ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,I SEMESTER

CH 101 (4)GENERAL CHEMISTRY -I Time:4Hrs/Week

Max.Marks:100

PAPER 1: QUANTUM CHEMISTRY- I AND MOLECULAR SPECTROSCOPY- I

OBJECTIVES:

The course enables 1) deriving Schrodinger wave equation with higher ordermathematics in quantum chemistry and to calculate lowest energies in 1 and 3 dimensions. 2) To determine vibrational and rotational modes of molecules at appropriate frequencies

COURSE OUTCOMES:

- Able to describe and interpret microscopic systems of various molecules

accurately with selection rules

- Able to deduce the concept of electronic structure and molecular dynamics using Schrodinger wave equation.
- Able to calculate the zero-point energies of 1dim, 3dim, harmonic oscillators.
- Able to determine bonding in molecules such as double bond, triple bond and back bonding.
- Able to predict the structure,nature of bonding and electronic transitions in molecules. able to apply selection rules for various organic and inorganic molecules.

SYLLABUS

UNITI-I

Wave equation-interpretation of wave function-properties of wave function-normalization and orthogonalization, Operators-linear and non-linear-commutators of operators. Postulates of quantum mechanics, Setting up of operator'sobservables-Hermitian operator-Eigen values of Hermitian operator.

UNIT-II

Wave mechanics of simple systems with constant potential energy, particle in one dimensional box-factors influencing color-transition-dipole integral, Symmetry arguments in deriving the selection rules – the concept of tunneling-particle in a three dimensional box. Rigid rotor, Wave mechanics of systems with variable potential energysimple harmonic oscillator-solution of wave equation-selection rules

MOLECULARSPECTROSCOPY'

UNIT-III

Rotation spectra of di atomic molecules-rigid rotor-selection rules-calculation of bond length isotopic effect, Second order Stark effect and its application: infrared spectra of di atomic molecules- harmonic and anharmonic oscillators-Selection rules over tones-combination bands-Calculation of force constant, an harmonicity constant and zero-point energy. Fermi resonance, Simultaneous vibration-rotation spectra of di atomic molecules

UNIT- IV

Raman effect- Classical and Quantum mechanical explanations-Rotational Raman and Vibrational Raman spectra, Electronic spectra of diatomic molecules-Vibrational coarse structure-intensity of spectral lines- Franck Condon principle-applications. Rotational fine structure – band head and band shading, Charge transfer spectra.

REFERENCES

1.Introductory quantum chemistry by A. K. Chandra ,McGraw Hill Education; *4th edition* (1 July2017)

2.Quantum chemistry by Eyring, Walter and Kimball, Published Andesite Press (2015).

3.Quantum chemistry by Donald A.Mc Quarrie, Published by University Science Books,U.S

4.Theoretical inorganic chemistry by Day and Selbin, published by Van Nostrand Reinhold Inc.,U.S (1969).

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
I M.ScORGANIC CHEMISTRY,I SEMESTER
CH 102 (4)INORGANIC CHEMISTRY -I Time:4Hrs/Week
Max.Marks:100

OBJECTIVES:

To enable students to gain insights on selected advanced theories and concepts of inorganic chemistry and apply the knowledge to predict the structure, stability, magnetic susceptibility & spectral properties of transition and inner transition metal complexes.

COURSEOUTCOMES:

- Apply VSEPR, Valence Bond and Molecular Orbital theories to deduce the structure and bonding in heteroatomic molecules.
- Construct MO diagrams, calculate bond order and correlate with stability and magnetic properties of complex compounds
- Prepare, establish the structure and explain the properties of car boranes, metallocarboranes, boron-nitrogen, phosphorous-nitrogen and Sulphur-nitrogen compounds.
- Deduce the term symbols and identify the spectroscopic ground states for various configurations
- Correlate and explain the spectral and magnetic properties of transition and inner transition metal complexes based on advanced theories on complex compound.

SYLLABUS

UNIT-1

Structure & Bonding: Applications of VSEPR, Valence Bond and Molecular orbital theories in explaining the structures of simple molecules- role of p and d orbitals in pi bonding.

Application of MO theory to square planar ($PtCl_4^{2-}$) and Octahedral complexes (CoF_6^{3-}, $Co(NH_3)_6^{3+}$).

Walsh diagram for H_2O molecule.

UNIT-II

Inorganic cage and ring compounds – preparation, structure and reactions of boranes, carboranes, metallocarboranes, boron–nitrogen ($H_3B_3N_3H_3$), phosphorus–nitrogen ($N_3P_3Cl_6$) and sulphur-nitrogen (S_4N_4, $(SN)_x$) cyclic compounds.

Electron counting in boranes – Wades rules (Polyhedral skeletal electron pair theory).

Isopoly and heteropoly acids.

UNIT-III

Coordination compounds: Crystal field theory - crystal field splitting patterns in octahedral, tetrahedral, tetragonal, square planar, square pyramidal and trigonal bipyramidal geometries. Calculation of crystal field stabilization energies. 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.

UNIT- IV

Electronic spectra of transition metal complexes: Selection rules, break down of selection rules – Orgel and Tanabe-Sugano diagrams for d^1 –d^9 octahedral and tetrahedral

transition metal complexes of 3d series – Calculation of Dq, B and β parameters. Charge transfer spectra.

Magnetic properties of transition and inner transition metal complexes – spin and orbital moments – quenching of orbital momentum by crystal fields in complexes.

Text books:

1. Advanced Inorganic Chemistry by F.A. Cotton and G. Wilkinson, IV Edition, John Wiley and Sons, New York, 1980.
2. Inorganic Chemistry by J.E. Huheey, III Edition, Harper International Edition, 1983.
3. Theoretical Inorganic Chemistry, II Edition by M.C. Day and J. Selbin, Affiliated East-West press Pvt. Ltd., New Delhi.
4. Inorganic Chemistry by Shriver and Atkins, Oxford University Press (1999)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
I M.ScORGANIC CHEMISTRY,I SEMESTER
CH 105 (3)INORGANIC CHEMISTRYPRACTICAL-ITime:6Hrs/Week
Max.Marks:100

OBJECTIVES:

To train students in higher order 'analysis' and 'synthesis' skills and facilitate their development as skilful professionals in inorganic qualitative analysis and synthesis.

COURSEOUTCOMES:

- Analyse & identify the ions in six radical mixtures at semi micro level Eliminate the interfering anion also establish the presence of less familiar cations
- Synthesise complex compounds and double salts with agility
- Optimally use the consumable and non-consumable laboratory resources without wastage.
- Complywith scientific regulations involved in safe handling and disposal of chemicals.

SYLLABUS

I. Inorganic Synthesis: Preparationof

- Tetraamminecopper (II)sulphate
- Potassium tris-oxalato ferrate (III)trihydrate
- Tris-thiourea copper(I)sulphate

II. Semimicro qualitative analysis of six radicalmixtures

(One interfering anion and one less familiar cation for each mixture)

Anions: CO_3^{2-},S^{2-}, SO_3^{2-},Cl^- Br^-, I^-,NO_3^-,SO_4^{2-}, CH_3COO^- $C_2O_4^{2-}$, $C_4H_4O_6^{2-}$, PO_4^{3-}, CrO_4^{2-}, AsO_4^{3-}, F^-, BO_3^{3-}

Cations: Ammonium(NH_4^+)

1^{st} group: Hg, Ag, Pb, Tl, W

2^{nd} group: Hg, Pb, Bi, Cu, Cd, As, Sb, Sn,

Mo 3^{rd} group: Fe, Al, Cr, Ce, Th, Ti, Zr, V,

U, Be 4^{th} group: Zn, Mn, Co,Ni

5^{th} group: Ca, Ba,

Sr 6^{th} group: Mg,

K, Li

Text book:

1. A textbook of qualitative inorganic analysis by A.I. Vogel, new edition , long man.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,I SEMESTER

CH 103 A (4)ORGANIC CHEMISTRY -I Time:4Hrs/Week

w.e.f.19-20 admitted batch syllabus Max.Marks:100

OBJECTIVES:

The course aims to correlate the nucleophilic, electrophilic substitution reactivity and stereochemistry of aliphatic molecules and structural and synthetic aspects of heterocyclic molecules and some natural products

COURSEOUTCOMES:

Able to

- Inspect aliphatic electrophilic substitution reactions in molecules with different functional nature
- Explore the configurations of conformational, optical and geometrical isomers making use of projection formulae
- Investigate the structure, aromatic nature, chemical activity of heterocyclic compounds
- Derive the structure of some natural products basing on their chemical reactivity

SYLLABUS

UNIT - I

Aliphatic Nucleophilic Substitutions: The SN_2, SN_1, SN_i and SET mechanisms. Substitution reactions of ambident nucleophiles, anchimeric assistance, the neighbouring group mechanism: neighbouring group participation by O, N, S, halogens, aryl groups, alkyl and cycloalkyl groups in nucleophilic substitution reactions. Sigma, Pi bond participation in acylic and bicyclic systems (Non- classic carbocations). Nucleophilic Substitution at allylic, trigonal and Vinylic carbons. Effect of substrate, attacking nucleophile, leaving group and reaction medium.

Aliphatic Electrophilic Substitutions: SE_1 SE_2 and SE_i mechanisms. Reactivity-effects of substrate, leaving group and solvent. Reactions- hydrogen exchange, migration of double bonds, halogenation of aldehydes, ketones, carboxylic acids, acyl halides, sulphoxides and sulphones.

