NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester I)

Class : B.sc **Section: Inorganic Chemistry**

Course/Paper: 1 Year - Semester-I- DSC- A

Unit: UNIT – I: Inorganic Chemistry – A **No. of Hours Allotted**: 15

Topics to be covered	No. of hours
Periodic properties-trends in ionic and atomic radii, covalent radii, single , double and triple bonds, Vander Waal radii, radii of cations and anions, isoelectronic ions	**1**
Ionization energy, electropositivity, basic nature, reducing behaviuor, electron affinity,electronegativity.	**1**
S -block elements- general charecteristics of Grp I &II elements-elements, comparision of grp-I and Grp-II elements, atomic ionic radii, electronegativity, electro positivity,basic nature etc. Born-haber cycle	**1**
Melting & boiling points,properties of oxides, hydroxides,superoxides,Complexation tendencies, diagonal relationship between Li & Mg, Be & Al	**1**
p-block elements- Group 13-elements, general properties , melting points, boiling points, compounds of boron , Aluminium, Gallium, Indium and Thallium	**1**
Synthesis and structure of Diborane and higher boranes(B_4H_{10}, & B_5H_9),	**1**
Boron nitrogen compounds (BN & $B_3N_3H_6$), Lewis acid nature of BX_3	**1**
Group 14: Carbides- classification- ionic, covalent, interstitial-synthesis, Structures and reactivity, industrial applications.	**1**
Carboranes-Nomenclature, Classification-Closo,Nido and Arachno types. Preparation and application of graphite compounds.	**1**
Silicones-preparation-a) direct silicon process b) use of Grignard reagent c)aromatic silylation, cyclic and cross linked. Types- oils,greases, resins and rubber-uses.	**1**
Silicates-Classification-orthosilicates, pyrosilicates, cyclic silicates, chain silicates, sheet silicates, three dimensional silicates and structural aspects	**1**
Group 15: elements and their properties. Compounds of nitrogen, phosphorous, arsenic,antimony,and bismuth.Nitrides-classification-ionic, covalent and interstitial. Structure of boron nitride.	**1**
Reactivity-hydrolysis. Preparation and reactions of Hydrazine, Hydroxyl amine, phosphazenes.	**1**
Group 16: elements-carbon, sulphur, selenium, tellurium, polonium, and their properties. Classification based on chemical behavior and oxygen content of Oxides-normal oxides, peroxides, suboxides, basic oxides, amphoteric oxides, acidic ,Neutral oxides.	**1**
Oxides and oxyacids of Boron and Carbon –structure and properties, oxyacids of N,P,S and Cl-structure, acidic nature and redox properties	**1**
	15

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester I)

Class : B.sc **Section: Organic Chemistry**

Course/Paper:1 Year - Semester-I- DSC- A

Unit:UNIT –II: Organic Chemistry – A **No. of Hours Allotted**: 15

Topics to be covered	No. of Hours required
O.A.1 Structural theory and mechanism of organic reactions: Brief review of structural theory of organic chemistry, Hybridization.	1
Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H_2O, BF_3, NH_3 & $AlCl_3$)	1
Bond polarization: Factors influencing the polarization of covalent bonds. Electronegativity - inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions	1
Resonance or Mesomeric effect, application to (a) acidity of phenol. (b) acidity of carboxylic acids, Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes	2
Types of organic reactions: Addition-electrophilic, nucleophilic and free-radical. Substitution-electrophilic, nucleophilic and free radical. Elimination: eliminations	1
O.A.2. Acyclic Hydrocarbons: Alkanes: IUPAC Nomenclature of Hydrocarbons. Methods of preparation: Hydrogenation of alkynes and alkenes, Wurtz reaction, Kolb's electrolysis, Corey-House reaction. Chemical reactivity-inert nature, free radical substitution mechanism. Halogenation example - reactivity, selectivity and orientation.	1
Alkenes: Preparation of alkenes (a) by dehydration of alcohols (b) Dehydrohalogenation of alkyl halides (c) by dehalogination of 1,2-dihalides, Zaitsev's rule. Properties: Addition of Hydrogen-heat of hydrogenation and stability of alkenes.	1
Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H_2O, HOX, H_2SO_4 with mechanism and addition of HBr in the presence of peroxide (anti-Markonikov's addition)	1
Oxidation-hydroxylation by $KMnO_4$, OSO_4, peracids (via epoxidation), hydroboration, ozonolysis-location of double bond. Dienes-Types of dienes, reaction of conjugated dienes –1,2 and 1,4 addition of HBr to 1,3-butadiene and Diel's-Alder reaction	1
Alkynes – Preparation by dehydrohalogination of dihalides, dehalogenation of tetrahalides, acetylene from CaC_2. Properties: Acidity of acetylenic hydrogen (Formation of metal acetylides)	1
preparation of higher acetylenes, metal- ammonia reductions. Physical properties, Chemical reactivity – electrophilic addition of X_2, HX, H_2O (tautomerism), Oxidation (formation of enediol; 1,2-diones and carboxylic acids), Reduction and polymerization reaction of acetylene.	1
O.A.3. Alicyclic hydrocarbons (Cycloalkanes): Nomenclature, Preparation by Freunds methods, heating dicarboxylic metal salts. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes	1
Stability of cycloalkanes – Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory, Conformational structures of cyclobutane, cyclopentane, cyclohexane	2
	15hrs

