

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

(A College with Potential for Excellence)

Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2018-19

Department:P.G.ORGANIC CHEMISTRY

Paper: GENERAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Wave equation-interpretation of wave function-properties of wave function-Normalisation and orthogonalisation
Operators-Linear and Non linear ,Commutators of Operators
Postulates of Quantum mechanics,Setting up of operators obserbables
Hermitian operator-Eigen values of hermitian operator
Basic quantum chemistry-II; Wave mechanics of simple systems with constant potential energy ,partical in one dimensional box .
Factors influencing color transition –dipole integral , symmetry arguments in deriving the selection rules.
Wave mechanics of systems with variable potential energy –symple harmonic oscillator , solution of wave equation-selection rules.
Molecular spectroscopy-I;Rotational spectra of diatomic molecules-Rigid rotor Selection rules-calculation of bond length –isotopic effect,second order stark effect and its applications
Infrared spectra of diatomic molecules , harmonic and anharmonic oscillators –selection rules.
Overtone combination bands – calculation of force constant , anharmonicity constant and zero point energy.
Fermi resonance ,simultaneous vibration-rotation spectra of diatomic molecule .
Molecular spectroscopyII-Raman effect –classical and quantum mechanical explanations
Franck Condon principle –applications ,Rotational fine structure . Charge transfer spectra-band head and band shading

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Department : P.G.ORGANIC CHEMISTRY

Paper :GENERAL CHEMISTRY

Class: I M.SC ORGANIC CHEMISTRY

Semester:II

Basic Quantum chemistry III-Hydrogen atom ,probability density in orbitals ,shapes of orbitals .
Perturbation theory- line independent perturbation theory Only first order perturbation is to be dealt with
Application to ground state energy of Helium atom . Variation principle –Application –Calculation
Molecular symmetry and group theory in chemistry, basic concepts of symmetry and group theory-symmetry elements.
Symmetry operations and point groups, classification of molecules in to point groups.
Group theory – group multiplication table for C _{2v} and C _{3v} point groups.
Representations, reducible and irreducible representations, Mulliken symbols, orthogonality theorem and its implications
Treatment of analytical data, classification of errors, determinations of indeterminate errors, minimisation of errors- absolute and relative errors,
Standard deviations- standard error of mean – student' t-test, testing for significance – comparison of two means – f –tes.
Introduction to computer programming – basic structure and functioning of computer with pc as an illustrative examples.
Main memory – secondary storage memory – in put, out put devices
Computer languages operating systems – principles of algorithms and flow charts.
Arithmetic expressions – arithmetic statements- replacement statements – IF statements.
Logical IF and block IF statements – GOTO statements, subscripted, variable and DIMENSION statement
DO statement – rules for DO statements, functions and subroutines-development of FORTRAN statements for simple formula in chemistry.
Nernst equation, pH of solution – first order rate equation – cell constant – electrode potential.

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Department:P.G.ORGANIC CHEMISTRY

Paper: Inorganic chemistry-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Structure & Bonding:Application of VSEPR ,Valence bond theory and applications.
Molecular orbital theories,Structure of Simple molecules.
Applications of MO theory to Square planar &Octahedral complexes.
Walsh diagram for water molecule.
Coordination compounds;Crystal field theory- Crystal field splitting patterns in octahedral,tetrahedral,tetragonal ,square planar,trigonal bipyramidal geometries.
Calculations of CFSE, Factors affecting crystal field splitting energies ,spectrochemical series .
Jahn-Teller effect, Nephelauxetic effect, ligand field theory .
Term symbols –Russell sanders coupling, derivation of term symbols for various configurations .Spectroscopic ground states.
Inorganic cage and ring compounds; Preparation ,structure and reactions of boranes , carboranes.
Preparation , structure and reactions of metallocarboranes ,boron-nitrogen cyclic compounds .
Phosphorus-nitrogen and sulphur- nitrogen cyclic compounds .
Electron counting in boranes –Wades rules.Isopoly and Heteropoly acids.
Electronic spectra of transition metal complexes;Selection rules ,break down of selection rules Orgel diagrams,T-S diagrams for d^1 - d^9 Octahedral and tetrahedral complexes.
Charge transfer spectra , Quenching of orbital momentum .

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Department:P.G.ORGANIC CHEMISTRY

Paper; INORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Metal cluster compounds –Definition –evidences for existence of M-M bonds conditions favourable for formation of M-M bonds
Classification of binuclear cluster compounds ,Confacial bioctahedron structures
Trinuclear cluster compounds and polynuclear cluster compounds
Polyatomic clusters –Zintl ions, Chevrel phases.
Organo metallic compounds : 16 and 18 electrons rules, isolobal relationship
Iso electron relationship- synthesis structure and bonding of carbon monoxide dinitrogen and nitric oxide complexes.
Synthesis, structure, bonding and reactions of metallocenes with special reference to ferrocene.
Classification metal carbonyls.
Metal ligand equilibrium in solution: step wise and overall formation constants, factors effecting the stability metal complexes.
Pearson's theory of hard and soft acids and bases, chelate effect, determination of stability constant.
Inert and labile complexes, explanation of lability on the basis of VBT and CFT. biological and abiological nitrogen fixation.
Metallo porphyrins with special reference to haemoglobin and myoglobin, biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} .
In organic reaction mechanisms: ligand replacement reactions of metal complexes, acid hydrolysis- factors effecting acid hydrolysis.
Anation and base hydrolysis of cobalt (III) complexes, ligand displacement reactions of square planar complexes of Pt(II).
Factors effecting square planar substitutions – trans effect, complementary and non complementary reactions with examples.
Electron transfer reactions of complexes- inner and outer sphere mechanisms.

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Department : P.G.ORGANIC CHEMISTRY

Paper :ORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Nature of bonding in organic molecules and aromaticity:a)electronic effects and reactive intermediates: inductive effect, mesomeric effect, hyper conjugation, steric effect, tautomerism..
Acidity and basicity of organic molecules, generation, structure, stability and reactivity of carbocations, carbanions, carbon free radicals, nitrenes and arynes.
Criteria of aromaticity: the energy , structure and electronic, criteria, for aromaticity relationship among the energetic, structural and electronic criteria of aromaticity.
Huckles rule and MO theory, aromaticity in benzeneoid and nonbenzenoid compounds, aromaticity in charged and fused ring systems, hetero aromatic systems.
Annulenes :cyclo butadiene, benzene, 1,3,5,7-cyclo tetraene, [10],[12],[14],[16] and[18] annulenes, azulenes fulvenes, fullerenes, ferrocene, anti aromaticity and homo aromaticity.
Stereo chemistry and molecular representation of organic molecules:a)molecular symmetry and chirality:symmetry elements, definition and classifications of stereo isomers, enantiomers, diastereomers,invertomers,homomers,epimers, anomer, configuration and conformation configurational nomenclature.
D,L and R,S nomenclature, molecules with a single chiral centre: tetra and tri coordinate chiral centre,molecules with two or more chiral centres, constitutionally unsymmetrical molecules.b)geometrical isomerism and conformations of cyclic systems:cis-trans, E,Z-and syn and anti nomenclature.
Methods of determining configuration of geometrical isomers using, physical, spectral and chemical methods, stability, cis-trans inter conversion. Conformations of cyclo butane, cyclo pentane, cyclo hexane, mono and disubstituted cyclo hexanes
Prochirality&prostereomerism:homotopic ligands faces&faces,enantiotopic ligands&faces,diastereotopic ligands&faces.d)stereoisomerism in molecules without chiral center-axial chirality allenes,alkylidene cycloalkanes,spiranes,atropisomerism:biphenyl derivatives,nomenclature. planar chirality:ansa compounds,paracyclophanes,trans-cyclooctene&helicity.
Heterocyclic compounds:importance of heterocyclic compounds as drugs,nomenclature of heterocyclic systems based on ring size,number&nature of heteroatoms.
Chemistry of heterocyclic compounds,synthesis&reactivity of the following systems:quinoline,isoquinoline,indole,pyrazole,imidazole,oxazole.
Chemistry of heterocyclic compounds,synthesis&reactivity of the following systems:isoxazole,pyridazine,pyrimidine&pyrazine
Chemistry of some typical natural products(alkaloids and terpenoids) isolation, structural elucidation, synthesis and biogenesis of alkaloids: atropine, nicotine, quinine.
isolation, structural elucidation, synthesis and biogenesis of terpenoids: alpha – terpineol, alpha piene and camphor.

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Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Aliphatic & aromatic nucleophilic substitution: stereochemistry of SN2 & SN1 mechanisms, neighbouring group participation, NGP by O, S, N
aromatic nucleophilic substitution: SN2 (Ar) (addition-elimination), SN1 (Ar) and benzyne mechanisms (elimination-addition), evidence for the structure of benzyne.
Von Richter, Sommelet-Hauser, Smiles rearrangement. Elimination reaction: type of elimination reactions, mechanisms, stereochemistry and orientations.
Hofmann and Saytzeff rules. Syn eliminations vs anti elimination, competition between elimination and substitutions, dehydration, dehydrogenation, dehalogenation, decarboxylative elimination and pyrolytic eliminations.
Addition reactions: a) addition to C-C multiple bonds: mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radical, region and chemo selectivity.
Orientation and reactivity, hydrogenation of double and triple bonds, hydrogenation of aromatic rings, hydroboration.
Addition to Carbon-hetero multiple bonds: steric course of addition reactions to C=O and C=N, aldol, Cannizzaro, Perkin, Knoevenagel, Claisen-Schmidt.
Claisen, Dieckmann, Benzoin and Stobbe condensation, Reformatsky reaction, Tolens, Prins reactions; Wittig, Grignard, Mannich and Michael reaction, hydrolysis of carbon nitrogen bond isocyanates and isothiocyanates.
Molecular rearrangements: types of molecular rearrangement, migratory aptitude. Rearrangement to electron deficient carbon: pinacol-pinacolone, Wagner-Meerwein, Tiffeneau-Demjanov.
Dienone-phenol, Arndt-Eistert synthesis. Rearrangement to electron deficient nitrogen: Beckmann, Hofmann, Curtius rearrangement.
Schmidt and Lossen rearrangement. Rearrangements to electron deficient oxygen: Baeyer-Villiger, hydroperoxide rearrangement and Dakin rearrangement.
Neber rearrangement, Benzil-benzilic acid and Favorskii rearrangement. Spectroscopy and protecting groups: basic principle and importance of UV.
Basic principle and importance of IR.
Basic principle and importance of NMR.
Basic principle and importance of Mass.
Protection of carbonyl, hydroxyl, carboxylic and amine groups.

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Paper: PHYSICAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Thermodynamics:concepts of partial molar properties, graphical methods, intercept method and apparent molar volume method.
Chemical potential with T&P Gibbs Duhem equation phase rule from the concept of chemical potential, thermodynamic properties of ideal solutions.
Raoult's law, Henry's law, non ideal systems, concept of fugacity, non ideal solutions, activities and activity coefficients.
Determination activity coefficient from vapour pressure measurement, chemical equilibrium, effect temp on equilibrium constant, Van't Hoff equation.
Micelles and macro molecules: classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration.
Factors affecting CMC, thermodynamics of micellization, phase separation and mass action models, solubilization, micro emulsions, reverse micelles.
Polymers, types of polymers, electrically conducting polymer, liquid crystal polymers, kinetics of free radical polymerization, molecular mass number and mass average molecular weight.
Weight determination - end group analysis, osmometry, viscometry, light scattering methods.
Chemical kinetics, collision theory, transition state theory Debye-Huckel theory, salt effects.
Hammett equation, Taft equation, consecutive reactions, parallel reactions, opposing reactions.
Acid-base catalysis, Arrhenius diagram, fast reactions flow methods.
Photochemistry: Franck-Condon principle, excited molecules, singlet and triplet states, spin orbit interactions, actinometry, ferrioxalate and uranyl oxalate actinometers – problems.
Derivation of fluorescence and phosphorescence, quantum yields, quenching effect, Stern-Volmer equation.
Photochemical equilibrium and delayed fluorescence- E type and P type, photochemical primary process, types of photochemical reactions, photodissociation, additional isomerisation reactions with examples.

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Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-II

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:II

NMR-Principle and Theory Introduction.
Nature of spinning particle and its interaction with magnetic field.Chemical shift&origin spin-spin interaction,Application of NMR to structural elucidation.
Electron spin resonance-principle and experimental technique –g-factor,Line shapes&Line widths hyperfine interactions.
Applications of ESR studies.
Brief review on Entropy changes accompanying specific process-expansion,phase transition,heating measurement of Entropy.
Nernst heat theorem,Third law of thermodynamics-Determination of the absolute entropy.
Types of ensembles,thermodynamic probability,most probable distribution law –partition function,molar&molecular partitions.
Rotational,translational,vibrational&electronic partition function –relation between thermodynamic function (E,H,S,G&Cv)and the partition functions.
Electrochemistry-Electrochemical cell –Galvanic&Electrolytical cell.Concentration cell with&without transference,effect of complexation on redox potential.
Ferricyanide\ferrocyanide couple,Iron(III) phenanthroline/Iron(II) phenanthroline couple.
- Ferricyanide\ferrocyanide couple,Iron(III)
Determination of standard potential,solubility product equilibrium constant&activity coefficients from EMF data.
Bjerrum theory of ion association concept of activity and activity coefficients in electrolytic solutions.
The mean ionic activity coefficient,Debye-Huckel theory of electrolytic solutions,Limiting law.
Calculation of mean ionic activity coefficient,limitations of Debye-Huckel theory.
Effect of dilution on equivalent conductance of electrolytes,anomalous behavior of strong electrolyte.Debye-Huckel Onsagar equation-verification and limitations,fuel cell.
Electrochemistry-II the electrode-electrolyte interface.
The electric double layer.The Helmholtz-Perrin parallel-plate model,The Gouy-chapman diffuse-charge model&the stern model.

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Department:P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism& Pericyclic reactions

Class: II M.Sc Organic chemistry

Semester: III

Unit1:Introduction of substitution reaction, neighbouring group participation by Br,Ph,non classical carbocation,pi &sigma bond cyclo propyl group
SN at allylic carbon,at aliphatic trigonal ,at vinylic carbon
Ambident nucleophile mechanism of esterification of carboxylic acids ,mayers synthesis of carbonyl compound and acids
Mitsunobu reaction,vonbarun reaction. (B)Aliphatic electrophilic substitutions: mechanisms of SE2 ,SE1,SEi Hydrogen exchange,migration of double bond,mechanism of halogenation of carbonyl compound
HVZ reaction,halogenations of sulphoxides,sulphones Aliphatic diazo coupling,diazo transfer reaction,insertion of nitrenes,metallation with organo metallic compounds,
Decarboxylation of aliphatic acid Dakin west reaction,Haller-baure reaction
Unit2:Asymmetric synthesis:introduction,topicity:homotopic.stereotopic,heterotopic group &face – symmetry,substitution &addition critrion
Prochirality nomenclature pro-R, pro-S,re and si, stereoselective reactions, substarate, product selectivity,
Enantio selectivity, dia stereo selectivity, conditions for stereo selectivity, kinetic and thermodynamic control condition, for introducing enantio and dia stereo selectivity,
Percentage of enantiomeric excess, er, optical purity, % of dia stereomeric excess, dr
Techniques for determination enantiomeric excess interms of specific rotation, chiral NMR and chiral HPLC.
Molecular orbital symmetry, frontier orbitals of ethylene 1,3 buta diene, 1,3,5 hexatriene allyl systems.
Classification of pericyclic reactions, FMO approach, wood ward Hoffman Correlation diagram method.
Perturbation of molecular (PMO) approach the explation of pericyclic reaction under thermal and photo chemical conditions.
Electrocyclic reactions, con rotatory and disrotatory motions, 4n and (4n+2) allyl systems and secondary effects.
Cycloadditions, antarafacial and suprafacial additions notation cyclo additions 4n and (4n+2) systems with a greater emphasis on (2+2) and (4+4)cyclo additions, (2+2) additions of ketones, chelotropic reactions.
FMO, PMO,wood ward – Hoffman correlation diagram method for sigmatropic rearrangements under thermal and photochemical conditions, retention and inversion of configuration.
(3,3) and (5,5) detailed treatment of claisen and cope rearrangement.
Fluxional taotomerism, aza-cope rearrangement and Barton reaction.

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Department:P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism –II &Organic Photo chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Free radical substitutions mechanism:mechanism at an aromatic substrate, neighbouring group assistance in free radical reactions, reactivity for aliphatic substrate, reactivity in aromatic substrate, reactivity at bridge head.
Reactivity in the attacking radicals, effect of solvent on reactivity, allylic halogonation using NBS, hydroxylation at aromatic carbon by fentons reagent, oxidation of aldehydes to carboxylic acids formation of cyclic ethers using lead tetra acetate.
Formation of hydroperoxides, coupling of alkynes, arylation of aromatic compounds by diazonium salts, mechanism of sandmayer reaction, Kolbes reactions, hunsdiecker reaction reed reaction, free radical rearrangement.
Quantitative relations between molecular structure and chemical reactivity: hammete and taft equation.rearrangements: wagner-meerwein rearrangement, demyanov rearrangement witting rearrangement and stevens rearrangement.
Methodologies in asymmetric synthesis: Strategies in asymmetric synthesis : chiral substrate control, chiral auxiliary controlled, chiral reagent controlled , chiral catalyst controlled, chiral substrate controlled asymmetric synthesis: nucleophilic additions to chiral carbonyl compounds.
1,2- asymmetric induction, crams rule and felkin-anh model chiral auxiliary asymmetric synthesis:alpha alkylation of chiral enolates, azaenolates, imines and hydrozones. 1,4 asymmetric induction and prologs rule. Use of chiral auxiliaries in diels – alder reactions.
Chiral reagent controlled asymmetric synthesis: asymmetric reductions using BINAL- H. asymmetric hydroboration using IPCBH1 and IPCBH2. Chiral catalyst controlled asymmetric synthesis: sharpless and Jacobsen asymmetric epoxidations. Sharpless asymmetric dihydroxylations.
Asymmetric hydrogenation using chiral Wilkinson biphosphine and noyori catalyst. Enzyme mediated enantio selective synthesis.asymmetric aldol reaction: diastereoselectivity aldol reaction its explanation by Zimmerman-Traxel model
Photo chemistry –I : photo chemical energy, frank condon principle, types of electronic excitation and M.O view of excitation, jablonski diagram.
Singlet and triplet states, dissipation of photo chemical energy, photo sensitization, quenching, quantum yield, determination photo chemistry of carbonyl compounds, Norrish type –I and II reactions.
Paterno-Buchi reaction,photo reduction, enolisation, photo chemical oxidation, oxidation of alkenes with singlet oxygen.
Di – Pi methane, Aza Di-Pi methane rearrangements, photo chemistry of benzene and substituted benzene, photo Fries rearrangement, photo chemistry of unsaturated systems, alkenes, buta diene.
Photo chemical rearrangement of cyclo hexa di enenones, photo chemistry of alpha, beta unsaturated ketones cyclo hexenones.
Photo rearrangements of beta, gamma unsaturated systems, photo chemistry of nitrite esters.
Barton reaction, applications, photo chemistry of alpha di azoketones.
Photo aromatic substitutions, photo chemistry of pyridinium ylides.