UNIT-II

Stereochemistry and conformational analysis:

Optical Isomerism: optical activity, molecular dissymmetry and chirality - elements of symmetry. Fisher's projection D,L. and R,S. configurations - relative and absolute configurations optical isomerism due to asymmetric carbon atoms - optical isomerism in biphenyls, allenes and spirans- optical isomerism of nitrogenous compounds, racemisation and resolution

Geometrical isomerism: E, Z -configurations, properties of geometrical isomers.

Conformational analysis: Conformations of acyclic molecules –alkanes and substituted alkanes compounds having intramolecular hydrogen bonding.

Conformations of cyclohexane, mono and disubstituted cyclohexane's and decalins, effect of conformations on reactivity.

UNIT-III

Chemistry of heterocyclic compounds:-

Structure, reactivity and synthesis of reduced three membered Heterocycles: (a) Oxirane: Sharpless method, Shi epoxidation, Jacobsen epoxidation, etc, (b) Aziridine; four membered Heterocycles: (b) Oxetane (b) Azetine; five membered Heterocycles: (a) Pyrrole: Paal Knorr, Hantzsch Methods, etc, (b) Thiophene: Paal Knorr, Hinsberg method, etc. (c) Furan: Paal Knorr, Fiest-Benary, Industrial Method, etc.; (d) Pyrazole, Imidazole, Oxazole, Thiazole; Six membered Heterocycles: (a) Pyridine, Pyridazine, pyrimidine and Pyrazine; Aromatic heterocyclics: a) Indole: Fischer indole synthesis, Bischler synthesis, Madelung synthesis, Domino and cascade methods of indole synthesis, (b) Quinoline and Isoquinoline, (c) Coumarins and Chromones

UNIT-IV

Chemistry of Natural Products

A. **Terpenoids: -** Occurrence, Isolation, isoprene rule, structure elucidation and synthesis ofα- Terpineol and α- pinene
B. **Steroids:-**Nomenclature of steroids,structure elucidation and synthesis and stereochemistry of cholesterol and progesterone
C. **Lipids:-** Classification, chemistry, properties and function-free fatty acids, triglycerides, phospholipids, glycolipids & waxes conjugated lipids-lipoproteins

Reference Books

1. Advanced Organic Chemistry: Reactions Mechani;sms and Structure by Jerry March, Mc.Graw Hill and Kogakush.
2. Organic Chemistry Vol. I (Sixth Ed.) and Vol. II (Fifth Ed.) by I L Finar ELBS by pearson Education (2002) .
3. Organic Chemistry (6 th Ed.,) by Morrison and Boyd, PHI, India (2018).
4. Organic Chemistry (fifth edition) by Francis A. Carey Tata Mc Graw Hill publishing Company Limited, New Delhi (2007).
5. Stereochemistry of Organic compounds by Ernest L. Eliel, Samuel H. Wilen,ohn Wiley & Sons Inc (Sea) Pte Ltd (2008).
6. Chemistry of natural products by S. V. Bhat, B. A. Nagasampangi and M. Sivakumar Narosa Publishing House, 6th reprint 2010.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,I SEMESTER

CH 105 A (3)ORGANIC CHEMISTRY PRACTICAL–I

Preparation of some organic compoundsTime:6Hrs/Week

w.e.f.19-20 admitted batch syllabus **Max.Marks:100**

OBJECTIVES:

To be able to synthesize organic compounds adopting techniques like Acetylation, Benzoylation, Nitration, Methylation, Condensation, Bromination , Deamination by upgrading the practical skills of students like handling of equipment and applying classical laboratory techniques

COURSEOUTCOMES:

- Acquire hands on experience on for the handling of Equipment, Glassware , Chemicals and safety measurements
- Develop the skills like preparation of solutions, crystallization techniques, checking the purity of compounds and collection of pure samples
- Correlate theoretical knowledge in the various steps of compound preparation
- Adopt the Techniques like Acetylation, Benzoylation, Nitration, Methylation, Condensation, Bromination, Deamination in the Preparation of Organic compounds
- Adopt the principles like Beckman's Rearrangement and Hoffmann's Rearrangement for preparation of Organic Compounds

SYLLABUS

synthesis of

1. Aspirin
2. Benzoic acid
3. P-nitroaniline from aniline
4. Methyl, 2-naphthyl ether
5. Anthranilic acid
6. 2,4-dinitro phenyl hydrazine,
7. Sym- Tribromo benzene
8. Benzanilide.

* Any six compounds to be prepared

Books Suggested :

1. A text book of practial Organic chemistry by A.I. Vogel, 5 th edition, published by prentic hall.
2. Practical Organic chemistry by Mann and Saunders, 4th edition,Pearson Education India (2009).
3. Laboratory Manual of Organic Chemistry by Raj K Bansal,5 th revised edition,published by New Age International Private Limite (2008).

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
I M.ScORGANIC CHEMISTRY,I SEMESTER
CH 104 (4)PHYSICAL CHEMISTRY -I Time:4Hrs/Week
Max.Marks:100

OBJECTIVES:

To provide insights to various principles and laws of physical chemistry, utility of specific nature of catalysts in reactions and to predict rate and equilibrium constants

COURSEOUTCOMES

- Able to derive 3rd law of thermodynamics based on Nernst heat theorem and study its implications
- Able to calculate rate constant, use of catalyst in a reaction to enhance rate and to identify the intermediate.
- Explains the electronic transitions by using Frank-Condon principle and to compare photophysical and photochemical process.
- Able to establish small scale industries (entrepreneurship) by the study of micelles.
- Can relate the feasibility and energy changes in chemical reactions.

Syllabus

UNIT-I:

Thermodynamics: Chemical equilibrium- effect of temperature on equilibrium constant- Van't Hoff equation. Partial molar quantity- different methods of determination of partial molar quantity. Chemical potential- Phase rule and its derivation, Gibbs-Duhem equation, Duhem-Margules equation, Classius-Clapeyron equation. Nernst heat theorem. Third law of thermodynamics- Determination of the absolute entropy- Apparent exceptions to Third law of thermodynamics.

UNIT-II:

Micelles and Macromolecules: Surface active agents, classification of surface active agents, micellization, hydrophobic interaction, critical micelllar concentration (CMC), factors affecting the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization- phase separation and mass action models, solubilization, micro emulsion, reverse micelles.

Polymers- Definition, types of polymers, electrically conducting, fire resistant, liquid crystal polymers, kinetics of polymerization. Molecular mass- Number and mass average molecular mass, molecular mass determination- Osmometry, viscometry, diffusion and light scattering methods. Sedimentation, chain configuration of macromolecules, calculation of average dimensions of various structures.

UNIT-III:

Chemical Kinetics: Theories of reaction rates- Collision theory- Limitations, Transition state theory. Effect of ionic strength- Debye Huckel theory-Primary and secondary salt effects. Effect of dielectric constant, effect of substituent, Hamett equation -limitations- Taft equation. Consecutive reactions, parallel reactions, opposing reactions (Uni molecular steps only, no derivation). Specific and general acid-base catalysis. Skrabal diagram. Fast

reactions- different methods of studying fast reactions- flow methods, relaxation methods- temperature jump and pressure jump methods.

UNIT-IV:

Photochemistry: Electronic transitions in molecules, Franck-Condon principle. Electronically excited molecules- singlet and triplet states, spin-orbit interaction. Quantum yield and its determination. Actinometry. Derivation of fluorescence and phosphorescence quantum yields. Quenching effect- Stern Volmer equation. Photochemical equilibrium and delayed fluorescence- E type and P type. Photochemical primary processes, types of photochemical reactions-photodissocoation, addition and isomerization reactions with examples.

Text Books:

1. Physical Chemistry by Peter Atkins and Julio de Paula,11 th edition, Oxford University Press (2018).

2. Physical Chemistry by G.W. Castellon, Narosha Publishing House.

3. Physical chemistry by K.L. Kapoor,5^{th} edition, vol 3,McGraw-Hill(2020).

Reference Books:

1. Thermodynamics for Chemists, Samuel Glasstone, published by Ewp (2008).

2. Chemical Kinetics by K.J.Laidler, 3 rd edition, Pearson Education India (2003).

3. Photochemistry, R.P. Kundall and A. Gilbert, Thomson Nelson .

4. Introduction to Polymer Science, V.R. Gowriker, N.V.Viswanadhan and J. Sreedhar., Wiley Easter.

5.Micelles, Theoretical and applied aspects, V.Moroi, Plenum publishers

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
I M.ScORGANIC CHEMISTRY,I SEMESTER
CH 107(3)PHYSICAL CHEMISTRY PRACTICAL -ITime:6Hrs/Week
Max.Marks:100

OBJECTIVES:

To train students to perform quantitative analysisof both classical and instrumental determinations , to impart knowledge and required skills inorder to enhance placementopportunities in various fields of chemistry.

COURSEOUTCOMES:

- Optimal utility of consumable laboratory resources
- Deduce the metal-ligand ratio of the complex using partition co-efficient principle.
- Interpret the data from experiment, including constructions of appropriate graph and evaluating the error.
- Evaluate the C.S.T of phenol-water system to analyse the concept of miscible and immiscible and evaluate the unknown concentration by calibration.
- Deducing the equivalent point of the unknown sample to determine the concentration conductometer.