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester I)

Class : B.sc **Section: Physical Chemistry**

Course/Paper:1 Year - Semester-I- DSC- A

Unit:UNIT – III: Physical Chemistry – A **No. of Hours Allotted**: 15

Topic to be covered	**No. of hours**
General chareteristics of gases expansibility, compressibility, diffusibility, parameters of a gas, the volume, its pressure, temperature, number of moles	1
Gas laws-Boyle's law, Charle's law, Avagadro's law, Gay Lussac's law. The ideal gas equation	1
Deviations of Real gases from Ideal behavior, Compressibilty factor, Effect of pressure and temperature on deviations	1
VanderWaal's equation of state-pressure correction, volume correction. Determination of units of a and b.limitations of VanderWaal's equation	1
Critical Phenemenon-Liquefaction of gases. Critical temperature Tc, Critical Pressure Pc,Crtical volume-Vc, Andrews isotherms of CO2, Continuity of state.	1
Derivation of relationship between critical constants and VanderWaals constant. Tc,Pc,Vc in terms of a and b vice versa i.e. a and b in terms of Tc,Pc,Vc.	1
Law of corresponding states-reduced equation of gas, Joule Thompson effect, inversion temperature, liquefaction of gas, linde's and Claude's method, problems	1
Solid state-types of solid-Crystalline, Amorphous,explanation of isotropy and anisotropy classification of crystal by nature of binding forces i.e. molecular covalent , ionic and metallic types.	1
Discussion on Unit cell, Crystallographic axes, axial ratio, lattice points, lattice sites symmetry in cubic crystals- plane, axix and centre of symmetry.	1
Types of cubic unit cells-simple, Body centered, face centered and end centered unit cell	1
Bravais lattice and seven crystal systems, law of rational indices, Miller indices	1
Derivation of Bragg's equation , measurement of diffraction angle-rotating crystal method and powder method	1
Structure of NaCl, Crystal defects, Stoichiometric –Schottky, Frenkel defects. Non-stoichiometric-metal excess defects, anion vacancies, extra cation occupancy, interstial sites and metal deficient defects.	1
Valence band theory of semiconductors-superconductivity, band gap, insulators, conductors, semiconductors, intrinsic and extrinsic semiconductors	1
n-type, p-type semiconductors, p-n junction applications in photoelectrochemical cells, solar and liquid crystals.	1
TOTAL	15

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester I)

Class : B.sc **Section: General Chemistry**

Course/Paper: 1 Year - Semester-I- DSC- A
Unit:UNIT – IV: General Chemistry – A **No. of Hours Allotted**: 15

Topics to be covered	No. of Hours
Classification of universe, matter and radiation, Electromagnetic radiation, Black Body radiation, Planck's Radiation law – postulates and explanation	1
Photoelectric effect and Compton effects	1
De Broglie's hypothesis and Heisenberg's uncertainty principles	1
Postulates of quantum mechanics – explanation	1
Schrodinger's wave equation –derivation and application to a particle in a box	2
Energy level, Eigen functions, Eigen values, significance of ψ and ψ^2	1
Schrodinger's wave equation for H- atom – conversion of Cartesian coordinate to polar coordinate – reduced equation.	1
Radial wave functions and angular wave functions, probability distribution curves,shapes of s, p and d orbitals, Quantum numbers and their importance	1
Principles of volumetric analysis: Standard solution, indicator, end point, titration error and titration curves, Types of reactions - titrations	1
Neutralization reaction – principle, titration curves – strong acid – strong base; strong acid – weak base; weak acid – strong base; weak acid - weak base:, Neutralization indicators – indicator theory – Ostwald and Quinonoid theory	1
Redox reactions – principle, titration curves, Redox indicators, Precipitation reactions – principles, titration curves, Precipitation indicators – mechanism of indicators	1
Complexation – principles, metal ion indicators	1
Principles of Gravimetric analysis: Nucleation, precipitation, growth of precipitate,	1
impurities in precipitates – co-precipitation and post precipitation. Filtration, washing, drying and incineration of precipitates.	1
	15hrs

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester II)

