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: CHEMISTRY Paper: 1 Class: B.Sc. Semester: I

p-block elements :
Group-13: Synthesis and structure of diborane and higher borane (B_4H_{10} and **B_5H_9),**
boron-nitrogen compounds ($B_3N_3H_6$ and BN) Group - 14: Preparation and applications of silanes and silicones.
Group - 15: Preparation and reactions of hydrazine, hydroxylamine
Group - 16: Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content.
Group -17: Inter halogen compounds and pseudo halogens.
General Principles of Inorganic qualitative analysis a) Solubility product, common ion effect,
characteristic reactions of anions, elimination of interfering anions,.
separation of cations into groups, group reagents, testing of cations.
Organometallic Chemistry Definition - classification of Organometallic compounds - nomenclature, preparation.
properties and applications of alkyls of Li and Mg.
Structural theory in Organic Chemistr
Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H_2O, **NH_3** & $AlCl_3$).
Bond polarization : Factors influencing the polarization of covalent bonds, electro negativity –
inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions.
Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbo cations.
Free radicals and alkenes, carbanions, carbenes and nitrenes. Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.
Alkanes - IUPAC Nomenclature of Hydrocarbons. Preparation by Hydrogenation of alkenes and alkynes, Wurtz reaction, Kolbe's electrolysis, Corey – House reaction. Chemical reactivity – inert nature, free radical substitution mechanism. Halogenation example – reactivity,selectivity and orientation.
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Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X_2, HX, H_2O (Tautomerism), Oxidation with $KMnO_4$, OsO_4, reduction and Polymerisation reaction of acetylene.

2. **Alicyclic hydrocarbons (Cycloalkanes)**

Nomenclature, Preparation by Freunds method, Wislicenus method.

Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes,

Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory.

Conformational structures of cyclobutane, cyclopentane, cyclohexane .

Benzene and its reactivity

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation.

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Department: CHEMISTRY Paper: 2 Class: B.SC. Semester: II

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X-ray diffraction and crystal structure,Bragg's law.etermination of crystal structure by Bragg's method. Indexing of planes and structure of NaCl and KC1 crystals.
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DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A

Syllabus for the Academic Year 2017-18

Department: CHEMISTRY Paper: 1 Class: BSc Semester:1

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Department: CHEMISTRY Paper : 2 Class: BSc Semester:II

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Syllabus for the Academic Year 2014-15

Department : CHEMISTRY Paper : 1 Class: BSc Semester:I

Atomic Structure and elementary quantum mechanics Blackbody radiation, Planck's radiation law, photoelectric effect, Compton effect, de Broglie's hypothesis, Heisenberg's uncertainty principle. Postulates of quantum mechanics.
Schrodinger wave equation and a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, Radial and angular functions, hydrogen like wave functions, quantum numbers and their importance.
Chemical Bonding Valence bond theory, hybridization, VB theory as applied to ClF3, BrF5, Ni(CO)4, XeF2.
Dipole moment – orientation of dipoles in an electric field, dipole moment, induced dipole moment, dipole moment and structure of molecules. Molecular orbital theory – LCAO method,
construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N2, O2,HCl, CO and NO). Comparision of VB and MO theories.
Theory of quantitative analysis a) Principles of volumetric analysis. Theories of acid-base, redox, complexometric, iodometric andprecipitation titrations, choice of indicators for these titrations.
b) Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, postprecipitation, digestion, filtration and washing of precipitate, drying and ignition, precipitationfrom homogenous solutions, requirements of gravimetric analysis.
Evaluation of analytical data. Theory of errors, idea of significant figures and its importance, accuracy – methods of expressingaccuracy, error analysis and minimization of errors, precision – methods of expressing precision,standard deviation and confidence limit.

p-block elements: General characteristics of elements of groups 14, 15, 16 and 17 Group – 14: Preparation, Structure and applications of silanes and silicones, graphitic compounds.
Group – 15: Preparation and reactions of hydrazine, hydroxylamine, phosphazenes.
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Group – 16: Classifications of oxides based on (i) Chemical behavior and (ii) Oxygen content.
Group – 16: Classifications of oxides based on (i) Chemical behavior and (ii) Oxygen content.
Group – 17: Inter halogen compounds and pseudo halogens-Preparation and Structural aspects.
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Organometallic Chemistry Definition and classification of organometallic compounds. Nomenclature.
preparation, properties and applications of alkyls of Li, Mg &Al.

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Syllabus for the Academic Year 2014-15

Department :CHEMISTRY Paper : 2 Class: BSc Semester:II

Structural theory in Organic Chemistry

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H_2O, $\mathbf{NH_3}$ & $AlCl_3$).Bond polarization : Factors influencing the polarization of covalent bonds, electro negativity

inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions.

Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbo cations.

Free radicals and alkenes, carbanions, carbenes and nitrenes.Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.

Alkanes - IUPAC Nomenclature of Hydrocarbons. Preparation by Hydrogenation of alkenes and alkynes, Wurtz reaction, Kolbe's electrolysis, Corey – House reaction.Chemical reactivity – inert nature, free radical substitution mechanism. Halogenation example – reactivity,selectivity and orientation.

Alkenes - Preparation of alkenes.Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H_2O, HOX, $\mathbf{H_2SO_4}$ with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition). Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X_2, HX, H_2O (Tautomerism), Oxidation with $KMnO_4$, OsO_4, reduction and Polymerisation reaction of acetylene.

2. **Alicyclic hydrocarbons (Cycloalkanes)**

Nomenclature, Preparation by Freunds method, Wislicenus method. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane .

Benzene and its reactivity

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation.

Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO_2 and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens(Explanation by taking minimum of one example from each type)
Gaseous state Compression factors, deviation of real gases from ideal behavior. Van der Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state.Critical phenomena.
The van der Waal's equation and the critical state. Relationship between critical constants and van der Waal's constants. The law of corresponding states and reduced equation of states. Joule Thomson effect. Liquefaction of gases: i) Linde's method and ii)Claude's method.
Solutions Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure – composition and vapour pressure-temperature curves. Azeotropes-HCl-H_2O,
ethanol-water systems and fractional distillation. Partially miscible liquids-phenolwater,trimethylamine-water, nicotine-water systems. Effect of impurity on consulate temperature.
Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.
Colloids and surface chemistry Definition of colloids. Solids in liquids(sols), preparation, purification,properties - kinetic,optical,electrical. Stability of colloids, Hardy-Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels)preparation, uses.
Adsorption: Physical adsoption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Syllabus for the Academic Year 2013-14

Department : CHEMISTRY Paper : 1 Class: BSc Semester: I

Atomic Structure and elementary quantum mechanics Blackbody radiation, Planck's radiation law, photoelectric effect, Compton effect, de Broglie's hypothesis, Heisenberg's uncertainty principle. Postulates of quantum mechanics.
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Syllabus for the Academic Year 2013-14

Department : CHEMISTRY Paper : 2 Class: BSc Semester: II

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inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions.
Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbo cations.
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Solutions Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure – composition and vapour pressure-temperature curves. Azeotropes-HCl-H_2O,
ethanol-water systems and fractional distillation. Partially miscible liquids-phenolwater,trimethylamine-water, nicotine-water systems. Effect of impurity on consulate temperature.
Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.
Colloids and surface chemistry Definition of colloids. Solids in liquids(sols), preparation, purification,properties - kinetic,optical,electrical. Stability of colloids, Hardy-Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels)preparation, uses.
Adsorption: Physical adsoption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption .

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Syllabus for the Academic Year 2018-19

DEPARTMENT: CHEMISTRY PAPER:3 CLASS: B. SC. SEMESTER: III

Chemistry of d-block elements:Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties.
Ability to form complexes. Stability of various oxidation states.Theories of bonding in metals: Metallic properties and its limitations, Valence bond theory, Free electron theory,
Explanation of thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors
Semiconductors and insulators. Metal carbonyls EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn
Structures and shapes of metal carbonyls of Fe, Co and Ni. Chemistry of f-block elements:Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction,
Magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.
Halogen compounds: Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aryl alkyl, allyl, vinyl, benzyl halides. Nucleophilic aliphatic substitution reaction
classification intoSN1 andSN2 – reaction mechanism with examples – Ethyl chloride, t-butyl chloride and optically active alkyl halide 2-bromobutane.Hydroxycompounds : Nomenclature and classification of hydroxycompounds.Alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols. Phenols: Preparation i) from diazonium salt, ii) from aryl sulphonates, iii) from cumene.
Physical properties- Hydrogen bonding (intermolecular and intra molecular).Effect of hydrogen bonding on boiling point and solubility in water. Identification of alcohols by oxidation with KMnO4, Ceric ammonium nitrate, Luca's reagent and phenols by reaction with FeCl3. Chemical properties:a) Dehydration of alcohols.b) Oxidation of alcohols by CrO3, KMnO4.
Special reaction of phenols: Bromination, Kolbe-Schmidt reaction, Riemer-Tiemann reaction, Fries rearrangement, azocoupling, Pinacol-Pinacolone rearrangement.
Carbonyl compounds: Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acidsPhysical properties: Reactivity of carbonyl group in aldehydes and ketones.Nucleophilic addition reaction with a) NaHSO3, b) HCN, c) RMgX, d) NH2OH, e)PhNHNH2, f) 2,4 DNPH, g) Alcohols-formation of hemiacetal and acetal.
Base catalysed reactions: a) Aldol, b) Cannizzaro's reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction.Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones.Reduction: Clemmensen reduction, Wolf-Kishner reduction,
MPV reduction, reduction with LiAlH4 and NaBH4. Analysis of aldehydes and ketones with a) 2,4-DNPH test, b) Tollen's test, c) Fehling test, d) Schiff's test e) Haloform test (with equation)
Carboxylic acids and derivatives: Nomenclature, classification and structure of carboxylic acids.

Methods of preparation by a) Hydrolysis of nitriles, amides b) Hydrolysis of esters by acids and bases with mechanism c) Carbonation of Grignard reagents.
Special methods of preparation of aromatic acids by a) Oxidation of side chain. b) Hydrolysis by benzotrichlorides. c) Kolbe reaction. Physical properties: Hydrogen bonding, dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids. Chemical properties
Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism).
Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell- Volhard- Zelinskyreaction.Active methylene compounds:Acetoacetic ester: keto –enoltautomerism, preparation by Claisen condensation,
Acid hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids b) Dicarboxylic acids. c) Reaction with urea Malonic ester: preparation from acetic acid.
Synthetic applications: Preparation of a) monocarboxylic acids (propionic acid and n-butyric acid). b) Dicarboxylic acids (succinic acid and adipic acid) c) α,β-unsaturated carboxylic acids (crotonic acid). d) Reaction with urea.