SYLLABUS

1. Critical Solution Temperature of partially miscible liquids phenol-water
System.
2. Effect of electrolyte (NaCl) on miscibility temperature.
3. Determination of cell constant.
4. Determination of Pk, value of acetic acid by conductometric method.
5. Conductometric titration of strong acid with strong base (HCL vs NaOH)
6. Conductometric titration of a weak acid strong base (HOAc vs NaOH)

Books suggested:

1. Practical Experiments in Physical Chemistry by Alexander Finallay,Franklin Classics Trade Press (2018).
2. Experiments in Chemistry by D.V. Jahagirdan, Himalaya Pub. House, 2003.
3. Physical chemistry experiments by P. Ghosh,New Central Book Agency (2

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,II SEMESTER

CH 201 (4)GENERAL CHEMISTRY -II Time:4Hrs/Week

Max.Marks:100

PAPER-I,QUANTUMCHEMISTRY-II,SYMMETRY-GROUP THEORYAND ELEMENTSOFCOMPUTERPROGRAMMING

OBJECTIVES:

The course aims 1)To investigate the time dependent and independent wave functions and to compare one and many electron systems by using various theories in chemical bonding.2) To predict the symmetry elements and character tables by symmetry operations.3) To construct flow chart and programme through Fortran to solve specific problems in chemistry

COURSEOUTCOMES:

- Able to describe the chemical bonding of molecules quantum mechanically.
- Compare one electron system and many electron system using various theories and calculating zero-point energies.
- Able to visualize the molecules in 3dim and predict the symmetry elements by performing symmetry operations.
- Able to predict point groups and to determine character table.
- Able to construct flow chart and programme for solving specific problems inchemistry

SYLLABUS

UNITI:

Hydrogenatom-solutionofR(r),(Θ)(Φ) equations-probabilitydensityinorbitals-shapesoforbitals.Perturbationtheory-timeindependentperturbation(onlyfirstorderperturbationistobedealtwith)-applicationto ground stateenergyofheliumatom-variationprinciple-applications-calculationofzero-pointenergyofharmonicoscillator-manyelectronatom-Hartee-Fockself-consistentfieldmethod(qualitativetreatment only).

UNITII:

Valencebondapproach-directed valence- hybridization- covalent bond-calculationofionicandcovalentbondcontributionsinhydrogenmolecule. Molecular orbital theory-LCAOapproximation-hydrogenmoleculeion-hydrogenmolecule(fundamentalconceptsonly)-Theelectronictransitionsinthehydrogenmolecule.

UNIT-III

MOLECULARSYMMETRYANDGROUPTHEORY::

Basicconcepts of Symmetry and Group theory- Symmetry elements, symmetry

operationsandpointgroups-Schoenfliessymbols-Classification ofmolecules intopointgroups-AxiomsofGrouptheory-GroupmultiplicationtablesforC2VandC3Vpointgroups-SimilarityTransformationand classes-Representations-reducibleandirreduciblerepresentations,Mullikensymbols,Orthogonalitytheoremanditsimplications,Charactertableanditsanatomy.

UNITIV:

ELEMENTSOFCOMPUTERPROGRAMMING:

BasiccomponentsofComputers,higher and lower level languages, MicrosoftFortran:constants,variablesandoperators,arithmeticexpressions,assignmentandreplacementstatements,InputandOutputstatements- Format free and Formatdirected1/0statements-Iw,Fw.d,Ew.d-aildGWd-fonnat specifications, conditionalandunconditionalstatements-LogicalIF,BlockIFandGoTostatements,Dostatement-syntaxand rules.

ApplicationtoChemicalProblems:FlowchartsandProgramsfor

1_StatisticalAnalysis..calculationofarithmeticmean,meandeviation,varianceandstandard deviationofreplicatemeasurements.

2. SolutionofQuadraticequation-calculationoftherootsofaquadraticequation.

3. CalculationofthepHandhydrogenionconcentrationofanaqueoussolutionofa strongacidtakingintoaccounttheauto ionizationofwater.

4. Calculationofthedegreeofdissociationofaweakacid,giventhedissociationconstant.

5. CalculationoftherootofapolynomialusingGauss-Newtonmethod-ApplicationtoVander-Waal'sequation.

6. Calculationoftherateconstantofafirstorderreactionorcalculationofmolarextinctionc oefficientusingBeer-Lambert'sLaw byLinearleast-squaresmethod.

References

1. Introductory quantum chemistry by A.K .Chandhra, McGraw Hill Education; 4th edition (1 July 2017).
2. Quantum chemistry by Eyring, Walter and Kimball, Published Andesite Press (2015).
3. Quantum chemistry by Donald A.Mc Quarrie, Published by University Science Books,U.
4. Text book of physical chemistry by Puri and Sharma,Vishal Publishing.
5. Text book of physical chemistry by Gurudeep raj, Krishna Prakashan Media, 1978.
6. Text book of physical chemistry by Samuel Glastone, ACS Publications

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
I M.ScORGANIC CHEMISTRY,II SEMESTER
CH 202 (4) INORGANIC CHEMISTRY -II Time: 4Hrs/Week
Max.Marks:100

OBJECTIVES:

To enable students to apply their knowledge in 'theories of bonding' and 'reaction kinetics' to predict and establish the 1. structure, bonding and reactivity in metal cluster and organometallic compounds & 2. stability and mechanism of reactions in complex compounds.

COURSEOUTCOMES:

- Identify the conditions favourable for the formation of M-M bonds and explain the structure and bonding in metal cluster compounds
- Apply the 16 and 18 electron rules to correlate the isoelectronic and isolobal relationship in organometallic compounds
- Differentiate between kinetic and thermodynamic stability and identify the factors affecting the stability and reactivity of complexes.
- Determine the stability of complexes by applying pH metric and spectrophotometric methods
- Correlate and explain the kinetic and mechanistic aspects of D, Id, Ia and A mechanisms for substitution reactions in octahedral and square planar metal complexes.

SYLLABUS

UNIT-I

Metal cluster compounds - definition – evidences for existence of M-M bonds - conditions favorable for formation of M-M bonds – preparation, structure and bonding of the following metal cluster compounds.

$Re_2Cl_8^{2-}$, $Mo_2Cl_8^{4-}$, $Re_2(RCOO)_4X_2$, $Mo_2(RCOO)_4(H_2O)_2$, $Cr_2(RCOO)_4(H_2O)_2$, $Cu_2(RCOO)_4$

Polyatomic clusters – Zintle ions, Chevrel phases.

UNIT-II

Organometallic compounds - 16 and 18 electron rules.

Isoelectronic relationship - Synthesis, structure, bonding and reactions of carbon monoxide, dinitrogen and nitric oxide complexes.

Isolobal relationship – H, Cl, CH_3, $Mn(CO)_5$; S, CH_2, $Fe(CO)_4$; P, CH, $Co(CO)_3$

Synthesis, structure, bonding and reactions of metallocenes with special reference to ferrocene

UNIT-III

Metal Ligand equilibria in solution:

Step wise and overall formation constants and their interaction – trends in stepwise constants – factors affecting the stability of metal complexes – Pearson's theory of hard and soft acids and bases (HSAB), chelate effect and its thermodynamic origin, determination of stability constants of complexes – spectrophotometric method and pH –metric method.

Reactivity of metal complexes – inert and labile complexes. Explanation of lability on the basis of valence bond and crystal field theories.

UNIT- IV

Inorganic Reaction Mechanisms:

Substitution reactions of metal complexes – D, Id, Ia and A mechanisms – Ligand replacement reactions of metal complexes – Acid hydrolysis – factors affecting acid hydrolysis – Anation and Base hydrolysis of Cobalt(III) complexes. Ligand displacement reactions of square planar complexes of platinum (II). Factors affecting square planar substitution – trans effect (theories).

Electron transfer reactions of complexes – concept of complementary and non-complementary reactions with examples. Inner and outer sphere mechanisms.

Text books:

1. Advanced Inorganic Chemistry by F.A. Cotton and R.G. Wilkinson, IV Edition, John, John Wiley and Sons, New York,1980.
2. Inorganic Chemistry by J.E. Huheey, III edition, Harper International Edition,1983.
3. Organometallic Chemistry-A unified approach by A. Singh and R.C. Mehrotra, Wiley EasternLtd.
4. Inorganic Chemistry by Shriver and Atkins, Oxford University Press(1999)
5. Theoretical Inorganic Chemistry, II Edition by M.C. Day and J. Selbin, Affiliated East-West press Pvt. Ltd., NewDelhi.
6. Mechanisims of Inorganic reactions in solution by D.Benson, MCgraw Hill, London, 1968.
7. Inorganic chemistry by K.F. Purcell and J.C.Kotz, W.B. Saunders company, New York,1977

.**ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM**

I M.ScORGANIC CHEMISTRY,II SEMESTER

CH 205(3)INORGANIC CHEMISTRY PRACTICAL-II Time:6Hrs/Week

Max.Marks:100

OBJECTIVES:

To train students in higher order 'analytical skills' involving quantitative estimations involving volumetric and gravimetric methods.

COURSEOUTCOMES:

- Perform photochemical reductions after evaluating the feasibility
- Determine the concentrations and estimate the quantities via acid-base, red-ox, complexometric and precipitation titrations.
- Identify and deploy the most appropriate experimental conditions and indicators
- Perform quantitative determinations through gravimetric methods with accuracy and precision
- Complywith scientific regulations involved in safe handling and disposal of chemicals.