Class : B.sc **Section: Inorganic Chemistry**

Course/Paper: 1 Year - Semester-II- DSC- B

Unit: UNIT – I: Inorganic Chemistry – B **No. of Hours Allotted**: 15

Topic to be covered	No. of hours
Group 17: interhalogens-classification, general preparations and structure of AB, AB_3, AB_5, AB_7 type and their reactivity	**1**
Basic Iodine-Basic nature and evidence of +I and +III Iodine.Polyhalides- Definition and structures of ICl_2^{-1},ICl_4^{-1},I_3^-	**1**
Comparision of pseudohalogens with halogens, halides-classification and structural aspects of halides of C, Si, N, P & S.	**1**
Zero group elements –general preparation structure bonding and reactivity of Xenon compounds-Oxides, halides, and Oxy-halides.	**1**
Clatherate compounds and anomalous behavior of He(II)	**1**
Types of Inorganic compounds and nomenclature-classification of inorganic compounds and nomenclature-nomenclature of anions, isopoly anions, neutral and cationic radicals. Nomenclature of binary compounds and oxy acids.	**2**
d-block :elements, position in the periodic table, electronic configuration, variable valency, magnetic properties.	**1**
Catalytic properties-examples of $TiCl_3$,V_2O_5,$PdCl_2$,$CuCl_2$,Ni etc., ability to form complexes-presence of empty d-orbitals, small size and big charge.	**1**
Colour of d-block elements-d-d transitions, colour due to charge transfer(L->M) and (M->L), spectral behavior of transition metal complexes with respect to d^1 to d^9 complexes	**1**
Frost latimer Diagrams, Comparitive study of 2^{nd} and 3^{rd} transition series with respect to their oxidation states, magnetic behavior and spectral properties.	**1**
Study of triads:**Titanium triad**-electronic configuration, reactivity of +III and +IV states, oxides and halides-spectra of Ti^{+3} ion , special mention of Zieglar natta catalyst.	**2**
Chromium triad: reactivity of +III and +VI oxidation states. oxides of chromium, Oxidizing properties of Chromium compounds- $K_2Cr_2O_7$, K_2CrO_4 etc	**1**
Copper triad: reactivity of +1, +II, +III oxidation states, mention about role of silver in photography, importance of gold in treating rheumatoid arthritis, commercial applications of coinage metals.	**1**
Total	**15**

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester II)

Class : B.sc **Section: Organic Chemistry**

Course/Paper: 1 Year - Semester-II- DSC- B

Unit: UNIT – II: Organic Chemistry – B **No. of Hours Allotted**: 15

Topics to be covered	No. of Hours required
O.B.1 Benzene and its reactivity: Molecular formula of Benzene, structure of benzene-open chain structure not possible, proposition of cyclic structure by Kekulae, dynamic equilibrium, evidence based on ozonolysis experiment, concept of resonance, resonance energy.	2
Heat of hydrogenation, heat of combustion of benzene, mention of C-C bond lengths and orbital picture of benzene.	1
Concept of aromaticity: aromaticity (definition) , Huckle's rule-application to Bezinoid compounds(Benzene, Naphthalene, Anthracene and Phenanthracene) and Non- Benzenoid compounds (Cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).	2
Reactions: General mechanism of electrophilic substitution, mechanism of nitration and sulfonation.Mechanism of halogenation, Friedel Craft's and acylation.	1
Orientation of aromatic substitution: Defination of ortho, para, and meta directing groups Ring activating and deactivating groups with examples.(Electronic interpretation of various groups like NO_2 and phenolic).	1
Orientaion: i. Amino, methoxy and methyl groups ii. Carboxy, nitro, nitrile, carbonyl and sulfonic acid groups. iii. Halogens (Explanation by taking one example)	1
O.B.2 Polynuclear aromatic hydrocarbons & Arenes: Polynuclear hydrocarbons **–** Structure of naphthalene and anthracene (Molecular Orbital Diagram and Resonance energy) Reactivity towards electrophilic substitution Nitration and suphonation as examples.	2
O.B.3 Halogen compounds: Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl). Physical properties, chemical reactivity- reduction, formation of RMgX, Nucleophylic substitution reaction – classification into S_N^1 and S_N^2. Mechanism of, energy profile diagrams of S_N^1 and S_N^2 reactions.	3
Stereochemistry of S_N^2 (Walden Inversion), S_N^1 (Racemisation) explanation of both by taking the example of optically active alkyl halide-2-bromo butane. Structure and reactivity-comparision of allyl, benzyl, alkyl, vinyl and aryl halides toward ease of hydrolysis.	2
	15hrs

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LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester II)

Class : B.sc **Section: Physical Chemistry**

Course/Paper: 1 Year - Semester-II- DSC- B

Unit: UNIT – III: Physical Chemistry – B **No. of Hours Allotted**: 15

Topic to be discussed	No. of hours
Solutions:liquid-liquid ideal solutions, Raoult's law, Ideally dilute solutions, Henry's Law. Non-Ideal solutions.	**2**
Vapour pressure –composition and vapour Pressure- temperature curves.	**1**
Azeotropes-HCl-H2O, Ethanol-Water system and Fractional distillation	**1**
Partially miscible liquids-phenol-water, Nicotine water systems.	**1**
Effect of impurity on absolute temperature. Immiscible liquids and steam distillation	**1**
Nernst distribution law. Calculation of partition coefficient. Applications of distribution law.	**1**
Liquid state: Intermolecular forces, Structure of liquids(Qualitative description).Structural difference between solids, liquids and gases.	**1**
Liquid crystals, the mesomorphic state: Classification of liquid crystals into Smectic and Nematic , difference between liquid crystal, solid and liquid.	**1**
Applications of liquid crystals as LCD devices.	**1**
Colloids: definition, classification. Solids in liquids(sols): Preparation, properties-kinetic,optical and electrical, Stability of colloids,protective action,Hardy-Schultz law, Gold number.	**2**
Liquids in liquids(emulsions): types, preparation and emulsifier	**1**
Liquids in solids(gels): classification, preparation, properties, inhibitors, general applications of colloids	**1**
Adsorption:Types, factors influencing adsorption. Freundlich Adsorption isotherm.Langmiur theory of unilayer adsorption isotherm.Applications	**1**
Total	**15**