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-I

Class: II MSC ORGANIC CHEMISTRY

Semester:III

Beer –lamberts law, deviations from beers law, instrumentation.
Mechanics of measurements, energy transitions, simple chromophores, auxochromes.
Uv absorption of alkenes, polyenes, unsaturated cyclic systems, carbonyl compounds, alpha, beta unsaturated cyclic systems, aromatic systems.
Solvent effects, geometrical isomerism, acid and base effects, calculation of absorption maximum values using wood ward fisher rules, applications.
Mechanics of measurement and fundamental modes of vibrations, stretching and bending vibrations.
Factors effecting vibrational frequencies, hydrogen bonding.
Fingerprint reagon and its importance,typical group frequencies for bonds-CH,-OH,-NH, -CC,-CO and aromatic systems.
Application in structural determination, examples, simple problems.
Introduction ,basic principle of NMR,nuclear spin, nuclea resonance, saturation, relaxation,instrumentatio
Shielding and deshielding,chemical shift, factors influencing, spin-spin intractions, factors.
Coupling constant, factors effecting J value, introduction to CMR spectroscopy.
Similarities and differences between PMR and CMR, general considerations, chemical shift coupling constants, typical examples of CMR, simple systems
Introduction ion production, EI, CI, ESI, MALDI, FAB,determination of molecular weight and formula.
Bheviour of organic compounds in mass spectro meter, factors affecting fragmentation, ion analysis, and ion abundance.
Mass spectral fragmentation of organic compounds, common functional groups.
Molecular ion peak, meta stable peak, Mclafferty rearrangement.
Nitrogen rule, high resolution mass spectrometry, examples.
Mass spectral fragmentation of organic compounds with respect of theirs structural determination.

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-II

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Optical rotatory dispersion , theory of ORD, cotton effect.
CD curves, types of ORD and CD Curves, Similarities and differences between ORD and C D curves.
The octant rule,applications in structural studies, alpha,halo keto rule.
Improving the PMR spectrum, chemical and magnetic equivalence, chemical exchange.
First and non first spectra and analysis of AB,AMX, and ABX systems, nuclear magnetic double resonance, lanthanide shift reagents.
Solvent effects, Fourier transforms technique, nuclear over hauser effect, deuterium exchanges, spectra at higher fields.
Hindered rotations and rate process, resonance of other nuclei, F-19 and P-31.
2D NMR spectroscopy, definitions and importance of COSY, DEPT, HOMCOR, HECTOR,INADEQUATE.
INDOR, INEPT, NOESY,HOM2DJ, HET2DJ, DQFCOSY.
Separation techniques, solvent extraction, chromatography, paper, thin layer chromatography.
Column chromatography, electrophoresis.
Instrumentation-gas chromatography, HPLC.
X-RAY diffraction.
Solution of structural problems by joint application of UV, IR, CMR AND PMR AND MASS SPECTROMETRY.
Spectral problems.

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Department :P.G.ORGANIC CHEMISTRY

Paper :MODERN ORGANIC SYNTHESIS-I

Class: II MSC ORGANIC CHEMISTRY

Semester:III

Alkylations via enolate, thermodynamic and kinetic enolate, asymmetric aldol reaction a)chiral enolate and achiral aldehyde, b)achiral enolate and chiral aldehyde.
Explanation by Zimmerman traxler model, stork enamine reaction and its applications, organo sulphur chemistry: umpolung and its synthetic applications (corey, seebach reaction).
Sulphur ylides: di methylsulphonium methylide, dimethyloxosulphonium methylide preparation and their synthetic applications.
Organo palladium chemistry: heck reaction, stille coupling, Suzuki coupling, sonogashira coupling, negeshi coupling, wacker oxidation.
Organo copper chemistry: Gilmans reagent and synthetic applications, synthetic applications of carbenes and carbenoids: baylis hilman reaction.
Stereochemistry of E1 and E2 reactions (different examples of acyclic and cyclic molecules, saytzeff rule, hofmann rules and bredts rule).
pyrolytic syn eliminations (focus should be given on stereochemistry of syn eliminations of amine oxides, xanthates and esters of acyclic and cyclic molecules.
Sulphoxide – sulphenate rearrangement(mislow-evans rearrangement), wittig reaction.
Wadsworth Emmons reaction, corey-fuchs reaction, aza wittig reaction, wittig-horner reaction and stereochemistry of wittig reaction.
Shapiro reaction, esehen-moser tanabe fragmentation, claisen rearrangement of allyl vinyl ethers, Julia lythgoe olefination, mcmurray coupling Peterson olefination.
Tebbs reagent and its applications, metathesis:grubbs first and second generation catalyst, olefine cross coupling (OCM), ring closing (RCM) and ring opening (ROM) metathesis, applications, olefination by nysted reagent.
The Hoffmann loeffler – Freytag reaction, barton reaction and photolysis of organic hypothalites, organo boranes, :preparation of organo boranes viz hydroboration with BH ₃ -THF, dicyclo hexyl borane, disiamyl borane, thexyl borane, 9-BBN,IPC BH ₂ , and IPC ₂ BH.
Functional group transformation of organo boranes- oxidation, protonolysis and isomersion. Formation of C-C bonds viz organo boranes, carbonylation and cyanidation, reactions of alkenyl boranes and tri alkyl alknyl borates.
Protecting groups:1.protection of alcohols as ethers(RO-ME, ROCMe ₃ , RO-Bn, RO-PMB) as silyl ethers(RO-TMS, RO-TES, OTBDMS,RO-TIPS, RO-TBDPS) as acetals (RO-THP,RO-CH ₂ -OCH ₃ =RO-MOM) and ester formation (carboxylic acid ester and para toluene sulphonate esters).
2.protection of 1,2-diols by acetal , ketal and carbonate formation.3.protection of amines by acetylation, benzoyloxy carbonyl, Fmoc and TPM groups.
4.protection of carbonyl by acetal, ketal and thioacetal(umpolung)groups.5.protection of carboxylic acids by esters and ortho ester formation.
Synthetic applications of PTC and Crown ethers, micro wave technology-: micro wave equipment, activation- benefits, limitations , micro wave effects. Micro wave assisted reactions in organic solvents- esterification reactions, fries rearrangement.
Ortho ester claisen rearrangement diels alder reaction, decarboxylation. Ultra sound assisted reactions:introduction, substitution reactions, addition, oxidation, reduction reactions. Click chemistry:critierion for click reaction, sharpless azides cyclo additions.

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Department :P.G.ORGANIC CHEMISTRY

Paper :MODERN ORGANIC SYNTESIS

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Synthetic applications trimethylsilylchloride dimethyl-t- butylsilyl chloride, trimethylsilyl cyanide, trimethyl silyl iodide and trimethyl silyl triflate, synthetic applications of alpha silyl carbanion and beta silyl carbonium ions.
Synthetic applications of silyl enone ethers, preparation and synthetic applications of alkynyl silanes,allyl silanes and vinyl silanes, nazarov cyclization.
Synthetic conversion of alpha,beta epoxy silanes, Peterson olefination , brook rearrangement and rubottom oxidation
Synthetic applications of the following in the oxidation of functional groups like alkenes, alkynes, alcohols, aldehydes and ketones:Pb(OAC) ₄ ,HIO ₄ , SeO ₂ , CrO ₃ , (sodium or potassium dichromate in H ₂ SO ₄)
Collins reagent , jones reagent, etard reagent , CrO ₃ in acetic anhydride, PCC, PDC, babler oxidation, MnO ₂ ,KMnO ₄ ,OsO ₄ , oxidations by using DMSO involving alkoxy sulphonium salts.
DCC-DMSO,swern oxidation , corey – kim oxidation, Albright-goldmen oxidation, oxidations by using, IBX, DMP, TPAP, TEMPO, CAN. Bayer villager oxidation and prilizheav epoxidation, oxidation of alkenes using, wood ward and prevost reagents.
Oxidation by using DDQ, shrpless asymmetric epoxidation and sharpless asymmetric dihydroxylation, thallium nitrate, oxidative coupling of phenol and alkynes.
Catalytic reductions :homogeneous and heterogeneous catalytic reductions and their synthetic applications.
Reductions by using electrophilic ,nucleophilic metal hydrides:LiAlH ₄ ,(various examples of reductions and crams rule).
Related reagent of LAH, NaBH ₄ ,NaBH ₃ CN, trialkyl borohydrides.reductions by using electrophilic metal hydrides:BH ₃ ,DIBAL.reductions by desolving metal-claimenson reduction .
Acyloin condensation, Bouveault-blanc reduction, birch reduction, reduction by using diimide.
Wolf –kishner reduction, hydrogenolysis, reduction by using tri n - butyl tin hydride
Basic definitions of the following: retro synthetic analysis, disconnection, target molecule, synthon, synthetic equivalent, functional group inter conversion,functional group addition.
One group C-X disconnections(carbonyl derivatives, ethers, sulphides and alcohols) two group c-x disconnections.(1,1 difunctionalised, 1,2 difunctionalised and 1,3 difunctionalised)
One group c-c disconnections,(alcohols and carbonyl compounds, 1,1 c-c, 1,2 c-c, 1,3c-c) synthesis of alkenes (wittig disconnections and diene synthesis)
Two group disconnections(diels alder reaction and 1,3 difunctionalised compounds) linear and convergent synthesis.

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Syllabus for the Academic Year 2018-19

Department: P.G.ORGANIC CHEMISTRY

Paper: Chemistry of Natural products

Class: II M.Sc Organic chemistry

Semester: III

Introduction of Natural products
Alkaloids: Introduction of alkaloids and their uses
Isolation, general methods for structure elucidation, physiological action, degradation, classification based on nitrogen heterocyclic
Morphine: Structure elucidation, synthesis, biosynthesis, stereochemistry. Strychnine: Structure, stereochemistry
Synthesis, biosynthesis. Vincristine: Structure, stereochemistry, synthesis, Biosynthesis. Colchicine: Structure, stereochemistry, synthesis, biosynthesis.
Camptothecin: Structure, stereochemistry, synthesis, biosynthesis Reserpine: Structure, stereochemistry, synthesis, biosynthesis.
Terpenoids: Introduction, isolation, occurrence, general methods for structure determination, isoprene rule. Farnesol: Structure determination, stereochemistry, synthesis, biosynthesis. Ziniberene: structure, stereochemistry, synthesis ,
Biosynthesis. Forskolin: structure, stereochemistry, synthesis, biosynthesis Taxol: Structure, synthesis, biosynthesis, stereochemistry
Azadirachtin: Structure determination, stereochemistry, synthesis, biosynthesis. Beta-amyrin: Structure, stereochemistry, synthesis, biosynthesis.
Steroids: Occurrence, nomenclature, basic skeleton, Diel's hydro carbon & its stereochemistry. Cholesterol: isolation, structure determination, & its synthesis.
Androsterone: isolation, structure determination, synthesis. Testosterone: Isolation, structure determination, synthesis. Estrone: isolation, structure determination, synthesis
synthesis (estrone) Progesterone: isolation, structure determination, synthesis, biosynthesis of steroids. Flavonoids & isoflavonoids: Occurrence, isolation
general methods of structure determination, Kaemferol: Isolation, structure determination, synthesis,
Quercetin: isolation, structure determination, synthesis. Genestein: isolation , structure determination, synthesis
Butein: isolation, structure determination, synthesis Daidzein: structure determination, synthesis
Biosynthesis of flavonoids & isoflavonoids, Acetate pathway & shikimic acid pathway

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Syllabus for the Academic Year 2018-19

Department:P.G. ORGANIC CHEMISTRY

Paper: Bio-organic chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Biopolymers and Enzymes: Peptides: Alpha-amino acids, their general properties and synthesis of amino acids
Synthesis of peptides by Merrifield solid phase method, chemistry of oxytocin
Chemistry of Dolastatin-10 Enzymes: oxidoreductases, hydrolases
Transferases, synthesis of ATP, Baker's yeast, Enzyme models (introduction)
NADH models, Bio transformations, remote functionalisations
Antimalarials & antibiotics: Antimalarials: chemotherapy, synthesis and activity
Antimalarial drugs: 1. Quinoline group-Quinine 2. Acridine group: Quinacrine Guanidine group: paludrine
Antibiotics: general characteristics Structure-activity relationships
Synthesis & activity of antibiotics
Synthesis & activity of Penicillin-G, cephalosporin-c, streptomycin Vitamins and prostaglandins: introduction Vitamins: Definition, occurrence, structural formulae
physiological functions and synthesis of vitamins Structure determination & synthesis of Retinol(A), Thiamine(B1)
Structure & synthesis of Riboflavin(B2), Pyridoxine(B6), Biotin(H), Nicotinic acid
Prostaglandins: Occurrence, nomenclature classification, Biogenesis physiological effects, synthesis of prostaglandin E2 & synthesis of prostaglandin F2
Nucleic acids: Basic concepts of the structures of RNA & DNA , Hydrolysis products of RNA & DNA Nucleotides, nucleosides, heterocyclic bases, genetic code
Finger-print test, application of recombinant DNA technology in (1) production of pharmaceuticals, (2) Diagnosis of diseases
(3) Insect control (4) Improved biological detergents (5) Gene therapy-examples

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Syllabus for the Academic Year 2017-18

Department:P.G.ORGANIC CHEMISTRY

Paper: GENERAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Wave equation-interpretation of wave function-properties of wave function-Normalisation and orthogonalisation
Operators-Linear and Non linear ,Commutators of Operators
Postulates of Quantum mechanics,Setting up of operators obserbables
Hermitian operator-Eigen values of hermitian operator
Basic quantum chemistry-II; Wave mechanics of simple systems with constant potential energy ,partical in one dimensional box .
Factors influencing color transition –dipole integral , symmetry arguments in deriving the selection rules.
Wave mechanics of systems with variable potential energy –symple harmonic oscillator , solution of wave equation-selection rules.
calculation of bond length –isotopic effect,second order stark effect and its applications
Molecular spectroscopy-I;Rotational spectra of diatomic molecules-Rigid rotor Selection rules-
Infrared spectra of diatomic molecules , harmonic and anharmonic oscillators –selection rules.
Overtone combination bands – calculation of force constant , anharmonicity constant and zero point energy.
Fermi resonance ,simultaneous vibration-rotation spectra of diatomic molecule .
Molecular spectroscopyII-Raman effect –classical and quantum mechanical explanations
Franck Condon priniciple –applications ,Rotational fine structure . Charge transfer spectra-band head and band shading

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Syllabus for the Academic Year 2017-18

Department : P.G.ORGANIC CHEMISTRY

Paper :GENERAL CHEMISTRY

Class: I M.SC ORGANIC CHEMISTRY

Semester:II

Basic Quantum chemistry III-Hydrogen atom ,probability density in orbitals ,shapes of orbitals .
Perturbation theory- line independent perturbation theory Only first order perturbation is to be dealt with
Application to ground state energy of Helium atom . Variation principle –Application – Calculation
Molecular symmetry and group theory in chemistry, basic concepts of symmetry and group theory-symmetry elements.
Symmetry operations and point groups, classification of molecules in to point groups.
Group theory – group multiplication table for C ₂ X and C ₃ X point groups.
Representations, reducible and irreducible representations, Mullikan symbols, orthogonality theorem and its implications
Treatment of analytical data, classification of errors, determinations of indeterminate errors, minimisation of errors- absolute and relative errors,
Standard deviations- standard error of mean – student' t-test, testing for significance – comparison of two means – f –tes.
Introduction to computer programming – basic structure and functioning of computer with pc as an illustrative examples.
Main memory – secondary storage memory – in put, out put devices
Computer languages operating systems – principles of algorithms and flow charts.
Arithmetic expressions – arithmetic statements- replacement statements – IF statements.
Logical IF and block IF statements – GOTO statements, subscripted, variable and DIMENSION statement
DO statement – rules for DO statements, functions and subroutines-development of FORTRAN statements for simple formula in chemistry.
Nernst equation, pH of solution – first order rate equation – cell constant – electrode potential.

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Syllabus for the Academic Year 2017-18

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC AND ANALYTICAL CHEMISTRY

Semester:I

Structure & Bonding:Application of VSEPR ,Valence bond theory and applications.
Molecular orbital theories,Structure of Simple molecules.
Applications of MO theory to Square planar &Octahedral complexes.
Walsh diagram for water molecule.
Coordination compounds;Crystal field theory- Crystal field splitting patterns in octahedral,tetrahedral,tetragonal ,square planar,trigonal bipyramidal geometries.
Calculations of CFSE, Factors affecting crystal field splitting energies ,spectrochemical series .
Jahn-Teller effect, Nephelauxetic effect, ligand field theory .
Term symbols –Russell sanders coupling, derivation of term symbols for various configurations .Spectroscopic ground states.
Inorganic cage and ring compounds; Preparation ,structure and reactions of boranes , carboranes.
Preparation , structure and reactions of metallocarboranes ,boron-nitrogen cyclic compounds .
Phosphorus-nitrogen and sulphur- nitrogen cyclic compounds .
Electron counting in boranes –Wades rules.Isopoly and Heteropoly acids.
Electronic spectra of transition metal complexes;Selection rules ,break down of selection rules Orgel diagrams,T-S diagrams for d^1 - d^9 Octahedral and tetrahedral complexes.
Charge transfer spectra , Quenching of orbital momentum .

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Syllabus for the Academic Year 2017-18

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Metal cluster compounds –Definition –evidences for existence of M-M bonds conditions favourable for formation of M-M bonds
Classification of binuclear cluster compounds ,Confacial bioctahedron structures
Trinuclear cluster compounds and polynuclear cluster compounds
Polyatomic clusters –Zintl ions,chevreton phases.
Organo metalliccompounds :16 and18 electrons rules, isolobal relation ship
Iso electron relationship- synthesis structure and bonding of carbonmonoxide dinitrogen and nitricoxide complexes.
Synthesis, structure, bonding and reactions of metalosins with special reference to ferrocene.
Classification metal carbonyls.
Metal ligand equilibrium in solution: step wise and overall formation constants, factors effecting the stability metal complexes.
Pearsons theory of hard and soft acids and basis, chelate effect, determination of stability constant.
Inert and labile complexes, explanation of lability on the basis of VBT and CFT.biological and abiological nitrogen fixation.
Metallo porphyrins with special reference to haemoglobin and myoglobin, biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} .
In organic reaction mechanisms:ligand replacement reactions of metal complexes, acid hydrolysis- factors effecting acid hydrolysis.
Anation and base hydrolysis of cobalt (III)complexes, ligand displacement reactions of square planar complexes of Pt(II).
Factors effecting square planar substitutions – trans effect, complementary and non complementary reactions with examples.
Electron transfer reactions of complexes- inner and outer sphere mechanisms.

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Syllabus for the Academic Year 2017-18

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Nature of bonding in organic molecules and aromaticity:a)electronic effects and reactive intermediates: inductive effect, mesomeric effect, hyper conjugation, steric effect, tautomerism..
Acidity and basicity of organic molecules, generation, structure, stability and reactivity of carbocations, carbanions, carbon free radicals, nitrenes and arynes.
Criteria of aromaticity: the energy, structure and electronic, criteria, for aromaticity relationship among the energetic, structural and electronic criteria of aromaticity.
Huckles rule and MO theory, aromaticity in benzenoid and nonbenzenoid compounds, aromaticity in charged and fused ring systems, hetero aromatic systems.
Annulenes :cyclo butadiene, benzene, 1,3,5,7-cyclo tetraene, [10],[12],[14],[16] and[18] annulenes, azulenes fulvenes, fullerenes, ferrocene, anti aromaticity and homo aromaticity.
Stereo chemistry and molecular representation of organic molecules:a)molecular symmetry and chirality:symmetry elements, definition and classifications of stereo isomers, enantiomers, diastereomers,invertomers,homomers,epimers, anomer, configuration and conformation configurational nomenclature.
D,L and R,S nomenclature, molecules with a single chiral centre: tetra and tri coordinate chiral centre,molecules with two or more chiral centres, constitutionally unsymmetrical molecules.b)geometrical isomerism and conformations of cyclic systems:cis-trans, E,Z-and syn and anti nomenclature.
Methods of determining configuration of geometrical isomers using, physical, spectral and chemical methods, stability, cis-trans inter conversion. Conformations of cyclo butane, cyclo pentane, cyclo hexane, mono and disubstituted cyclo hexanes
Prochirality&prostereomerism:homotopic ligands faces&faces,enantiotopic ligands&faces,diastereotopic ligands&faces.d)stereoisomerism in molecules without chiral center-axial chirality allenes,alkylidene cycloalkanes,spiranes,atropisomerism:biphenyl derivatives,nomenclature. planar chirality:ansa compounds,paracyclophanes,trans-cyclooctene&helicity.
Heterocyclic compounds:importance of heterocyclic compounds as drugs,nomenclature of heterocyclic systems based on ring size,number&nature of heteroatoms.
Chemistry of heterocyclic compounds,synthesis&reactivity of the following systems:quinoline,isoquinoline,indole,pyrazole,imidazole,oxazole.
Chemistry of heterocyclic compounds,synthesis&reactivity of the following systems:isoxazole,pyridazine,pyrimidine&pyrazine
Chemistry of some typical natural products(alkaloids and terpenoids) isolation, structural elucidation, synthesis and biogenesis of alkaloids: atropine, nicotine, quinine.
isolation, structural elucidation, synthesis and biogenesis of terpenoids: alpha – terpineol, alpha pinenene and camphor.