SYLLUBUS

III Quantitativ analysis:

a) **Volumetric :** i) Determination of Ferric iron by photochemicalreduction

ii) Determination of Nickel byEDTA

iii) Determination of Calcium and Magnesium in a mixture by EDTA

iv) Determination of Ferrocyanide by Cericsulphate

v) Determination of Copper(II) in presence ofiron(III)

b) **Gravimetric:** i) Determination of Zinc as Zincpyrophosphate

ii). Determination of Nickel from a mixture of Copper and Nickel

1. A textbook of quantitative inorganic analysis by A.I. Vogel, new edition , long man.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,II SEMESTER

CH 203A (4)ORGANIC CHEMISTRY – IITime:4Hrs/Week

w.e.f.19-20 admitted batch syllabus Max.Marks:100

OBJECTIVE:

1. To correlate aromatic nature of benzenoid and non-benzenoid molecules and ions, aromatic nucleophilic reactivity, structure and stability of reaction intermediates and mechanistic aspects of some name and rearrangement reactions

2. To derive structure of organic molecules and some natural products basing on their chemical reactivity, configurational and spectral studies

COURSEOUTCOMES:

- To examine aromaticity of aromatic and non, homo, pseudo aromatic compounds of benzenoid and non-benzenoid nature.
- Identify and predict the mechanism of some name reactions and rearrangements involving electron deficient carbon, nitrogen and oxygen
- Select the appropriate reagents to bring required reactions in substrate molecules
- Employ spectral data (UV, IR, NMR & Mass) to verify functional nature of molecules and derive the structure
- To inspect structural and synthetic studies of some alkaloids and peptides, proteins and nucleic acids

SYLLABUS

UNIT-I

A. Aromaticity : Concept of Aromaticity, Aromaticity of five membered, six membered and fused systems - non-benzenoid aromatic compounds :- cyclopropenyl cation, cyclobuta dienyl dication, cyclopenta dienyl anion – tropylium cation and cyclooctatetraenyl di anion – matallocenes, ferrocenes, azulenes, fulvenes, annulenes, fullerenes. Homo aromaticity, Anti aromaticity and Pseudo aromaticity.

B. Aromatic nucleophilic substitutions: The SNAr, ArSN1, benzyne and SRN1 mechanisms. Reactivity: Effect of substrate, leaving group and attacking nucleophile. The von Richter, Sommlet- Hauser and Smiles rearrangements.

UNIT - II

A. **Reactive Intermediates: -** Generation, structure, stability and reactivity of carbanion, carbocation, free radicals, carbenes and nitrenes.

B. **Name Reactions:-** Wittig, Grignard, Stork enamine reaction, Michael addition, Mannich Reaction, Diel's-Alder reaction, Ene - reaction,

C. Molecular RearrangementsTypes of molecular rearrangements, migratory aptitude;

Rearrangements to electron deficient carbon: Pinacol-pinacolone, Wagner-Meerwein and Benzil-Benzilic acid,

Rearrangements to electron deficient nitrogen: Beckmann, Hofmann, Curtius, Schmidt and Lossen rearrangements;

Rearrangements to electron deficient oxygen: Baeyer-villiger, Dakin rearrangements;

Other rearrangements: Neber rearrangement and Favorskii rearrangements

UNIT – III

UV Spectroscopy: Various electronic transitions, selection rules, effect of solvent on electronic transitions, the absorption laws, chromophores, auxochromes, bathochromic and hypso chromic shifts, hyperchromic and hypochromic effects, Woodward-Fieser rules for conjugated dienes and carbonyl compounds.

Infrared Spectroscopy: Basic principles: types of molecular vibrations, fingerprint region and identification of functional groups.

Nuclear Magnetic Resonance Spectroscopy (^{1}H-NMR): nuclear spin, nuclear resonance, saturation, shielding of magnetic nuclei, chemical shifts, factors affecting the chemical shift, and assignment of chemical shifts.

Mass Spectroscopy: Basic principles, nitrogen rule and fragmentation pattern of carbonyl compounds and alcohols

UNIT–IV

A. **ALKALOIDS**: Occurrence, Isolation, classification based on nitrogen heterocyclic ring and synthesis of quinine and nicotine

B. **Peptides and Proteins**: α-Aminoacids, their general properties and synthesis, Synthesis of peptides by Merrifield solid phase synthesis. Primary, secondary and tertiary structures of proteins

C. **Nucleic acids:** Heterocyclic bases; Purines: Adenine and Guanine; Pyramidines: Cytosine, Uracil and Thymine; nucleosides, nucleotides Basic concepts of the structures of RNA and DNA

Text books:

1. Organic Chemistry Vol. I (Sixth Ed.) and Vol. II (Fifth Ed.) by I L Finar ELBS by pearson Education (2002).
2. Organic Chemistry (6 th Ed.,) by Morrison and Boyd, PHI, India (2018).
3. Organic Chemistry (fifth edition) by Francis A. Carey Tata Mc Graw Hill publishing Company Limited, New Delhi (2007).
4. Reaction Mechanism in Organic Chemistry by Mukherjee Sirigh, N Terniitarr, Indiar
5. A guide book to mechanism in Organic Chemistry by Peter Sykes, ELBS.

REFERENCE BOOKS:

1. Advanced organic chemistry by Jerry March (4th Edition)Wiley Eastern. .
2. Stereochemistry of Organic compounds by Ernest L. Eliel, Samuel H. Wilen,John Wiley & Sons Inc (Sea) Pte Ltd (2008).
3. Stereochemistry of Organic compounds by D. Nasipuri.
4. Chemistry of Natural products by R.S. Kalsi Kalyani Publishers. 1983.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,II SEMESTER

CH 206A(3) ORGANIC PRACTICAL –II

Analysis of Organic CompoundsTime:6Hrs/Week

w.e.f.19-20 admitted batch syllabusMax.Marks:100

OBJECTIVES:

To characterise the given organic compound basing on experimental observations, predict the functional nature and derivatise

COURSEOUTCOMES:

- Acquire the skills of testing the solubilities and the regeneration of organic compounds
- Identify the presence of extra-elements (nitrigen, halogens and sulphur) and unsaturation
- Characterize the functional nature of given compounds
- Prepare solid derivatives for the given compound as per the functional group present in it
- Predict the structure of given compound basing on experimental observations with the correlation of theory knowledge

SYLLABUS

Organic analysis

Identification of the compounds by a systematic study of the physical characteristics (mp/bp), extra elements (nitrogen, halogens and sulfur), solubility, functional groups, preparation of crystalline derivatives and identification by referring to literature. A minimum of 6 Compounds should be analyzed by these procedures.

Books Suggested :

1. A text book of practial Organic chemistry by A.I. Vogel, 5 th edition, published by prenticehall.
2. Practical Organic chemistry by Mann and Saunders, 4th edition,Pearson Education India (2009).
3. Laboratory Manual of Organic Chemistry by Raj K Bansal,5 th revised edition,published by New Age International Private Limite (2008).

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,II SEMESTER

CH 204 (4)PAPER IV, PHYSICAL CHEMISTRY-IITime:4Hrs/Week

w.e.f.19-20 admitted batch syllabus Max.Marks:100

OBJECTIVES:

The course provides insights to apply Nernst law for redox reactions and determine E.M.F of the cells and to determine the molecular formula of the organic compound and explains the interaction between spin of the nucleus and electrons.

COURSEOUTCOMES:

- Able todetermine the EMF of the cell using Nernst law and to eliminate LJP using salt bridge
- Able to calculate the reaction rates from current data when the reaction is at equilibrium.
- Methodology of diagnosing cancerusing ESR
- Able to detect number of protons present in organic compound and evaluate coupling constant values in presence of radio frequency and magnetic field.
- Able to differentiate between chemical shift and hyperfine splitting.

SYLLABUS

UNIT-I:

Physical methods of molecular structural elucidation: Magnetic properties of molecules- theories of magnetic susceptibility- measurement of magnetic susceptibility.Principle and theory of NMR spectroscopy- Nature of spinning particle and its interaction with magnetic field. Chemical shift and its origin. Spin-Spin interaction-experimental methods. Application of NMR to structural elucidation-Structure of ethanol, dimethylformamide,styrene and acetophenone.

UNIT-II:

Electron Spin Resonance: Principle and experimental technique- g-factor, line shapes and line widths- hyperfine interactions- applications of ESR studies to the structure of free radicals, metal complexes and biological systems.

UNIT-III:

Electrochemistry I: Electrochemical cell- Galvanic and electrolytic cell. Concentration cell with and without transference- effect of complexation on redox potential-ferricyanide/ferrocyanide couple, Iron(III) phenonthroline/ Iron(II) phenonthroline couple. Determination of standard potential. Activity coefficient from EMF data. Primary and secondary cells,batteries examples. Fuel cells.

UNIT-IV:

Electrochemistry II: The electrode-electrolyte interface. The electrical double layer. The Helmholtz-Perrin parallel-plate model, the Gouy-Chapman diffuse-charge model and the Stern model. Electrodics: Charge transfer reactions at the electrode-electrolyte interface.Exchange current density and overpotential. Derivation of Butler-Volmer equation. High field approximation, Tafel equation, Low field equilibrium, Nernest equation. Voltametry-Concentration polarization, experimental techniques.

Text Books:

1. Physical Chemistry by Peter Atkins and Julio de Paula,11 th edition, Oxford University Press (2018).
2. Physical Chemistry by G.W. Castellon, Narosha Publishing House.
3. Physical chemistry by K.L. Kapoor,5th edition, vol 3,McGraw-Hill(2020).