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester II)

Class : B.sc **Section: General Chemistry**

Course/Paper: 1 Year - Semester-II- DSC- B
Unit: UNIT – IV: General Chemistry – B **No. of Hours Allotted**: 15

Topics to be covered	No. of Hours
Ionic solids – general properties of ionic solids, energy changes during ionic solid formation - lattice energy – definition and derivation	2
Solvation energy and solubility of ionic solids - Fajan's rules.Polarizing power and polarisability of ions	1
Covalent bond- Stereochemistry of inorganic molecules – common hybridization and shapes – sp, sp^2, sp^3, sp^3d^2, sp^3d, d sp^2, sp^3d^3 ….	1
Molecular orbital theory – Shapes and sign convention of atomic orbital, modes of overlapping, concepts of sigma and pi bonds, criteria for forming molecular orbital from atomic orbital	2
LCAO – concept, types of molecular orbital – bonding, anti – bonding and non – bonding	1
electron density distribution diagram for H_2^+, MOED of homo- nuclear- H_2, He^{2+}, B_2, C_2, N_2, O_2, F_2 { Bond order and magnetic properties }	1
MOED of hetero- nuclear diatomic molecules CO,CN^-, NO, NO^- and HF { Bond order and magnetic properties }	1
Semi – micro analysis: Principles involved – solubility product, common ion effect	1
Separation of cations into groups; group reagents; reactions of cations	1
reactions of anions, theory of Flame test	1
Classification and characteristics of a solvent.Reactions in liquid ammonia – physical properties, auto-ionisation, examples of ammono acids and ammono bases.	1
Reactions taking place in liquid ammonia – precipitation, neutralization, solvolysis, solvation - solutions of metals in ammonia, complex formation and redox reactions	1
Reactions in HF – auto-ionisation, reactions taking place in HF – precipitation, acid – base reactions and protonation	1
	15hrs

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester III)

Class : B.sc **Section: Inorganic Chemistry**

Course/Paper: II Year - Semester-III- DSC- C

Unit: UNIT – I: Inorganic Chemistry – C **No. of Hours Allotted**: 15

Topic to be covered	**No. of hours**
Introduction to f-block elements-position in the periodic table elements, their electronic configuration and stable oxidation states	**1**
Atomic and ionic radii, lanthanide contraction and its consequences: anomalous behavior of post lanthanides and their basicity	**1**
Magnetism of lanthanides, colour properties-relation between nf electrons and (14-n)f electrons, spectral properties- comparision of f- and d-block elements spectral characters	**1**
Separation of lanthanides by ion exchange chromatography and solvent extraction, Actinides-elements,	**1**
stable oxidation states, atomic and ionic radii, magnetism, complex formation and brief note about actinide contraction	**1**
Metals- properties,uses,applications and their sources	**1**
Theories explaining metallic properties-free electron theory, valence band theory,	**1**
Band theory-conductors, insulators, p-type and n-type semi conductors	**1**
Alloys-definition, uses, types, classification-substitutional solid solutions, interstitial and intermetallic alloys	**1**
Preparation of alloys-fusion. Electrodeposition, reduction and compression,	**1**
uses of ferrous and non ferrous alloys,Hume –rothery for the classification of alloys into α,β,ε types	**1**
Extraction of metals-minerals, ores, examples, methods involved in extraction-concentration,reduction,purification	**1**
Concentration-hand picking, wilfley table, hydraulic classifier, leaching, calcination and roasting	**1**
Acid and alkali digestion, reduction- smelting, flux, auto reduction, alumino thermi reduction, electrolytic reduction	**1**
Purification-liquation, fractional distillation, zone refining, oxidative processes,amalgamation and electrolysis	**1**
	15

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester III)

