, Orgel diagrams,
April 25-30, 2022	Tanabe-Sugano diagrams for transition metal complexes (d1 -d9 states) ,
May 2-7,2022	calculations of Dq, B and b parameters,charge transfer spectra,
May 9-14, 2022	spectroscopic method of a ssignment of absolute configurationin optically active metal chelates and their stereochemical information,
May 16-21,2022	anoma lousmagnet ic moments, magnet ic exchange coupling and spin crossover.
May23-28, 2022	Circular Dichroism and Optical Rotatory Dispersion
May 30-31- June 1-4,2022	Polarized light, fundamental symmetry requirements, for optical activity, interaction of polarized light with optically active matter,
June 6-11, 2022	optical rotation, Cotton effect,configuration of Tris -chelated complexes.
June 13-16, 2022	Metal carbonyls, structure and bonding, vibrational spectra of metal carbonyls for bonding and structural elucidation,
(For 2nd & 4th Sem only)	important reactions of metal carbonyls; prepa ration, bonding, structure and important reactions of transit ion metal nitrosyl,dinitrogen and dioxygen complexes; tertiary phosphine as ligand.
June 13-18,2022	Higher boranes,
June 27-30, July1-2,2022	carboranes, meta lloboranes and metallocarboranes.
July 4- 9,2022	Metalca rbonyl and halide clusters, compounds with meta l-meta l multiple bonds.

MSc -Physical Chemistry-2021-22

Odd Sem	MSc 1st Sem	MSc 3rd Sem
Oct 25-30, 2021	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
Nov. 8-13 , 2021	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
Nov.15-20 , 2021	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
Nov. 22-27, 2021	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.
Nov. 29-Dec. 4,2021	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	
Dec.6-11, 2021	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,
Dec.13-18 , 2021	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.
Dec.20- 24, 2021	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.
Dec 27, 2021 - Jan 1,2022	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.
Jan 3-8, 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.

Jan.10-15, 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
Jan. 17-22, 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.
Jan. 24-29, 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.
Jan 31, Feb1-5, 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
Feb. 7-12,2022	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).
Feb. 14-19, 2022	Revision, Class Test	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.

Feb. 21-22, 2022		

Even Sem	**MSc 2nd Sem**
April 1-2, 2022	The postulates of quantum mechanics, Linear and Hermitian operators, Commutation of operators and Uncertainty Principle, Schrodinger equation
April 4-9, 2022	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
April 11-16,2022	Schrodinger equation for linear harmonic oscillator and its solution, zero point energy, Tunneling Problem: Tunneling through a rectangular barrier.
April 18-23, 2022	Energy levels and wave-functions of Rigid rotator, Hydrogen atom: Complete solution (separation of variables in spherical polar coordinates and its solution).
April 25-30, 2022	Radial distributions, Angular momentum and its directional quantization, Angular momentum operators, commutation relation
May 2-7,2022	Revision of Basic concepts, Kinetics of Polymerization: Mechanism and Kinetics of chain growth polymerization: free-radical, cationic, anionic and coordination polymerization.
May 9-14, 2022	Mechanism and Kinetics of step-growth polymerization. Comparison between step-growth and chain polymerization.
May 16-21,2022	Molecular mass of polymers: Significance of average molecular mass, Poly-dispersity, Molecular mass distribution curves, Determination of molecular mass by osmometry and viscosity methods.
May23-28, 2022	Electrically conducting polymers, Fire resistant polymers, Liquid crystal polymers.
May 30-31- June 1-4,2022	Nuclear stability and binding energy. Mass and binding energy, Nuclear fission and nuclear fusion,
June 6-11, 2022	Fission cross section, chain fission, fission product and fission yield. Interaction of nuclear radiation with matter,
June 13-16, 2022	Detectors (Proportional, Geiger-Muller and Scintillation counters) and their principles. Units for measuring radiation absorbed, radiation dosimetry
(For 2nd & 4th Sem only)	Doubt Session
June 13-18,2022	Radiotracer technique, Activation analysis, isotope dilution technique,
June 27-30, July1-2,2022	Radiochromatography, radiometric titrations, Neutron absorptiometry, Some applications
July 4- 9,2022	Revision of Syllabus
	Class test