Reference books:

4. Introduction to Electrochemistry, S.Glasstone.
5. Fundamentals of Molecular Spectroscopy, Banwell, McGraw Hill Publising house.
6. Spectroscopy by Barrow.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

I M.ScORGANIC CHEMISTRY,II SEMESTER

CH 207 (3) PHYSICAL CHEMISTRY PRACTICAL –IITime:6Hrs/Week

Max.Marks:100

OBJECTIVES:

The course aims to measure certain parameters of unknown samples by upgrading the skills in laboratory techniques like operation of the instruments, preparation ,standardisation and estimation of solutions in accordance with the theory based principles

COURSEOUTCOMES:

- Deduce equivalent point of the unknown sample and determine the concentration potentiometrically.
- Determine the order of a reaction and rate constant at definite time intervals in presence of catalyst.
- Evaluate the partition co-efficient constant by using different solutes and solvents.
- Handling the instrument and calibrating it.
- Determine the equilibrium constant and estimate the unknown concentration.

SYLLABUS

1.Determination of composition of cuprammonium cation.

2. Determination of equilibrium constant of the reaction: $KI + I_2 = KI_3$

3. Conductometric titration of mixture of a strong acid and weak acid

weak acid with a strong base (HCl + HOAc) vs NaOH.

4. Potentiometric titration of iron (II) with $K_2Cr_2O_7$

5. Determination of relative strength of acids (HCl) by ester hydrolysis

6. Polarimetric determination of relative strength of acids by hydrolysis of sucrose.

Books suggested:

1.Practical Experiments in Physical Chemistry by Alexander Finallay,Franklin Classics Trade Press (2018).

2. Experiments in Chemistry by D.V. Jahagirdan, Himalaya Pub. House, 2003.

3. Physical chemistry experiments by P. Ghosh,New Central Book Agency (201

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

IIM.ScORGANIC CHEMISTRY,III SEMESTER

CH 301A (4) PAPER-1 : ORGANIC REACTION MECHANISM, PERICYCLIC REACTIONS ANDTime:4Hrs/Week w.e.f.19-20 admitted batch syllabus Max.Marks:100

PHOTOCHEMISTRY

- **OBJECTIVES:** The course aims to focus on 1.) advanced mechanistic principles of organic reactions with reference to various types of substitutions to be able to apply to larger of reactions pertaining to natural, synthetic products of organic and allied fields. 2.)To acquire conceptual knowledge on concerted mechanism and integrate symmetry allowed and forbidden products , conditions in electrocyclic, cycloaddition sigmatropic and ene reactions. 3.)To integrate knowledge on the electronic transition while irradiation , use of photosensitizes to promote abnormal yields and products in α, β cleavages of ketone, Unusual products of Olefins and electrophilic substitutions and additions reactions of aromatic compounds.

COURSEOUTCOMES:

- To explore generation and substitution of radicals over various substrates and name reactions involving radicals as intermediates
- To examine addition reactions of carbon-carbon multiple bonds, carbon – hetero atom multiple bonds in reference to mechanism, orientation and stereochemistry
- To investigate the pattern of elimination reactions with emphasis on stereochemistry and orientation
- Apply the symmetry allowed and forbidden products in electrocyclic, cycloaddition, sigmatropic and ene reactions via triplet state promoted by sensitizers in carbonyl compounds, Olefins, aromatic compounds enables significant abnormal products

SYLLABUS

UNIT-I

A. **Radical substitution Mechanism**: Reactivity for aliphatic substrates, reactivity at bridgehead, Reactivity in aromatic substrates, neighbouring group assistance in free radical reactions, reactivity in the attacking radical, effect of solvent on reactivity, halogenation at an alkyl carbon and allylic carbon, hydroxylation at aromatic carbon by means of Fenton's reagent, oxidation of aldehydes to carboxylic acids, formation of cyclic ethers with Pb(OAC)4, Reed reaction, sandmayer reaction, kolbe reaction and Hunsdiecker reaction.

B. **Elimination reactions**: - mechanisms of E2, El, and E1CB, reactivity-effects of substrate, attacking base, leaving group and medium, Stereochemistry of eliminations in acyclic and cyclic systems, orientation in eliminations - Saytzeff and Hoffman elimination and pyrolytic elimination.

UNIT-II

Addition Elimination Mechanisms:

(a) **Addition to carbon-carbon multiple bonds**- Addition reactions involving electrophiles, necleophiles and free radicals, cyclic mechanisms. Orientation and reactivity-stereochemical orientation. Hydrogenation of double and triple bonds, hydroboration, Birch reduction. Michael reaction, addition of oxygen and N204. (b) **Addition to carbon-hetero atom multiple bonds**: Mechanism and reactivity, Mannich reaction, reductions of carbonyl compounds, carboxylic acids, esters, nitrites, addtion of Grignard reagents, Reformatsky reaction, Tollen's reaction, witting reaction, Prins reaction:

UNIT-III

Pericyclic reactions:

Molecular orbital symmetry, frontier orbitals of ethylene, 1,3 Butadiene, 1,3,5-Hexatriene, allyl system, classification of pericyclic reactions. Woodward-Hoffman correlation diagram method. FMO and perturbation of molecular (PMO) approach for the explanation of pericyclic reactions under thermal and photochemical conditions.

Electrocyclic Reactions: Conrotatory and disrotatory motions. 4n and 4n+2 π electrons systems.

Cycloadditions: Antarafacial and suprafacial additions, notation of cycloadditions, 2+2, 4+2 additions and chelotropic reactions.

Sigma tropic rearrgements-suprafacial and antarafacial shifts of H, Sigmatropic shift involving carbon moieties, (3.3) and (5.5) sigmatropic rearrangements. Claisen, Cope, Oxy-cope and aza- Cope rearrangements. Ene reaction.

UNIT-IV

Organic photochemistry:

Photochemistry of carbonyl compounds n-π* and π-π* transitions.Norrish type1 and norrish type 2 cleavages, patternobuchi reactions,photoreductions, photochemistry of enoneshydrogenabstraction,rearrangement of α,β-unsaturated ketones and cyclohexadienones, photochemistry of unsaturated systems(olefins)cis trans isomerisation,dimerization and hydrogen abstraction and additions,acetylenesdimerization,dienes-photochemistryof1,3-butadiene, diπmethane rearrangements.photochemistry of aromatic compounds-excited states of benzene and its 1,2-1,3-1,4-additions. Photofries rearrangements,photofries reaction of anilides,photo substitution reactions of benzene derivatives

Reference Books

1.Advanced Organic Chemistry: Reactions Mechanisms and Structure by

1. Jerry March, Mc.Graw Hill and Kogakush.
2. 2.Molecular reactions and Photochemistry by Charles Dupey and O.
3. Chapman, Prentice Hall.
4. 3.Pericyclic reactions by S.N. Mukharji, Mcmilan.
5. .Mechanisms and Theory in Organic Chemistry by T.H. Lowery and K.S.
6. Richardson, Harper and Row publishers, New York
7. 5.The modern structural theory in Organic Chemistry by L.N. Ferguson,
8. Pretice Hall

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,III SEMESTER

CH 302A (4) PAPER II : ORGANIC SPECTROSCOPYTime:4Hrs/Week

w.e.f.19-20 admitted batch syllabus Max.Marks:100

OBJECTIVES:

The courseenables to detect, identify and quantify information about atoms and molecules in a minute sample with the help of spectroscopic techniques like UV, NMR, MASS, IR etc.

COURSEOUTCOMES:

- Characterize the molecules based on absortion pattern in Electro magnetic radiation
- Able to determine analyte concentration based on absorption of light in the UV region of light radiation
- Derive the structure of organic molecule in solution using IR and NMR Spectroscopy
- Applications of mass spectroscopy for drug testing, discovery , protein identification etc

UNIT-I

UV SPECTROSCOPY: a) UV spectra of aromatic and heterocyclic compounds, α-diketones , β-diketones, enediones and quinines. Applications of UV Specroscopy-study of isomerism, determination of strength of hydrogen bonding and conformations of α-substituted cyclohexanones. Steric effect in biphenyls.

Infrared Spectroscopy: characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, amines, carbonyl compounds, esters, amides, carboxylic acids, anhydrides, lactones, lactums, nitriles and conjugated carbonyl compounds. Effect of hydrogen bonding and solvent on vibrational frequencies.

UNIT-II

Nuclear Magnetic Resonance Spectroscopy (1H NMR): Nuclear spin, resonance, satuaration, shielding of magnetic nuclei, chemical shifts and its measurements, factors affecting chemical shift, chemical and magnetic equivalence of spins, spin-spin coupling, intergration, the coupling constant, types of spin-spin couplings, factors influencing coupling constants, first-order and non-first order spectra, spin system notations (ABX, AMX, ABC, A2B2 etc.). Simplification of non-first order spectra- use of higher magnetic fields, nuclear magnetic double resonance and contact shift reagents. Deuterium exchange, nuclear overhauser effect difference spectra, Study of dynamic processes by Variable temperature (VT) NMR, restricted rotation DMF, cyclohexane ring inversion.

UNIT-III

Mass spectroscopy: Basic Principles, instrumentation, isotope abundance, the molecular ion, metastable ions, base peak, fragment ions, even-electron rule and nitrogen rule. McLafferty rearrangement, ortho effect. *retro*-Diels- Alder reaction, Fragmentation processes- fragmentation associated with various functional groups (alkanes, cycloalkanes, alkenes, alkynes, aromatic hydrocarbons, alcohols, phenols, ethers, aldehydes , ketones, esters , carboxylic acids, amides, amines, alkyl chlorides and alkyl bromides.