Class : B.sc **Section: Organic Chemistry**

Course/Paper: II Year - Semester-III- DSC- C

Unit: UNIT – II: Organic Chemistry – C **No. of Hours Allotted**: 15

Topics to be covered	**No. of Hours required**
Nomenclature and classification of hydroxy compounds. Preparation: from carbonyl compounds. Aryl carbinols by hydroxy methylation	1
Phenols – (a) by diazotisation (b) from sulfonic acid (c) from cumene (d) by hydrolysis of halobenzene. Physical properties – Hydrogen bonding (inter molecular and intramolecular) effect of hydrogen bonding on boiling point and water solubility	1
Chemical properties (a) acidic nature of Phenols (b) Formation of alkoxide/phenoxides and their reaction with RX (c) replacement of OH by X using PCl5, PBr3, SOCl2 and with HX/ZnCl2	1
Esterification by (a) acid halides, anhydrides and acids (mechanism) (b) Esters of inorganic acids (c) dehydration of alcohols (in case of phenols not possible). Oxidation of alcohols by CrO3, KMnO4.	1
Special reactions of Phenols – (a) Bromination , (b) Kolbe- Schmidt reaction (c) Riemer Tiemann (d) Azo coupling	1
Analysis of alcohols by oxidation (KMnO4), Ceric ammonium nitrate, Lucas reagentAnalysis of phenols by action of FeCl3, and by the solubility in NaOH. Poly hydroxyl compounds - Pinacol-pinacolone rearrangement, Oxidatve cleavage (Pb(OAc)4 & HIO4.	1
Nomenclature, preparation by (a) Williamson's synthesis (b) from alkenes by the action of conc. H2SO4. Physical properties – Absence of Hydrogen bonding, insoluble in water, low boiling point.	1
Chemical properties – inert nature, action of conc. H2SO4 and HI. Acid and base catalysed ring opening of epoxides- orientative	1
Nomenclature of aliphatic and aromatic carbonyl compounds and isomerism. Synthesis of aldehydes & ketones from acid chloride, by using 1,3-dithianes, nitriles and from carboxylic acids.	1
Special methods of preparing aromatic aldehydes and ketones by (a) Oxidation of arenes (b) Hydrolysis of benzal halides.	1
Physical properties – absence of Hydrogen bonding. Keto-enol tautomerism, polarisability of carbonyl groups, reactivity of the carbonyl groups in aldehydes and ketones.	1
Chemical reactivity – i. Addition of [a] NaHSO3 (b) HCN (c) RMgX (d) NH3 (e) RNH2 (f) NH2OH(g) PhNHNH2 (h) 2,4DNP Schiff bases, Addition of H2O to form hydrate (unstable), comparison with chloral hydrate (stable), addition of alcohols - hemi acetal and acetal formation, Halogenation using PCl5 with mechanism.	1
Base catalysed reactions – with particular emphasis on Aldol, Cannizaro reaction, Perkin reaction, Benzoin condensation, haloform reaction, Knoevengeal condensation.	1
Oxidation reactions –KMnO4 oxidation and auto oxidation, reduction – catalytic hydrogenation, Clemmenson's reduction, Wolf- kishner reduction, MPV reduction, reduction with LAH, NaBH4.	1
Analysis – 2, 4 –DNP test, Tollen's test, Fehlings test, Scihff's test, haloform test (with equations). Introduction to Unsaturated carbonyl compounds.	1
	15hrs

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester III)

Class : B.sc **Section: Physical Chemistry**

Course/Paper: II Year - Semester-III- DSC- C

Unit: UNIT – III: Physical Chemistry – C **No. of Hours Allotted**: 15

Topic to be discussed	No. of hours
Phase rule: Statement and meaning of phase, component and degrees of freedom.	**1**
Gibbs phase rule, phase equilibria of one component system-water system.	**1**
Phase equilibria of two component system-solid-liquid equilibria, simple eutectic-Pb-Ag system, desilverization of lead.	**2**
Solid solutions-compound with congruent melting point-(Mg-Zn) system and incongruent melting point-($NaCl-H_2O$) system. Freezing mixtures.	**2**
Dilute solutions and Colligative properties: Dilute solutions, colligative properties, ideal and non-ideal solutions.	**1**
Raoult's law,relative lowering of vapour pressure ,molecular weight determination.	**2**
Osmosis, laws of osmotic pressure, its measurement,	**1**
determination of mol.wt from osmotic pressure	**1**
Elevation of boiling point and depression of freezing point. derivation of relation between mol.wt and elevation in boiling point and depression in freezing point.	**1**
Experimental determination of boiling point and depression of freezing point.	**1**
Experimental methods for determining various colligative properties, abnormal molar mass, Vant Hoff factor, degree of dissociation and association of solutes.	**2**
Total	**15**

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester III)

Class : B.sc **Section: General Chemistry**

Course/Paper: II Year - Semester-III- DSC- C
Unit: UNIT – IV: General Chemistry – C **No. of Hours Allotted**: 15

Topics to be covered	No. of Hours required
Definition, requirements for an ideal drug source; Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptor – brief treatment)	2
Metabolites and anti-metabolites; Nomenclature: Chemical name, generic name and trade name with 3 examples.	1
Classification of drugs based on structure and therapeutic action. Chemotherapeutic agents, Pharmacodynamic agents	1
Natural drugs: Penicillins, isolation and therapeutic uses, structures of different penicillins.	1
Structure, name and therapeutic uses of the following drugs: 1. Sulpha drug: Sulphanilamide; 2. Antipyretic and analgesics: Paracetamol, Aspirin and Analgin	1
Anti- inflammatory drug: Ibuprofen; 4. Anti-Parkinson's drug : L-Dopa	1
5. Antiemetic drug: Metoclopramide; 6. Muscle relaxant: Mephensin; 7.Bronchodilator: Salbutamol	1
8. Anti malarial drug: Cholroquin; 9. Anti hypertensive and angina drug: Nifedipine	1
10. Antiepileptic drug: Phenobarbital; 11. Anti-bacterial: Ciprofloxacin	1
12. HIV AIDS drugs: Indinavir, Zidovudine (Retro AZT, ZD)	1
Introduction to pesticides – types – Insecticides, Fungicides, Herbicides, Weedicides, Rodenticides plant growth regulators, Pheremones and Hormones. Brief discussion with examples, Structure and uses	2
Synthesis and present status of the following: 1. DDT, 2. BHC, 3. Malathion, 4. Parathion, 5. Endrine, 6. Baygon, 7. 2,4-D and 8. Endosulphon	2
	15hrs