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Syllabus for the Academic Year 2017-18

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Aliphatic & aromatic nucleophilic substitution: stereochemistry of SN2 & SN1 mechanisms, neighbouring group participation, NGP by O, S, N
aromatic nucleophilic substitution: SN2 (Ar) (addition-elimination), SN1 (Ar) and benzyne mechanisms (elimination-addition), evidence for the structure of benzyne.
Von Richter, Sommelet-Hauser, Smiles rearrangement. Elimination reaction: type of elimination reactions, mechanisms, stereochemistry and orientations.
Hofmann and Saytzeff rules. Syn eliminations vs anti elimination, competition between elimination and substitutions, dehydration, dehydrogenation, dehalogenation, decarboxylative elimination and pyrolytic eliminations.
Addition reactions: a) addition to C-C multiple bonds: mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radical, region and chemo selectivity.
Orientation and reactivity, hydrogenation of double and triple bonds, hydrogenation of aromatic rings, hydroboration.
Addition to Carbon-hetero multiple bonds: steric course of addition reactions to C=O and C=N, aldol, Cannizzaro, Perkin, Knoevenagel, Claisen-Schmidt.
Claisen, Dieckmann, Benzoin and Stobbe condensation, Reformatsky reaction, Tolens, Prins reactions; Wittig, Grignard, Mannich and Michael reaction, hydrolysis of carbon nitrogen bond isocyanates and isothiocyanates.
Molecular rearrangements: types of molecular rearrangement, migratory aptitude. Rearrangement to electron deficient carbon: pinacol-pinacolone, Wagner-Meerwein, Tiffeneau-Demjanov.
Dienone-phenol, Arndt-Eistert synthesis. Rearrangement to electron deficient nitrogen: Beckmann, Hofmann, Curtius rearrangement.
Schmidt and Lossen rearrangement. Rearrangements to electron deficient oxygen: Baeyer-Villiger, hydroperoxide rearrangement and Dakin rearrangement.
Neber rearrangement, Benzil-benzilic acid and Favorskii rearrangement. Spectroscopy and protecting groups: basic principle and importance of UV.
Basic principle and importance of IR.
Basic principle and importance of NMR.
Basic principle and importance of Mass.
Protection of carbonyl, hydroxyl, carboxylic and amine groups.

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Syllabus for the Academic Year 2017-18

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Thermodynamics:concepts of partial molar properties, graphical methods, intercept method and apparent molar volume method.
Chemical potential with T&P Gibbs Duhem equation phase rule from the concept of chemical potential, thermodynamic properties of ideal solutions.
Raoult's law, Henry's law, non ideal systems, concept of fugacity, non ideal solutions, activities and activity coefficients.
Determination activity coefficient from vapour pressure measurement, chemical equilibrium, effect temp on equilibrium constant, Van't Hoff equation.
Micelles and macro molecules: classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration.
Factors affecting CMC, thermodynamics of micellization, phase separation and mass action models, solubilization, micro emulsions, reverse micelles.
Polymers, types of polymers, electrically conducting polymers, liquid crystal polymers, kinetics of free radical polymerization, molecular mass number and mass average molecular weight.
Weight determination - end group analysis, osmometry, viscometry, light scattering methods.
Chemical kinetics, collision theory, transition state theory Debye-Huckel theory, salt effects.
Hammett equation, Taft equation, consecutive reactions, parallel reactions, opposing reactions.
Acid-base catalysis, Arrhenius diagram, fast reactions flow methods.
Photochemistry: Franck-Condon principle, excited molecules, singlet and triplet states.
spin orbit interactions, actinometry, ferrioxalate and uranyl oxalate actinometers – problems.
Derivation of fluorescence and phosphorescence, quantum yields, quenching effect, Stern-Volmer equation.

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Syllabus for the Academic Year 2017-18

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-II

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:II

NMR-Principle and Theory Introduction.
Nature of spinning particle and its interaction with magnetic field.Chemical shift&origin spin-spin interaction,Application of NMR to structural elucidation.
Electron spin resonance-principle and experimental technique –g-factor,Line shapes&Line widths hyperfine interactions.
Applications of ESR studies.
Brief review on Entropy changes accompanying specific process-expansion,phase transition,heating measurement of Entropy.
Nernst heat theorem,Third law of thermodynamics-Determination of the absolute entropy.
Types of ensembles,thermodynamic probability,most probable distribution law –partition function,molar&molecular partitions.
Rotational,translational,vibrational&electronic partition function –relation between thermodynamic function (E,H,S,G&Cv)and the partition functions.
Electrochemistry-Electrochemical cell –Galvanic&Electrolytical cell.Concentration cell with&without transference,effect of complexation on redox potential.
Ferricyanide\ferrocyanide couple,Iron(III)
phenanthroline/Iron(II) phenanthroline couple.
Determination of standard potential,solubility product equilibrium constant&activity coefficients from EMF data.
Bjerrum theory of ion association concept of activity and activity coefficients in electrolytic solutions.
The mean ionic activity coefficient,Debye-Huckel theory of electrolytic solutions,Limiting law.
Calculation of mean ionic activity coefficient,limitations of Debye-Huckel theory.
Effect of dilution on equivalent conductance of electrolytes,anomalous behavior of strong electrolyte.Debye-Huckel Onsager equation-verification and limitations,fuel cell.
Electrochemistry-II the electrode-electrolyte interface.
The electric double layer.The Helmholtz-Perrin parallel-plate model,The Gouy-chapman diffuse-charge model&the stern model.

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Syllabus for the Academic Year 2017-18

Department: P.G.ORGANIC CHEMISTRY**Paper: Organic reaction mechanism & Pericyclic reactions****Class: II M.Sc Organic chemistry****Semester: III**

Unit 1: Introduction of substitution reaction, neighbouring group participation by Br, Ph, non classical carbocation
neighbouring group participation by pi & sigma bond cyclo propyl group SN at allylic carbon, at aliphatic trigonal, at vinylic carbon
Ambident nucleophile mechanism of esterification of carboxylic acids, Mayers synthesis of carbonyl compound and acids
Mitsunobu reaction, von Barun reaction. (B) Aliphatic electrophilic substitutions: mechanisms of SE2, SE1, SEi. Hydrogen exchange, migration of double bond, mechanism of halogenation of carbonyl compound
HVZ reaction, halogenations of sulfoxides, sulphones Aliphatic diazo coupling, diazo transfer reaction, insertion of nitrenes, metallation with organo metallic compounds Decarboxylation of aliphatic acid
Dakin West reaction, Haller-Baure reaction Unit 2: Asymmetric synthesis: introduction, topicity: homotopic, stereotopic, heterotopic group & face - symmetry, substitution & addition criterion
Prochirality nomenclature pro-R, pro-S, re and si, stereoselective reactions, substrate, product selectivity,
Enantio selectivity, diastereo selectivity, conditions for stereo selectivity, kinetic and thermodynamic control condition, for introducing enantio and dia stereo selectivity,
Percentage of enantiomeric excess, er, optical purity, % of dia stereomeric excess, dr
Techniques for determination enantiomeric excess in terms of specific rotation, chiral NMR and chiral HPLC.
Molecular orbital symmetry, frontier orbitals of ethylene 1,3 buta diene, 1,3,5 hexatriene allyl systems.
Classification of pericyclic reactions, FMO approach, Woodward-Hoffman Correlation diagram method.
Perturbation of molecular (PMO) approach the explanation of pericyclic reaction under thermal and photo chemical conditions.
Electrocyclic reactions, con rotatory and disrotatory motions, 4n and (4n+2) allyl systems and secondary effects.
Cycloadditions, antarafacial and suprafacial additions notation cyclo additions 4n and (4n+2) systems with a greater emphasis on (2+2) and (4+4) cyclo additions, (2+2) additions of ketones, chelotropic reactions.
FMO, PMO, Woodward-Hoffman correlation diagram method for sigmatropic rearrangements under thermal and photochemical conditions, retention and inversion of configuration.
(3,3) and (5,5) detailed treatment of Claisen and Cope rearrangement.
Fluxional tautomerism, aza-Cope rearrangement and Barton reaction.

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Syllabus for the Academic Year 2017-18

Department: P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism –II&Organic Photo chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Free radical substitutions mechanism:mechanism at an aromatic substrate, neighbouring group assistance in free radical reactions, reactivity for aliphatic substrate, reactivity in aromatic substrate, reactivity at bridge head.
Reactivity in the attacking radicals, effect of solvent on reactivity, allylic halogonation using NBS, hydroxylation at aromatic carbon by fentons reagent, oxidation of aldehydes to carboxylic acids formation of cyclic ethers using lead tetra acetate.
Formation of hydroperoxides, coupling of alkynes, arylation of aromatic compounds by diazonium salts, mechanism of sandmayer reaction, Kolbes reactions, hunsdiecker reaction reed reacation, free radical rearrangement.
Quantitative relation ships between molecular structure and chemical reactivity: hammete and taft equation.rearrangements: wagner-meerwein rearrangement, demyanov rearrangement witting rearrangement and stevens rearrangement.
Methodologies in asymmetric synthesis: Strategies in asymmetric synthesis : chiral substrate control, chiral auxiliary controlled, chiral reagent controlled , chiral catalyst controlled, chiral subatrate controlled asymmetric synthesis: nucleophilic additions to chiral carbonyl compounds.
1,2- asymmetric induction, crams rule and felkin-anh model chiral auxiliary asymmetric synthesis:alpha alkylation of chiral enolates, azaenolates, imines and hydrozones. 1,4 asymmetric induction and prologs rule. Use of chiral auxiliaries in diels – alder reactions.
Chiral reagent controlled asymmetric synthesis: asymmetric reductions using BINAL-H. asymmetric hydroboration using IPCBH1and IPCBH2. Chiral catalyst controlled asymmetric synthesis: sharpless and Jacobsen asymmetric epoxidations. Sharpless asymmetric dihydroxylations.
Asymmetric hydrogenation using chiral Wilkinson biphosphine and noyori catalyst. Enzyme mediated enantio selective synthesis.asymmetric aldol reaction: diastereoselectivity aldol reaction its explanation by Zimmerman-Traxel model
Photo chemistry –I : photo chemical energy, frank condon principle, types of electronic excitation and M.O view of excitation, jablonski diagram.
Singlet and triplet states, dissipation of photo chemical energy, photo sensitization, quenching, quantum yield, determination photo chemistry of carbonyl compounds, Norrish type –I and II reactions.

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Syllabus for the Academic Year 2017-18

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-II

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Beer –lamberts law, deviations from beers law, instrumentation.
Mechanics of measurements, energy transitions, simple chromophores, auxochromes.
Uv absorption of alkenes, polyenes, unsaturated cyclic systems, carbonyl compounds, alpha, beta unsaturated cyclic systems, aromatic systems.
Solvent effects, geometrical isomerism, acid and base effects, calculation of absorption maximum values using wood ward fisher rules, applications.
Mechanics of measurement and fundamental modes of vibrations, stretching and bending vibrations.
Factors effecting vibrational frequencies, hydrogen bonding.
Fingerprint reagon and its importance,typical group frequencies for bonds-CH,-OH,-NH, -CC,-CO and aromatic systems.
Application in structural determination, examples, simple problems.
Introduction ,basic principle of NMR,nuclear spin, nuclea resonance, saturation, relaxation,instrumentatio
Shielding and deshielding,chemical shift, factors influencing, spin-spin intractions, factors.
Coupling constant, factors effecting J value, introduction to CMR spectroscopy.
Similarities and differences between PMR and CMR, general considerations, chemical shift coupling constants, typical examples of CMR, simple systems
Introduction ion production, EI, CI, ESI, MALDI, FAB,determination of molecular weight and formula.
Bheviour of organic compounds in mass spectro meter, factors affecting fragmentation, ion analysis, and ion abundance.
Mass spectral fragmentation of organic compounds, common functional groups.
Molecular ion peak, meta stable peak, Mclafferty rearrangement.
Nitrogen rule, high resolution mass spectrometry, examples.
Mass spectral fragmentation of organic compounds with respect of theirs structural determination.

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-II

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Optical rotatory dispersion , theory of ORD, cotton effect.
CD curves, types of ORD and CD Curves, Similarities and differences between ORD and C D curves.
The octant rule,applications in structural studies, alpha,halo keto rule.
Improving the PMR spectrum, chemical and magnetic equivalence, chemical exchange.
First and non first spectra and analysis of AB,AMX, and ABX systems, nuclear magnetic double resonance, lanthanide shift reagents.
Solvent effects, Fourier transforms technique, nuclear over hauser effect, deuterium exchanges, spectra at higher fields.
Hindered rotations and rate process, resonance of other nuclei, F-19 and P-31.
2D NMR spectroscopy, definitions and importance of COSY, DEPT, HOMCOR, HECTOR,INADEQUATE.
INDOR, INEPT, NOESY,HOM2DJ, HET2DJ, DQFCOSY.
Separation techniques, solvent extraction, chromatography, paper, thin layer chromatography.
Column chromatography, electrophoresis.
Instrumentation-gas chromatography, HPLC.
X-RAY diffraction.
Solution of structural problems by joint application of UV, IR, CMR AND PMR AND MASS SPECTROMETRY.
Spectral problems.

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Syllabus for the Academic Year 2017-18

Department :P.G.ORGANIC CHEMISTRY Paper :MODERN ORGANIC SYNTHESIS -I

Class: II MSC ORGANIC CHEMISTRY

Semester:III

Alkylations via enolate, thermodynamic and kinetic enolate, asymmetric aldol reaction a)chiral enolate and achiral aldehyde, b)achiral enolate and chiral aldehyde.
Explanation by Zimmerman traxler model, stork enamine reaction and its applications, organo sulphur chemistry: umpolung and its synthetic applications (corey, seebach reaction).
Sulphur ylides: di methylsulphonium methylide, dimethyloxosulphonium methylide preparation and their synthetic applications.
Organo palladium chemistry: heck reaction, stille coupling, Suzuki coupling, sonogashira coupling, negeshi coupling, wacker oxidation.
Organo copper chemistry: Gilman's reagent and synthetic applications, synthetic applications of carbenes and carbenoids: baylis hilman reaction.
Stereochemistry of E1 and E2 reactions (different examples of acyclic and cyclic molecules, saytzeff rule, hofmann rules and bredt's rule).
pyrolytic syn eliminations (focus should be given on stereochemistry of syn eliminations of amine oxides, xanthates and esters of acyclic and cyclic molecules).
Sulphoxide – sulphenate rearrangement(mislow-evans rearrangement), wittig reaction.
Wadsworth Emmons reaction, corey-fuchs reaction, aza wittig reaction, wittig-horner reaction and stereochemistry of wittig reaction.
Shapiro reaction, eschen-moser tanabe fragmentation, claisen rearrangement of allyl vinyl ethers, Julia lythgoe olefination, mcmurray coupling Peterson olefination.
Tebbs reagent and its applications, metathesis:grubbs first and second generation catalyst, olefine cross coupling (OCM), ring closing (RCM) and ring opening (ROM) metathesis, applications, olefination by nysted reagent.
The Hoffmann loeffler – Freytag reaction, barton reaction and photolysis of organic hypothalites, organo boranes, :preparation of organo boranes viz hydroboration with BH ₃ -THF, dicyclo hexyl borane, disiamyl borane, thexyl borane, 9-BBN,IPC BH ₂ , and IPC ₂ BH.
Functional group transformation of organo boranes- oxidation, protonolysis and isomeration. Formation of C-C bonds viz organo boranes, carbonylation and cyanidation, reactions of alkenyl boranes and tri alkyl alknyl borates.
Protecting groups:1.protection of alcohols as ethers(RO-ME, ROCMe ₃ , RO-Bn, RO-PMB) as silyl ethers(RO-TMS, RO-TES, OTBDMS,RO-TIPS, RO-TBDPS) as acetals (RO-THP,RO-CH ₂ -OCH ₃ =RO-MOM) and ester formation (carboxylic acid ester and para toluene sulphonate esters).
2.protection of 1,2-diols by acetal, ketal and carbonate formation.3.protection of amines by acetylation, benzoyloxy carbonyl, Fmoc and TPM groups.
4.protection of carbonyl by acetal, ketal and thioacetal(umpolung) groups.5.protection of carboxylic acids by esters and ortho ester formation.
Synthetic applications of PTC and Crown ethers, micro wave technology-: micro wave equipment, activation- benefits, limitations, micro wave effects. Micro wave assisted reactions in organic solvents- esterification reactions, fries rearrangement.
Ortho ester claisen rearrangement diels alder reaction, decarboxylation. Ultra sound assisted reactions:introduction, substitution reactions, addition, oxidation, reduction reactions. Click chemistry: criterion for click reaction, sharpless azides cyclo additions.

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2017-18

Department :P.G.ORGANIC CHEMISTRY

Paper :MODERN ORGANIC SYNTHESIS-II

Class: II MSCORGANIC CHEMISTRY

Semester:IV

Synthetic applications trimethylsilylchloride dimethyl-t- butylsilyl chloride, trimethylsilyl cyanide, trimethyl silyl iodide and trimethyl silyl triflate, synthetic applications of alpha silyl carbanion and beta silyl carbonium ions.
Synthetic applications of silyl enone ethers, preparation and synthetic applications of alkynyl silanes, allyl silanes and vinyl silanes, nazarov cyclization.
Synthetic conversion of alpha,beta epoxy silanes, Peterson olefination , brook rearrangement and rubottom oxidation
Synthetic applications of the following in the oxidation of functional groups like alkenes, alkynes, alcohols, aldehydes and ketones:Pb(OAC) ₄ ,HIO ₄ , SeO ₂ , CrO ₃ , (sodium or potassium dichromate in H ₂ SO ₄)
Collins reagent , jones reagent, etard reagent , CrO ₃ in acetic anhydride, PCC, PDC, babler oxidation, MnO ₂ ,KMnO ₄ ,OsO ₄ , oxidations by using DMSO involving alkoxy sulphonium salts.
DCC-DMSO,swern oxidation , corey – kim oxidation, Albright-goldmen oxidation, oxidations by using, IBX, DMP, TPAP, TEMPO, CAN. Bayer villager oxidation and prilizheav epoxidation, oxidation of alkenes using, wood ward and prevost reagents.
Oxidation by using DDQ, shrpless asymmetric epoxidation and sharpless asymmetric dihydroxylation, thallium nitrate, oxidative coupling of phenol and alkynes.
Catalytic reductions :homogeneous and heterogeneous catalytic reductions and their synthetic applications.
Reductions by using electrophilic ,nucleophilic metal hydrides:LiAlH ₄ ,(various examples of reductions and crams rule).
Related reagent of LAH, NaBH ₄ ,NaBH ₃ CN, trialkyl borohydrides.reductions by using electrophilic metal hydrides:BH ₃ ,DIBAL.reductions by desolving metal-claimenson reduction .
Acyloin condensation, Bouveault-blanc reduction, birch reduction, reduction by using diimide.
Wolf –kishner reduction, hydrogenolysis, reduction by using tri n - butyl tin hydride
Basic definitions of the following: retro synthetic analysis, disconnection, target molecule, synthon, synthetic equivalent, functional group inter conversion,functional group addition.
One group C-X disconnections(carbonyl derivatives, ethers, sulphides and alcohols) two group c-x disconnections.(1,1 difunctionalised, 1,2 difunctionalised and 1,3 difunctionalised)
One group c-c disconnections,(alcohols and carbonyl compounds, 1,1 c-c, 1,2 c-c, 1,3c-c) synthesis of alkenes (wittig disconnections and diene synthesis)
Two group disconnections(diels alder reaction and 1,3 difunctionalised compounds) linear and convergent synthesis.