UNIT-IV

Structural elucidation of organic compounds by a combined application of UV,IR,NMR,Mass spectral data

Reference books:

1. Spectroscopic identification of organic compounds by RM Silverstein, G C Bassler and T BMorrill.wiley 8th edition,2015.
2. Organic Spectroscopy by William Kemp. Parlgrave Macmillan 3th edition 1991.
3. 3.Spectroscopic methods in Organic chemistry by DH Williams and I Fleming. Springer 7th edition2020.
4. Modern NMR techniques for chemistry research by Andrew B Derome. Pergamon 1987.
5. NMR in chemistry - A multinuclear introduction by William Kemp. Palgrave. 1stedition.

6. Spectroscopic identification of organic compounds by P S Kalsi. New age International PrivateLimited 8th edition 2020.
7. Introduction to organic spectroscopy by Pavia Brooks/cole 5th edition 2014.
8. Carbon-13 NMR for organic chemists by GC Levy and O L Nelson. Wiley-interscience 1974.
9. Nuclear Magnetic Resonance Basic principles by Atta-ur-Rahman. Springer Nature (SIE) 2008

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,III SEMESTER

CH 303A (4) PAPER-III , ORGANIC SYNTHESISTime:4Hrs/Week

w.e.f.19-20 admitted batch syllabusMax.Marks:100

OBJECTIVES:

To conceptualize different processes involved in organic synthesis, asymmetric synthesis and applications of organic polymers.

COURSEOUTCOMES:

- Explore ZIEGLAR-NATTA polymerisation for the reaction for production of polymers in industries
- Able to propose synthesize for eco-friendly products using Diels alder reaction
- Able to predict to synthesis for various organic compounds which are useful in pharma and polymer industries
- To Identify the starting material of the product based on disconnection approach
- Develops employability skills which enable students to find jobs in chemistry and related fields

UNIT-I

Formation of Carbon-Carbon (C-C) single bonds:

A. Alkylations via enolate anions-1,3-dicarbonyl and related compounds, direct alkylation of simple enolates, imine and hydrozone anions, enamines. The aldol reaction, umplong (dipole inversion).

B. Via organometallic reagents- organ palladium, organo nickel and organo copper reagents

UNIT-II

Formation of carbon-carbon double bonds:β- Elimination reactions, Pyrolytic *syn* eliminations, alkenes form hydrazones, 1,2-diols, sulfones, sulphoxide-sulphonate rearrangement, the Wittig and related reactions

UNIT-III:

Organic polymers & Reactions of unactivated carbon-hydrogen bonds

A. Introduction to organic polymers, general properties and classification of polymers. Methods of polymerization: (a) Addition polymerization- Definition, synthesis and applications, vulcanization. (b) Condensation polymerization- Definition, synthesis and applications. Radical polymerization- Definition, synthesis and applications. Ziegler-Natta polymerization (With atleast two examples in each category)

B. Unactivated carbon-hydrogen bonds: Definition, mechanism and synthetic applications- The Hoffmann-Loeffler- Freytag reaction-the Barton reaction- Photolysis of rganic hypohalites.

UNIT-IV

Asymmetric synthesis: Topocity-prochirality-substrate selectivity-diastereo selectivity and enantio selectivity-substrate controlled methods-use of chiral substrates – examplesAuxillary controlled methods-use of chiral auxillaries-chiral enolates-alkylation of chiral imines-stereo selective diels alder reaction Reagent controlled methods-use of chiral reagents-asymmetric oxidation-sharpless epoxidation-asymmetric reduction-use of $LiAlH_4$ and borate reagents

Textbooks:

1. Some Modem Methods of Organic Synthesis W. Carothers, Third Edition, Cambridge University Press, Cambridge, 1988.
2. Modern Synthetic Reactions, Herbert O. House, Second Edition, W.A. BenzamineInc. Menio Park, California, 1972.
3. Principle of Organic Synthesis- R.O.C. Norman and J. M. Coxon. Taylor & Francis EXCL 3rd edition 2017.
4. Advanced organic chemistry part A & B; Fourth edition; Francis A Cary and Richard J. Sundberg; Kluwer Academic/Plenum Publisher New York, 2000.
5. Organic chemistry Jonathan Clayden, Nick Geeves, Stuart Warren, 2nd Edition, 2012, Oxford University Press

6. Stereochemistry of organic compounds — Principles & Applications by D Nasipuri. New Age International Private Limited 4th edition 2020.
7. Stereochemistry of Carbon compounds by Ernest L Eliel & Samuel H. wilen. Mc Graw Hill Education 2001.
8. Stereochemistry: Conformation & Mechanism by P S Kalsi. New Age Publishers 10th edition 2019.
9. The third dimension in organic chemistry, by Alan Bassendale. Wiley- Blackwell 1984.
10. Stereo selectivity in organic synthesis by R S Ward. Wiley 1st edition 1999
11. Asymmetric synthesis by Nogradi. Wiley-VCH, 1st edition 2016.
12. Asymmetric organic reactions by J D Morrison and H S Moschcr. American Chemical Society 1977.
13. Principles in Asymmetric synthesis by Robert E. Gawley Elsevier 2nd edition 2012.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,III SEMESTER

CH 304A (4)PAPER – IV : CHEMISTRY OF NATURAL PRODUCTS

w.e.f.19-20 admitted batch syllabusTime:4Hrs/Week

Max.Marks:100

OBJECTIVES:

The course aims to enhance knowledge base on chemistry of medicinal compounds of natural origin and also to study the molecular structure and physiochemical properties of the molecules

COURSEOUTCOMES:

- Able to examine general methods of structural elucidation of medicinally active natural compounds
- To get insights into isolation and purification of medicinal compounds from natural origin
- To characterize products by physical and spectroscopic means including IR, NMR,GC and MS
- To inspect different types of natural products, their occurrence, structure , biosynthesis and properties

SYLLABUS

UNIT-I

Isolation, structure elucidation, stereochemistry, synthesis and biological properties of Pencillin G, Cephalosphorin-C, streptomycin, chloramphenicol and tetracyclins.

UNIT-II

Isolation, structure elucidation, stereochemistry, synthesis and biological properties ofTerpenes: Forskolin, taxol and β-amyrin

UNIT-III

Isolation, structure elucidation, stereochemistry, synthesis, and biological properties of Alkaloids: Morphine, reserpine and vincristin

UNIT-IV

Natural pigments: Flavones-Apigenin,flavanones-Hesperitin,Isoflavones-Genestin,Flavanol-qurcetin,xanthone-Euxanthone,quinones-polyporic acid,chlorophyll and haemin

Reference books :

1.Organic Chemistry, Volume 2, Stereochemistry and chemistry of natural products,I.L. Finar, 5th Edition. ELBS.

2. Chemical A spects of Biosynthesis, John Mann, Oxford University Press, Oxford, 1996

3.Chemistiy of Natural Products. A Unified Approach, N.R.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,III SEMESTER

CH 305 (4) Practical-I: Multi stage organic synthesisTime:9 Hrs/Week

w.e.f.19-20 admitted batch syllabusMax.Marks:100

OBJECTIVES:

To train students in varied techniques of organic synthesis and equip them the skills of perform multi stage synthesis of organic compounds with focus on purity and yield

COURSEOUTCOMES:

- Apply standardised procedures effectively and synthesize efficiently organic compounds
- Achieve effective multi step synthesis of organic compounds
- Comply with the regulations involved in safe handling and disposal of chemicals
- Helps the students to identify its applications in chemical and pharma industries
- Adopt procedures like sulphonation , diazotisation , condensation ,oxidation in various steps of multi stage synthesis

SYLLABUS

Multistage Organic synthesis involving three or four stages

Paracetamol, 6-Methyluracil, Methyl orange, p-Aminobenzoic acid, Acridone and 2-Iodobenzoic acid

Books Suggested :

1. A text book of practial Organic chemistry by A.I. Vogel 5th edition, ELBS and Longman group.
2. Practical Organic chemistry by Mann and Saunders 4th edition, ELBS and Longman group.
3. Laboratory Manual of Organic Chemistry by Raj K Bansal.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,I SEMESTER

CH 306 (4)Practical-II: Chromatography and Viva-Voce

w.e.f.19-20 admitted batch syllabusTime:9 Hrs/Week

Max.Marks:100

OBJECTIVES:

To train the students in advanced isolation and separation skills to separate organic compounds using TLC, column and paper chromatography with proper orientation on the principles of Chromatography with hands on experience on handling the equipment

COURSEOUTCOMES:

- To test the purity of compounds prepared in the laboratory by correlating with standard samples
- To predict the solvent systems to run TLC, paper and column chromatography
- Skill development and employability skills enable students to find jobs related to chemistry
- To analyze the observations and draw the conclusions
- To identify and separate the preservatives and additives added in the food items and also in DNA fingerprinting

SYLLABUS

1. Thin layer chromatography: Determination of purity of a given sample and identification of unknown organic compounds by comparing the Rf values of known standards.
2. Separation by column chromatographyViva-voce

Books Suggested :

1. A text book of practial Organic chemistry by A.I. Vogel 5th edition, ELBS and Longman group.

2. Practical Organic chemistry by Mann and Saunders 4th edition, ELBS and Longman group.
3. Laboratory Manual of Organic Chemistry by Raj K Bansal

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,IV SEMESTER

CH 306 (4)PAPER- I , MODERN SYNTHETIC METHODOLOGY

w.e.f.19-20 admitted batch syllabusTime:4Hrs/Week

Max.Marks:100

OBJECTIVES:

1.To acquire conceptual knowledge on Name reactions pertaining to metal mediated carbon-carbon and carbon –halogen coupling reactions ,Oxidation , reduction with heavy metals and popular specific oxidizing and reducing agents

2.To enable the students toGain Knowledge on alternative synthetic green methods incorporating basic principles, advances in microwave induced reactions, nanoparticles adaption in organic synthesis

COURSEOUTCOMES:

- Discriminates popular name reactions and apply various oxidizing and reducing agents
- Analyse the underlining principles of metal and non- metal based oxidation and reductions
- Compares the Conventional conditions with Green methodology applying twelve basic principles and differentiating the conditional Microwave, and conventional aqueous phase reaction protocols

,adapts nanoparticles as phase transfer catalyst in minimizing the use chemical in protecting environment.