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Syllabus for the Academic Year 2018-19

DEPARTMENT: CHEMISTRY PAPER :4 CLASS: B.SC SEMESTER IV

Dilute solutions: Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.
Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties- Van't Hoff factor.
Electrochemistry-I: Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law
Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorfs method. Application of conductivity measurements-conductometric titrations.
Electrochemistry-II. Single electrode potential, sign convention, Reversible and irreversible cells Nernst Equation- Reference electrode.
Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode, Determination of EMF of cell, Applications of EMF measurements - Potentiometric titrations.
Phase rule: Concept of phase, components, degrees of freedom. Thermodynamic Derivation of Gibbs phase rule. Phase equilibrium of one component system - water system. Phase equilibrium of two- component system, solid-liquid equilibrium.
Simple eutectic diagram of Pb-Ag system, simple eutectic diagram, desilverisation of lead.,NaCl-Water system, Freezing mixtures.General features of absorption - Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers.
Application of Beer-Lambert law for quantitative analysis of 1.Chromium in $K_2Cr_2O_7$ 2. Manganese in Manganoussulphate.
Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals (σ, π, n).
Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation.

Concept of chromophore and auxochrome.
Infra red spectroscopy: Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules.
Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols carbonyls, and amines with one example to each.
Proton magnetic resonance spectroscopy (1H-NMR) Principles of nuclear magnetic resonance,
Equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals.Spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol,
Applications of NMR: acetaldehyde, 1, 1, 2-tribromo ethane, acetophenone.Applications of NMR: ethyl acetate, toluene and

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Syllabus for the Academic Year 2017-18

DEEPARTMENT: CHEMISTRY PAPER: 3 CLASS: B. Sc SEMESTER:III

Chemistry of d-block elements:Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties
Ability to form complexes. Stability of various oxidation states.Theories of bonding in metals:Metallic properties and its limitations, Valence bond theory, Free electron theory,
Explanation of thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors
Semiconductors and insulators. Metal carbonyls EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn
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Magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.
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Syllabus for the Academic Year 2017-18

DEPARTMENT: CHEMISTRY PAPER :4 CLASS:B.Sc SEMESTER:IV

Dilute solutions: Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.
Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties- Van't Hoff factor.
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Phase rule: Concept of phase, components, degrees of freedom. Thermodynamic Derivation of Gibbs phase rule. Phase equilibrium of one component system - water system. Phase equilibrium of two- component system, solid-liquid equilibrium.
Simple eutectic diagram of Pb-Ag system, simple eutectic diagram, desilverisation of lead.,NaCl-Water system, Freezing mixtures. General features of absorption
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DEPARTMENT: CHEMISTRY PAPER: 3 CLASS: II B.Sc. SEMESER:III

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classificationintoSN 1andSN 2– reaction mechanism with examples – Ethyl chloride, t-butyl chloride and optically active alkyl halide -2bromobutane. Hydroxycompounds : Nomenclature and classification of hydroxyl compounds.Alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols. Phenols: Preparation i) from diazonium salt, ii) from aryl sulphonates, iii) from cumene.
Physical properties- Hydrogen bonding (intermolecular and intra molecular).Effect of hydrogen bonding on boiling point and solubility in water. Identification of alcohols by oxidation with KMnO4, Ceric ammonium nitrate, Luca's reagent and phenols by reaction with FeCl .3Chemical properties:a) Dehydration of alcohols.b) Oxidation of alcohols by CrO3, KMnO.4
Special reaction of phenols: Bromination, Kolbe-Schmidt reaction, Riemer-Tiemann reaction, Fries rearrangement, azocoupling, Pinacol-Pinacolone rearrangement.Carbonyl compounds: Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids
Physical properties: Reactivity of carbonyl group in aldehydes and ketones.Nucleophilic addition reaction with a) NaHSO3, b) HCN, c) RMgX, d) NH2OH, e)PhNHNH2, f) 2, 4DNPH, g) Alcohols-formation of hemiacetal and acetal.Base catalysed reactions: a) Aldol, b) Cannizzaro's reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction. Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf-Kishner

reduction.
MPV reduction, reduction with LiAlH4and NaBH .4Analysis of aldehydes and ketones with a) 2,-4 DNPH test, b) Tollen's test, c) Fehling test, d) Schiff's test e) Haloform test (with equation)
Carboxylic acids and derivatives: Nomenclature, classification and structure of carboxylic acids. Methods of preparation by a) Hydrolysis of nitriles, amides b) Hydrolysis of esters by acids and bases with mechanism c) Carbonation of Grignard reagents.
Special methods of preparation of aromatic acids by a) Oxidation of side chain. b) Hydrolysis by benzotrichlorides. c) Kolbe reaction. Physical properties: Hydrogen bonding
dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids. Chemical properties
Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism).
Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction.
Active methylene compounds:Acetoacetic ester: keto –enoltautomerism, preparation by Claisen condensation,
Acid hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids b) Dicarboxylic acids. c) Reaction with urea Malonic ester: preparation from acetic acid.
Synthetic applications: Preparation of a) monocarboxylic acids (propionic acid and n-butyric acid). b) Dicarboxylic acids (succinic acid and adipic acid
α, β-unsaturated carboxylic acids (crotonic acid). d) Reaction with urea.

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Syllabus for the Academic Year 2016-17

DEPARTMENT: CHEMISTRY PAPER: 4 CLASS: II B.Sc. SEMESER:IV

Dilute solutions: Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.
Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties- Van't Hoff factor.
Electrochemistry-I: Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law
Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorfs method. Application of conductivity measurements-conductometric titrations.
Electrochemistry-II. Single electrode potential, sign convention, Reversible and irreversible cells Nernst Equation- Reference electrode.
Phase rule: Concept of phase, components, degrees of freedom. Thermodynamic Derivation of Gibbs phase rule. Phase equilibrium of one component system - water system. Phase equilibrium of two- component system, solid-liquid equilibrium.
Simple eutectic diagram of Pb-Ag system, simple eutectic diagram, desilverisation of lead.,NaCl-Water system, Freezing mixtures. General features of absorption
Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers.Application of Beer-
Lambert law for quantitative analysis of 1.Chromium in K2Cr2O7 2. Manganese in Manganoussulphate.Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and
types of molecular spectra. Energy levels of molecular orbitals (σ, π, n).Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation..
Concept of chromophore and auxochrome
Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols carbonyls.
amines with one example to each.Proton magnetic resonance spectroscopy (1H-NMR) Principles of nuclear magnetic resonance,
Equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals. Spin-spin coupling, coupling constants.
Applications of NMR with suitable examples - ethyl bromide, ethanol,
Applications of NMR: acetaldehyde, 1, 1, -2tribromo ethane, acetophenone. Applications of NMR: ethyl acetate, toluene and

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Syllabus for the Academic Year 2015-16

DEPARTMENT:CHEMSITRY PAPER:3 CLASS: B.Sc SEMESTER: III

Chemistry of d-block elements: Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties, color and ability to form complexes.
Stability of various oxidation states and e.m.f. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu traids in respect of electronic configuration and reactivity of different oxidation states.
Chemistry of f-block elements: Chemistry of lanthanides – electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties, spectral properties
Separation of lanthanides by ion exchange and solvent extraction methods. Chemistry of actinides – electronic configuration, oxidation states, actinide contraction, position of actinides in the periodic table,
Comparison with lanthanides in terms of magnetic properties, spectral properties and complex formation.
Theories of bonding in metals: Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory,
Thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors and insulators.
Metal carbonyls and related compounds – EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of Fe, Co and Ni. Metal nitrosyls and metallocenes (only ferrocene).
Halogen compounds Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl halides. Chemical Reactivity, formation of RMgX Nucleophilic aliphatic substitution reaction- classification into SN1 and SN2.
Hydroxy compounds: Nomenclature and classification of hydroxy compounds. Alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols. Phenols: Preparation i) from diazonium salt, ii) from aryl sulphonates, iii) from cumene. Physical properties- Hydrogen bonding (intermolecular and intramolecular). Effect of hydrogen bonding on boiling point and solubility in water.
Chemical properties: a. Acidic nature of phenols. b.Formation of alkoxides/phenoxides and their reaction with RX. c. Replacement of OH by X using PCl_5, PCl_3, PBr_3, $SOCl_2$ and with HX/$ZnCl_2$. d. Esterification by acids (mechanism). e. Dehydration of alcohols. f. oxidation of alcohols by CrO_3, $KMnO_4$. g. Special reaction of phenols: Bromination, Kolb-Schmidt reaction, Riemer- Tiemann reaction, Fries rearrangement, azocoupling. Identification of alcohols by oxidation with $KMnO_4$, ceric ammonium nitrate, lucas reagent and phenols by reaction with $FeCl_3$. Polyhydroxy compounds: Pinacol-Pinacolone rearrangement.
Carbonyl compounds: Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the

carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.
Physical properties: absence of hydrogen bonding, keto-enol tautomerism, reactivity of carbonyl group in aldehydes and ketones. Nucleophilic addition reaction with a) NaHSO3, b) HCN, c) RMgX, d) NH2OH, e)PhNHNH2, f) 2,4 DNPH, g) Alcohols-formation of hemiacetal and acetal. Halogenation using PCl5 with mechanism. Base catalysed reactions: a) Aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction.
Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with LiAlH4 and NaBH4. Analysis of aldehydes and ketones with a) 2,4-DNP test, b) Tollen's test, c) Fehling test, d) Schiff test, e) Haloform test (with equation).
Carboxylic acids and derivatives: Nomenclature, classification and structure of carboxylic acids. Methods of preparation by a) hydrolysis of nitriles, amides and esters. b) carbonation of Grignard reagents. Special methods of preparation of aromatic acids by a) oxidation of side chain. b) hydrolysis by benzotrichlorides. c) Kolbe reaction. Physical properties: Hydrogen bonding, dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids.
Chemical properties: Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard- Zelinsky reaction. Derivatives of carboxylic acids: Reaction of acid chlorides, acid anhydrides, acid amides, esters (mechanism of the hydrolysis of esters by acids and bases).
Active methylene compounds: Acetoacetic esters: preparation by Claisen condensation, keto-enol tautomerism. Acid hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids. b) dicarboxylic acids. Reaction with urea.
Malonic ester: preparation from acetic acid. Synthetic applications: Preparation of a) Monocarboxylic acids (propionic acid and n-butyric acid). b) Dicarboxylic acids (succinic acid and adipic acid). c) α, ß-unsaturated carboxylic acids (crotonic acid).