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester IV)

Class : B.sc **Section:Inorganic Chemistry**

Course/Paper:II Year - Semester-IV - DSC- D

Unit:UNIT – I: Inorganic Chemistry – D **No.of Hours Allotted**: 15

Topics to be covered	No. of Hours required
Evaluation of Analytical Data: Introduction to Data handling, role in chemical analysis,Error-definition, classification of errors, minimization of errors.	1
Accuracy-Definition, Ways of expressing accuracy, precision-definition, ways of expressing precession,Numberical problems	1
Significant figures- Definition,mathematicaloperation,addition,subtraction, division, and multiplication,Numberical problems	1
Introduction to separation techniques: Definition, role of separation in analysis,examples and brief review on basic separation methods	1
Chromatography: Definition,principles, adsorption,partition, adsorbent-Definition, nature of adsorbents, forces of adsorption. Plate theory and rate theory	1
Eluent, and Choice of eluents for development, Classification of chromatographic technique,Column chromatography: principle, types of column packing,experimental procedure-separation of Ortho and Para nitroaniline, applications	2
Paper chromatography: principle, types of paper, choice of paper, experimental procedure	1
Modes of development, two dimensional chromatography, Applications	1
TLC: Principle,merits, experimental procedure,types of stationary phases,locatingreagents,detection of spot, calculation of Rf values.	1
Applications of TLC, Introduction to gas chromatography, instrumentation,applications	1
Introduction to HPLC, instrumentation,applications	1
Solvent extraction: introduction,Definition, principle, distribution coefficient, distribution ratio, Chelating reagents	1
Types of extractions based on K_d , Applications,Advantages, Limitations	1
Revision	1
	15hrs

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester IV)

Class : B.sc **Section: Organic Chemistry**

Course/Paper:II Year - Semester-IV - DSC- D

Unit:UNIT – II: Organic Chemistry – D **No. of Hours Allotted**: 15

Topics to be covered	No. of Hours required
Nomenclature, classification and methods of preparation: a) Hydrolysis of Nitrites, amides and esters. b) carbonation of grignard reagents	1
Physical properties- hydrogen bonding, dimeric association, acidity – strength of acids with the examples of trimethyl acetic acid and trichloro acetic acid, Relative differences in the acidity of Aromatic and aliphatic acids.	1
Chemical properties – Reactions involving H, OH and COOH groups -salt formation, anhydride formation, Acid halide formation, Esterification (mechanism) & Amide formation	1
Reduction of acid to the corresponding primary alcohol - via ester or acid chloride. Degradation of carboxylic acids by Huns Diecker reaction, Schmidt reaction (Decarboxylation)	1
Arndt – Eistert synthesis, Halogenation by Hell – Volhard - Zelensky reaction. Carboxylic acid Derivatives – Reactions of acid halides, Acid anhydrides, acid amides and ester. (mechanism of ester hydrolysis by base and acid)	1
Acidity of □-Hydrogens, structure of carbanion. Preparation of Acetoacetic ester by Claisen condensation and synthetic application of Aceto acetic ester. [a) Acid hydrolysis and ketonic hydrolysis.	1
Preparation of i) monocarboxylic acids ii) dicarboxylic acids (b) malonic ester – synthetic applications. Preparation of i] substituted mono carboxylic acids ii) substituted dicarboxylic acids. iii) trialkyl acetic acid	1
Nitro hydrocarbons: Nomenclature and classification – nitro hydrocarbons – structure. Tautomerism of nitroalkanes leading to aci and keto form.	1
Preparation of Nitroalkanes. Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction.	1
Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds	1
Preparative methods -1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). 4. Reduction of Amides and Schmidt reaction.	1
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	1
Use of amine salts as phase transfer catalysts. 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).	1
(Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration. Oxidation of aryl and 3° Amines. Diazotization. Cyanides and isocyanides: Nomenclature (aliphatic and aromatic) structure.	1
Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation	1
	15hrs

NIZAM COLLEGE : DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester IV)