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Syllabus for the Academic Year 2017-18

Department:P.G.ORGANIC CHEMISTRY

Paper: Chemistry of Natural products

Class: II M.Sc Organic chemistry

Semester: III

Alkaloids: Introduction of alkaloids Isolation, general methods for structure elucidation, physiological action, degradation, classification based on nitrogen heterocyclic
Morphine: Structure elucidation, synthesis, biosynthesis, stereochemistry.
Strychnine: Structure, stereochemistry Synthesis, biosynthesis Vincristine: Structure, stereochemistry ,synthesis, Biosynthesis. Colchicine: Structure, stereochemistry
synthesis, biosynthesis. Camptothecin: Structure, stereochemistry,synthesis,biosynthesis Reserpine: Structure, stereochemistry, synthesis, biosynthesis.
Terpenoids: Introduction, isolation, occurrence, general methods for structure determination, isoprene rule. Farnesol: Structure determination,stereochemistry,synthesis,biosynthesis.
Zinziberene: structure, stereochemistry, synthesis , Biosynthesis. Forskolin: structure, stereochemistry,synthesis,biosynthesis
Taxol: Structure, synthesis, biosynthesis, stereochemistry
Azadirachtin: Structure determination,stereochemistry,synthesis,biosynthesis. Beta-amyrin:Structure, stereochemistry,synthesis,biosynthesis.
Steroids: Occurrence, nomenclature, basic skeleton,Diel's hydro carbon&its stereochemistry. Cholesterol: isolation, structure determination,&its synthesis.
Androsterone: isolation,structure determination,synthesis. Testosterone: Isolation, structure determination, synthesis. Estrone: isolation,structure determination,synthesis
Progesterone: isolation, structure determination, synthesis, biosynthesis of steroids
Flavonoids&isoflavonoids:Occurrence,isolation general methods of structure determination, Kaemferol:Isolation,structure determination,synthesis
Quercetin:isolation,structure determination,synthesis. cyanidin: isolation,structure determination,synthesis
Genestein: isolation,structure determination,synthesis
Butein: isolation,structure determination
synthesis Daidzein:structure determination and synthesis
Biosynthesis of flavonoids &isoflavonoids,Acetate pathway &shikimic acid pathway

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Syllabus for the Academic Year 2017-18

Department:P.G. ORGANIC CHEMISTRY

Paper: Bio-organic chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Biopolymers and Enzymes: Peptides: Alpha-amino acids, their general properties and synthesis of amino acids
Synthesis of peptides by Merrifield solid phase method, chemistry of oxytocin
Chemistry of Dolastatin-10 Enzymes: oxidoreductases, hydrolases
Transferases, synthesis of ATP, Baker's yeast, Enzyme models (introduction)
NADH models, Bio transformations, remote functionalisations
Antimalarials & antibiotics: Antimalarials: chemotherapy
synthesis and activity, Antimalarial drugs:1.Quinoline group-Quinine 2.Acridine group: Quinacrine Guanidine group: paludrine
Antibiotics: general characteristics Structure-activity relationships
Synthesis & activity of antibiotics
Synthesis & activity of Penicillin-G, cephalosporin-c, streptomycin Vitamins and prostaglandins: introduction Vitamins: Definition , occurrence, structural formulae
physiological functions and synthesis of vitamins Structure determination & synthesis of Retinol(A),Thiamine(B1)
Structure & synthesis of Riboflavin(B2),Pyridoxine(B6), Biotin(H),Nicotinic acid
Prostaglandins: Occurrence, nomenclature classification, Biogenesis physiological effects, synthesis of prostaglandin E2 & synthesis of prostaglandin F2
Nucleic acids: Basic concepts of the structures of RNA & DNA , Hydrolysis products of RNA&DNA Nucleotides, nucleosides, heterocyclic bases, genetic code
Finger-print test, application of recombinant DNA technology in (1)production of pharmaceuticals, (2)Diagnosis of diseases
(3)Insect control (4)Improved biological detergents (5)Gene therapy-examples

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Syllabus for the Academic Year 2016-17

Department:P.G.ORGANIC CHEMISTRY

Paper: GENERAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Wave equation-interpretation of wave function-properties of wave function-Normalisation and orthogonalisation
Operators-Linear and Non linear ,Commutators of Operators
Postulates of Quantum mechanics,Setting up of operators obserbables
Hermitian operator-Eigen values of hermitian operator
Basic quantum chemistry-II; Wave mechanics of simple systems with constant potential energy ,partical in one dimensional box .
Factors influencing color transition –dipole integral , symmetry arguments in deriving the selection rules.
Wave mechanics of systems with variable potential energy –symple harmonic oscillator , solution of wave equation-selection rules.
calculation of bond length –isotopic effect,second order stark effect and its applications
Molecular spectroscopy-I;Rotational spectra of diatomic molecules-Rigid rotor Selection rules-calculation of bond length –isotopic effect,second order stark effect and its applications
Infrared spectra of diatomic molecules , harmonic and anharmonic oscillators –selection rules.
Overtone combination bands – calculation of force constant , anharmonicity constant and zero point energy.
Fermi resonance ,simultaneous vibration-rotation spectra of diatomic molecule .
Molecular spectroscopyII-Raman effect –classical and quantum mechanical explanations
Franck Condon principle –applications ,Rotational fine structure . Charge transfer spectra-band head and band shading

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Syllabus for the Academic Year 2016-17

Department : P.G.ORGANIC CHEMISTRY

Paper :GENERAL CHEMISTRY

Class: I M.SC ORGANIC CHEMISTRY

Semester:II

Basic Quantum chemistry III-Hydrogen atom ,probability density in orbitals ,shapes of orbitals .
Perturbation theory- line independent perturbation theory Only first order perturbation is to be dealt with
Application to ground state energy of Helium atom . Variation principle –Application – Calculation
Molecular symmetry and group theory in chemistry, basic concepts of symmetry and group theory-symmetry elements.
Symmetry operations and point groups, classification of molecules in to point groups.
Group theory – group multiplication table for C ₂ X and C ₃ X point groups.
Representations, reducible and irreducible representations, Mullikan symbols, orthogonality theorem and its implications
Treatment of analytical data, classification of errors, determinations of indeterminate errors, minimisation of errors- absolute and relative errors,
Standard deviations- standard error of mean – student' t-test, testing for significance – comparison of two means – f –tes.
Introduction to computer programming – basic structure and functioning of computer with pc as an illustrative examples.
Main memory – secondary storage memory – in put, out put devices
Computer languages operating systems – principles of algorithms and flow charts.
Arithmetic expressions – arithmetic statements- replacement statements – IF statements.
Logical IF and block IF statements – GOTO statements, subscripted, variable and DIMENSION statement
DO statement – rules for DO statements, functions and subroutines-development of FORTRAN statements for simple formula in chemistry.
Nernst equation, pH of solution – first order rate equation – cell constant – electrode potential.

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Syllabus for the Academic Year 2016-17

Department:P.G.ORGANIC CHEMISTRY

Paper: Inorganic chemistry-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Structure & Bonding:Application of VSEPR ,Valence bond theory and applications.
Molecular orbital theories,Structure of Simple molecules.
Applications of MO theory to Square planar &Octahedral complexes.
Walsh diagram for water molecule.
Coordination compounds;Crystal field theory- Crystal field splitting patterns in octahedral,tetrahedral,tetragonal ,square planar,trigonal bipyramidal geometries.
Calculations of CFSE, Factors affecting crystal field splitting energies ,spectrochemical series .
Jahn-Teller effect, Nephelauxetic effect, ligand field theory .
Term symbols –Russell sanders coupling, derivation of term symbols for various configurations .Spectroscopic ground states.
Inorganic cage and ring compounds; Preparation ,structure and reactions of boranes , carboranes.
Preparation , structure and reactions of metallocarboranes ,boron-nitrogen cyclic compounds .
Phosphorus-nitrogen and sulphur- nitrogen cyclic compounds .
Electron counting in boranes –Wades rules.Isopoly and Heteropoly acids.
Electronic spectra of transition metal complexes;Selection rules ,break down of selection rules Orgel diagrams,T-S diagrams for d^1 - d^9 Octahedral and tetrahedral complexes.
Charge transfer spectra , Quenching of orbital momentum .

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Syllabus for the Academic Year 2016-17

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Metal cluster compounds –Definition –evidences for existence of M-M bonds conditions favourable for formation of M-M bonds
Classification of binuclear cluster compounds ,Confacial bioctahedron structures
Trinuclear cluster compounds and polynuclear cluster compounds
Polyatomic clusters –Zintl ions,chevre phases.
Organo metalliccompounds :16 and18 electrons rules, isolobal relation ship
Iso electron relationship- synthesis structure and bonding of carbonmonoxide dinitrogen and nitricoxide complexes.
Synthesis, structure, bonding and reactions of metalosins with special reference to ferrocene.
Classification metal carbonyls.
Metal ligand equilibrium in solution: step wise and overall formation constants, factors effecting the stability metal complexes.
Pearsons theory of hard and soft acids and basis, chelate effect, determination of stability constant.
Inert and labile complexes, explanation of lability on the basis of VBT and CFT.biological and abiological nitrogen fixation.
Metalo porphyrins with special reference to haemoglobin and myoglobin, biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} .
In organic reaction mechanisms:ligand replacement reactions of metal complexes, acid hydrolysis- factors effecting acid hydrolysis.
Anation and base hydrolysis of cobalt (III)complexes, ligand displacement reactions of square planar complexes of Pt(II).
Factors effecting square planar substitutions – trans effect, complementary and non complementary reactions with examples.
Electron transfer reactions of complexes- inner and outer sphere mechanisms.

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Syllabus for the Academic Year 2016-17

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Nature of bonding in organic molecules and aromaticity:a)electronic effects and reactive intermediates: inductive effect, mesomeric effect, hyper conjugation, steric effect, tautomerism..
Acidity and basicity of organic molecules, generation, structure, stability and reactivity of carbo cations, carbanions, carbon free radicals, nitrenes and arynes.
Criteria of aromaticity: the energy , structure and electronic, criteria, for aromaticity relationship among the energetic, structural and electronic criteria of aromaticity.
Huckles rule and MO theory, aromaticity in benzeneoid and nonbenzenoid compounds, aromaticity in charged and fused ring systems, hetero aromatic systems.
Annulenes :cyclo butadiene, benzene, 1,3,5,7-cyclo tetraene, [10],[12],[14],[16] and[18] annulenes, azulenes fulvenes, fullerenes, ferrocene, anti aromaticity and homo aromaticity.
Stereo chemistry and molecular representation of organic molecules:a)molecular symmetry and chirality:symmetry elements, definition and classifications of stereo isomers, enantiomers, diastereomers,invertomers,homomers,epimers, anomer, configuration and conformation configurational nomenclature.
D,L and R,S nomenclature, molecules with a single chiral centre: tetra and tri coordinate chiral centre,molecules with two or more chiral centres, constitutionally unsymmetrical molecules.b)geometrical isomerism and conformations of cyclic systems:cis-trans, E,Z-and syn & anti nomenclature.
Methods of determining configuration of geometrical isomers using, physical, spectral and chemical methods, stability, cis-tans inter conversion. Conformations of cyclo butane, cyclo pentane, cyclo hexane, mono and disubstituted cyclo hexanes
Prochirality&prostereomerism:homotopic ligands faces&faces,enantiotopic ligands&faces,diastereotopic ligands&faces.d)stereoisomerism in molecules without chiral center-axial chirality allenes,alkylidene cycloalkanes,spiranes,atropisomerism:biphenyl derivatives,nomenclature. planar chirality:ansa compounds,paracyclophanes,trans-cyclooctene&helicity.
Heterocyclic compounds:importance of heterocyclic compounds as drugs,nomenclature of heterocyclic systems based on ring size,number&nature of heteroatoms.
Chemistry of heterocyclic compounds,synthesis&reactivity of the following systems:quinoline,isoquinoline,indole,pyrazole,imidazole,oxazole.
Chemistry of heterocyclic compounds,synthesis&reactivity of the following systems:isoxazole,pyridazine,pyrimidine&pyrazine
Chemistry of some typical natural products(alkaloids and terpenoids) isolation, structural elucidation, synthesis and biogenesis of alkaloids: atropine, nicotine, quinine.
isolation, structural elucidation, synthesis and biogenesis of terpenoids: alpha – terpineol, alpha piene and camphor.

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Syllabus for the Academic Year 2016-17

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-I I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Aliphatic & aromatic nucleophilic substitution: stereochemistry of SN2&SN1 mechanisms,neighbouring group participation ,NGP by O,S,N
aromatic nucleophilic substitution:SN2 (Ar)(addition-elimination),SN1(Ar) and benzyne mechanisms(elimination-addition), evidence for the structure of benzyne.
Von richter sommelet – hauser, smiles rearrangement. Elimination reaction: type of elimination reactions mechanisms, stereochemistry and orientations.
Hofmann and saytzeff rules. Syn eliminations vs anti elimination,competition between elimination and substitutions, dehydration, de hydrogenation, dehalogenation, de carboxylative elimination and pyrolytic eliminations.
Addition reactions :a)addition to C-C multiple bonds: mechanistic and stereo chemical aspects of addition reactions involving electrophiles , nucleophiles and free radical, region and chemo selectivity.
Orientation and reactivity, hydrogenation of double and triple bonds, hydrogenation of aromatic rings, hydro boration.
Addition to Carbon-hetero multiple bonds: steric course of addition reactions to C=O a nd C=N, aldol, cannizzaro , perkin, knoevenagel, claisen- sehmidt.
Claisen, dieckman, benzoin and stobbe condensation, reformatsky, reaction, tolens, prins reactions;witttig , Grignard mannich and Michael reaction, hydrolysis of carbon nitrogen bond isocyanates and iso thiocyanates.
Molecular rearrangements: types of molecular rearrangement, migratory appitude. Rearrangement to electron deficient carbon: pinacol-pinacolone, wagner – meerwein, tiffeneau – demjanov.
Dienone- phenol, arndt- eistert synthesis.rearrangment to electron deficient nitrogen:Beckmann , hofmann, curtius rearrangement.
Schmidt and lossen rearrangement. Rearrangements to electron deficient oxygen:Baeyer – villager , hydro peroxide rearrangment and dakin rearrangement.
Neber rearrangement, benzil- benzilic acid and favorskii rearrangement. Spectroscopy and protecting groups: basic principle and importance of UV.
Basic principle and importance of IR.
Basic principle and importance of NMR.
Basic principle and importance of Mass.
Protection of carbonyl, hydroxyl, carboxylic and amine groups.

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Syllabus for the Academic Year 2016-17

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Topics to be Covered
Thermodynamics:concepts of partial molar properties, graphical methods, intercept method and apparent molar volume method.
Chemical potential with T&P Gibbs Duhem equation phase rule from the concept of chemical potential, thermodynamic properties of ideal solutions.
Raoult's law, Henry's law, non ideal systems, concept of fugacity, non ideal solutions, activities and activity coefficients.
Determination activity coefficient from vapour pressure measurement, chemical equilibrium, effect temp on equilibrium constant, Vant hoff equation.
Micelles and macro molecules: classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration.
Factors affecting CMC, thermodynamics of micellization , phase separation and mass action models, solubilization, micro emulsions, reverse micelles.
Polymers, types of polymers, electrically conducting polymer, liquid crystal polymers, kinetics of free radical polymerization, molecular mass number and mass average molecular weight.
Weight determination - end group analysis, osmometry, viscometry, light scattering methods.
Chemical kinetics, collision theory, transition state theory Debye Huckel theory, salt effects.
Hammett equation, Taft equation, consecutive reactions, parallel reactions, opposing reactions.
Acid -base catalysis, Arrhenius diagram, fast reactions flow methods.
Photochemistry: Franck Condon principle, excited molecules, singlet and triplet states, spin orbit interactions, actinometry, ferrioxalate and uranyl oxalate actinometers – problems.
photochemical primary process, types of photochemical reactions, photodissociation, additional isomerisation reactions with examples.
primary process, types of photochemical reactions, photodissociation, additional isomerisation reactions with examples.

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Syllabus for the Academic Year 2016-17

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-II

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:II

NMR-Principle and Theory Introduction.
Nature of spinning particle and its interaction with magnetic field.Chemical shift&origin spin-spin interaction,Application of NMR to structural elucidation.
Electron spin resonance-principle and experimental technique –g-factor,Line shapes&Line widths hyperfine interactions.
Applications of ESR studies.dimethylformamide,styrene
Brief review on Entropy changes accompanying specific process-expansion,phase transition,heating measurement of Entropy.
Nernst heat theorem,Third law of thermodynamics-Determination of the absolute entropy.
Types of ensembles,thermodynamic probability,most probable distribution law –partition function,molar&molecular partitions.
Rotational,translational,vibrational&electronic partition function –relation between thermodynamic function (E,H,S,G&Cv)and the partition.
Electrochemistry-Electrochemical cell –Galvanic&Electrolytical cell.Concentration cell with&without transference,effect of complexation on redox potential.
Ferricyanide\ferrocyanide couple,Iron(III) .free radicals,metal complexes and biological systems.
phenanthroline/Iron(II) phenanthroline couple.
Determination of standard potential,solubility product equilibrium constant&activity coefficients from EMF data.
Bjerrum theory of ion association concept of activity and activity coefficients in electrolytic solutions.
The mean ionic activity coefficient,Debye-Huckel theory of electrolytic solutions,Limiting law.
Calculation of mean ionic activity coefficient,limitations of Debye-Huckel theory.
Effect of dilution on equivalent conductance of electrolytes,anomalous behavior of strong electrolyte.Debye-Huckel Onsager equation-verification and limitations,fuel cell.
Electrochemistry-II the electrode-electrolyte interface.primary and secondary cells,batteries examples.
The electric double layer.The Helmholtz-Perrin parallel-plate model,The Gouy-chapman diffuse-charge model&the stern

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Syllabus for the Academic Year 2016-17

Department: P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism& Pericyclic reactions

Class: II M.Sc Organic chemistry

Semester: III

Aliphatic nucleophilic substitution mech. Nucleophilic substitution: substitutions of reaction of ambident nucleophiles, NGP of O, S, N, halogens, aryl groups, alkyl and cyclo alkyl groups, in nucleophilic substitutions reactions.
Sigma, pi bond participation in acyclic by cyclic systems, substitution at allylic, trigonal and vinylic carbons, hydrolysis of esters.
Meyers aldehydes, ketones, and carboxylic acids, alkylation with trialkyl boranes. Aliphatic electrophilic substitutions: SE1, SE2, SEi Mechanisms, hydrogen exchange.
Migration of double bonds, halogenations aldehydes, ketones, acids, acyl halides, sulphoxides and sulphones, aliphatic diazonium coupling.
Nitrosation at carbon and nitrogen di azo transfer reaction and carbene and nitrene insertion, formation sulphur yield, metalation with organo metallic compounds and with metal.
Decarboxylation of aliphatic acids. Haloform reaction and haller-bauer reaction Aromatic nucleophilic substitution: a general introduction to different mechanisms of aromatic substitutions SN Ar, AN.
Aryne von richter rearrangement, sommler hauser rearrangement, smiles rearrangement, radical substitution mechanisms: reaction at sp ³ carbon: reactivity in aliphatic substrates.
Reactivity at bridged positions, reactivity at sp ² carbon. Reactivity in aromatic substrates, neighbouring group assistance in free radical reactions.
Effect of reactivity in attacking radical, effect of solvent and reactivity, halogenation at an alkyl carbon and allylic carbon, hydroxylation at aromatic carbon by means of fentons reagent
Oxidation of aldehydes to carboxylic acids, formation of cyclic ethers with Pb(OAc) ₄ reed reaction, sandmeyer reaction, Kolbe reaction and hunsdiecker reaction.
Molecular orbital symmetry, frontier orbitals of ethylene 1,3 buta diene, 1,3,5 hexatriene allyl systems.
Classification of pericyclic reactions, FMO approach, wood ward Hoffman Correlation diagram method.
Perturbation of molecular (PMO) approach the explanation of pericyclic reaction under thermal and photo chemical conditions.
Electrocyclic reactions, con rotatory and disrotatory motions, 4n and (4n+2) allyl systems and secondary effects.
Cycloadditions, antarafacial and suprafacial additions notation cyclo additions 4n and (4n+2) systems with a greater emphasis on (2+2) and (4+4)cyclo additions, (2+2) additions of ketones, chelotropic reactions.
FMO, PMO, wood ward – Hoffman correlation diagram method for sigmatropic rearrangements under thermal and photochemical conditions, retention and inversion of configuration.
(3,3) and (5,5) detailed treatment of claisen and cope rearrangement.
Fluxional tautomerism, aza-cope rearrangement and Barton reaction.