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Syllabus for the Academic Year 2015-16

DEPARTMENT:CHEMSITRY PAPER:4 CLASS: B.Sc SEMESTER: IV

Phase rule: Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule. Phase equilibrium of one component – water system. Phase equilibrium of twocomponent system, solid-liquid equilibrium.
Simple eutectic diagram of Pb-Ag system, desilverisation of lead. Solid solutions- compound with congruent melting point- (Mg-Zn) system, compound with incongruent melting point – NaCl- water system. Freezing mixtures.
Dilute solutions: Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point
depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties. Van't Hoff factor, degree of dissociation and association.
Electrochemistry: Specific conductance, equivalent conductance, measurement of equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law.
Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorf's method.
Application of conductivity measurements determination of dissociation constant (Ka) of an acid, determination of solubility product of sparingly soluble salt, conductometric titrations.
Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, single electrode potential, standard Hydrogen electrode, reference electrodes, standard electrode potential, sign convention, electrochemical series and its significance
Reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF Potentiometric titrations
Molecular symmetry: Concept of symmetry in chemistry-symmetry operations, symmetry elements. Rotational axis of symmetry and types of rotational axes. Planes of symmetry and types of planes
Improper rotational axis of symmetry. Inversion centre. Identity element. The symmetry operations of a molecule form a group. Flow chart for the identification of molecular point group.
Stereochemistry of carbon compounds: Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae. Stereoisomerism, Stereoisomers: enantiomers, diastereomers- definition and examples.Conformational and configurational isomerism- definition. Conformational isomerism of

ethane and nbutane.
Enantiomers: Optical activity- wave nature of light, plane polarised light, interaction with molecules, optical rotation and specific rotation. Chiral moleculesdefinition and criteria- absence of plane, center, and Sn axis of symmetryasymmetric and disymmetric molecules. Examples of asymmetric molecules(Glyceraldehyde, Lactic acid, Alanine) and disymmetric molecules (trans -1,2-dichloro cyclopropane).
Chiral centers: definition- molecules with similar chiral carbon (Tartaric acid), definition of mesomers- molecules with dissimilar chiral carbons (2,3- dibromopentane). Number of enantiomers and mesomers- calculation. D, L and R, S configuration for asymmetric and disymmetric molecules. Cahn- Ingold-Prelog rules. Racemic mixture- racemisation and resolution techniques. Diastereomers: definition- geometrical isomerism with reference to alkenes- cis, trans and E,Z- configuration.
Introductory treatment to: a) Pericyclic Reactions: Concerted reactions, Molecular orbitals, Symmetry properties HOMO, LUMO, Thermal and photochemical pericyclic reactions. Types of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions – one example each. b) Synthetic strategies: Terminology – Disconnection (dix), Symbol ( ), synthon, synthetic equivalent (SE), Functional group interconversion (FGI), Target molecule (TM). Retrosynthesis of the following molecules 1) acetophenone 2) cyclohexene
Asymmetric (Chiral) synthesis: Definitions-Asymmetric synthesis, enantiomeric excess, diastereomeric excess. stereospecific reaction, definition, example, dehalogenation of 1,2-dibromides by I-. stereoselective reaction, definition, example, acid catalysed dehydration of 1-phenylproponol. 4. General Principles of Inorganic qualitative analysis a) Solubility product, common ion effect, characteristic reactions of anions, elimination of interfering anions, separation of cations into groups, group reagents, testing of cations.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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DEPARTMENT: CHEMISTRY PAPER:3 SEMESTER – III

Chemistry of d-block elements: Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties, color and ability to form complexes.
Stability of various oxidation states and e.m.f. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu traids in respect of electronic configuration and reactivity of different oxidation states.
Chemistry of f-block elements: Chemistry of lanthanides – electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties, spectral properties
Separation of lanthanides by ion exchange and solvent extraction methods. Chemistry of actinides – electronic configuration, oxidation states, actinide contraction, position of actinides in the periodic table,
Comparison with lanthanides in terms of magnetic properties, spectral properties and complex formation.
Theories of bonding in metals: Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory,
Thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors and insulators.
Metal carbonyls and related compounds – EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of Fe, Co and Ni. Metal nitrosyls and metallocenes (only ferrocene).
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carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.
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Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with LiAlH4 and NaBH4. Analysis of aldehydes and ketones with a) 2,4-DNP test, b) Tollen's test, c) Fehling test, d) Schiff test, e) Haloform test (with equation).
Carboxylic acids and derivatives: Nomenclature, classification and structure of carboxylic acids. Methods of preparation by a) hydrolysis of nitriles, amides and esters. b) carbonation of Grignard reagents. Special methods of preparation of aromatic acids by a) oxidation of side chain. b) hydrolysis by benzotrichlorides. c) Kolbe reaction. Physical properties: Hydrogen bonding, dimeric association, acidity- strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids.
Chemical properties: Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard- Zelinsky reaction. Derivatives of carboxylic acids: Reaction of acid chlorides, acid anhydrides, acid amides, esters (mechanism of the hydrolysis of esters by acids and bases).
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Syllabus for the Academic Year 2014-15

DEPARTMENT: CHEMISTRY PAPER:4 SEMESTER - IV

Phase rule: Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule. Phase equilibrium of one component – water system. Phase equilibrium of twocomponent system, solid-liquid equilibrium.
Simple eutectic diagram of Pb-Ag system, desilverisation of lead. Solid solutions- compound with congruent melting point- (Mg-Zn) system, compound with incongruent melting point – NaCl- water system. Freezing mixtures.
Dilute solutions: Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point
depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties. Van't Hoff factor, degree of dissociation and association.
Electrochemistry: Specific conductance, equivalent conductance, measurement of equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law.
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Application of conductivity measurements determination of dissociation constant (Ka) of an acid, determination of solubility product of sparingly soluble salt, conductometric titrations.
Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, single electrode potential, standard Hydrogen electrode, reference electrodes, standard electrode potential, sign convention, electrochemical series and its significance
Reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF Potentiometric titrations
Molecular symmetry: Concept of symmetry in chemistry-symmetry operations, symmetry elements. Rotational axis of symmetry and types of rotational axes. Planes of symmetry and types of planes
Improper rotational axis of symmetry. Inversion centre. Identity element. The symmetry operations of a molecule form a group. Flow chart for the identification of molecular point group.
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Enantiomers: Optical activity- wave nature of light, plane polarised light, interaction with molecules, optical rotation and specific rotation. Chiral moleculesdefinition and criteria- absence of plane, center, and Sn axis of symmetryasymmetric and disymmetric molecules. Examples of asymmetric molecules(Glyceraldehyde, Lactic acid, Alanine) and disymmetric molecules (trans -1,2-dichloro cyclopropane).
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DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Syllabus for the Academic Year 2013-14

DEPARTMENT: CHEMISTRY PAPER: 3 II B.Sc. SEMESTER: III

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Stability of various oxidation states and e.m.f. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu traids in respect of electronic configuration and reactivity of different oxidation states.
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Separation of lanthanides by ion exchange and solvent extraction methods. Chemistry of actinides – electronic configuration, oxidation states, actinide contraction, position of actinides in the periodic table,
Comparison with lanthanides in terms of magnetic properties, spectral properties and complex formation.
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Thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors and insulators.
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DEPARTMENT: CHEMISTRY PAPER: 4 CLASS: II B.Sc SEMESTER: IV

Phase rule: Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule. Phase equilibrium of one component – water system. Phase equilibrium of twocomponent system, solid-liquid equilibrium.
Simple eutectic diagram of Pb-Ag system, desilverisation of lead. Solid solutions- compound with congruent melting point- (Mg-Zn) system, compound with incongruent melting point – NaCl- water system. Freezing mixtures.
Dilute solutions: Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point
depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties. Van't Hoff factor, degree of dissociation and association.
Electrochemistry: Specific conductance, equivalent conductance, measurement of equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law.
Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorf's method.
Application of conductivity measurements determination of dissociation constant (Ka) of an acid, determination of solubility product of sparingly soluble salt, conductometric titrations.
Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, single electrode potential, standard Hydrogen electrode, reference electrodes, standard electrode potential, sign convention, electrochemical series and its significance
Reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF Potentiometric titrations
Molecular symmetry: Concept of symmetry in chemistry-symmetry operations, symmetry elements. Rotational axis of symmetry and types of rotational axes. Planes of symmetry and types of planes
Improper rotational axis of symmetry. Inversion centre. Identity element. The symmetry operations of a molecule form a group. Flow chart for the identification of molecular point group.
Stereochemistry of carbon compounds: Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae. Stereoisomerism, Stereoisomers: enantiomers, diastereomers- definition and examples.Conformational and configurational isomerism- definition. Conformational isomerism of

ethane and nbutane.
Enantiomers: Optical activity- wave nature of light, plane polarised light, interaction with molecules, optical rotation and specific rotation. Chiral moleculesdefinition and criteria- absence of plane, center, and Sn axis of symmetryasymmetric and disymmetric molecules. Examples of asymmetric molecules(Glyceraldehyde, Lactic acid, Alanine) and disymmetric molecules (trans -1,2-dichloro cyclopropane).
Chiral centers: definition- molecules with similar chiral carbon (Tartaric acid), definition of mesomers- molecules with dissimilar chiral carbons (2,3- dibromopentane). Number of enantiomers and mesomers- calculation. D, L and R, S configuration for asymmetric and disymmetric molecules. Cahn- Ingold-Prelog rules. Racemic mixture- racemisation and resolution techniques. Diastereomers: definition- geometrical isomerism with reference to alkenes- cis, trans and E,Z- configuration.
Introductory treatment to: a) Pericyclic Reactions: Concerted reactions, Molecular orbitals, Symmetry properties HOMO, LUMO, Thermal and photochemical pericyclic reactions. Types of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions – one example each. b) Synthetic strategies: Terminology – Disconnection (dix), Symbol ( ), synthon, synthetic equivalent (SE), Functional group interconversion (FGI), Target molecule (TM). Retrosynthesis of the following molecules 1) acetophenone 2) cyclohexene
Asymmetric (Chiral) synthesis: Definitions-Asymmetric synthesis, enantiomeric excess, diastereomeric excess. stereospecific reaction, definition, example, dehalogenation of 1,2-dibromides by I-. stereoselective reaction, definition, example, acid catalysed dehydration of 1-phenylproponol. 4. General Principles of Inorganic qualitative analysis a) Solubility product, common ion effect, characteristic reactions of anions, elimination of interfering anions, separation of cations into groups, group reagents, testing of cations.