Class : B.sc **Section: Physical Chemistry**

Course/Paper: II Year - Semester-IV - DSC- D

Unit:UNIT – III: Physical Chemistry – D **No.of Hours Allotted**: 15

Topic to be covered	No. of hours
Electrochemistry- electrical transport-conduction in metals and in electrolyte solutions,.	**1**
Specific conductance and equivalent conductance, measurement of equivalent conductance	**1**
Variation of specific and equivalent conductance with dilution. Migration of ions and Kholrausch' Law.	**1**
Arrhenius theory of electrolyte dissociation and its limitations	**1**
Weak and strong electrolytes, Ostwalds diution law, its uses and limitations.	**1**
Debye-Huckel –Onsagar's equation for strong electrolytes(elementary treatment only)	**1**
Transport number, definition and determination by Hittorf method for attackable electrodes	**1**
Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt,.	**2**
conductometric titrations.	**1**
Types of reversible electrodes-gas-metal ion, metal-metal ion, metal-insoluble salt-anion and redox electrodes.	**2**
Electrode reactions, Nernst equation,Cell EMF and single electrode potential, standard Hydrogen electrode-reference electrodes-Standard electrode potential, sign conventions,electrochemical series and its significance.	**3**
Total	**15**

NIZAM COLLEGE: DEPARTMENT OF CHEMISTRY

LESSON PLAN FOR THE ACADEMIC YEAR 2017-2018 (Semester IV)

Class : B.sc **Section: General Chemistry**

Course/Paper: II Year - Semester-IV - DSC- D

Unit: UNIT – IV: General Chemistry – D **No. of Hours Allotted**: 15

Topics to be covered	No. of Hours required
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).	2
Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore	1
Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies	1
Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum	1
Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules	1
Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals.	1
Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, 1, 1,2tribromo ethane, ethyl acetate, toluene and acetophenone.	2
Basic principles – Molecular ion / parent ion, fragment ions / daughter ions. Theory – formation of parent ions	1
Representation of mass spectrum. Identification of parent ion, (M+1), (M+2), base peaks (relative abundance 100%)	1
Determination of molecular formula – Mass spectra of ethylbenzene, acetophenone, n-butyl amine and 1- proponal.	2
Interpretation of IR, UV-Visible, 1H-NMR and mass spectral data of the following compounds 1. Phenyl acetylene, 2. Acetophenone, 3.Cinnamic Acid, 4. para-nitro aniline	2
	15hrs

III YEAR -SEMESTER – V

DSC E, HOUR-WISE TEACHING PLAN

UNIT – I INORGANIC CHEMISTRY – E - PAPER - 5

I. COORDINATION COMPOUNDS

1. Introduction – Simple salts, double salts, complex compounds.

2. IUPAC Nomenclature of Coordination complexes.

3. Werner's theory - Postulates and experimental evidences, limitations.

Sidwicks theory – Electronic interpretation, coordination number and calculation of EAN, Limitations.

4. Types of ligands, Coordination geometries of metal ions with C.N. 4 and 6.

Isomerism in coordination complexes - Structural isomerism – Ionisation, hydrate, linkage, coordination position, polymerization and coordination isomerism.

5. Stereoisomerism – Geometrical isomerism in square plannar and octahedral complexes. Optical isomerism in tetrahedral and octahedral complexes.

6. Valence bond theory (VBT) – postulates, applications based on C.N. 4 (tetrahedral and square planar) and C.N. 6 (octahedral) complexes.

7. Crystal field theory (CFT) - Features of CFT, splitting of d-orbital in Oh, Td, Square plannar complexes

8. Weak and strong ligands, spectrochemical series, high spin and low spin complexes.

9. Crystal field stabilization energies (CFSE), its calculation for d^n configurations in octahedral complexes; Factors affecting CFSE.

10. Spectral and Magnetic properties of transition metal complexes – Electronic absorption spectrum of $[Ti(H_2O_6)]^{3+}$ion.

11. Types of magnetic behavior (para, dia, ferro and antiferromagnetic): Calculation of magnetic moments using spin only formulae. Determination of magnetic susceptibility- Guoy balance method.

12. Determination of composition of metal complex using Job's method and Mole ratio method.

II. STABILITY OF METAL COMPLEXES

13. Thermodynamic stability and kinetic stability of metal complexes

14. Types of stability constants – step-wise and overall stability constants. Relation between step-wise and overall stability constants.

15. Factors affecting the stability of metal complexes.

UNIT – II Organic chemistry – E

I. AMINO ACIDS AND PROTEINS :

1.INTRODUCTION: Defintion of amino acids, classification of amino acids into alpha, beta and gama amino acids. Natural and essential amino acids- definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples.

2.METHODS OF SYNTHESIS: General method of synthesis of alpha amino acids (specific examples-glycine, alanine,valine,and leucine) by following methods: a)from halogenated carboxylic acid b)malonic ester synthesis c)Streckers synthesis.

3.PHYSICAL PROPERTIES: Optical activity of naturally occurring amino acids: L-configuration,irrespective of sign of rotation. Zwitter ion structure-salt like character, solubility, melting point, amphoteric character, definition of isoelectric point.

4.CHEMICAL PROPERTIES: General reactions due to amino and carboxylic groups – lactams from gamma and delta amino acids by heating peptide bond.

5.STRUCTURE: Structure and nomenclature of peptide and proteins, peptide synthesis.