MSc -Organic Chemistry-2021-22

Odd Sem	MSc 1st Sem	MSc 3rd Sem	MSc 3rd Sem	MSc 3rd Sem
2021-2022	Paper -III	Paper - XIV	Paper -XV	Paper -XVI
Oct 25-30, 2021	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,
Nov. 8-13 , 2021	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,

Nov.15-20 , 2021	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 amines.	Principle , preparations, properties and applications of the reagents of the following metals in organic synthesis with mechanistic details Pd, Ni, Fe	Ring opening of cyclopropyl halides and tosylates, cycloadditions-antarafacia l and supa rafacial additions,
Nov. 22-27, 2021	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 Ti compounds	4n and 4n+2 systems , 2+2 addition of ketenes, 1,3 - dipolar cycloaddit ions and cheleotropic Reactions.
Nov. 29-Dec. 4,2021	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,

Dec.6-11, 2021	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 spin-spin interaction between two, thre e, four and five nucle i (f irst order spectra),	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 ,
Dec.13-18 , 2021	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.
Dec.20-24, 2021	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	.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.

		ructures by NMR including an ove rview of 2D NMR Techniques-Deuterat ion, changing solvents, trif luoroacetylation,		
Dec 27, 2021 - Jan 1,2022	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,
Jan 3-8, 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.
Jan.10-15, 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, molecularweightdetermination molecula r formula from isotopic ratio data,	Carbonyl compounds – aldehydes, ketones ,	Di-p-methane rearrangement , enone and dienone rearrangements,

Jan. 17-22, 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, retro-Diels Alder,	acids and their derivatives. Epoxides.Nitro, nitroso, azo and oxime groups.Hydrogenolysis, Books	photochemistry of aromatic compounds (substitution, isomerization, cyclization and cycloaddition
Jan. 24-29, 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
Jan 31, Feb1-5, 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 details B and I	Barton reaction , Hoffman-Loef ller-Freytag reaction.
Feb. 7-12,2022	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.

Feb. 14-19, 2022	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
Feb. 21-22, 2022	Revisions	Revisions	Revisions	Revisions

Even Sem	MSc 2nd Sem	MSc 4th Sem	MSc 4th Sem	MSc 4th Sem	MSc 4th Sem
2017-2018	**Paper(VII)**	**Paper(XVII)**	**Paper(XVIII)**	**Paper(XIX)**	**Paper (XX)**
April 1-2, 2022	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 .
April 4-9, 2022	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,
April 11-16,2022	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	chemical basis of messenger induced change of shape by the receptor, design of agonists, antagonists and partial agonists

	)			labeling.	
April 18-23, 2022	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 synthesis	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),
April 25-30, 2022	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.
May 2-7,2022	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)
May 9-14, 2022	pincol pinacolone r ea rrangement, Demjanove rea rrangement, Tif feneau -Demjanove r ing	synthesis of three membered rings, photochemistry in organic synthesis-	Flavonoids Occurrence, nomenc la ture, genera l (chemical and spectroscopic)	Cofactors a s derived from vitamins, coenzymes, prosthetic groups, apoenzymes.	Antima la ria ls: Chloroquine , pr imaquine, chloroguanide, pyrimethamine’