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Syllabus for the Academic Year 2018-19

Department : Chemistry Paper : IV Class: III B.SC. Semester:V

Nitro hydrocarbons: Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form.
Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid),Nef reaction and Mannich reaction leading to Micheal addition and reduction.
Nitrogen compounds: Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.
Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.
Heterocyclic Compounds: Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,- dicarbonyl compounds, Paul-Knorr synthesis. Properties : Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.
Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.
Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).
(-) Fructose (ketohexose) - Evidence of 2 - ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula)
osazone formation from glucose and fructose – Definition of anomers with examples. Interconversion of Monosaccharides: Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method).
Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation.

Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)
Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples,
Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples.
Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid Malonic ester synthesis c) strecker's synthesis.
Physical properties: Zwitter ion structure - salt like character - solubility, melting points amphoteric character, definition of isoelectric point.
Chemical properties: General reactions due to amino and carboxyl groups
lactams from gamma and delta amino acids by heating peptide bond (amide linkage).
Structure and nomenclature of peptides and proteins.

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Syllabus for the Academic Year 2018-19

DEPARTMENT:CHEMISTRY PAPER: VI (CLUSTER – I) CLASS: B. Sc. SEMESTER:VI

UNIT – IV: Electronic spectra of poly atomic molecules
Chemical analysis by electronic spectroscopy, Beer-Lambert's law. Deviation from Beer's law.
Quantitative determination of metal ions Mn^{+2}
Quantitative determination of metal ions Fe^{+2}, NO^{2-}, Pb^{+2}. Simultaneous determination of chromium and manganese in a mixture.
UNIT – III: Electronic spectra of diatomic molecules. The Born-Oppenheimer approximation. Vibrational course structure: bond association and bond sequence.
Intensity of vibrational-electronic spectra: The Franck-Condon principle. Rotational fine structure electronic vibration transitions.
Electronic structure of di atomic molecules, chromophores.
Types of transitions, conjugated dienes, trienesamdpolyenes
Wood ward – Fieser rules..
Unsaturated carbonyl compounds
UNIT – 1: NMR Spectroscopy: Nuclear spin, principles of NMR, Classical and quantum mechanical methods, magnetic moment and spin angular momentum,
Larmour frequency. Instrumentation. Relaxation spin-spin and spin lattice relaxation. Shielding constants, chemical shifts, shielding and deshielding mechanism factors. Influencing chmical shift. Spin-spin interactions,
Coupling constants. Factors influencing coupling constants. **UNIT – II**: Spin decoupling, chemical shift reagents and nuclear over hauser effect. Applications in medical diagnostics. Reaction kinetics and mechanically induced dynamic nuclear polarization. FT NMR and its advantages.
UNIT – V: ESR Spectroscopy: Basic principles, theory of ESR, comparison of NMR and ESR. Instrumentation, factors affecting 'g'value, determination of g value. Isotopic and anisotropic constants. Splitting hyper fine splitting coupling constants.
Line width, zero field splitting and Kramer degeneracy, crystal field splitting, crystal field effects. Applications of ESR: detection of free radicals.
ESR spectra of methyl radical, benzene anion, isoquene $[Cu(H_2O)_6]^{2+}$, $[Fe(CN)_5NO]^{-3}$

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Syllabus for the Academic Year 2018-19

Department : Chemistry **Paper : CLUSTER -2** **Class: III B.SC.** **Semester:VI**

Organic photochemistry : Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer. Energies properties and reaction of singlet and triplet states of and transitions.
Photochemical reactions **:** (a) Photoreduction, mechanism, influence of temperature, solvent, nature of hydrogen donors, structure of substrates on the course of photo reduction.
Norrisch cleavages, type I : Mechanism, acyclic cyclicdiones, influence of sensitizer, photo Fries rearrangement. Norrisch type II cleavage : Mechanism and stereochemistry, type II reactions of esters : 1: 2 diketones, photo decarboxylation.,
Di - π methane rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites – Barton reaction.
PROTECTING GROUPS AND ORGANIC REACTIONS Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal,ketal and carbonate formation.
(3) Protection of carboxylic acids – ester formation, benzyl and t–butyl esters, (4) Protection of amines – acetylation, benzoylation, benzyloxy carbonyl, triphenyl methyl groups and fmoc,
(5) Protection of carbonyl groups – acetal, ketal, 1,2–glycols and 1,2–dithioglycols formation
Synthetic reactions : Mannich reaction – Mannich bases – Robinson annulations The Shapiro reaction,
Stork–enamine reaction. Use of dithioacetals – Umpolung,
phase transfercatalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction.
Baylis–Hillman reaction, RCM olefm metathesis, Grubb catalyst
Mukayama aldol reaction, Mitsunobu reaction, McMurrey reaction,
Julia–Lythgoe olefination, and Peterson's stereoselective olefination, Heck reaction,
Suziki coupling, Stille coupling
Sonogishira coupling, Buchwald–Hartwig coupling.
. Ugi reaction, Click reaction

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Syllabus for the Academic Year 2018-19

Department : Chemistry **Paper : CLUSTER -3** **Class: III B.SC.** **Semester: VI**

Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,
Pharmacokinetics (ADME, Receptors - brief treartment) Metabolites and Anti metabolites.
Drugs: Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each, Administration of drugs
Classification: Classification based on structures and therapeutic activity with one example each.
Administration of drugs Synthesis and therapeutic activity of the compounds: a. Chemotheraputic Drugs l.Sulphadrugs(Sulphamethoxazole)
2.Antibiotics - β-Lactam Antibiotics
Macrolide Antibiotics, 3. Anti malarial Drugs(chloroquine)
b.Psycho therapeutic Drugs:1.Anti- pyretics (Paracetamol) 2.Hypnotics,
3.Tranquilizers(Diazepam)4.Levodopa
Pharmacodynamic Drugs**:** 1. Antiasthma Drugs (Solbutamol) 3. Antianginals (Glycerol Trinitrate).
Diuretics(Frusemide) HIV-AIDS: Immunity
CD-4cells, CD-8cells
Retro virus, Replication in human body
Investigation available, prevention of AIDS
Drugs available - examples with structures: PIS: Indivanir (crixivan)
Nelfinavir(Viracept).

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Syllabus for the Academic Year 2017-18

Department : Chemistry Paper : IV Class: III B.SC Semester: V

Nitro hydrocarbons: Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form.
Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid),Nef reaction and Mannich reaction leading to Micheal addition and reduction.
Nitrogen compounds:Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods – 1. Ammonolysis alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.
Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.
Heterocyclic Compounds: Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,- dicarbonyl compounds, Paul-Knorr synthesis. Properties : Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.
Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.
Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).
(-) Fructose (ketohexose) - Evidence of 2 - ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula)
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Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation.

Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)
Amino acids and proteins Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples
Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples.
Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid Malonic ester synthesis c) strecker's synthesis.
Physical properties: Zwitter ion structure - salt like character - solubility, melting points amphoteric character, definition of isoelectric point.
Chemical properties: General reactions due to amino and carboxyl groups
lactams from gamma and delta amino acids by heating peptide bond (amide linkage).
Structure and nomenclature of peptides and proteins.

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Syllabus for the Academic Year 2017-18

DEPARTMENT: CHEMISTRY PAPER: VI (CLUSTER – I) CLASS: B.Sc. SEMESTER: VI

UNIT – IV: Electronic spectra of poly atomic molecules
Chemical analysis by electronic spectroscopy, Beer-Lambert's law. Deviation from Beer's law.
Quantitative determination of metal ions Mn^{+2}
Quantitative determination of metal ions Fe^{+2}, NO^{2-}, Pb^{+2}. Simultaneous determination of chromium and manganese in a mixture.
UNIT – III: Electronic spectra of diatomic molecules. The Born-Oppenheimer approximation. Vibrational course structure: bond association and bond sequence.
Intensity of vibrational-electronic spectra: The Franck-Condon principle. Rotational fine structure electronic vibration transitions.
Electronic structure of di atomic molecules, chromophores.
Types of transitions, conjugated dienes, trienesamdpolyenes
Wood ward – Fieser rules..
Unsaturated carbonyl compounds
UNIT – 1: NMR Spectroscopy: Nuclear spin, principles of NMR, Classical and quantum mechanical methods, magnetic moment and spin angular momentum,
Larmour frequency. Instrumentation. Relaxation spin-spin and spin lattice relaxation. Shielding constants, chemical shifts, shielding and deshielding mechanism factors. Influencing chmical shift. Spin-spin interactions,
Coupling constants. Factors influencing coupling constants. **UNIT – II**: Spin decoupling, chemical shift reagents and nuclear over hauser effect. Applications in medical diagnostics. Reaction kinetics and mechanically induced dynamic nuclear polarization. FT NMR and its advantages.
UNIT – V: ESR Spectroscopy: Basic principles, theory of ESR, comparison of NMR and ESR. Instrumentation, factors affecting 'g'value, determination of g value. Isotopic and anisotropic constants. Splitting hyper fine splitting coupling constants.
Line width, zero field splitting and Kramer degeneracy, crystal field splitting, crystal field effects. Applications of ESR: detection of free radicals.
ESR spectra of methyl radical, benzene anion, isoquene $[Cu(H_2O)_6]^{2+}$, $[Fe(CN)_5NO]^{-3}$

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Syllabus for the Academic Year 2017-18