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Syllabus for the Academic Year 2016-17

Department: P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism –II&Organic Photo chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Addition elimination mechanisms:a)addition to carbon multiple bonds-addition reactions involving electrophiles, nucleophiles, &free radicals,cyclic mechanisms,orientations.
Stereochemistry,hydrogenation of double &triple bonds,hydroboration,birch reduction.michael reaction,addition of oxygen& N,.04
(b)addition to carbon-hetero atom multiple bonds:mannich reaction AH reduction of carbonyl compounds, acids,esters, nitriles,addition of Grignard reagents,reformatsky reaction.
Tollens reaction, wittig, prins reaction.(c)elimination reactions:stereochemistry of eliminations in acyclic &cyclic systems,orientation in elimination in elimination-saytzeff & Hoffman elimination propolitic elimination
Rearrangements:classification&general mechanistic treatment of nucleophilic,free radical .
electrophilic rearrangements Wagner-meerwein and related reactions,
Tiffenue demjanov rearrangement,a- ketone rearrangement, Neber rearrangement.
Neber,hofmann,bayer-villiger ,stevens ,wittig rearrangement
Photo chemistry: photo chemical energy, electronic transitions, laws of photo chemistry.
Jablonski diagram,Franck condon principle,quenching.

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Syllabus for the Academic Year 2016-17

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-I

Class: II MSC ORGANICCHEMISTRY

Semester:III

IR spectroscopy, units of frequency, wavelength, wave number, molecular vibrations.
Factors influencing vibrational frequencies, IR spectrometer.
Sampling techniques, characteristic frequencies of organic molecules.
Interpretation of spectra, problems.
UV spectroscopy, introduction, absorption laws, measurements of spectrum.
Chromophores, standard works of reference, definitions.
Applications of UV spectroscopy to conjugated dienes, trienes.
Carbonyl compounds, aromatic compound, problems.
NMR spectroscopy, measurement of spectra, chemical shift, intensity of NMR signals.
Integration factors affecting, the chemical shift, spin-spin coupling to ^{13}C , ^1H - ^1H first order coupling.
Some simple ^1H - ^1H splitting patterns, magnitude of ^1H - ^1H coupling constants.
Mass spectroscopy, basic principles, instrumentation.
The mass spectrometer, isotope abundances.
Molecular ion, meta stable ions, problems related to NMR.
Problems related to mass spectroscopy.
Separation techniques, solvent extraction, chromatography paper, thin layer chromatography.
Column chromatography, Electrophoresis.

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Syllabus for the Academic Year 2016-17

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-II

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Optical rotatory dispersion and circular dichroism, phenomena of ORD and CD.
Classifications of ORD and CD curves, cotton effect curves and their applications.
The octant rule and its applications to alicyclic ketones.
Improving the NMR spectrum, mean, pulse experiment.
New techniques in FT-NMR spectroscopy, the separation of chemical shift and coupling on to different axes.
Spin de coupling, nuclear over Hauser effect.
The signals from directly bonded ^{13}C and ^1H .
ESR derivative curves, values and hyperfine splitting.
Fragmentation processes, fragmentation associated with functional groups
Rearrangements and mass spectra of some chemical classes, problems.
Structural elucidation of organic compounds by a combined application of the special methods of units.
Spectral problems.
Separation techniques GC, HPLC.
Instrumentations of GC and HPLC, applications.
X-Ray diffraction.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2016-17

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class:II MSC ORGANIC CHEMISTRY

Semester:III

Topics to be covered
Formation of carbon-carbon single bond; alkylation via enolate the enamine and related reactions.
Umplog(dipole inversion)-the aldol reaction
Applications of organo palladium compounds.
Organo nickel and organo copper reagents
Applications of thiocarbonions-selenocarbonins and sulphur yields.
Synthetic applications of carbenes and carbenoids.
Formation of carbon-carbon double bonds; elimination reactions pyrolytic, syn eliminations.
Sulfoxide-sulphonate rearrangement the wittig reaction-alkenes.
Arylsulphonyl-hydrazones-claisen rearrangement of allyl vinyl ethers.
Methods of polymerization (a) Addition polymerisation (b) condensation polymerization
(c)Radical polymerization(two examples of each method)
Reactions of unactivated carbon-hydrogen bonds; The HLF Reaction.
The barton reaction and synthetic applications.
Photolysis of organo hypothalites.synthetic applications of organo boranes and organo silanes.
Organoboranes;preparation of organo boranes viz hydroboration with BH ₃ -THF, dicyclohexyl borane, dismyl borane,thexyl borane.9BBN and disopinamplyel borane,
Functional group transformations of organo boranes –oxidation,protonolysis and rearrangements.
Formation of carbon-bonds viz organo boranes carbonylation,
The cyanoborate process and reactions of alkenyl boranes and trialkenyl borates.

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Syllabus for the Academic Year 2016-17

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class:II MSC ORGANIC CHEMISTRY

Semester:IV

Topics to be covered
Organo silanes; synthetic applications of trimethylsilyl chloride.
Dimethyl-butylsilyl chloride,trimethylcyanide.
Trimethylsilyl iodide and trimethylsilyl triflate.
Synthetic applications of-silyl carbanion and b-silyl carbonium ions.
Phase transfer catalysis-principle and applications.
Oxidation ; oxidations of hydrocarbons,alkenes, alcohols aldehydes and ketones.
Oxidative coupling reactions, use of Pb(OAC) ₄ ,NBS,CRO ₃ .
SeO ₂ ,MnO ₂ , Dealkoxylsulphonium yields, KMnO ₄ ,OSO ₄ .
Peracids and Ti(III)nitrate.
Catalytic hydrogenation (homogeneous and heterogeneous).
Reduction by dissolving metals,reduction by hydride transfer reagents.
Reduction with hydrazine and diamide.
Selectivity in reduction of nitroso and nitro compounds,reductive cleavage.
Retrosynthesis the disconnection approach-basic principles.
Convergent synthesis.
Linear synthesis.

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Syllabus for the Academic Year 2016-17

Department:P.G.ORGANIC CHEMISTRY

Paper: Natural products &Biopolymers

Class: II M.Sc Organic chemistry

Semester: III

Introduction of antibiotics,classification of penicillins
biological properties, biosynthesis Structure elucidation, synthesis of penicillins
semi synthetic penicillins Structure of cephalosporin-C and their synthesis ,Biological properties,biosynthesis
Biological properties,biosynthesis Conversions,structure elucidation of streptomycin
synthesis Biological properties,biosynthesis,
Introduction of terpenoids,isolation Structure elucidation of Taxol, synthesis
Structure elucidation of Taxol, Synthesis of Taxol,
biosynthesis,biological properties,structure elucidation of forskolin
Synthesis of forskolin,biological properties,biosynthesis,structural elucidation of Azadirachtin,
Introduction of alkaloids,classification,isolation
structural elucidation of reserpine
Synthesis of forskolin,biological properties,biosynthesis,structural elucidation of Azadirachtin Synthesis of reserpine
biological properties,biosynthesis,aminoacids
Synthesis of aminoacids,physical&chemical properties
Protecting groups,
synthesis of peptides, merri field solid phase synthesis
Structural elucidation of morphine,synthesis
Biological properties ,biosynthesis of vincristine

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Syllabus for the Academic Year 2016-17

Department: P.G.ORGANIC CHEMISTRY

Paper: Bio-organic chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Nucleic acids introduction & introduction of nucleotides, nucleosides
DNA, RNA explanation,differences
Steroids introduction,structure determination of cholesterol
Synthesis, biosynthesis ,properties,reactions of cholesterol
Structure determination of progesterone, synthesis of progesterone from ergosterol,stigmasterol,cholesterol
Biosynthesis of progesterone,structural elucidation of Beta-amyrin&synthesis ,biosynthesis of Beta-amyrin
Biological properties of amyrin. Structural elucidation of strychnine
Synthesis of strychnine
Biosynthesis, biological properties of strychnine
Structural elucidation,synthesis,biosynthesis,biological properties of colchicine
Structural elucidation, synthesis, biosynthesis, biological properties of camptothecin.
Prostaglandins: introduction, classification, structural elucidation
Synthesis, biosynthesis, biological properties of prostaglandins
Podophyllotoxin : structure determination, synthesis, biosynthesis &biological properties
Rotenone : structure determination, synthesis, biosynthesis & their biological properties
Etoposide : structure determination, synthesis, biosynthesis &biological properties

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Syllabus for the Academic Year 2015-16

Department:P.G.ORGANIC CHEMISTRY

Paper: GENERAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Wave equation-interpretation of wave function-properties of wave function-Normalisation and orthogonalisation
Operators-Linear and Non linear ,Commutators of Operators
Postulates of Quantum mechanics,Setting up of operators obserbables
Hermitian operator-Eigen values of hermitian operator
Basic quantum chemistry-II; Wave mechanics of simple systems with constant potential energy ,partical in one dimensional box .
Factors influencing color transition –dipole integral , symmetry arguments in deriving the selection rules.
Wave mechanics of systems with variable potential energy –symple harmonic oscillator , solution of wave equation-selection rules.
calculation of bond length –isotopic effect,second order stark effect and its applications
Molecular spectroscopy-I;Rotational spectra of diatomic molecules-Rigid rotor Selection rules- calculation of bond length –isotopic effect,second order stark effect and its applications
Infrared spectra of diatomic molecules , harmonic and anharmonic oscillators –selection rules.
Overtone combination bands – calculation of force constant , anharmonicity constant and zero point energy.
Fermi resonance ,simultaneous vibration-rotation spectra of diatomic molecule .
Molecular spectroscopyII-Raman effect –classical and quantum mechanical explanations
Franck Condon principle –applications ,Rotational fine structure . Charge transfer spectra-band head and band shading

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Syllabus for the Academic Year 2015-16

Department : P.G.ORGANIC CHEMISTRY

Paper :GENERAL CHEMISTRY-I

Class: I M.SC ORGANIC CHEMISTRY

Semester:II

Basic Quantum chemistry III-Hydrogen atom ,probability density in orbitals ,shapes of orbitals .
Perturbation theory- line independent perturbation theory Only first order perturbation is to be dealt with
Application to ground state energy of Helium atom . Variation principle –Application – Calculation
Symmetry operations and point groups, classification of molecules in to point groups.
Group theory – group multiplication table for C _{2v} and C _{3v} point groups.
Representations, reducible and irreducible representations, Mulliken symbols, orthogonality theorem and its implications
Treatment of analytical data, classification of errors, determinations of indeterminate errors, minimisation of errors- absolute and relative errors,
Standard deviations- standard error of mean – student' t-test, testing for significance – comparison of two means – f –tes.
Basic quantum chemistry -4; Valence bond approach –directed valence hybridization .
Calculation of ionic and covalent bond contribution in hydrogen molecule
Molecular orbital theory- LCAO approximation –hydrogen molecule ion
Hydrogen molecule (fundamental concepts only) –The electronic transition in the hydrogen molecule .
Computer languages operating systems – principles of algorithms and flow charts.
Arithmetic expressions – arithmetic statements- replacement statements – IF statements.
Logical IF and block IF statements – GOTO statements, subscripted, variable and DIMENSION statement
DO statement – rules for DO statements, functions and subroutines-development of FORTRAN statements for simple formula in chemistry.
Wander wall equation, pH of solution – first order rate equation – cell constant – electrode potential.

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Syllabus for the Academic Year 2015-16

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Structure & Bonding:Application of VSEPR ,Valence bond theory and applications.
Molecular orbital theories,Structure of Simple molecules.
Applications of MO theory to Square planar &Octahedral complexes.
Walsh diagram for water molecule.
Coordination compounds;Crystal field theory- Crystal field splitting patterns in octahedral,tetrahedral,tetragonal ,square planar,trigonal bipyramidal geometries.
Calculations of CFSE, Factors affecting crystal field splitting energies ,spectrochemical series .
Jahn-Teller effect, Nephelauxetic effect, ligand field theory .
Term symbols –Russell sanders coupling, derivation of term symbols for various configurations .Spectroscopic ground states.
Inorganic cage and ring compounds; Preparation ,structure and reactions of boranes , carboranes.
Preparation , structure and reactions of metallocarboranes ,boron-nitrogen cyclic compounds .
Phosphorus-nitrogen and sulphur- nitrogen cyclic compounds .
Electron counting in boranes –Wades rules.Isopoly and Heteropoly acids.
Electronic spectra of transition metal complexes;Selection rules ,break down of selection rules Orgel diagrams,T-S diagrams for d^1 - d^9 Octahedral and tetrahedral complexes.
Charge transfer spectra , Quenching of orbital momentum .

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Syllabus for the Academic Year 2015-16

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Metal cluster compounds –Definition –evidences for existence of M-M bonds conditions favourable for formation of M-M bonds
Classification of binuclear cluster compounds ,Confacial bioctahedron structures
Trinuclear cluster compounds and polynuclear cluster compounds
Polyatomic clusters –Zintl ions, Chevrel phases.
Organo metallic compounds : 16 and 18 electrons rules, isolobal relationship
Iso electron relationship- synthesis structure and bonding of carbon monoxide dinitrogen and nitric oxide complexes.
Synthesis, structure, bonding and reactions of metallocenes with special reference to ferrocene.
Classification metal carbonyls.
Metal ligand equilibrium in solution: step wise and overall formation constants, factors effecting the stability metal complexes.
Pearson's theory of hard and soft acids and bases, chelate effect, determination of stability constant.
Inert and labile complexes, explanation of lability on the basis of VBT and CFT. biological and abiological nitrogen fixation.
Metallo porphyrins with special reference to haemoglobin and myoglobin, biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} .
In organic reaction mechanisms: ligand replacement reactions of metal complexes, acid hydrolysis- factors effecting acid hydrolysis.
Anation and base hydrolysis of cobalt (III) complexes, ligand displacement reactions of square planar complexes of Pt(II).
Factors effecting square planar substitutions – trans effect, complementary and non complementary reactions with examples.
Electron transfer reactions of complexes- inner and outer sphere mechanisms.

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Syllabus for the Academic Year 2015-16

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Localised and delocalised covalent bond, concept of resonance, aromaticity, Huckle's rule.
Benzenoid and non benzenoid compounds, anto aromaticity, homo aromaticity, nature of reaction energy and kinetic considerations.
Types of organic reactions, reagents, reactive intermediates, formation and stabilization, inductive and mesomeric effects.
Stereo chemistry conformational isomerism, acyclic and simple systems, substituted ethanes.
Cyclo pentane, cyclo hexane, cyclo heptanes, cyclo octane and decalins.
Optical isomerism, optical activity, molecular dissymmetry and chirality, elements of symmetry.
Fisher's projection, D,L and R,S configurations, relative absolute configurations, optical isomerism due to asymmetric carbon atoms, bi phenyls allenes, spirans, racemisation, resolution.
Geometrical isomerism, E,Z configurations, properties.
Hetero cyclic compounds, synthesis and reactivity of pyridine, quinoline, iso quinoline.
Indole, benzo furan, benzo thiofene, pyrazole.
Imidazole, oxazole, isoxazole, thiazole, isothiazole, pyridazine, pyrimydine, pyrazine
Chemistry of some typical natural products, isolation, structure, elucidation, synthesis and bio genesis of the following compounds,flavonoids.
Quercetin, cyanidin, genestein, terpenoids.
Alpha terpineol, alpha pinene, camphor, farnesol.

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Syllabus for the Academic Year 2015-16

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Aromatic substitution reactions, electrophilic, nucleophilic and through benzyne, radical substitution of arenes.
Orientation of nucleophilic substitution at saturated carbon, SN1, SN2.
SNi reactions, effect of structure, nucleophile, leaving group, solvent, addition, involving, electrophiles, nucleophiles and free radicals.
Elimination reactions, E1, E1CB, E2 reactions, elimination versus substitution reactions.
Mechanism of some named reactions, Aldol, Perkin, Benzoin, Cannizzaro reactions
Wittig, Grignard, Reformatsky, Meerwein, Hoffmann, Claisen rearrangements.
Favorsky rearrangement, hydroboration, openauer oxidation, Clemmensen reduction, Meerwein-Ponndorf and Verley, Birch reduction, Stork enamine reactions.
Michael addition, Mannich reaction, Diel's -Alder reaction, Ene reaction, Bayer-Villiger reaction,
Spectra and structure, application of organic spectroscopy, UV Spectroscopy.
IR spectroscopy, basic principles and importance.
PMR spectroscopy, basic principles and importance.
Mass spectroscopy, basic principle and importance.
Isolation, structure, elucidation and synthesis of alkaloids, atropine, nicotine, quinine.
Purines, caffeine, configuration.
Ring structure and explanation of glucose.
Ring structure and explanation of fructose, anomeric effects.

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Syllabus for the Academic Year 2015-16

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Thermodynamics:concepts of partial molar properties, graphical methods, intercept method and apparent molar volume method.
Chemical potential with T&P Gibbs Duhem equation phase rule from the concept of chemical potential, thermodynamic properties of ideal solutions.
Raoult's law, Henry's law, non ideal systems, concept of fugacity, non ideal solutions, activities and activity coefficients.
Determination activity coefficient from vapour pressure measurement, chemical equilibrium, effect temp on equilibrium constant, Vant hoff equation.
Micelles and macro molecules: classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration.
Factors affecting CMC, thermodynamics of micellization , phase separation and mass action models, solubilization, micro emulsions, reverse micelles.
Polymers, types of polymers, electrically conducting polymer, liquid crystal polymers, kinetics of free radical polymerization, molecular mass number and mass average molecular weight.
Weight determination - end group analysis, osmometry, viscometry, light scattering methods.
Chemical kinetics, collision theory, transition state theory Debye Huckel theory, salt effects.
Hammett equation, Taft equation, consecutive reactions, parallel reactions, opposing reactions.
Acid -base catalysis, Arrhenius diagram, fast reactions flow methods.
Photochemistry: Franck Condon principle, excited molecules, singlet and triplet states, spin orbit interactions, actinometry, ferrioxalate and uranyl oxalate actinometers - problems.
Derivation of fluorescence and phosphorescence, quantum yields, quenching effect, Stern Volmer equation.
Primary process, types of photochemical reactions, photodissociation, additional isomerisation reactions with examples.