	expansion, a ldehyde -ketone rearrangement, dienone-phenol r ea rrangement and trans - annular rearrangements.	synthesis of four membered rings ,	methods of structure determinat ion of f lavonoids	Structure and biological funct ions of coenz yme A,	Ana lgesics, Ant ipyrics and Antiinflammatory agents: Morphine and related compounds (codeine and heroin),
May 16-21,2022	General aspects of genera tion, structur e, stability and rea ctivity of free radica ls, types of free radical r eactions	1,3-difunctiona lized compounds and unsatura ted ca rbonyl compounds, control in carbonyl condensations,	Isolat ion and synthesis of Cyanin, Quercet in, Diadzein and Chrysin	thiamine pyrophospha te, pyr idoxal phosphate, NAD+, NADP+ , FMN, FAD,	meper idine , methadone, a spirin, a cetaminophen, indomethac in, phenylbutazone, mef enamic ac id, ibuprofen, diclofena c, naproxen, ce lecoxib.
May23-28, 2022	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).
May 30-31-June 1-4,2022	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
June 6-11, 2022	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).
June 13-16, 2022	Reactivity of carbonyl compounds towards Addition. Mannich Reaction, lithium a luminium hydride , reduct ion of ca rbonyl compounds	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,	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, synthesis,
(For 2nd & 4th Sem only)	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,
June 13-18,2022	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.
June 27-30, July1-2,2022	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,
July 4-	Ester hydrolysis, aminolysis of esters, amide hydrolysis	Crown ethers, cryptates,	HMO and PMO for determining aromatic,	structure, synthesis (Woodward) and	general methods of structure

9,2022			non - aromatic and anti-aromatic character of annulenes	stereochemist ry of cholesterol	elucidation, degradation,
	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 ® Progesterone	classification based on nitrogen heterocyclic ring, role of alkaloids in plants.
	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
Oct 25-30, 2021	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.
Nov. 8-13 , 2021	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,

Nov.15-20 , 2021	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
Nov. 22-27, 2021	Illustra tion of applications to spectroscopy and quantum chemistry.	pathway and gluconeogenes is ,
Nov. 29-Dec. 4,2021	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
Dec.6-11, 2021	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
Dec.13-18 , 2021	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
Dec.20- 24, 2021	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

Dec 27, 2021 - Jan 1,2022	Rectangular coordinates, straight lines, slope and interc ept of the equa tion,slope and point equation, two point equation,	mucopolysacchaides .Glycoconjugates- glycoproteins and glcolipids.
Jan 3-8, 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.
Jan.10-15, 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,
Jan. 17-22, 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 .
Jan. 24-29, 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.

Jan 31, Feb1-5, 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.
Feb. 7-12,2022	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 standard integra ls used in chemistry.	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,
Feb. 14-19, 2022	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).
Feb. 21-22, 2022		

MSc

Even Sem	MSc 2nd Sem Computer
April 1-2, 2022	Elementary Aspects of computer , memory size/architecture.Binary, octal & hexadecimal number systems. Using Internet, word processing package; Graphics Package and visualization.
April 4-9, 2022	Introduct ion to Opera ting system (UNIX, Windows) andprogramming language. Algorithm, Flow cha rts. Writing simple programs, convert inga flow chart into a program.
April 11-16,2022	Using graphics package plotting (a) y = x, x 2 , sin(x), tan(x) (b) wavefunct ions for s, p, and d – orbitals.
April 18-23, 2022	Numerica l Methods: Roots of Polynomials, Solut ion of Linear simultaneous equations, matrix mult iplica tion and inversion.
April 25-30, 2022	Numerical differentia tion and integration. Statistical treatment of data , variance and correlations, linear regression
May 2-7,2022	Using ChemDraw. Writ ing programs for van der Waals equation, pH tit ra tion,kinetics, radioactive de cay,
May 9-14, 2022	evaluation of lattice energy and ionic radii from experimental data.
May 16-21,2022	Elementa ry structura l fea tures such a s bond lengths,\
May23-28, 2022	Elementary structural features such a s bond lengths, bondangles,dihedra l angles et c.
May 30-31- June 1-4,2022	of molecules extra cted from a da tabase such as Cambridgeda tabase. numerical problem on data base
June 6-11, 2022	numerical problem on data base
June 13-16, 2022	chem draw molecular representation on computer
(For 2nd & 4th Sem only)	polynomials programme determination on computer
June 13-18,2022	Doubt session
June 27-30, July1-2,2022	Revisions
July 4- 9,2022	Revisions
	class tests

HEAD
Chemistry Department
Dyal Singh College, KARNAL