Department : Chemistry Paper : CLUSTER- 2 Class: III B.SC. Semester: VI

Organic photochemistry : Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer. Energies properties and reaction of singlet and triplet states of and transitions.
Photochemical reactions **:** (a) Photoreduction, mechanism, influence of temperature, solvent, nature of hydrogen donors, structure of substrates on the course of photo reduction,.
Norrisch cleavages, type I : Mechanism, acyclic cyclicdiones, influence of sensitizer, photo Fries rearrangement. Norrisch type II cleavage : Mechanism and stereochemistry, type II reactions of esters : 1: 2 diketones, photo decarboxylation.,
Di - π methane rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites – Barton reaction.
PROTECTING GROUPS AND ORGANIC REACTIONS : Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal,ketal and carbonate formation.
(3) Protection of carboxylic acids – ester formation, benzyl and t–butyl esters, (4) Protection of amines – acetylation, benzoylation, benzyloxy carbonyl, triphenyl methyl groups and fmoc,
(5) Protection of carbonyl groups – acetal, ketal, 1,2–glycols and 1,2–dithioglycols formation
Synthetic reactions : Mannich reaction – Mannich bases – Robinson annulations The Shapiro reaction,
Stork–enamine reaction. Use of dithioacetals – Umpolung,
phase transfercatalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction.
Baylis–Hillman reaction, RCM olefm metathesis, Grubb catalyst
Mukayama aldol reaction, Mitsunobu reaction, McMurrey reaction,
Julia–Lythgoe olefination, and Peterson's stereoselective olefination, Heck reaction,
Suziki coupling, Stille coupling
Sonogishira coupling, Buchwald–Hartwig coupling.
Ugi reaction, Click reaction

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Syllabus for the Academic Year 2017-18

Department : Chemistry Paper :CLUSTER- 3 Class: III B.SC. Semester: VI

Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,
Pharmacokinetics (ADME, Receptors - brief treartment) Metabolites and Anti metabolites.
Drugs: Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each, Administration of drugs
Classification: Classification based on structures and therapeutic activity with one example each
Administration of drugs Synthesis and therapeutic activity of the compounds: a. Chemotheraputic Drugs l.Sulphadrugs(Sulphamethoxazole)
Antibiotics - β-Lactam Antibiotics
Macrolide Antibiotics, 3. Anti malarial Drugs(chloroquine)
b.Psycho therapeutic Drugs:1.Anti- pyretics (Paracetamol) 2.Hypnotics,
3.Tranquilizers(Diazepam)4.Levodopa
Pharmacodynamic Drugs: 1. Antiasthma Drugs (Solbutamol)3. Antianginals(Glycerol Trinitrate)
Diuretics(Frusemide) HIV-AIDS: Immunity
CD-4cells, CD-8cells
Retro virus, Replication in human body
Investigation available, prevention of AIDS
Drugs available - examples with structures: PIS: Indivanir (crixivan)
Nelfinavir(Viracept).

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Syllabus for the Academic Year 2016-17

Department : Chemistry Paper : IV Class: III B.SC. Semester: V

Solvent extraction: Principle and process, Batch extraction, continuousextraction and counter current extraction. Application – Determination of Iron (III)
Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon,
Nature of adsorbents, solventsystems, Rf values, factors effecting Rf values.
Paper Chromatography: Principles, Rf values, experimental procedures,choice of paper and solvent systems, developments of chromatogram –ascending, descending and radial. Two dimensional chromatography,applications.
Thin layer Chromatography (TLC): Advantages. Principles, factorseffecting Rf values. Experimental procedures. Adsorbents andsolvents. Preparation of plates. Development of the chromatogram.Detection of the spots. Applications. Column Chromatography: Principles, experimental procedures,Stationary and mobile Phases, Separation technique. Applications.
High Performance Liquid Chromatography (HPLC): Principles andApplications.
Gas Liquid Chromatography (GLC): Principles and Applications.
General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and doublebeam spectrophotometers.
Application of Beer-Lambert law for quantitativeanalysis of **1**. Chromium in $K_2Cr_2O_7$ **2**. Manganese in manganous sulphate **3**. Iron (III) with thiocyanate.
Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals.
Energy levels of molecules (σ,π, n) . Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.
Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecularvibration spectrum, selection rules. Determination of force constant.
Qualitativerelation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules.
Characteristic absorption bands of various functional groups. Finger print region of infrared spectrum. Raman spectroscopy: Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Proton magnetic resonance spectroscopy (1H-NMR) Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, and acetophenone.
spectral interpretation**:** interpretation of IR, UV-Visible, proton NMR and mass spectral data of the following compounds 1. phenyl acetylene 2. Acetophenone 3. Cinnamic acid 4. P- nitro aniline.
Catalysis: Homogeneous and heterogeneous catalysis, comparision with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar.Kinetics of specific base catalyzed reactions, base catalyzed conversion ofacetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis ofesters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms ofheterogeneous catalysis. Langmuir-Hinshelwood mechanism.
Enzymecatalysis: Characteristics and classification.kinetics of enzyme catalysed reactions- Michael's –Menton law, significane of Michael's constant(Km) and maximum velocity (Vmax) . factors affecting enzyme catalysis- effect of temperature, P^H, concentration and inhibitor, catalytic efficiency. Mechanism of ethanol by alcohol dehydrogenase .

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Syllabus for the Academic Year 2016-17

Department : Chemistry Paper : IV Class: III B.SC. Semester: VI

Introduction: Drug, disease (definition), Historical evolution, Sources – Plant,Animal synthetic, Biotechnology and human gene therapy Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,Pharmacokinetics (ADME, Receptors – brief teartment) Metabolites and Antimetabolites. Nomenclature: Chemical name and Generic name
Classification: Classification based on structures and therapeutic activity withone example each. Synthesis: Synthesis and therapeutic activity of the following drugs, L-Dopa,Chloroquin, Omeprazole, Paracetamol, Sulphamethoxazole.
Drug Development: Pencillin, Separation and isolation, structures of differentpencillins. HIV-AIDS: ImmUnity – CD-4 cells, CD-8 cells Retrovirus, replication inhuman body. Investigation available, prevention of AIDS. Drugs available –examples with clinical uses: PIS: Indinavir (Crixivan), Nelfinavir (Viracept),NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir(Ziagen), Lamivudine (Epivir, 3TC) Zidovudine (Retravir, AZT, ZDV) monographs of drugs: Eg paracetamol, sulpha methoxagole(tablets)
Need of conversion of drugs into medicine. Additives and their role (briefaccount only) Different types of formulations.
introduction to pesticides-types – insecticides,fungicides,herbicides,weedicides, Rodenticides,plant growth regulators,pheromones and hormones. Brief discussion with examples,structures of the following. Synthesis and present status of the following DDT,BHC, Malathion, parathion,endrin,baygon, 2,4-D and endosulphon.
Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry.Green synthesis: Evalution of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no byproduct).
Selection of solvent: i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis iv) Solvent free reactions (solid phase reactions) ii) green catalysts:1). phase transfer catalysts.2) bio catalysts
microwave and ultra sound essisted green synthesis; 1.aldol condensation 2. Cannizaro reaction 3. Diels alder reaction 4. Strecker synthesis 5. Williamson synthesis 6. Bieckmann condensation
Classification of polymers, definition and mechanismsof polymerization methods- chain polymerization, step polymerization,coordination polymerization – tacticity.
Co-Polymerization. Molecular weightof polymers-number average and weight average molecular weight, degree ofpolymerization, determination of molecular weight of polymers by viscometryand Osmometry.
Preparation and industrial application of polyethylene, PVC,Teflon, polyacrylonitrile, terelene and Nylon66. Introduction tobiodegradability.
Superconductivity, characteristics of superconductors,Meissner effect,
Types of superconductors and applications.Nanomaterials- synthetic techniques, bottom-up-sol-gel method,
top-downelectrondeposition method. Properties and applications of nano-materials
Composites-definition, general characteristics,
particle reinforce and fiber reinforce composites and their applications.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Syllabus for the Academic Year 2015-16

Department : Chemistry Paper : IV Class: III B.SC. Semester: V

Solvent extraction: Principle and process, Batch extraction, continuousextraction and counter current extraction. Application – Determination of Iron (III)
Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon,
Nature of adsorbents, solventsystems, Rf values, factors effecting Rf values.
Paper Chromatography: Principles, Rf values, experimental procedures,choice of paper and solvent systems, developments of chromatogram –ascending, descending and radial. Two dimensional chromatography,applications.
Thin layer Chromatography (TLC): Advantages. Principles, factorseffecting Rf values. Experimental procedures. Adsorbents andsolvents. Preparation of plates. Development of the chromatogram.Detection of the spots. Applications. Column Chromatography: Principles, experimental procedures,Stationary and mobile Phases, Separation technique. Applications.
High Performance Liquid Chromatography (HPLC): Principles andApplications.
Gas Liquid Chromatography (GLC): Principles and Applications.
General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and doublebeam spectrophotometers.
Application of Beer-Lambert law for quantitativeanalysis of **1**. Chromium in $K_2Cr_2O_7$ **2**. Manganese in manganous sulphate **3**. Iron (III) with thiocyanate.
Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals.
Energy levels of molecules (σ,π, n) . Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.
Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecularvibration spectrum, selection rules. Determination of force constant.
Qualitativerelation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules.
Characteristic absorption bands of various functional groups. Finger print region of infrared spectrum. Raman spectroscopy: Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Proton magnetic resonance spectroscopy: (1H-NMR) Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, and acetophenone.
spectral interpretation: interpretation of IR, UV-Visible, proton NMR and mass spectral data of the following compounds 1. phenyl acetylene 2. Acetophenone 3. Cinnamic acid 4. P- nitro aniline.
Catalysis: Homogeneous and heterogeneous catalysis, comparision with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar.Kinetics of specific base catalyzed reactions, base catalyzed conversion ofacetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis ofesters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms ofheterogeneous catalysis. Langmuir-Hinshelwood mechanism.
Enzymecatalysis: Characteristics and classification.kinetics of enzyme catalysed reactions- Michael's –Menton law, significane of Michael's constant(Km) and maximum velocity (Vmax) . factors affecting enzyme catalysis- effect of temperature, P^H, concentration and inhibitor, catalytic efficiency. Mechanism of ethanol by alcohol dehydrogenase .