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Syllabus for the Academic Year 2015-16

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-II

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:II

NMR-Principle and Theory Introduction.
Nature of spinning particle and its interaction with magnetic field.Chemical shift&origin spin-spin interaction,Application of NMR to structural elucidation.
Electron spin resonance-principle and experimental technique –g-factor,Line shapes&Line widths hyperfine interactions.
Applications of ESR studies.dimethylformamide,styrene
Brief review on Entropy changes accompanying specific process-expansion,phase transition,heating measurement of Entropy.
Nernst heat theorem,Third law of thermodynamics-Determination of the absolute entropy.
Types of ensembles,thermodynamic probability,most probable distribution law –partition function,molar&molecular partitions.
Rotational,translational,vibrational&electronic partition function –relation between thermodynamic function (E,H,S,G&Cv)and the partition.
Electrochemistry-Electrochemical cell –Galvanic&Electrolytical cell.Concentration cell with&without transference,effect of complexation on redox potential.
Ferricyanide\ferrocyanide couple,Iron(III) .free radicals,metal complexes and biological systems.
phenanthroline/Iron(II) phenanthroline couple.
Determination of standard potential,solubility product equilibrium constant&activity coefficients from EMF data.
Bjerrum theory of ion association concept of activity and activity coefficients in electrolytic solutions.
The mean ionic activity coefficient,Debye-Huckel theory of electrolytic solutions,Limiting law.
Calculation of mean ionic activity coefficient,limitations of Debye-Huckel theory.
Effect of dilution on equivalent conductance of electrolytes,anomalous behavior of strong electrolyte.Debye-Huckel Onsager equation-verification and limitations,fuel cell.
Electrochemistry-II the electrode-electrolyte interface.primary and secondary cells,batteries examples.
The electric double layer.The Helmholtz-Perrin parallel-plate model,The Gouy-chapman diffuse-charge model&the stern.

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Syllabus for the Academic Year 2015-16

Department: P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism& Pericyclic reactions

Class: II M.Sc Organic chemistry

Semester: III

Aliphatic nucleophilic substitution mech. Nucleophilic substitution: substitutions of reaction of ambident nucleophiles, NGP of O, S, N, halogens, aryl groups, alkyl and cyclo alkyl groups, in nucleophilic substitutions reactions.
Sigma, pi bond participation in acyclic by cyclic systems, substitution at allylic, trigonal and vinylic carbons, hydrolysis of esters.
Meyers aldehydes, ketones, and carboxylic acids, alkylation with trialkyl boranes. Aliphatic electrophilic substitutions: SE1, SE2, SEi Mechanisms, hydrogen exchange.
Migration of double bonds, halogenations aldehydes, ketones, acids, acyl halides, sulphoxides and sulphones, aliphatic diazonium coupling.
Nitrosation at carbon and nitrogen di azo transfer reaction and carbene and nitrene insertion, formation sulphur yield, metalation with organo metallic compounds and with metal.
Decarboxylation of aliphatic acids. Haloform reaction and haller-bauer reaction Aromatic nucleophilic substitution: a general introduction to different mechanisms of aromatic substitutions SN Ar, AN.
Aryne von richter rearrangement, sommler hauser rearrangement, smiles rearrangement, radical substitution mechanisms: reaction at sp ³ carbon: reactivity in aliphatic substrates.
Reactivity at bridged positions, reactivity at sp ² carbon. Reactivity in aromatic substrates, neighbouring group assistance in free radical reactions.
Effect of reactivity in attacking radical, effect of solvent and reactivity, halogenation at an alkyl carbon and allylic carbon, hydroxylation at aromatic carbon by means of fentons reagent
Oxidation of aldehydes to carboxylic acids, formation of cyclic ethers with Pb(OAc) ₄ reed reaction, sandmeyer reaction, Kolbe reaction and hunsdiecker reaction.
Molecular orbital symmetry, frontier orbitals of ethylene 1,3 buta diene, 1,3,5 hexatriene allyl systems.
Classification of pericyclic reactions, FMO approach, wood ward Hoffman Correlation diagram method.
Perturbation of molecular (PMO) approach the explanation of pericyclic reaction under thermal and photo chemical conditions.
Electrocyclic reactions, con rotatory and disrotatory motions, 4n and (4n+2) allyl systems and secondary effects.
Cycloadditions, antarafacial and suprafacial additions notation cyclo additions 4n and (4n+2) systems with a greater emphasis on (2+2) and (4+4)cyclo additions, (2+2) additions of ketones, chelotropic reactions.
FMO, PMO, wood ward – Hoffman correlation diagram method for sigmatropic rearrangements under thermal and photochemical conditions, retention and inversion of configuration.
(3,3) and (5,5) detailed treatment of claisen and cope rearrangement.
Fluxional tautomerism, aza-cope rearrangement and Barton reaction.

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Syllabus for the Academic Year 2015-16

Department: P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism –II&Organic Photo chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Addition elimination mechanisms:a)addition to carbon multiple bonds-addition reactions involving electrophiles, nucleophiles, &free radicals,cyclic mechanisms,orientations.
Stereochemistry,hydrogenation of double &triple bonds,hydroboration,birch reduction.michael reaction,addition of O& N,.04
(b)addition to carbon-hetero atom multiple bonds:mannich reaction AH reduction of carbonyl compounds, acids,esters, nitriles,addition of Grignard reagents,reformatsky reaction.
Tollens reaction, wittig, prins reaction.(c)elimination reactions:stereochemistry of eliminations in acyclic &cyclic systems,orientation in elimination in elimination-saytzeff & Hoffman elimination propolitic elimination
Rearrangements:classification&general mechanistic treatment of nucleophilic,free radical .
electrophilic rearrangements Wagner-meerwein and related reactions,
Tiffenue demjanov rearrangement,a- ketone rearrangement.
Neber,hofmann,bayer-villiger ,stevens ,wittig rearrangement
Photo chemistry: photo chemical energy, electronic transitions, laws of photo chemistry.
Jablonski diagram,Franck condon principle,quenching.

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Syllabus for the Academic Year 2015-16

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-I

Class: II MSC ORGANIC CHEMISTRY

Semester-III

IR spectroscopy, units of frequency, wavelength, wave number, molecular vibrations.
Factors influencing vibrational frequencies, IR spectrometer.
Sampling techniques, characteristic frequencies of organic molecules.
Interpretation of spectra, problems.
UV spectroscopy, introduction, absorption laws, measurements of spectrum.
Chromophores, standard works of reference, definitions.
Applications of UV spectroscopy to conjugated dienes, trienes.
Carbonyl compounds, aromatic compound, problems.
NMR spectroscopy, measurement of spectra, chemical shift, intensity of NMR signals.
Integration factors affecting, the chemical shift, spin-spin coupling to ^{13}C , ^1H - ^1H first order coupling.
Some simple ^1H - ^1H splitting patterns, magnitude of ^1H - ^1H coupling constants.
Mass spectroscopy, basic principles, instrumentation.
The mass spectrometer, isotope abundances.
Molecular ion, meta stable ions, problems related to NMR.
Problems related to mass spectroscopy.
Separation techniques, solvent extraction, chromatography paper, thin layer chromatography.
Column chromatography.
Electrophoresis.

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Syllabus for the Academic Year 2015-16

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-II

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Optical rotatory dispersion and circular dichroism, phenomena of ORD and CD.
Classifications of ORD and CD curves, cotton effect curves and their applications.
The octant rule and its applications to alicyclic ketones.
Improving the NMR spectrum, mean, pulse experiment.
New techniques in FT-NMR spectroscopy, the separation of chemical shift and coupling on to different axes.
Spin de coupling, nuclear over Hauser effect.
The signals from directly bonded ^{13}C and ^1H .
ESR derivative curves, values and hyperfine splitting.
Fragmentation processes, fragmentation associated with functional groups
Rearrangements and mass spectra of some chemical classes, problems.
Structural elucidation of organic compounds by a combined application of the special methods of units.
Spectral problems.
Separation techniques GC, HPLC.
Instrumentations of GC and HPLC, applications.
X-Ray diffraction.

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Syllabus for the Academic Year 2015-16

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class:II MSC ORGANIC CHEMISTRY

Semester:III

Formation of carbon-carbon single bond; alkylation via enolate the enamine and related reactions.
Umplong(dipole inversion)-the aldol reaction
Applications of organo palladium compounds.
Organo nickel and organo copper reagents
Applications of thiocarbonions-selenocarbonins and sulphur yields.
Synthetic applications of carbenes and carbenoids.
Formation of carbon-carbon double bonds; elimination reactions pyrolytic,syn eleminations.
Sulphoxide-sulphonate rearrangement the wittig reaction-alkenes.
Arylsulphonyl-hydrazones-claisen rearrangement of allyl vinyl ethers.
Methods of polymerizastion (a) Addition polymerisation (b) condensation polymerization
(c)Radical polymerization(two examples of each method)
Reactions of unactivated carbon-hydrogen bonds; The HLF Reaction.
The barton reaction and synthetic applications.
Photolysis of organo hypothalites.synthetic applications of organo boranes and organo silanes.
Organoboranes;preparation of organo boranes viz hydroboration with BH ₃ -THF, dicyclohexyl borane, dismyl borane,thexyl borane.9BBN and disopinamplyel borane,
Functional group transformations of organo boranes –oxidation,protonolysis and rearrangements.
Formation of carbon-bonds viz organo boranes carbonylation,
The Formation of carbon-bonds viz organo boranes carbonylation,
The cyanoborate process and reactions of alkenyl boranes and trialkenyl borates

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Syllabus for the Academic Year 2015-16

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class:II MSC ORGANIC CHEMISTRY

Semester:IV

Organo silanes; synthetic applications of trimethylsilyl chloride.
Dimethyl-butylsilyl chloride,trimethylcyanide.
Trimethylsilyl iodide and trimethylsilyl triflate.
Synthetic applications of-silyl carbanion and b-silyl carbonium ions.
Phase transfer catalysis-principle and applications.
Oxidation ; oxidations of hydrocarbons,alkenes, alcohols aldehydes and ketones.
Oxidative coupling reactions, use of Pb(OAC) ₄ ,NBs,CRO ₃ .
SeO ₂ ,MnO ₂ , Dealkoxylsulphonium yields, KMnO ₄ ,OSO ₄ .
Peracids and Ti(III)nitrate.
Catalytic hydrogenation (homogeneous and heterogeneous).
Reduction by dissolving metals,reduction by hydride transfer reagents.
Reduction with hydrazine and diamide.
Selectivity in reduction of nitroso and nitro compounds,reductive cleavage.
Retrosynthesis the disconnection approach-basic principles.
Convergent synthesis.
Linear synthesis.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2015-16

Department: P.G.ORGANIC CHEMISTRY

Paper: Natural products & Biopolymers

Class: II M.Sc Organic chemistry

Semester: III

Introduction of antibiotics, classification of penicillins
biological properties, biosynthesis Structure elucidation, synthesis of penicillins
semi synthetic penicillins Structure of cephalosporin-C and their synthesis ,Biological properties, biosynthesis
Biological properties, biosynthesis Conversions, structure elucidation of streptomycin
synthesis Biological properties, biosynthesis,
Introduction of terpenoids, isolation Structure elucidation of Taxol, synthesis
Structure elucidation of Taxol, Synthesis of Taxol,
biosynthesis, biological properties, structure elucidation of forskolin
Synthesis of forskolin, biological properties, biosynthesis, structural elucidation of Azadirachtin,
Introduction of alkaloids, classification, isolation
structural elucidation of reserpine
Synthesis of forskolin, biological properties, biosynthesis, structural elucidation of Azadirachtin Synthesis of reserpine
biological properties, biosynthesis, aminoacids
Synthesis of aminoacids, physical & chemical properties
Protecting groups,
synthesis of peptides, Merrifield solid phase synthesis
Structural elucidation of morphine, synthesis
Biological properties , biosynthesis of vincristine

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Syllabus for the Academic Year 2015-16

Department: P.G. ORGANIC CHEMISTRY

Paper: Bio-organic chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Nucleic acids introduction & introduction of nucleotides, nucleosides
DNA, RNA explanation,differences
Steroids introduction,structure determination of cholesterol
Synthesis, biosynthesis ,properties,reactions of cholesterol
Structure determination of progesterone, synthesis of progesterone from ergosterol,stigmasterol,cholesterol
Biosynthesis of progesterone,structural elucidation of Beta-amyrin&synthesis ,biosynthesis of Beta-amyrin
Biological properties of amyrin. Structural elucidation of strychnine
Synthesis of strychnine
Biosynthesis, biological properties of strychnine
Structural elucidation,synthesis,biosynthesis,biological properties of colchicine
Structural elucidation, synthesis, biosynthesis, biological properties of camptothecin.
Prostaglandins: introduction, classification, structural elucidation
Synthesis, biosynthesis, biological properties of prostaglandins
Podophyllotoxin : structure determination, synthesis, biosynthesis &biological properties
Rotenone : structure determination, synthesis, biosynthesis & their biological properties
Etoposide : structure determination, synthesis, biosynthesis &biological properties

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2014-15

Department:P.G.ORGANIC CHEMISTRY

Paper: GENERAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Wave equation-interpretation of wave function-properties of wave function-Normalisation and orthogonalisation
Operators-Linear and Non linear ,Commutators of Operators
Postulates of Quantum mechanics,Setting up of operators obserbables
Hermitian operator-Eigen values of hermitian operator
Basic quantum chemistry-II; Wave mechanics of simple systems with constant potential energy ,partical in one dimensional box .
Factors influencing color transition –dipole integral , symmetry arguments in deriving the selection rules.
Wave mechanics of systems with variable potential energy –symple harmonic oscillator , solution of wave equation-selection rules.
calculation of bond length –isotopic effect,second order stark effect and its applications
Molecular spectroscopy-I;Rotational spectra of diatomic molecules-Rigid rotor Selection rules-calculation of bond length –isotopic effect,second order stark effect and its applications
Infrared spectra of diatomic molecules , harmonic and anharmonic oscillators –selection rules.
Overtone combination bands – calculation of force constant , anharmonicity constant and zero point energy.
Fermi resonance ,simultaneous vibration-rotation spectra of diatomic molecule .
Molecular spectroscopyII-Raman effect –classical and quantum mechanical explanations
Franck Condon priniciple –applications ,Rotational fine structure . Charge transfer spectra-band head and band shading

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Syllabus for the Academic Year 2014-15

Department : P.G.ORGANIC CHEMISTRY

Paper :GENERAL CHEMISTRY

Class: I M.SC ORGANIC CHEMISTRY

Semester:II

Basic Quantum chemistry III-Hydrogen atom ,probability density in orbitals ,shapes of orbitals .
Perturbation theory- line independent perturbation theory Only first order perturbation is to be dealt with
Application to ground state energy of Helium atom . Variation principle –Application – Calculation
Symmetry operations and point groups, classification of molecules in to point groups.
Group theory – group multiplication table for C _{2v} and C _{3v} point groups.
Representations, reducible and irreducible representations, Mulliken symbols, orthogonality theorem and its implications
Treatment of analytical data, classification of errors, determinations of indeterminate errors, minimisation of errors- absolute and relative errors,
Standard deviations- standard error of mean – student' t-test, testing for significance – comparison of two means – f –tes.
Basic quantum chemistry -4; Valence bond approach –directed valence hybridization .
Calculation of ionic and covalent bond contribution in hydrogen molecule
Molecular orbital theory- LCAO approximation –hydrogen molecule ion
Hydrogen molecule (fundamental concepts only) –The electronic transition in the hydrogen molecule .
Computer languages operating systems – principles of algorithms and flow charts.
Arithmetic expressions – arithmetic statements- replacement statements – IF statements.
Logical IF and block IF statements – GOTO statements, subscripted, variable and DIMENSION statement
DO statement – rules for DO statements, functions and subroutines-development of FORTRAN statements for simple formula in chemistry.
Nernst equation, pH of solution – first order rate equation – cell constant – electrode potential.

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Syllabus for the Academic Year 2014-15

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Structure & Bonding:Application of VSEPR ,Valence bond theory and applications.
Molecular orbital theories,Structure of Simple molecules.
Applications of MO theory to Square planar &Octahedral complexes.
Walsh diagram for water molecule.
Coordination compounds;Crystal field theory- Crystal field splitting patterns in octahedral,tetrahedral,tetragonal ,square planar,trigonal bipyramidal geometries.
Calculations of CFSE, Factors affecting crystal field splitting energies ,spectrochemical series .
Jahn-Teller effect, Nephelauxetic effect, ligand field theory .
Term symbols –Russell sanders coupling, derivation of term symbols for various configurations .Spectroscopic ground states.
Inorganic cage and ring compounds; Preparation ,structure and reactions of boranes , carboranes.
Preparation , structure and reactions of metallocarboranes ,boron-nitrogen cyclic compounds .
Phosphorus-nitrogen and sulphur- nitrogen cyclic compounds .
Electron counting in boranes –Wades rules.Isopoly and Heteropoly acids.
Electronic spectra of transition metal complexes;Selection rules ,break down of selection rules Orgel diagrams,T-S diagrams for d^1 - d^9 Octahedral and tetrahedral complexes.
Charge transfer spectra , Quenching of orbital momentum .

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Syllabus for the Academic Year 2014-15

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Topics to be covered
Classification of binuclear cluster compounds ,Confacial bioctahedron structures
Trinuclear cluster compounds and polynuclear cluster compounds
Polyatomic clusters –Zintl ions,chevreil phases.
Organo metalliccompounds :16 and18 electrons rules, isolobal relation ship
Iso electron relationship- synthesis structure and bonding of carbonmonoxide dinitrogen and nitricoxide complexes.
Synthesis, structure, bonding and reactions of metalosins with special reference to ferrocene.
Classification metal carbonyls.
Metal ligand equilibrium in solution: step wise and overall formation constants, factors effecting the stability metal complexes.
Pearsons theory of hard and soft acids and basis, chelate effect, determination of stability constant.
Inert and labile complexes, explanation of lability on the basis of VBT and CFT.biological and abiological nitrogen fixation.
Metallo porphyrins with special reference to haemoglobin and myoglobin, biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} .
In organic reaction mechanisms:ligand replacement reactions of metal complexes, acid hydrolysis- factors effecting acid hydrolysis.
Anation and base hydrolysis of cobalt (III)complexes, ligand displacement reactions of square planar complexes of Pt(II).
Factors effecting square planar substitutions – trans effect, complementary and non complementary reactions with examples.
Electron transfer reactions of complexes- inner and outer sphere mechanisms.

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Syllabus for the Academic Year 2014-15

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Localised and delocalised covalent bond, concept of resonance, aromaticity, Huckle's rule.
Benzenoid and non benzenoid compounds, anto aromaticity, homo aromaticity, nature of reaction energy and kinetic considerations.
Types of organic reactions, reagents, reactive intermediates, formation and stabilization, inductive and mesomeric effects.
Stereo chemistry conformational isomerism, acyclic and simple systems, substituted ethanes.
Cyclo pentane, cyclo hexane, cyclo heptanes, cyclo octane and decalins.
Optical isomerism, optical activity, molecular dissymmetry and chirality, elements of symmetry.
Fisher's projection, D,L and R,S configurations, relative absolute configurations, optical isomerism due to asymmetric carbon atoms, bi phenyls allenes, spirans, racemisation, resolution.
Geometrical isomerism, E,Z configurations, properties.
Hetero cyclic compounds, synthesis and reactivity of pyridine, quinoline, iso quinoline.
Indole, benzo furan, benzo thiofene, pyrazole.
Imidazole, oxazole, isoxazole, thiazole, isothiazole, pyridazine, pyrimydine, pyrazine
Chemistry of some typical natural products, isolation, structure, elucidation, synthesis and bio genesis of the following compounds,flavonoids.
Quercetin, cyanidin, genestein, terpenoids.
Alpha terpeneol, alpha pinene, camphor, farnesol.