SYLLABUS

UNIT-I

Kulinkovich reaction,Baylis-Hillman reaction, Henry Ritter reaction, Sakurai reaction, Tishchenkoreaction, Nef reaction, reaction and Ugi reaction. Brook rearrangement; Tebbe ole£rnation. Metal mediated C-C and C-X coupling reactions: Heck,

Stifle, Suzuki, Negishi and Sonogashira, Nozaki-Hiyama, Buchwald- Hartwig, Ullmann coupling reactions.

Multicomponent Reactions: Passerini, Biginelli, Hantzsch and Mannich reactions.Metathesis: Grubb's 1st and 2»d generation catalyst, Olefin cross coupling metathesis (OCM), ring

closing metathesis(RCM), ring opening metathesis (ROM), applications.

UNIT-II

Oxidation: Metal based and non-metal based oxidations of (a) alcohols to carbonyls (Chromium, Manganese, aluminium, silver, ruthenium. DMSO, hypervalent iodine and TEMPO based reagents). (b) phenols (Fremy's salt, silver carbonate) (c) alkenes to epoxides (peroxides/per acids based), Sharpless asymmetric epoxidation, Jacobsen epoxidation, Shi epoxidation.(d) alkenes to diols (Manganese, Osmium based), Sharpless asymmetric dihydroxylation, Prevost reaction and Woodward modification, (e) alkenes to carbonyls with bond cleavage (Manganese, Osmium, Ruthenium and lead based, ozonolysis) (f) alkenes to **alcohols/carbonyls** without bond cleavage (hydroboration-oxidation, Wacker oxidation, selenium, chromium based allylic oxidation) (g) ketones to ester/lactones (Baeyer-Villiger)

UNIT-III

Reduction: (a) Catalytic hydrogenation (Heterogeneous: Palladium /Platinum/Rhodium/Nickel etc; Homogeneous: Wilkinsou). Noyori asymmetric hydrogenation.

(b) Metal based reductions

using Li/Na/Ca in liquid ammonia, Sodium, Magnesium, Zinc, Titanium

Pinacol formation, McMurry,Acyloin formation, dehalgenation and

and Samarium (Birch,deoxygenations)

(c)Hydridetransferreagents-NaB@ triacetoxyborohydride, L-selectride, K-selectride, Luchereduction; LiA, DIBAL-H, and Red-Al.

UNIT-IV

NEWER METHODS IN ORGANIC SYNTHESIS

Green Chemistry-Introduction, principles, atom economy and scope (illustrate with two examples)

Microwave induced reactions: Principle

methods-applications

conditions, advantages over conventional heating methods-applications

Ionic liquids:Introduction and application in organic synthesis (illustrate with 2 examples) Nanomaterials:Introduction,methods of preparation,applications in organic synthesis. Phase transfer catalyst:solid solid,solid liquid system-mechanism of catalyst action, type of catalyst, application in few important reactions.

REFERENCE BOOKS:

1. Some modern methods of organic synthesis W.Carothers,3rd edition,Cambridge university.
2. M.B.smidth organic synthesis 2nd Edition 2005, McGraw Hill.
3. New trnds in green chemistry by V.K.ahulwalia and Kidway, Anamaya Publishers.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,IV SEMESTER

CH 402A (4)PAPER-II , ORGANIC SPECTROSCOPY AND STRUCTURAL DETERMINATION OF NATURAL PRODUCTS

w.e.f.19-20 admitted batch syllabus Time:4Hrs/Week

Max.Marks:100

OBJECTIVES:

The course aims to investigate structural aspects of optically active chiral media using circular dichroism, application of ESR in pharmaceutical and agricultural basic research and C13 spectroscopy for identification of carbon skeleton

COURSEOUTCOMES:

- Apply CD and ORD to study biological molecules, their structure and interactions with metals and other molecules
- Application of principals of ESR spectroscopy for working of Semiconductor materials and identification of biological free radicals for the diagnosis of abnormal tissues
- To determine the structure of natural products from the information of UV,IR,NMR and COSY
- To describe the interaction of optically active compounds based on circular dichroism and circular bifringence
- Gain knowledge on handling and managing the instrumentation

SYLLABUS

UNIT-I

C^{13} NMR spectroscopy & Heteronuclear couplings

Introduction, 1’ C-chemical shifts, factors affecting the chemical shifts, chemical slufts of organicCompounds. Calculation of chemical shifts of alkanes, alkenes and aromatic compounds. Typesof 13C NMR sectra: Proton-coupled, proton-decoupled and OFF-resonance deeoupled (ORD)spectra, DEPT. ^{13}C-NMR solvents:

Heteronucle ar couplings: ^{3}C E H, ^{3}C-D,' ^{3}C-" F, ' ^{3}C-^{3}' p.^{l} H-D, 'H-"F, ’H- 'P, 'H-"N

UNIT-II

NMR Instrumentation, 2D-NMR techniques & ESR:

NMR Instrumentation: Types of NMR Spectrometers-Continuous Wave (CW)-NMR, Fourier

Transform (FT)-NMR, NMR solvents, sample preparation

2D-NMR techniques: Principles of 2D NMR, Correlation spectroscopy (COSY) HOMO COSY (1H-IH COSY), Hetero COSY ('H, '°C COSY, HMQC), long range 'H,"C COSY (HMBC),

NOESY and 2D-INADEQUATE experiments and their applications.

ESR Spectroscopy: Principles, hyperfme splittin

UNIT-III

Optical Rotatory Dispersion (ORD) and CD Spectroscopy: Optical rotation, circular birekingence, and circular dichroism and Cotton effect. Plain curves and anomalous curves. Empirical and semiempirical rules-The axial haloketone rule, the octant rule, Application of the rules to the study of absolute configuration and conformations of organic molecules.

UNIT-IV

Structure determination of natural products by spectral: methodsstructure elucidation-Spectroscopic techniques IR, UV, 'H-NMR, "C-NMR, COSY, HETEROCOSY, and MS- natural products-Examples, flavones-Apigenin, flavanones- Hesperetin, isoflavones-Genistein,'coumarins-7-hydroxycoumarin, alkaloids-morphine, quinine, terpenoids-(-) -Menthol, Steroids-stigmasterol, Glycosides-salicin (Alcoholic §-glucoside)

TEXT BOOKS:

1. Spectroscopy 4th edition,D.L.pavia, G.N.Lampman, CENGAGE Learning 2012.
2. Spectroscopic Methods in organic Chemistry 4thedition D.M. Williams and I.Fleming Tata – McGraw Hill, New Delhi1990. For all spectral methods except ORD and CD and ESR.
3. Organic spectroscopy, 2nd edition, W.Kemp,E.L.B.S.Macmelon,1987 for ORD and CD and ESR.
4. Chemistry of natural products, S.V. Bhat, Narosa Publishing House, 6th reprint 2010 (for IV unit)

BOOKS IN REFERENCES:

1. Application of absorption spectroscopy of organic compounds J.R. Dyer, Prentice Hall of India, New Delhi, 1984.
2. Spectrometric identification of organic compounds, 4thedition, R.M. Silverstein: G.C.Vassiellr and T.C. Merill, Johne Willey, Singapore, 1981.
3. For ORD and CD "Applications of Optical rotation and Circular Dichroism", G.C. Barret, in " Elucidation of organic structures by Physical and chemical methods" Part I (Eds) K.W. Bentley and G.W. Kirty John Wiley, 1972, Chapter 8.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,IV SEMESTER

CH 403A (4) PAPER-III: DESIGNING ORGANIC SYNTHESIS AND SYNTHETIC APPLICATIONS OF ORGANO-BORANES AND SILANES

w.e.f.19-20 admitted batch syllabusTime:4Hrs/Week

Max.Marks:100

OBJECTIVES

The course focuses on 1) designing a reverse method to reconstruct the organic molecule which helps students on better approach for the synthesis of organic molecules 2) the role of oregano boranes and silanes to get high yield and better products in organic synthesis

COURSEOUTCOMES:

- To Analyse the formation of enantioselective, diastereoselective products using various reagents
- To implement better process for the synthesis of target molecule with high yield
- To apply silylating agents for the protection of functional groups like alcohols, phenols etc

- To synthesize variety of organic products like alkenes, halide, alcohols using organo boranes
- The synthesis helps the students to perform well in pharma and related industries

SYLLABUS

UNIT-I

Disconnection approach -Principle

Introduction, Terminology: Retrosynthesis, Target Molecule (TM), synthon, synthetic equivalent, functional group interconversion (FGI). Linear and convergent synthesis. Criteria for selection of target . Order of events in retrosynthesis with reference to Salbutamol, Proparcaine and Dopamine. Chemoselectivity, Regioselectivity, reversal of polarity and cyclizations. Protecting groups- Principles of protection of alcohols, amine, carbonyl and carbonyl groups

UNIT-II

Synthetic Strategies

A. Introduction to one group disconnections: C-C disconnection-alcohols and carbonyl compounds; C-X disconnections- alcohols and carbonyl compounds and sulphides Evo group C-C and C-X disconnections,

B. Introduction to Two group C-C disconnections; Diels-Alder reaction, 1,5- difunctionalised compounds, Michael addition and Robinson annulation.