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

(A College with Potential for Excellence)

Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2015-16

Department : Chemistry Paper : IV Class: Semester: VI

Introduction: Drug, disease (definition), Historical evolution, Sources – Plant,Animal synthetic, Biotechnology and human gene therapyTerminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,Pharmacokinetics (ADME, Receptors – brief teartment) Metabolites and Antimetabolites. Nomenclature: Chemical name and Generic name
Classification: Classification based on structures and therapeutic activity withone example each. Synthesis: Synthesis and therapeutic activity of the following drugs, L-Dopa,Chloroquin, Omeprazole, Paracetamol, Sulphamethoxazole.
Drug Development: Pencillin, Separation and isolation, structures of different pencillins.HIV-AIDS: ImmUnity – CD-4 cells, CD-8 cells Retrovirus, replication inhuman body. Investigation available, prevention of AIDS. Drugs available –examples with clinical uses: PIS: Indinavir (Crixivan), Nelfinavir(Viracept),NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir(Ziagen), Lamivudine (Epivir, -3TC) Zidovudine (Retravir, AZT, ZDV) monographs of drugs: Eg paracetamol, sulpha methoxazole(tablets)
Need of conversion of drugs into medicine. Additives and their role (briefaccount only) Different types of formulations.
introduction to pesticides-types – insecticides,fungicides,herbicides,weedicides, Rodenticides,plant growth regulators,pheromones and hormones. Brief discussion with examples,structures of the following. Synthesis and present status of the following DDT,BHC, Malathion, parathion,endrin,baygon, 2,4-D and endosulphon.
Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry.Green synthesis: Evalution of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no byproduct).
Selection of solvent: i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis iv) Solvent free reactions (solid phase reactions) ii) green catalysts:1). phase transfer catalysts.2) bio catalysts
microwave and ultra sound essisted green synthesis; 1.aldol condensation 2. Cannizaro reaction 3. Diels alder reaction 4. Strecker synthesis 5. Williamson synthesis 6. Bieckmann condensation
Classification of polymers, definition and mechanismsof polymerization methods- chain polymerization, step polymerization,coordination polymerization – tacticity.
Co-Polymerization. Molecular weightof polymers-number average and weight average molecular weight, degree ofpolymerization, determination of molecular weight of polymers by viscometryand Osmometry.
Preparation and industrial application of polyethylene, PVC,Teflon, polyacrylonitrile, terelene and Nylon66. Introduction tobiodegradability.
Superconductivity, characteristics of superconductors,Meissner effect,
Types of superconductors and applications.Nanomaterials- synthetic techniques, bottom-up-sol-gel method,
Top-downelectrondeposition method. Properties and applications of nano-materials
Composites-definition, general characteristics,
Particle reinforce and fiber reinforce composites and their applications.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Bhimavaram, W.G.Dist, A.P
Syllabus for the Academic Year 2014-15

Department : Chemistry Paper : IV Class: III B.SC. Semester: V

Solvent extraction: Principle and process, Batch extraction, continuousextraction and counter current extraction. Application – Determination of Iron (III)
Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon,
Nature of adsorbents, solventsystems, Rf values, factors effecting Rf values.
Paper Chromatography: Principles, Rf values, experimental procedures,choice of paper and solvent systems, developments of chromatogram –ascending, descending and radial. Two dimensional chromatography,applications.
Thin layer Chromatography (TLC): Advantages. Principles, factorseffecting Rf values. Experimental procedures. Adsorbents andsolvents. Preparation of plates. Development of the chromatogram.Detection of the spots. Applications. Column Chromatography: Principles, experimental procedures,Stationary and mobile Phases, Separation technique. Applications.
High Performance Liquid Chromatography (HPLC): Principles andApplications.
Gas Liquid Chromatography (GLC): Principles and Applications.
General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and doublebeam spectrophotometers.
Application of Beer-Lambert law for quantitativeanalysis of **1**. Chromium in $K_2Cr_2O_7$ **2**. Manganese in manganous sulphate **3**. Iron (III) with thiocyanate.
Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals.
Energy levels of molecules (σ,π, n) . Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.
Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecularvibration spectrum, selection rules. Determination of force constant.
Qualitativerelation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules.
Characteristic absorption bands of various functional groups. Finger print region of infrared spectrum. Raman spectroscopy: Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Proton magnetic resonance spectroscopy**:** (1H-NMR) Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, and acetophenone.
spectral interpretation**:** interpretation of IR, UV-Visible, proton NMR and mass spectral data of the following compounds 1. phenyl acetylene 2. Acetophenone 3. Cinnamic acid 4. P- nitro aniline.
Catalysis: Homogeneous and heterogeneous catalysis, comparision with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar.Kinetics of specific base catalyzed reactions, base catalyzed conversion ofacetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis ofesters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms ofheterogeneous catalysis. Langmuir-Hinshelwood mechanism.
Enzymecatalysis: Characteristics and classification.kinetics of enzyme catalysed reactions- Michael's –Menton law, significane of Michael's constant(Km) and maximum velocity (Vmax) . factors affecting enzyme catalysis- effect of temperature, P^H, concentration and inhibitor, catalytic efficiency. Mechanism of ethanol by alcohol dehydrogenase .

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2014-15

Department : Chemistry Paper : IV Class: III B.SC. Semester: VI

Introduction: Drug, disease (definition), Historical evolution, Sources – Plant,Animal synthetic, Biotechnology and human gene therapyTerminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,Pharmacokinetics (ADME, Receptors – brief teartment) Metabolites and Antimetabolites. Nomenclature: Chemical name and Generic name
Classification: Classification based on structures and therapeutic activity withone example each. Synthesis: Synthesis and therapeutic activity of the following drugs, L-Dopa,Chloroquin, Omeprazole, Paracetamol, Sulphamethoxazole.
Drug Development: Pencillin, Separation and isolation, structures of different pencillins.HIV-AIDS: ImmUnity – CD-4 cells, CD-8 cells Retrovirus, replication inhuman body. Investigation available, prevention of AIDS. Drugs available –examples with clinical uses: PIS: Indinavir (Crixivan), Nelfinavir(Viracept),NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir(Ziagen), Lamivudine (Epivir, -3TC) Zidovudine (Retravir, AZT, ZDV) monographs of drugs: Eg paracetamol, sulpha methoxazole(tablets)
Need of conversion of drugs into medicine. Additives and their role (briefaccount only) Different types of formulations.
introduction to pesticides-types – insecticides,fungicides,herbicides,weedicides, Rodenticides,plant growth regulators,pheromones and hormones. Brief discussion with examples,structures of the following. Synthesis and present status of the following DDT,BHC, Malathion, parathion,endrin,baygon, 2,4-D and endosulphon.
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Selection of solvent: 3i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis iv) Solvent free reactions (solid phase reactions) ii) green catalysts:1). phase transfer catalysts.2) bio catalysts
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Classification of polymers, definition and mechanismsof polymerization methods- chain polymerization, step polymerization,coordination polymerization – tacticity.
Co-Polymerization. Molecular weightof polymers-number average and weight average molecular weight, degree ofpolymerization, determination of molecular weight of polymers by viscometryand Osmometry.
Preparation and industrial application of polyethylene, PVC,Teflon, polyacrylonitrile, terelene and Nylon66. Introduction tobiodegradability.
Superconductivity, characteristics of superconductors,Meissner effect,
Types of superconductors and applications.Nanomaterials- synthetic techniques, bottom-up-sol-gel method,
Top-downelectrondeposition method. Properties and applications of nano-materials
Composites-definition, general characteristics,
Particle reinforce and fiber reinforce composites and their applications.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Bhimavaram, W.G.Dist, A.P
Syllabus for the Academic Year 2013-14

Department : Chemistry Paper : IV Class: III B.SC. Semester: V

Solvent extraction: Principle and process, Batch extraction, continuousextraction and counter current extraction. Application – Determination of Iron (III)
Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon,
Nature of adsorbents, solventsystems, Rf values, factors effecting Rf values.
Paper Chromatography: Principles, Rf values, experimental procedures,choice of paper and solvent systems, developments of chromatogram –ascending, descending and radial. Two dimensional chromatography,applications.
Thin layer Chromatography (TLC): Advantages. Principles, factorseffecting Rf values. Experimental procedures. Adsorbents andsolvents. Preparation of plates. Development of the chromatogram.Detection of the spots. Applications. Column Chromatography: Principles, experimental procedures,Stationary and mobile Phases, Separation technique. Applications.
High Performance Liquid Chromatography (HPLC): Principles andApplications.
Gas Liquid Chromatography (GLC): Principles and Applications.
General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and doublebeam spectrophotometers.
Application of Beer-Lambert law for quantitativeanalysis of **1**. Chromium in $K_2Cr_2O_7$ **2**. Manganese in manganous sulphate **3**. Iron (III) with thiocyanate.
Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals.
Energy levels of molecules (σ,π, n) . Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.
Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecularvibration spectrum, selection rules. Determination of force constant.
Qualitativerelation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules.
Characteristic absorption bands of various functional groups. Finger print region of infrared spectrum. Raman spectroscopy: Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

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Enzymecatalysis: Characteristics and classification.kinetics of enzyme catalysed reactions- Michael's –Menton law, significane of Michael's constant(Km) and maximum velocity (Vmax) . factors affecting enzyme catalysis- effect of temperature, P^H, concentration and inhibitor, catalytic efficiency. Mechanism of ethanol by alcohol dehydrogenase

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2013-14

Department : Chemistry Paper : IV Class: III B.SC Semester: VI

Introduction: Drug, disease (definition), Historical evolution, Sources – Plant,Animal synthetic, Biotechnology and human gene therapyTerminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,Pharmacokinetics (ADME, Receptors – brief teartment) Metabolites and Antimetabolites. Nomenclature: Chemical name and Generic name
Classification: Classification based on structures and therapeutic activity withone example each. Synthesis: Synthesis and therapeutic activity of the following drugs, L-Dopa,Chloroquin, Omeprazole, Paracetamol, Sulphamethoxazole.
Drug Development: Pencillin, Separation and isolation, structures of different pencillins.HIV-AIDS: ImmUnity – CD-4 cells, CD-8 cells Retrovirus, replication inhuman body. Investigation available, prevention of AIDS. Drugs available –examples with clinical uses: PIS: Indinavir (Crixivan), Nelfinavir(Viracept),NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir(Ziagen), Lamivudine (Epivir, -3TC) Zidovudine (Retravir, AZT, ZDV) monographs of drugs: Eg paracetamol, sulpha methoxazole(tablets)
Need of conversion of drugs into medicine. Additives and their role (briefaccount only) Different types of formulations.
introduction to pesticides-types – insecticides,fungicides,herbicides,weedicides, Rodenticides,plant growth regulators,pheromones and hormones. Brief discussion with examples,structures of the following. Synthesis and present status of the following DDT,BHC, Malathion, parathion,endrin,baygon, 2,4-D and endosulphon.
Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry.Green synthesis: Evalution of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no byproduct).
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microwave and ultra sound essisted green synthesis; 1.aldol condensation 2. Cannizaro reaction 3. Diels alder reaction 4. Strecker synthesis 5. Williamson synthesis 6. Bieckmann condensation
Classification of polymers, definition and mechanismsof polymerization methods- chain polymerization, step polymerization,coordination polymerization – tacticity.
Co-Polymerization. Molecular weightof polymers-number average and weight average molecular weight, degree ofpolymerization, determination of molecular weight of polymers by viscometryand Osmometry.
Preparation and industrial application of polyethylene, PVC,Teflon, polyacrylonitrile, terelene and Nylon66. Introduction tobiodegradability.
Superconductivity, characteristics of superconductors,Meissner effect,
Types of superconductors and applications.Nanomaterials- synthetic techniques, bottom-up-sol-gel method,
Top-downelectrondeposition method. Properties and applications of nano-materials
Composites-definition, general characteristics,
Particle reinforce and fiber reinforce composites and their applications.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2018-19

Department : Chemistry Paper : IV Class: III B.SC. Semester:V

Nitro hydrocarbons: Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form.
Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid),Nef reaction and Mannich reaction leading to Micheal addition and reduction.
Nitrogen compounds: Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.
Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.
Heterocyclic Compounds: Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,- dicarbonyl compounds, Paul-Knorr synthesis. Properties : Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.
Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.
Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).
(-) Fructose (ketohexose) - Evidence of 2 - ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula)
osazone formation from glucose and fructose – Definition of anomers with examples. Interconversion of Monosaccharides: Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method).
Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation.

Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)
Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples,
Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples.
Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid Malonic ester synthesis c) strecker's synthesis.
Physical properties: Zwitter ion structure - salt like character - solubility, melting points amphoteric character, definition of isoelectric point.
Chemical properties: General reactions due to amino and carboxyl groups
lactams from gamma and delta amino acids by heating peptide bond (amide linkage).
Structure and nomenclature of peptides and proteins.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Bhimavaram, W.G.Dist, A.P
Syllabus for the Academic Year 2018-19

DEPARTMENT:CHEMISTRY PAPER: VI (CLUSTER – I) CLASS: B. Sc.
SEMESTER:VI

UNIT – IV: Electronic spectra of poly atomic molecules
Chemical analysis by electronic spectroscopy, Beer-Lambert's law. Deviation from Beer's law.
Quantitative determination of metal ions Mn^{+2}
Quantitative determination of metal ions Fe^{+2}, NO^{2-}, Pb^{+2}. Simultaneous determination of chromium and manganese in a mixture.
UNIT – III: Electronic spectra of diatomic molecules. The Born-Oppenheimer approximation. Vibrational course structure: bond association and bond sequence.
Intensity of vibrational-electronic spectra: The Franck-Condon principle. Rotational fine structure electronic vibration transitions.
Electronic structure of di atomic molecules, chromophores.
Types of transitions, conjugated dienes, trienesamdpolyenes
Wood ward – Fieser rules..
Unsaturated carbonyl compounds
UNIT – 1: NMR Spectroscopy: Nuclear spin, principles of NMR, Classical and quantum mechanical methods, magnetic moment and spin angular momentum,
Larmour frequency. Instrumentation. Relaxation spin-spin and spin lattice relaxation. Shielding constants, chemical shifts, shielding and deshielding mechanism factors. Influencing chmical shift. Spin-spin interactions,
Coupling constants. Factors influencing coupling constants. **UNIT – II**: Spin decoupling, chemical shift reagents and nuclear over hauser effect. Applications in medical diagnostics. Reaction kinetics and mechanically induced dynamic nuclear polarization. FT NMR and its advantages.
UNIT – V: ESR Spectroscopy: Basic principles, theory of ESR, comparison of NMR and ESR. Instrumentation, factors affecting 'g'value, determination of g value. Isotopic and anisotropic constants. Splitting hyper fine splitting coupling constants.
Line width, zero field splitting and Kramer degeneracy, crystal field splitting, crystal field effects. Applications of ESR: detection of free radicals.
ESR spectra of methyl radical, benzene anion, isoquene $[Cu(H_2O)_6]^{2+}$, $[Fe(CN)_5NO]^{-3}$

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Syllabus for the Academic Year 2018-19

Department : Chemistry **Paper : CLUSTER -2** **Class: III B.SC.** **Semester:VI**

Organic photochemistry : Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer. Energies properties and reaction of singlet and triplet states of and transitions.
Photochemical reactions **:** (a) Photoreduction, mechanism, influence of temperature, solvent, nature of hydrogen donors, structure of substrates on the course of photo reduction.
Norrisch cleavages, type I : Mechanism, acyclic cyclicdiones, influence of sensitizer, photo Fries rearrangement. Norrisch type II cleavage : Mechanism and stereochemistry, type II reactions of esters : 1: 2 diketones, photo decarboxylation.,
Di - π methane rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites – Barton reaction.
PROTECTING GROUPS AND ORGANIC REACTIONS Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal,ketal and carbonate formation.
(3) Protection of carboxylic acids – ester formation, benzyl and t–butyl esters, (4) Protection of amines – acetylation, benzoylation, benzyloxy carbonyl, triphenyl methyl groups and fmoc,
(5) Protection of carbonyl groups – acetal, ketal, 1,2–glycols and 1,2–dithioglycols formation
Synthetic reactions : Mannich reaction – Mannich bases – Robinson annulations The Shapiro reaction,
Stork–enamine reaction. Use of dithioacetals – Umpolung,
phase transfercatalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction.
Baylis–Hillman reaction, RCM olefm metathesis, Grubb catalyst
Mukayama aldol reaction, Mitsunobu reaction, McMurrey reaction,
Julia–Lythgoe olefination, and Peterson's stereoselective olefination, Heck reaction,
Suziki coupling, Stille coupling
Sonogishira coupling, Buchwald–Hartwig coupling.
. Ugi reaction, Click reaction

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Syllabus for the Academic Year 2018-19

Department : Chemistry **Paper : CLUSTER -3** **Class: III B.SC.** **Semester: VI**

Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,
Pharmacokinetics (ADME, Receptors - brief treartment) Metabolites and Anti metabolites.
Drugs: Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each, Administration of drugs
Classification: Classification based on structures and therapeutic activity with one example each.
Administration of drugs Synthesis and therapeutic activity of the compounds: a. Chemotheraputic Drugs l.Sulphadrugs(Sulphamethoxazole)
2.Antibiotics - β-Lactam Antibiotics
Macrolide Antibiotics, 3. Anti malarial Drugs(chloroquine)
b.Psycho therapeutic Drugs:1.Anti- pyretics (Paracetamol) 2.Hypnotics,
3.Tranquilizers(Diazepam)4.Levodopa
Pharmacodynamic Drugs**:** 1. Antiasthma Drugs (Solbutamol) 3. Antianginals (Glycerol Trinitrate).
Diuretics(Frusemide) HIV-AIDS: Immunity
CD-4cells, CD-8cells
Retro virus, Replication in human body
Investigation available, prevention of AIDS
Drugs available - examples with structures: PIS: Indivanir (crixivan)
Nelfinavir(Viracept).

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Bhimavaram, W.G.Dist, A.P
Syllabus for the Academic Year 2017-18

Department : Chemistry Paper : IV Class: III B.SC Semester: V

Nitro hydrocarbons: Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form.
Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid),Nef reaction and Mannich reaction leading to Micheal addition and reduction.
Nitrogen compounds:Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods – 1. Ammonolysis alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism).Reduction of Amides and Schmidt reaction. Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.
Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration. Oxidation of aryl and Tertiary amines, Diazotization.
Heterocyclic Compounds: Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,- dicarbonyl compounds, Paul-Knorr synthesis. Properties : Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.
Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.
Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).
(-) Fructose (ketohexose) - Evidence of 2 - ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI). Cyclic structure for fructose (Furanose structure and Haworth formula)
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Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation.

Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose)
Amino acids and proteins Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples
Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples.
Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid Malonic ester synthesis c) strecker's synthesis.
Physical properties: Zwitter ion structure - salt like character - solubility, melting points amphoteric character, definition of isoelectric point.
Chemical properties: General reactions due to amino and carboxyl groups
lactams from gamma and delta amino acids by heating peptide bond (amide linkage).
Structure and nomenclature of peptides and proteins.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2017-18

DEPARTMENT: CHEMISTRY PAPER: VI (CLUSTER – I) CLASS: B.Sc. SEMESTER: VI

UNIT – IV: Electronic spectra of poly atomic molecules
Chemical analysis by electronic spectroscopy, Beer-Lambert's law. Deviation from Beer's law.
Quantitative determination of metal ions Mn^{+2}
Quantitative determination of metal ions Fe^{+2}, NO^{2-}, Pb^{+2}. Simultaneous determination of chromium and manganese in a mixture.
UNIT – III: Electronic spectra of diatomic molecules. The Born-Oppenheimer approximation. Vibrational course structure: bond association and bond sequence.
Intensity of vibrational-electronic spectra: The Franck-Condon principle. Rotational fine structure electronic vibration transitions.
Electronic structure of di atomic molecules, chromophores.
Types of transitions, conjugated dienes, trienesamdpolyenes
Wood ward – Fieser rules..
Unsaturated carbonyl compounds
UNIT – 1: NMR Spectroscopy: Nuclear spin, principles of NMR, Classical and quantum mechanical methods, magnetic moment and spin angular momentum,
Larmour frequency. Instrumentation. Relaxation spin-spin and spin lattice relaxation. Shielding constants, chemical shifts, shielding and deshielding mechanism factors. Influencing chmical shift. Spin-spin interactions,
Coupling constants. Factors influencing coupling constants. **UNIT – II**: Spin decoupling, chemical shift reagents and nuclear over hauser effect. Applications in medical diagnostics. Reaction kinetics and mechanically induced dynamic nuclear polarization. FT NMR and its advantages.
UNIT – V: ESR Spectroscopy: Basic principles, theory of ESR, comparison of NMR and ESR. Instrumentation, factors affecting 'g'value, determination of g value. Isotopic and anisotropic constants. Splitting hyper fine splitting coupling constants.
Line width, zero field splitting and Kramer degeneracy, crystal field splitting, crystal field effects. Applications of ESR: detection of free radicals.
ESR spectra of methyl radical, benzene anion, isoquene $[Cu(H_2O)_6]^{2+}$, $[Fe(CN)_5NO]^{-3}$

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Bhimavaram, W.G.Dist, A.P
Syllabus for the Academic Year 2017-18