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Syllabus for the Academic Year 2014-15

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY -II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Aromatic substitution reactions, electrophilic, nucleophilic and through benzyne, radical substitution of arenes.
Orientation of nucleophilic substitution at saturated carbon, SN1, SN2.
SNi reactions, effect of structure, nucleophile, leaving group, solvent, addition, involving, electrophiles, nucleophiles and free radicals.
Elimination reactions, E1, E1CB, E2 reactions, elimination versus substitution reactions.
Mechanism of some named reactions, Aldol, Perkin, Benzoin, Cannizzaro reactions
Wittig, Grignard, Reformatsky, Meerwein, Hoffmann, Claisen rearrangements.
Favorsky rearrangement, hydroboration, openauer oxidation, clemmensen reduction, meerwein-pondorf and verley, birch reduction, stork enamine reactions.
Michael addition, mannich reaction, Diel's -Alder reaction, Ene reaction, Bayer- Villiger reaction,
Spectra and structure, application of organic spectroscopy, UV Spectroscopy.
IR spectroscopy, basic principles and importance.
PMR spectroscopy, basic principles and importance.
Mass spectroscopy, basic principle and importance.
Isolation, structure, elucidation and synthesis of alkaloids, atropine, nicotine, quinine.
Purines, caffeine, configuration.
Ring structure and explanation of glucose.
Ring structure and explanation of fructose, anomeric effects.

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Syllabus for the Academic Year 2014-15

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Topics to be Covered
Thermodynamics: concepts of partial molar properties, graphical methods, intercept method and apparent molar volume method.
Chemical potential with T&P Gibbs Duhem equation phase rule from the concept of chemical potential, thermodynamic properties of ideal solutions.
Raoult's law, Henry's law, non ideal systems, concept of fugacity, non ideal solutions, activities and activity coefficients.
Determination activity coefficient from vapour pressure measurement, chemical equilibrium, effect temp on equilibrium constant, Vant hoff equation.
Micelles and macro molecules: classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration.
Factors affecting CMC, thermodynamics of micellization, phase separation and mass action models, solubilization, micro emulsions, reverse micelles.
Polymers, types of polymers, electrically conducting polymer, liquid crystal polymers, kinetics of free radical polymerization, molecular mass number and mass average molecular weight.
Weight determination - end group analysis, osmometry, viscometry, light scattering methods.
Chemical kinetics, collision theory, transition state theory Debye Huckel theory, salt effects.
Hammett equation, Taft equation, consecutive reactions, parallel reactions, opposing reactions.
Acid-base catalysis, Arrhenius diagram, fast reactions flow methods.
Derivation of fluorescence and phosphorescence, quantum yields, quenching effect, Stern Volmer equation.
Primary process, types of photochemical reactions, photodissociation, additional isomerisation reactions with examples.

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Syllabus for the Academic Year 2014-15

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-II

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:II

NMR-Principle and Theory Introduction.
Nature of spinning particle and its interaction with magnetic field.Chemical shift&origin spin-spin interaction,Application of NMR to structural elucidation.
Electron spin resonance-principle and experimental technique –g-factor,Line shapes&Line widths hyperfine interactions.
Applications of ESR studies.dimethylformamide,styrene
Brief review on Entropy changes accompanying specific process-expansion,phase transition,heating measurement of Entropy.
Nernst heat theorem,Third law of thermodynamics-Determination of the absolute entropy.
Types of ensembles,thermodynamic probability,most probable distribution law –partition function,molar&molecular partitions.
Rotational,translational,vibrational&electronic partition function –relation between thermodynamic function (E,H,S,G&C _v)and the partition.
Electrochemistry-Electrochemical cell –Galvanic&Electrolytical cell.Concentration cell with&without transference,effect of complexation on redox potential.
Ferricyanide\ferrocyanide couple,Iron(III) .free radicals,metal complexes and biological systems.
phenanthroline/Iron(II) phenanthroline couple.
Determination of standard potential,solubility product equilibrium constant&activity coefficients from EMF data.
Bjerrum theory of ion association concept of activity and activity coefficients in electrolytic solutions.
The mean ionic activity coefficient,Debye-Huckel theory of electrolytic solutions,Limiting law.
Calculation of mean ionic activity coefficient,limitations of Debye-Huckel theory.
Effect of dilution on equivalent conductance of electrolytes,anomalous behavior of strong electrolyte.Debye-Huckel Onsager equation-verification and limitations,fuel cell.
Electrochemistry-II the electrode-electrolyte interface.primary and secondary cells,batteries examples.
The electric double layer.The Helmholtz-Perrin parallel-plate model,The Gouy-chapman diffuse-charge model&the stern.

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Syllabus for the Academic Year 2014-15

Department: P.G. ORGNIC CHEMISTRY

Paper: Organic reaction mechanism& Pericyclic reactions

Class: II M.Sc Organic chemistry

Semester: III

Aliphatic nucleophilic substitution mech. Nucleophilic substitution: substitutions of reaction of ambident nucleophiles, NGP of O, S ,N , halogens, aryl groups, alkyl and cyclo alkyl groups, in nucleophilic substitutions reactions.
Sigma, pi bond participation in acyclic by cyclic systems, substitution at allylic, trigonal and vinylic carbons, hydrolysis of esters.
Meyers aldehydes, ketones, and carboxylic acids, alkylation with trialkyl boranes. Aliphatic electrophilic substitutions: SE1,SE2,SEi Mechanisms, hydrogen exchange.
Migration of double bonds, halogenations aldehydes, ketones, acids, acyl halides, sulphoxides and sulphones, aliphatic diazonium coupling.
Nitrosation at carbon and nitrogen di azo transfer reaction and carbene and nitrene insertion, formation sulphur yield, metalation with organo metallic compounds and with metal.
Decarboxylation of aliphatic acids. Haloform reaction and haller-bauer reaction Aromatic nucleophilic substitution: a general introduction to different mechanisms of aromatic substitutions SN Ar, AN.
Aryne von richter rearrangement, sommler hauser rearrangement, smiles rearrangement, radical substitution mechanisms: reaction at sp ³ carbon: reactivity in aliphatic substrates.
Reactivity at bridged positions, reactivity at sp ² carbon. Reactivity in aromatic substrates, neighbouring group assistance in free radical reactions.
Effect of reactivity in attacking radical, effect of solvent and reactivity, halogenation at an alkyl carbon and allylic carbon, hydroxylation at aromatic carbon by means of fentons reagent
Oxidation of aldehydes to carboxylic acids, formation of cyclic ethers with Pb(OAc) ₄ reed reaction, sandmayer reaction, Kolbe reaction and hunsdiecker reaction.
Molecular orbital symmetry, frontier orbitals of ethylene 1,3 buta diene, 1,3,5 hexatriene allyl systems.
Classification of pericyclic reactions, FMO approach, wood ward Hoffman Correlation diagram method.
Perturbation of molecular (PMO) approach the explation of pericyclic reaction under thermal and photo chemical conditions.
Electrocyclic reactions, con rotatory and disrotatory motions, 4n and (4n+2) allyl systems and secondary effects.
Cycloadditions, antarafacial and suprafacial additions notation cyclo additions 4n and (4n+2) systems with a greater emphasis on (2+2) and (4+4)cyclo additions, (2+2) additions of ketones, chelotropic reactions.
FMO, PMO,wood ward – Hoffman correlation diagram method for sigmatropic rearrangements under thermal and photochemical conditions, retention and inversion of configuration.
(3,3) and (5,5) detailed treatment of claisen and cope rearrangement.
Fluxional taotomerism, aza-cope rearrangement and Barton reaction.

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Syllabus for the Academic Year 2014-15

Department: P.G. ORGANIC CHEMISTRY

Paper: Organic reaction mechanism –II&Organic Photo chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Addition elimination mechanisms:a)addition to carbon multiple bonds-addition reactions involving electrophiles, nucleophiles, &free radicals,cyclic mechanisms,orientations.
Stereochemistry,hydrogenation of double &triple bonds,hydroboration,birch reduction.michael reaction,addition of oxygen& N,.04
(b)addition to carbon-hetero atom multiple bonds:mannich reaction AH reduction of carbonyl compounds, acids,esters, nitriles,addition of Grignard reagents,reformatsky reaction.
Tollens reaction, wittig, prins reaction.(c)elimination reactions:stereochemistry of eliminations in acyclic &cyclic systems,orientation in elimination in elimination-saytzeff & Hoffman elimination propolitic elimination
Rearrangements:classification&general mechanistic treatment of nucleophilic,free radical .
electrophilic rearrangements Wagner-meerwein and related reactions,
Tiffenue demjanov rearrangement,a- ketone rearrangement.
Neber,hofmann,bayer-villiger ,stevens ,wittig rearrangement
Photo chemistry: photo chemical energy, electronic transitions, laws of photo chemistry.
Jablonski diagram,Franck condon principle,quenching.

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Syllabus for the Academic Year 2014-15

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-I

Class:II MSC ORGANICCHEMISTRY

Semester:III

IR spectroscopy, units of frequency,wavelength,wave number, molecular vibrations.
Factors influencing vibrational frequencies, ir spectrometer.
Sampling techniques, characteristic frequencies of organic molecules.
Interpretation of spectra, problems.
UV spectroscopy, introduction, absorption laws, measurements of spectrum.
Chromophores, standard works of reference, definitions.
Applications of UV spectroscopy to conjugated dienes, trienes.
Carbonyl compounds, aromatic compound,problems.
NMR spectroscopy, measurement of spectra, chemical shift, intensity of NMR signals.
Integration factors affecting, the chemical shift, spin-spin coupling to ^{13}C , ^1H - ^1H first order coupling.
Some simple ^1H - ^1H splitting patterns, magnitude of ^1H - ^1H coupling constants.
Mass spectroscopy, basic principles, instrumentation.
The mass spectrometer, isotope abundances.
Molecular ion, meta stable ions, problems related to NMR.
Problems related to mass spectroscopy.
Separation techniques, solvent extraction, chromatography paper, thin layer chromatography.
Column chromatography.
Electrophoresis.

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Syllabus for the Academic Year 2014-15

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-II

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Optical rotatory dispersion and circular dichroism, phenomena of ORD and CD.
Classifications of ORD and CD curves, cotton effect curves and their applications.
The octant rule and its applications to alicyclic ketones.
Improving the NMR spectrum, mean, pulse experiment.
New techniques in FT-NMR spectroscopy, the separation of chemical shift and coupling on to different axes.
Spin de coupling, nuclear over Hauser effect.
The signals from directly bonded ^{13}C and ^1H .
ESR derivative curves, values and hyperfine splitting.
Fragmentation processes, fragmentation associated with functional groups
Rearrangements and mass spectra of some chemical classes, problems.
Structural elucidation of organic compounds by a combined application of the special methods of units.
Spectral problems.
Separation techniques GC, HPLC.
Instrumentations of GC and HPLC, applications.
X-Ray diffraction.

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class: II MSC ORGANIC CHEMISTRY

Semester:III

Formation of carbon-carbon single bond; alkylation via enolate the enamine and related reactions.
Umpolung(dipole inversion)-the aldol reaction
Applications of organo palladium compounds.
Organo nickel and organo copper reagents
Applications of thiocarbonions-selenocarbonins and sulphur yields.
Synthetic applications of carbenes and carbenoids.
Formation of carbon-carbon double bonds; elimination reactions pyrolytic,syn eliminations.
Sulphoxide-sulphonate rearrangement the wittig reaction-alkenes.
Arylsulphonyl-hydrazones-claisen rearrangement of allyl vinyl ethers.
Methods of polymerization (a) Addition polymerisation (b) condensation polymerization
(c)Radical polymerization(two examples of each method)
Reactions of unactivated carbon-hydrogen bonds; The HLF Reaction.
The barton reaction and synthetic applications.
Photolysis of organo hypothalites.synthetic applications of organo boranes and organo silanes.
Organoboranes;preparation of organo boranes viz hydroboration with BH ₃ -THF, dicyclohexyl borane, dismyl borane,thexyl borane.9BBN and disopinamplyel borane,
Functional group transformations of organo boranes –oxidation,protonolysis and rearrangements. Formation of carbon-bonds viz organo boranes carbonylation,
The Formation of carbon-bonds viz organo boranes carbonylation,
The cyanoborate process and reactions of alkenyl boranes and trialkenyl borates

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class:II MSC ORGANIC CHEMISTRY

Semester:IV

Organo silanes; synthetic applications of trimethylsilyl chloride.
Dimethyl-butylsilyl chloride,trimethylcyanide.
Trimethylsilyl iodide and trimethylsilyl triflate.
Synthetic applications of-silyl carbanion and b-silyl carbonium ions.
Phase transfer catalysis-principle and applications.
Oxidation ; oxidations of hydrocarbons,alkenes, alcohols aldehydes and ketones.
Oxidative coupling reactions, use of Pb(OAC) ₄ ,NBs,CRO ₃ .
SeO ₂ ,MnO ₂ , Dealkoxylsulphonium yields, KMnO ₄ ,OSO ₄ .
Peracids and Ti(III)nitrate.
Catalytic hydrogenation (homogeneous and heterogeneous).
Reduction by dissolving metals,reduction by hydride transfer reagents.
Reduction with hydrazine and diamide.
Selectivity in reduction of nitroso and nitro compounds,reductive cleavage.
Retrosynthesis the disconnection approach-basic principles.
Convergent synthesis.
Linear synthesis.

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Department: P.G.ORANIC CHEMISTRY

Paper: Natural products & Biopolymers

Class: II M.Sc Organic chemistry

Semester: III

Introduction of antibiotics, classification of penicillins
biological properties, biosynthesis Structure elucidation, synthesis of penicillins
semi synthetic penicillins Structure of cephalosporin-C and their synthesis ,Biological properties, biosynthesis
Biological properties, biosynthesis Conversions, structure elucidation of streptomycin
synthesis Biological properties, biosynthesis,
Introduction of terpenoids, isolation Structure elucidation of Taxol, synthesis
Structure elucidation of Taxol, Synthesis of Taxol,
biosynthesis, biological properties, structure elucidation of forskolin
Synthesis of forskolin, biological properties, biosynthesis, structural elucidation of Azadirachtin,
Introduction of alkaloids, classification, isolation
structural elucidation of reserpine
Synthesis of forskolin, biological properties, biosynthesis, structural elucidation of Azadirachtin Synthesis of reserpine
biological properties, biosynthesis, aminoacids
Synthesis of aminoacids, physical & chemical properties
Protecting groups,
synthesis of peptides, Merrifield solid phase synthesis
Structural elucidation of morphine, synthesis
synthesis of morphine, Biological properties , biosynthesis of vincristine

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Department: P.G. ORGANIC CHEMISTRY

Paper: Bio-organic chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Nucleic acids introduction & introduction of nucleotides, nucleosides
DNA, RNA explanation,differences
Steroids introduction, structure determination, synthesis of cholesterol
biosynthesis ,properties,reactions of cholesterol
Structure determination of progesterone, synthesis of progesterone from ergosterol,stigmasterol,cholesterol
Biosynthesis of progesterone,structural elucidation of Beta-amyrin&synthesis ,biosynthesis of Beta-amyrin
Biological properties of amyrin. Structural elucidation of strychnine
Synthesis of strychnine
Biosynthesis, biological properties of strychnine
Structural elucidation,synthesis,biosynthesis,biological properties of colchicine
Structural elucidation, synthesis, biosynthesis, biological properties of camptothecin.
Prostaglandins: introduction, classification, structural elucidation
Synthesis, biosynthesis, biological properties of prostaglandins
Podophyllotoxin : structure determination, synthesis, biosynthesis &biological properties
Rotenone : structure determination, synthesis, biosynthesis & their biological properties
Etoposide : structure determination, synthesis, biosynthesis &biological properties

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Syllabus for the Academic Year 2013-14

Department:P.G.ORGANIC CHEMISTRY

Paper: GENERAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Wave equation-interpretation of wave function-properties of wave function-Normalisation and orthogonalisation
Operators-Linear and Non linear ,Commutators of Operators
Postulates of Quantum mechanics,Setting up of operators obserbables
Hermitian operator-Eigen values of hermitian operator
Basic quantum chemistry-II; Wave mechanics of simple systems with constant potential energy ,partical in one dimensional box .
Factors influencing color transition –dipole integral , symmetry arguments in deriving the selection rules.
Wave mechanics of systems with variable potential energy –symple harmonic oscillator , solution of wave equation-selection rules.
calculation of bond length –isotopic effect,second order stark effect and its applications
Molecular spectroscopy-I;Rotational spectra of diatomic molecules-Rigid rotor Selection rules-calculation of bond length –isotopic effect,second order stark effect and its applications
Infrared spectra of diatomic molecules , harmonic and anharmonic oscillators –selection rules.
Overtone combination bands – calculation of force constant , anharmonicity constant and zero point energy.
Fermi resonance ,simultaneous vibration-rotation spectra of diatomic molecule .
Molecular spectroscopyII-Raman effect –classical and quantum mechanical explanations
Franck Condon principle –applications ,Rotational fine structure . Charge transfer spectra-band head and band shading

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Syllabus for the Academic Year 2013-14

Department : P.G.ORGANIC CHEMISTRY

Paper :GENERAL CHEMISTRY

Class: I M.SC ORGANIC CHEMISTRY

Semester:II

Basic Quantum chemistry III-Hydrogen atom ,probability density in orbitals ,shapes of orbitals .
Perturbation theory- line independent perturbation theory Only first order perturbation is to be dealt with
Application to ground state energy of Helium atom . Variation principle –Application – Calculation
Symmetry operations and point groups, classification of molecules in to point groups.
Group theory – group multiplication table for C _{2v} and C _{3v} point groups.
Representations, reducible and irreducible representations, Mulliken symbols, orthogonality theorem and its implications
Treatment of analytical data, classification of errors, determinations of indeterminate errors, minimisation of errors- absolute and relative errors,
Standard deviations- standard error of mean – student' t-test, testing for significance – comparison of two means – f – tes.
Basic quantum chemistry -4; Valence bond approach –directed valence hybridization .
Calculation of ionic and covalent bond contribution in hydrogen molecule
Molecular orbital theory- LCAO approximation –hydrogen molecule ion
Hydrogen molecule (fundamental concepts only) –The electronic transition in the hydrogen molecule .
Computer languages operating systems – principles of algorithms and flow charts.
Arithmetic expressions – arithmetic statements- replacement statements – IF statements.
Logical IF and block IF statements – GOTO statements, subscripted, variable and DIMENSION statement
DO statement – rules for DO statements, functions and subroutines-development of FORTRAN statements for simple formula in chemistry.
Wander wall equation, pH of solution – first order rate equation – cell constant – electrode potential.

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Syllabus for the Academic Year 2013-14

Department: P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY Semester:I

Structure & Bonding:Application of VSEPR ,Valence bond theory and applications.
Molecular orbital theories,Structure of Simple molecules.
Applications of MO theory to Square planar &Octahedral complexes.
Walsh diagram for water molecule.
Coordination compounds;Crystal field theory- Crystal field splitting patterns in octahedral,tetrahedral,tetragonal ,square planar,trigonal bipyramidal geometries.
Calculations of CFSE, Factors affecting crystal field splitting energies ,spectrochemical series .
Jahn-Teller effect, Nephelauxetic effect, ligand field theory .
Term symbols –Russell sanders coupling, derivation of term symbols for various configurations .Spectroscopic ground states.
Inorganic cage and ring compounds; Preparation ,structure and reactions of boranes , carboranes.
Preparation , structure and reactions of metallocarboranes ,boron-nitrogen cyclic compounds .
Phosphorus-nitrogen and sulphur- nitrogen cyclic compounds .
Electron counting in boranes –Wades rules.Isopoly and Heteropoly acids.
Electronic spectra of transition metal complexes;Selection rules ,break down of selection rules Orgel diagrams,T-S diagrams for d^1 - d^9 Octahedral and tetrahedral complexes.
Charge transfer spectra , Quenching of orbital momentum .