Two group C-X disconnections; 1, 1-difunctionalised, 1, 2-difunctiona1ised and 1, 3-difunctiona1ised compounds. Control in carbonyl condensations, explanation with examples oxanamide and mevalonic acid.

UNIT -III:

Organoboranes: Hydroboration- Preparation of Organoboranes. Reagents - dicyloliexyl borane, disiamyl borane, thexyl borane, 9-BBN and mono-, di-isopinocamplieyl borane. Functional group transformations of Organo boranes-Oxidation, protonolysis and rearrangements. Formation of carbon-carbon-bonds viz organo boranes- carbonylation, cyanoboration.

UNIT-IV:

Organo Silanes: Preparation and synthetic applications of trimethylsilyl chloride, dimethyl-t- butylsilyl chloride, trimetthylsilyl cyanide, trimethylsilyl

iodide and trimethylsilyl triflate.protection of functional groups trimethyl silyl ether, silylenolethers. Synthetic applications of alpha silyl carbanions,beta silyl carbonium ions,petersons olefination

TEXTBOOKS:

1. Organic synthesis via boranes / Herbert C. Brown: with Techniques by Gary W. Kramer, Alan B. Levy, M. Mark midland. New York: Wiley, 1975.
2. Some Modern Methods of organic Synthesis W. Carothers, 3rd edition Cambridge university Press. Cambridge, 1988.
3. Organic synthesis: The disconnection approach, S. Warrant Jhon Wiley & sons, New York, 1984.
4. Modren Synthetic Reactions, Herbert o. house, 2nd edition, W.A. benzamine inc. Menio Park. Califorrnia,1972.
5. principle of Organic Synthesis – R.O.C. Norman and J.M. Coxon. (ELBS). Taylor & Francis EXCL 3rd edition 2017.
6. Organic Synthesis : Special techinques. V.K. Ahulwalia and Renu Aggarwal. Narosa 2009.
7. Organic Synthesis by C Willis and M Willes OUP UK: 1st edition 1991.
8. Problems on organic synthesis by Stuart Warren. Jhon Wiley & Sons Inc, 2008.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,IVSEMESTER

CH 404A (4)PAPER IV : DRUG DESIGN AND DRUG CHEMISTRY

w.e.f.19-20 admitted batch syllabusTime:4Hrs/Week

Max.Marks:100

OBJECTIVES:

The course provides insights into drug design, development and discovery of medicinal compounds and structure, preparation and analysis of Antineoplastic, Cardiovascular and Antiviral drugs.

COURSEOUTCOMES:

- Able to investigate the mechanism of drug action and its relevance in the treatment of different diseases.
- Able to conceptualize lead seeking method and lead modification opportunities.
- Able to get insights into the processes involved in the design, development and discovery of medicinal compounds.
- To appreciate the SAR of some important drug classes.
- Able to relate the chemistry of drugs with respect to their pharmacological activity.

UNIT-I

Basic consideration of drugs:

General classification,nomenclature,drug metabolism.

Development of drugs:procedure followed in drug design.Concept of lead compound ,lead modification,concept of pro drugs.Structure,activity,relationship(SAR factors) affecting bio activity resonance.Inductive effect,isomerisation,isosterism,biosterism,s pecial considerations,quantitate structure,activity relation (QSAR)concept of drug receptor Elementary treatment of drug receptor interactions,physiochemical parametors-lipophylicity,partition coefficient,electronic ionisation constants,steric,Shelton and surface activity parameters and redox potentials

UNIT-II

Antineoplastic agents

Introduction, classification-alkylating agents ,mechanism and mode of action. Nitrogen mustards -synthesis,properties,uses and dosage-chloranbucal,cyclo phosphamide and melphalan. Antimetabolites-synthesis,properties,uses and dosage-pyrimidineanaloges-5 -floro uracil,purine analogs-6-mercaptopurines,folic acid analoges-methotrexate,antibiotics structure,properties and dosage-doxorubicin,mitomycin

UNIT-III

Cardiovascular Drugs & Oral Hypoglycemic Drugs

Cardiovascular Drugs: Introduction, cardiovascular diseases, drug inhibitors of peripheml sympathetic function, central intervention of cardiovascular output. Direct acting arteriolar dilators. Synthesis of amyl nitrate, sorbitrate, diltiazem, quinidine, verapaniil, niethyldopa. aterioloJ, oxyprenolol.

o«i nypoglycemic Drugs: Introduction, Classification, Sulphon3lureas- synthesis, iiiode of action, properties, uses and dosage- tolbutamide, glipizide. Biguauides-synthesis, iiiode ot" action, properties, uses and dosage-Metformin. **o-glucosidap•e** inhibitors- synthesis, iiiode of actJon, properties, uses and dosage- Miglitol. Dipeptidyl Pcptidase-4 (DPPfi) inhibitors- synthesis, mode of action, properties, uses and dosage-saxagliptin and sitagliptin

UNIT IV

Local Anfiinfective Drugs & Antiviral drags

Local Axfiinfective Drugs: *Introduction* and general mode of action. S}flitllCSlS 01 sulphonamides, ciprofloxacin, norfloxacin, dapsone, amino salicylic acid, isoiiiazid, fluconazole, econozole and chloroqain.

Antiviral Drugs: Introduction, classification based on mechanism of action , nucleoside orNucleotide Reverse Transcriptase Inhibitors (NRTIS)-Synthesis, metabolism, properties and uses and dosage-AcycIovir, Zidovodine (Anti-HIV agent). Non-Nucleoside or Niiclcoiiéc Reverse TranscriptaseInhibitors (NNRTIs)-Synthesis, metabolism, propertic•s and use of dosagedosage-Nevirapine, Efavirenz. Protease Inhibitors (PIs)- Synthesis, iiictabolisiii, ii'0[ICrlics" and use5 and dosage-Indinavir. CCR5-Inhibitors-

Synthesis,metabolism, properties lild tlSc*S and dosage-Maraviroc.

TEXT BOOKS:

1. Text book of medicinal chemistry volume 1 and 2 3rd edition by V.Alagarsamy CBS publishers.
2. Introduction of medicinal chemistry Gringage,Wiley-VCH
3. Good man and Glim mans Pharmacological bases of therapeutics,Mcgraw-hill

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,IV SEMESTER

CH 405A (4)PRACTICALSMIXTURE ANALYSISTime:9 Hrs/Week

w.e.f.19-20 admitted batch syllabus Max.Marks:100

OBJECTIVES:

To train students in the separation of organic mixture, to carry thorough analysis of two separated compounds, identification of the functional groups and preparation of solid derivatives

COURSEOUTCOMES:

- To predict the structure of the given compounds correlating experimental observations and theoretical knowledge
- Analyse organic compound by developing standardised procedures
- Aquire skills needed for the identification of functional groups
- Purify as well as ascertain purity through distillation and MP/BP determination
- Safely handle and dispose volatilr, corrosive and inflammable substances

SYLLABUS:

Separation of two component mixtures by chemical methods and their identification by chemical reactions — separation by using solvent ether, 5 % aqueous sodium bicarbonate, 5% sodium hydroxide and dil hydrochloric acid, checking the purity of the two components by TLC, identification of the compounds by a systematic study of the physical characteristics (mp/bp), extra elements (nitrogen, halogens and sulfur), solubility, functional groups, preparation of crystalline derivatives and identification by referring to literature. A minimum of 5 mixtures should be separated and analyzed by these procedures.

Books Suggested :

1. A text book of practial Organic chemistry by A.I. Vogel 5th edition, ELBS and Longman group.
2. Practical Organic chemistry by Mann and Saunders 4th edition, ELBS and Longman group.
3. Laboratory Manual of Organic Chemistry by Raj K Bansal.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

II M.ScORGANIC CHEMISTRY,II SEMESTER

CH 406 (4) PRACTICAL-II ORGANIC ISOLATIONS AND ESTIMATION

w.e.f.19-20 admitted batch syllabus Time:9 Hrs/Week

Max.Marks:100

OBJECTIVES:

Aquire skills of preparing the solutions required for estimations and standardising them

COURSEOUTCOMES:

- To estimate the concentration of glucose, aniline and sucrose by titrimetric method
- Able to extract caffeine from tea leaves and coffee beans, lycopene from from tomatoes
- Purify as well as ascertain purity through distillation and MP/BP determination
- Develop skills needed for the jobs related to pharma and chemical industries

- Gain experience on handling equipments

A) Estimation of the following compounds

i) Glucose ii) Phenol iii) Aniline iv) Aspirin (titrimetry) v) Ibuprofen (titrimetry)

B) Isolation of the following compounds

i) Caffeine from tea leaves (solvent extraction) ii) Piperine from pepper (Soxhlet extraction)

ii) Lycopene from tomato

Books Suggested :

1. A text book of practial Organic chemistry by A.I. Vogel 5th edition, ELBS and Longman group.
2. Practical Organic chemistry by Mann and Saunders 4th edition, ELBS and Longman group.
3. Laboratory Manual of Organic Chemistry by Raj K Bansal.