Department : Chemistry Paper : CLUSTER- 2 Class: III B.SC. Semester: VI

Organic photochemistry : Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer. Energies properties and reaction of singlet and triplet states of and transitions.
Photochemical reactions **:** (a) Photoreduction, mechanism, influence of temperature, solvent, nature of hydrogen donors, structure of substrates on the course of photo reduction,.
Norrisch cleavages, type I : Mechanism, acyclic cyclicdiones, influence of sensitizer, photo Fries rearrangement. Norrisch type II cleavage : Mechanism and stereochemistry, type II reactions of esters : 1: 2 diketones, photo decarboxylation.,
Di - π methane rearrangement, Photochemistry – of conjugated dienes, Decomposition of nitrites – Barton reaction.
PROTECTING GROUPS AND ORGANIC REACTIONS : Principles of (1) Protection of alcohols – ether formation including silyl ethers – ester formation, (2) Protection of diols – acetal,ketal and carbonate formation.
(3) Protection of carboxylic acids – ester formation, benzyl and t–butyl esters, (4) Protection of amines – acetylation, benzoylation, benzyloxy carbonyl, triphenyl methyl groups and fmoc,
(5) Protection of carbonyl groups – acetal, ketal, 1,2–glycols and 1,2–dithioglycols formation
Synthetic reactions : Mannich reaction – Mannich bases – Robinson annulations The Shapiro reaction,
Stork–enamine reaction. Use of dithioacetals – Umpolung,
phase transfercatalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction.
Baylis–Hillman reaction, RCM olefm metathesis, Grubb catalyst
Mukayama aldol reaction, Mitsunobu reaction, McMurrey reaction,
Julia–Lythgoe olefination, and Peterson's stereoselective olefination, Heck reaction,
Suziki coupling, Stille coupling
Sonogishira coupling, Buchwald–Hartwig coupling.
Ugi reaction, Click reaction

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Department : Chemistry Paper :CLUSTER- 3 Class: III B.SC. Semester: VI

Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,
Pharmacokinetics (ADME, Receptors - brief treartment) Metabolites and Anti metabolites.
Drugs: Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each, Administration of drugs
Classification: Classification based on structures and therapeutic activity with one example each
Administration of drugs Synthesis and therapeutic activity of the compounds: a. Chemotheraputic Drugs l.Sulphadrugs(Sulphamethoxazole)
Antibiotics - β-Lactam Antibiotics
Macrolide Antibiotics, 3. Anti malarial Drugs(chloroquine)
b.Psycho therapeutic Drugs:1.Anti- pyretics (Paracetamol) 2.Hypnotics,
3.Tranquilizers(Diazepam)4.Levodopa
Pharmacodynamic Drugs: 1. Antiasthma Drugs (Solbutamol)3. Antianginals(Glycerol Trinitrate)
Diuretics(Frusemide) HIV-AIDS: Immunity
CD-4cells, CD-8cells
Retro virus, Replication in human body
Investigation available, prevention of AIDS
Drugs available - examples with structures: PIS: Indivanir (crixivan)
Nelfinavir(Viracept).

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Syllabus for the Academic Year 2016-17

Department : Chemistry Paper : IV Class: III B.SC. Semester: V

Solvent extraction: Principle and process, Batch extraction, continuousextraction and counter current extraction. Application – Determination of Iron (III)
Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon,
Nature of adsorbents, solventsystems, Rf values, factors effecting Rf values.
Paper Chromatography: Principles, Rf values, experimental procedures,choice of paper and solvent systems, developments of chromatogram –ascending, descending and radial. Two dimensional chromatography,applications.
Thin layer Chromatography (TLC): Advantages. Principles, factorseffecting Rf values. Experimental procedures. Adsorbents andsolvents. Preparation of plates. Development of the chromatogram.Detection of the spots. Applications. Column Chromatography: Principles, experimental procedures,Stationary and mobile Phases, Separation technique. Applications.
High Performance Liquid Chromatography (HPLC): Principles andApplications.
Gas Liquid Chromatography (GLC): Principles and Applications.
General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and doublebeam spectrophotometers.
Application of Beer-Lambert law for quantitativeanalysis of **1**. Chromium in $K_2Cr_2O_7$ **2**. Manganese in manganous sulphate **3**. Iron (III) with thiocyanate.
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Energy levels of molecules (σ,π, n) . Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.
Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecularvibration spectrum, selection rules. Determination of force constant.
Qualitativerelation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules.
Characteristic absorption bands of various functional groups. Finger print region of infrared spectrum. Raman spectroscopy: Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.
Proton magnetic resonance spectroscopy (1H-NMR) Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, and acetophenone.
spectral interpretation**:** interpretation of IR, UV-Visible, proton NMR and mass spectral data of the following compounds 1. phenyl acetylene 2. Acetophenone 3. Cinnamic acid 4. P- nitro aniline.
Catalysis: Homogeneous and heterogeneous catalysis, comparision with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar.Kinetics of specific base catalyzed reactions, base catalyzed conversion ofacetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis ofesters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms ofheterogeneous catalysis. Langmuir-Hinshelwood mechanism.
Enzymecatalysis: Characteristics and classification.kinetics of enzyme catalysed reactions- Michael's – Menton law, significane of Michael's constant(Km) and maximum velocity (Vmax) . factors affecting enzyme catalysis- effect of temperature, P^H, concentration and inhibitor, catalytic efficiency. Mechanism of ethanol by alcohol dehydrogenase .

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Syllabus for the Academic Year 2016-17

Department : Chemistry Paper : IV Class: III B.SC. Semester: VI

Introduction: Drug, disease (definition), Historical evolution, Sources – Plant,Animal synthetic, Biotechnology and human gene therapy Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics,Pharmacokinetics (ADME, Receptors – brief teartment) Metabolites and Antimetabolites. Nomenclature: Chemical name and Generic name
Classification: Classification based on structures and therapeutic activity withone example each. Synthesis: Synthesis and therapeutic activity of the following drugs, L-Dopa,Chloroquin, Omeprazole, Paracetamol, Sulphamethoxazole.
Drug Development: Pencillin, Separation and isolation, structures of differentpencillins. HIV-AIDS: ImmUnity – CD-4 cells, CD-8 cells Retrovirus, replication inhuman body. Investigation available, prevention of AIDS. Drugs available –examples with clinical uses: PIS: Indinavir (Crixivan), Nelfinavir (Viracept),NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir(Ziagen), Lamivudine (Epivir, 3TC) Zidovudine (Retravir, AZT, ZDV) monographs of drugs: Eg paracetamol, sulpha methoxagole(tablets)
Need of conversion of drugs into medicine. Additives and their role (briefaccount only) Different types of formulations.
introduction to pesticides-types – insecticides,fungicides,herbicides,weedicides, Rodenticides,plant growth regulators,pheromones and hormones. Brief discussion with examples,structures of the following. Synthesis and present status of the following DDT,BHC, Malathion, parathion,endrin,baygon, 2,4-D and endosulphon.
Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry.Green synthesis: Evalution of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no byproduct).
Selection of solvent: i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis iv) Solvent free reactions (solid phase reactions) ii) green catalysts:1). phase transfer catalysts.2) bio catalysts
microwave and ultra sound essisted green synthesis; 1.aldol condensation 2. Cannizaro reaction 3. Diels alder reaction 4. Strecker synthesis 5. Williamson synthesis 6. Bieckmann condensation
Classification of polymers, definition and mechanismsof polymerization methods- chain polymerization, step polymerization,coordination polymerization – tacticity.
Co-Polymerization. Molecular weightof polymers-number average and weight average molecular weight, degree ofpolymerization, determination of molecular weight of polymers by viscometryand Osmometry.
Preparation and industrial application of polyethylene, PVC,Teflon, polyacrylonitrile, terelene and Nylon66. Introduction tobiodegradability.
Superconductivity, characteristics of superconductors,Meissner effect,
Types of superconductors and applications.Nanomaterials- synthetic techniques, bottom-up-sol-gel method,
top-downelectrondeposition method. Properties and applications of nano-materials
Composites-definition, general characteristics,
particle reinforce and fiber reinforce composites and their applications.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)
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Syllabus for the Academic Year 2015-16

Department : Chemistry Paper : IV Class: III B.SC. Semester: V

Solvent extraction: Principle and process, Batch extraction, continuousextraction and counter current extraction. Application – Determination of Iron (III)
Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon,
Nature of adsorbents, solventsystems, Rf values, factors effecting Rf values.
Paper Chromatography: Principles, Rf values, experimental procedures,choice of paper and solvent systems, developments of chromatogram –ascending, descending and radial. Two dimensional chromatography,applications.
Thin layer Chromatography (TLC): Advantages. Principles, factorseffecting Rf values. Experimental procedures. Adsorbents andsolvents. Preparation of plates. Development of the chromatogram.Detection of the spots. Applications. Column Chromatography: Principles, experimental procedures,Stationary and mobile Phases, Separation technique. Applications.
High Performance Liquid Chromatography (HPLC): Principles andApplications.
Gas Liquid Chromatography (GLC): Principles and Applications.
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Application of Beer-Lambert law for quantitativeanalysis of **1**. Chromium in $K_2Cr_2O_7$ **2**. Manganese in manganous sulphate **3**. Iron (III) with thiocyanate.
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Energy levels of molecules (σ,π, n) . Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.
Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecularvibration spectrum, selection rules. Determination of force constant.
Qualitativerelation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules.
Characteristic absorption bands of various functional groups. Finger print region of infrared spectrum. Raman spectroscopy: Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

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Syllabus for the Academic Year 2015-16

Department : Chemistry Paper : IV Class: Semester: VI

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Co-Polymerization. Molecular weightof polymers-number average and weight average molecular weight, degree ofpolymerization, determination of molecular weight of polymers by viscometryand Osmometry.
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Types of superconductors and applications.Nanomaterials- synthetic techniques, bottom-up-sol-gel method,
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Composites-definition, general characteristics,
Particle reinforce and fiber reinforce composites and their applications.

DANTULURI NARAYANA RAJU COLLEGE(AUTONOMOUS)

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Bhimavaram, W.G.Dist, A.P

Syllabus for the Academic Year 2014-15

Department : Chemistry Paper : IV Class: III B.SC. Semester: V

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Syllabus for the Academic Year 2014-15

Department : Chemistry Paper : IV Class: III B.SC. Semester: VI

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Syllabus for the Academic Year 2013-14

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Composites-definition, general characteristics,
Particle reinforce and fiber reinforce composites and their applications.