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Syllabus for the Academic Year 2013-14

Department:P.G.ORGANIC CHEMISTRY

Paper: INORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Metal cluster compounds –Definition –evidences for existence of M-M bonds conditions favourable for formation of M-M bonds
Classification of binuclear cluster compounds ,Confacial bioctahedron structures
Trinuclear cluster compounds and polynuclear cluster compounds
Polyatomic clusters –Zintl ions,chevreton phases.
Organo metalliccompounds :16 and18 electrons rules, isolobal relation ship
Iso electron relationship- synthesis structure and bonding of carbonmonoxide dinitrogen and nitricoxide complexes.
Synthesis, structure, bonding and reactions of metalosins with special reference to ferrocene.
Classification metal carbonyls.
Metal ligand equilibrium in solution: step wise and overall formation constants, factors effecting the stability metal complexes.
Pearsons theory of hard and soft acids and basis, chelate effect, determination of stability constant.
Inert and labile complexes, explanation of lability on the basis of VBT and CFT.biological and abiological nitrogen fixation.
Metallo porphyrins with special reference to haemoglobin and myoglobin, biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} .
In organic reaction mechanisms:ligand replacement reactions of metal complexes, acid hydrolysis- factors effecting acid hydrolysis.
Anation and base hydrolysis of cobalt (III)complexes, ligand displacement reactions of square planar complexes of Pt(II).
Factors effecting square planar substitutions – trans effect, complementary and non complementary reactions with examples.
Electron transfer reactions of complexes- inner and outer sphere mechanisms.

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Syllabus for the Academic Year 2013-14

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-I

Class: I M.Sc ORGANIC CHEMISTRY

Semester:I

Localised and delocalised covalent bond, concept of resonance, aromaticity, Huckle's rule.
Benzenoid and non benzenoid compounds, anto aromaticity, homo aromaticity, nature of reaction energy and kinetic considerations.
Types of organic reactions, reagents, reactive intermediates, formation and stabilization, inductive and mesomeric effects.
Stereo chemistry conformational isomerism, acyclic and simple systems, substituted ethanes.
Cyclo pentane, cyclo hexane, cyclo heptanes, cyclo octane and decalins.
Optical isomerism, optical activity, molecular dissymmetry and chirality, elements of symmetry.
Fisher's projection, D,L and R,S configurations, relative absolute configurations, optical isomerism due to asymmetric carbon atoms, bi phenyls allenes, spirans, racemisation, resolution.
Geometrical isomerism, E,Z configurations, properties.
Hetero cyclic compounds, synthesis and reactivity of pyridine, quinoline, iso quinoline.
Indole, benzo furan, benzo thiofene, pyrazole.
Imidazole, oxazole, isoxazole, thiazole, isothiazole, pyridazine, pyrimydine, pyrazine
Chemistry of some typical natural products, isolation, structure, elucidation, synthesis and bio genesis of the following compounds,flavonoids.
Quercetin, cyanidin, genestein, terpenoids.
Alpha terpeneol, alpha pinene, camphor, farnesol.

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Syllabus for the Academic Year 2013-14

Department :P.G.ORGANIC CHEMISTSRY

Paper :ORGANIC CHEMISTRY-II

Class: I M.Sc ORGANIC CHEMISTRY

Semester:II

Aromatic substitution reactions, electrophilic, nucleophilic and through benzyne, radical substitution of arenes.
Orientation of nucleophilic substitution at saturated carbon, SN1, SN2.
SNi reactions, effect of structure, nucleophile, leaving group, solvent, addition, involving, electrophiles, nucleophiles and free radicals.
Elimination reactions, E1, E1CB, E2 reactions, elimination versus substitutions reactions.
Mechanism of some named reactions, Aldol, Perkin, Benzoin, Cannizzaro reactions
Wittig, Grignard, Reformatsky, Meerwein, Hoffmann, Claisen rearrangements.
Favorsky rearrangement, hydroboration, openauer oxidation, clemmensen reduction, meerwein-pondorf and verley, birch reduction, stork enamine reactions.
Michael addition, mannich reaction, Diel's -Alder reaction, Ene reaction, Bayer- Villiger reaction,
Spectra and structure, application of organic spectroscopy, UV Spectroscopy.
IR spectroscopy, basic principles and importance.
PMR spectroscopy, basic principles and importance.
Mass spectroscopy, basic principle and importance.
Isolation, structure, elucidation and synthesis of alkaloids, atropine, nicotine, quinine.
Purines, caffeine, configuration.
Ring structure and explanation of glucose.
Ring structure and explanation of fructose, anomeric effects.

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Syllabus for the Academic Year 2013-14

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-I

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:I

Thermodynamics:concepts of partial molar properties, graphical methods, intercept method and apparent molar volume method.
Chemical potential with T&P Gibbs Duhem equation phase rule from the concept of chemical potential, thermodynamic properties of ideal solutions.
Raoult's law, Henry's law, non ideal systems, concept of fugacity, non ideal solutions, activities and activity coefficients.
Determination activity coefficient from vapour pressure measurement, chemical equilibrium, effect temp on equilibrium constant, Vant hoff equation.
Micelles and macro molecules: classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration.
Factors affecting CMC, thermodynamics of micellization, phase separation and mass action models, solubilization, micro emulsions, reverse micelles.
Polymers, types of polymers, electrically conducting polymers, liquid crystal polymers, kinetics of free radical polymerization, molecular mass number and mass average molecular weight.
Weight determination - end group analysis, osmometry, viscometry, light scattering methods.
Chemical kinetics, collision theory, transition state theory Debye Huckel theory, salt effects.
Hammett equation, Taft equation, consecutive reactions, parallel reactions, opposing reactions.
Acid-base catalysis, Arrhenius diagram, fast reactions flow methods.
Photochemistry: Franck-Condon principle, excited molecules, singlet and triplet states, spin orbit interactions, actinometry, ferrioxalate and uranyl oxalate actinometers – problems.
Derivation of fluorescence and phosphorescence, quantum yields, quenching effect, Stern-Volmer equation.
Primary process, types of photochemical reactions, photodissociation, additional isomerisation reactions with examples.

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Syllabus for the Academic Year 2013-14

Department:P.G.ORGANIC CHEMISTRY

Paper: PHYSICAL CHEMISTRY-II

Class: I M.Sc. ORGANIC CHEMISTRY

Semester:II

NMR-Principle and Theory Introduction.
Nature of spinning particle and its interaction with magnetic field.Chemical shift&origin spin-spin interaction,Application of NMR to structural elucidation.
Electron spin resonance-principle and experimental technique –g-factor,Line shapes&Line widths hyperfine interactions.
Applications of ESR studies.dimethylformamide,styrene.
Brief review on Entropy changes accompanying specific process-expansion,phase transition,heating measurement of Entropy.
Nernst heat theorem,Third law of thermodynamics-Determination absolute
Types of ensembles,thermodynamic probability,most probable distribution law –partition function,molar&molecular partitions.
Rotational,translational,vibrational&electronic partition function –relation between thermodynamic function (E,H,S,G&Cv)and the partition functions.
Electrochemistry-Electrochemical cell –Galvanic&Electrolytical cell.Concentration cell with&without transference,effect of complexation on redox potential.
Ferricyanide\ferrocyanide couple,Iron(III) .free radicals,metal complexes and biological systems. phenanthroline/Iron(II) phenanthroline couple.
Determination of standard potential,solubility product equilibrium constant&activity coefficients from EMF data.
Bjerrum theory of ion association concept of activity and activity coefficients in electrolytic solutions.
The mean ionic activity coefficient,Debye-Huckel theory of electrolytic solutions,Limiting law.
Calculation of mean ionic activity coefficient,limitations -
Effect of dilution on equivalent conductance of electrolytes,anomalous behavior of strong electrolyte.Debye-Huckel Onsagar equation-verification and limitations,fuel cell.
Electrochemistry-II the electrode-electrolyte interface.primary and secondary cells,batteries examples.
The electric double layer.The Helmholtz-Perrin parallel-plate model,The Gouy-chapman diffuse-charge model&the stern

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Syllabus for the Academic Year 2013-14

Department: P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism & Pericyclic reactions

Class: II M.Sc Organic chemistry

Semester: III

Aliphatic nucleophilic substitution mech. Nucleophilic substitution: substitutions of reaction of ambident nucleophiles, NGP of O, S, N, halogens, aryl groups, alkyl and cyclo alkyl groups, in nucleophilic substitutions reactions.
Sigma, pi bond participation in acyclic by cyclic systems, substitution at allylic, trigonal and vinylic carbons, hydrolysis of esters.
Meyers aldehydes, ketones, and carboxylic acids, alkylation with trialkyl boranes. Aliphatic electrophilic substitutions: SE1, SE2, SEi Mechanisms, hydrogen exchange.
Migration of double bonds, halogenations aldehydes, ketones, acids, acyl halides, sulphoxides and sulphones, aliphatic diazonium coupling.
Nitrosation at carbon and nitrogen di azo transfer reaction and carbene and nitrene insertion, formation sulphur yield, metalation with organo metallic compounds and with metal.
Decarboxylation of aliphatic acids. Haloform reaction and haller-bauer reaction Aromatic nucleophilic substitution: a general introduction to different mechanisms of aromatic substitutions SN Ar, AN.
Aryne von richter rearrangement, sommler hauser rearrangement, smiles rearrangement, radical substitution mechanisms: reaction at sp ³ carbon: reactivity in aliphatic substrates.
Reactivity at bridged positions, reactivity at sp ² carbon. Reactivity in aromatic substrates, neighbouring group assistance in free radical reactions.
Effect of reactivity in attacking radical, effect of solvent and reactivity, halogenation at an alkyl carbon and allylic carbon, hydroxylation at aromatic carbon by means of fentons reagent
Oxidation of aldehydes to carboxylic acids, formation of cyclic ethers with Pb(OAc) ₄ reed reaction, sandmeyer reaction, Kolbe reaction and hunsdiecker reaction.
Molecular orbital symmetry, frontier orbitals of ethylene 1,3 buta diene, 1,3,5 hexatriene allyl systems.
Classification of pericyclic reactions, FMO approach, wood ward Hoffman Correlation diagram method.
Perturbation of molecular (PMO) approach the explanation of pericyclic reaction under thermal and photo chemical conditions.
Electrocyclic reactions, con rotatory and disrotatory motions, 4n and (4n+2) allyl systems and secondary effects.
Cycloadditions, antarafacial and suprafacial additions notation cyclo additions 4n and (4n+2) systems with a greater emphasis on (2+2) and (4+4)cyclo additions, (2+2) additions of ketones, chelotropic reactions.
FMO, PMO, wood ward – Hoffman correlation diagram method for sigmatropic rearrangements under thermal and photochemical conditions, retention and inversion of configuration.
(3,3) and (5,5) detailed treatment of claisen and cope rearrangement.
Fluxional tautomerism, aza-cope rearrangement and Barton reaction.

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Syllabus for the Academic Year 2013-14

Department: P.G.ORGANIC CHEMISTRY

Paper: Organic reaction mechanism –II&Organic Photo chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Addition elimination mechanisms:a)addition to carbon multiple bonds-addition reactions involving electrophiles, nucleophiles, &free radicals,cyclic mechanisms,orientations.
Stereochemistry,hydrogenation of double &triple bonds,hydroboration,birch reduction.michael reaction,addition of oxygen& N,.04
(b)addition to carbon-hetero atom multiple bonds:mannich reaction AH reduction of carbonyl compounds, acids,esters, nitriles,addition of Grignard reagents,reformatsky reaction.
Tollens reaction, wittig, prins reaction.(c)elimination reactions:stereochemistry of eliminations in acyclic &cyclic systems,orientation in elimination in elimination-saytzeff & Hoffman elimination propolitic elimination
Rearrangements:classification&general mechanistic treatment of nucleophilic,free radical .
electrophilic rearrangements Wagner-meerwein and related reactions,
Tiffenue demjanov rearrangement,a- ketone rearrangement,
Neber,hofmann,bayer-villiger ,stevens ,wittig rearrangement
Photo chemistry: photo chemical energy, electronic transitions, laws of photo chemistry.
Jablonski diagram,Franck condon principle,quenching.

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Syllabus for the Academic Year 2013-14

Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-I

Class:II MSC ORGANICCHEMISTRY

Semester:III

IR spectroscopy, units of frequency, wavelength, wave number, molecular vibrations. Factors influencing vibrational frequencies, IR spectrometer
Sampling techniques, characteristic frequencies of organic molecules.
Interpretation of spectra, problems.
Interpretation of spectra, problems.
UV spectroscopy, introduction, absorption laws, measurements of spectrum.
Chromophores, standard works of reference, definitions.
Applications of UV spectroscopy to conjugated dienes, trienes.
Carbonyl compounds, aromatic compound, problems.
NMR spectroscopy, measurement of spectra, chemical shift, intensity of NMR signals.
Integration factors affecting, the chemical shift, spin-spin coupling to ^{13}C , ^1H - ^1H first order coupling.
Some simple ^1H - ^1H splitting patterns, magnitude of ^1H - ^1H coupling constants.
Mass spectroscopy, basic principles, instrumentation. The mass spectrometer, isotope abundances.
Molecular ion, meta stable ions, problems related to NMR. Problems related to mass spectroscopy. Separation techniques, solvent extraction
paper, thin layer and Column chromatography.. Electrophoresis.

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SPECTROSCOPY-II

Class: II MSC ORGANIC

CHEMISTRY

Semester:IV

Optical rotatory dispersion and circular dichroism, phenomena of ORD and CD.
Classifications of ORD and CD curves, cotton effect curves and their applications.
The octant rule and its applications to alicyclic ketones.
Improving the NMR spectrum, mean, pulse experiment.
New techniques in FT-NMR spectroscopy, the separation of chemical shift and coupling on to different axes.
Spin de coupling, nuclear over Hauser effect.
The signals from directly bonded ^{13}C and ^1H .
ESR derivative curves, values and hyperfine splitting.
Fragmentation processes, fragmentation associated with functional groups
Rearrangements and mass spectra of some chemical classes, problems.
Structural elucidation of organic compounds by a combined application of the special methods of units.
Spectral problems.
Separation techniques GC, HPLC.
Instrumentations of GC and HPLC, applications.
X-Ray diffraction.

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class: II MSC ORGANIC CHEMISTRY

Semester:III

Formation of carbon-carbon single bond; alkylation via enolate the enamine and related reactions.
Umplong(dipole inversion)-the aldol reaction
Applications of organo palladium compounds.
Organo nickel and organo copper reagents
cations of thiocarbonions-selenocarbonins and sulphur yields. Synthetic applications of carbenes and carbenoids
. Formation of carbon-carbon double bonds; elimination reactions pyrolytic,syn eleminations.
Formation of carbon-carbon double bonds; elimination reactions pyrolytic,syn eleminations. Sulphoxide-sulphonate rearrangement the wittig reaction-alkenes
Arylsulphonyl-hydrazones-claisen rearrangement of allyl vinyl ethers.
Methods of polymerization (a) Addition polymerisation Reactions of unactivated carbon-hydrogen bonds; The HLF Reaction. (b) condensation polymerization(c)Radical polymerization(two examples of each method)
Reactions of unactivated carbon-hydrogen bonds; The HLF Reaction The barton reaction and synthetic applications
Photolysis of organo hypothalites.synthetic applications of organo boranes and organo silanes.
Organoboranes;preparation of organo boranes viz hydroboration with BH ₃ -THF, dicyclohexyl borane, dismyl borane,thexyl borane.9BBN and disopincomplyel borane,
Functional group transformations of organo boranes –oxidation,protonolysis and rearrangements.
Formation of carbon-bonds viz organo boranes carbonylation
The Formation of carbon-bonds viz organo boranes carbonylation, The cyanoborate process and reactions of alkenyl boranes and trialkenyl borates

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Department :P.G.ORGANIC CHEMISTRY

Paper :ORGANIC SYNTHESIS

Class: II MSC ORGANIC CHEMISTRY

Semester:IV

Organo silanes; synthetic applications of trimethylsilyl chloride.
Dimethyl-butylsilyl chloride,trimethylcyanide.
Trimethylsilyl iodide and trimethylsilyl triflate.
Synthetic applications of-silyl carbanion and b-silyl carbonium ions.
Phase transfer catalysis-principle and applications.
Oxidation ; oxidations of hydrocarbons,alkenes, alcohols aldehydes and ketones.
Oxidative coupling reactions, use of Pb(OAC) ₄ ,NBs,CRO ₃ .
SeO ₂ ,MnO ₂ , Dealkoxylsulphonium yields, KMnO ₄ ,OSO ₄ .
Peracids and Ti(III)nitrate.
Catalytic hydrogenation (homogeneous and heterogeneous).
Reduction by dissolving metals,reduction by hydride transfer reagents.
Reduction with hydrazine and diamide.
Selectivity in reduction of nitroso and nitro compounds,reductive cleavage.
Retrosynthesis the disconnection approach-basic principles.
Convergent synthesis.
Linear synthesis.

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Department: P.G.ORGANIC CHEMISTRY

Paper: Natural products & Biopolymers

Class: II M.Sc Organic chemistry

Semester: III

Introduction of antibiotics, classification of penicillins biological properties, biosynthesis Structure elucidation
synthesis of penicillins semi synthetic penicillins Structure of cephalosporin-C
synthesis of cephalosporin-C, Biological properties, biosynthesis Biological properties, biosynthesis Conversions
structure elucidation of streptomycin synthesis Biological properties, biosynthesis, Introduction of terpenoids, isolation
Structure elucidation of Taxol, Synthesis of Taxol,
biosynthesis, biological properties, structure elucidation of forskolin
Synthesis of forskolin, biological properties, biosynthesis, structural elucidation of Azadirachtin
Introduction of alkaloids, classification, isolation structural elucidation of reserpine
Synthesis of forskolin, biological properties, biosynthesis, structural elucidation of Azadirachtin Synthesis of reserpine
biological properties, biosynthesis, aminoacids Synthesis of aminoacids
physical & chemical properties of amino acids, Protecting groups,
synthesis of peptides, Merrifield solid phase synthesis
Structural elucidation of morphine, synthesis
synthesis of morphine, Biological properties, biosynthesis of vincristine

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Syllabus for the Academic Year 2013-14

Department:P.G. ORGANIC CHEMISTRY

Paper: Bio-organic chemistry

Class: II M.Sc Organic chemistry

Semester: IV

Nucleic acids introduction & introduction of nucleotides, nucleosides
DNA, RNA explanation, differences
Steroids introduction, structure determination of cholesterol
Synthesis, biosynthesis ,properties, reactions of cholesterol
Structure determination of progesterone, synthesis of progesterone from ergosterol, stigmasterol, cholesterol
Biosynthesis of progesterone, structural elucidation of Beta-amyrin & synthesis ,biosynthesis of Beta-amyrin
Biological properties of amyirin. Structural elucidation of strychnine
Synthesis of strychnine Biosynthesis, biological properties of strychnine
Structural elucidation,synthesis,biosynthesis,biological properties of colchicine
Structural elucidation, synthesis, biosynthesis, biological properties of camptothecin.
Prostaglandins: introduction, classification, structural elucidation
Synthesis, biosynthesis, biological properties of prostaglandins
Podophyllotoxin : structure determination, synthesis, biosynthesis & biological properties
Rotenone : structure determination, synthesis, biosynthesis & their biological properties
Etoposide : structure determination, synthesis, biosynthesis & biological properties