II. HETEROCYCLIC COMPOUNDS:

6. INTRODUCTION: Introduction to heterocyclic compounds and nomenclature.

7. DEFINITION AND IMPORTANCE: Simple 5 membered ring compounds with one hetero atom. Eg.Furan, Thiophene and Pyrrole.

Importance of ring systems-presence in important. Natural products like haemoglobin and chlorophyll.

8. NUMBER AND CHARACTER: Numbering the ringsystems as per Greek letters and numbers. Aromatic character 6-electron system(4-electron from two double bonds and a pair of non bonded electrons from hetero atom)

Tendency to undergo substitution reactions.

9. RESONANCE STRUCTURES: Indicating electron surplus carbon and electron deficient hetero atom, Explanation of feebly acidic character of pyrrole.

10. CHEMICAL PROPERITIES: Electrophilic substitution at 2 or 5 position, Halogenation, Nitration, and Sulphonation under mild conditions.

11. REACTIVITY: Reactivity of furan as 1,3-diene, diels alder reaction(with one example). Sulphonation of thiophene (purification of Benzene obtained from coal tar).

PREPARATION: Preparation of furan, pyrrole and thiophene from 1,4-dicarbonyl compounds only.

12. STRUCTURE: Structure of pyridine, Basicity, Aromaticity-comparision with pyrrole.

13. PYRROLE: Preparation of pyrrole, properties. Reactivity towards Nucleophilic substitution reactions-chichibabin reaction.

14. QUINOLINE:Structure of Quinoline, basicity, aromaticity, Preparation.

ISOQUINOLINE: Structure of Isoquinolin, basicity, aromaticity, preparation.

15. REACTIVITY: Reactivity, Properties, reactivity towards Nucleophilic substitution reations.

UNIT – III PHYSICAL CHEMISTRY – E

I. CHEMICAL KINETICS

1. Introduction, Rate of a reaction,

2. Factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light and catalyst.

3. Concentration dependence of rates, mathematical characteristics of simple chemical reactions.

4. Zero order, first order,

5. Second order, pseudo first order, half-life and mean life.

6. Determination of order of a reaction – differential method, method of integration, half-life method, isolation method and initial rate method.

7. Radioactive decay as first order phenomenon.

8. Experimental methods of chemical kinetics: Conductometric, potentiometric, optical methods and polarimetry and spectrophotometer.

9. Theories of chemical kinetics: effect of temperature on rate of a reaction, Arrhenius equation, and concept of activation energy.

10. Numerical problems. Simple collision theory based on hard sphere model.

II. PHOTOCHEMISTRY

11. Interaction of radiation with matter, difference between thermal and photochemical processes.

12. Laws of photochemistry: Grothus –Draper law.

13. Stark – Einstein law, Quantum yield, photochemical combinations of hydrogen-chlorine and hydrogen-bromine.

14. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), photosensitized reactions – energy transfer processes (simple examples).

15. Revision

SEMESTER-VD SE E1(ELECTIVE- I) - PAPER-6

UNIT – I INORGANIC CHEMISTRY – E1

I. ORGANOMETALLIC CHEMISTRY

1. Introduction, Definition and classification of organometallic compounds.
2. Nomenclature of organometallic compounds.
3. Preparation and properties of organometallic compounds.
4. Applications of alkyls of Li, Mg and Al.
5. Preparation and structure of Metallocenes-ferrocene and bis(benzene)chromium.

II. BIOINORGANICCHEMISTRY

6. Introduction, Role of elements in biological systems.
7. Essential and non-essential elements.
8. Biological significance of Na, K, Ca and Mg.
9. Biological significance of Fe, Co and Ni.
10. Biological significance of Cu, Zn and chloride.
11. Metalloporphyrins – introduction, definition, significance of hemoglobin.
12. Structure and function of hemoglobin
13. Chlorophyll: structure and role in photosynthesis.
14. Biological Nitrogen fixation; Na-K Pump.
15. Role of calcium in blood clotting, stabilization of protein structures and structural role in bones.

UNIT – II Organic Chemistry – E1

I. ORGANIC REACTION MECHANISM

1. Introduction to reaction mechanism
2. Types of organic reactions- Addition reaction mechanism.
3. Addition reaction examples,substitution reaction mechanism
4. Elimination reactions mechanism and examples
5. Substitution Vs elimination reactions and overview

II. SELECTED ORGANIC NAMED REACTIONS

6. Favorskii reaction mechanism and examples
7. Stork enamine mechanism and examples
8. Michael addition mechanism and examples
9. Mannich bases mechanism and examples
10. Ene reaction m mechanism and examples
11. Barton reaction mechanism and examples
12. Baeyer villager reaction mechanism and examples
13. Chichibabin reaction mechanism and examples
14. Revision
15. Slip test

UNIT – III Physical Chemistry – E1

1. ENERGY SOURCES

1. Introduction to Energy sources - Conventional energy resources.

2. Chemical fuels, classification (solids, liquids, gaseous).

3. Solid fuels: coal, analysis of coal, proximate and ultimate analysis and their significance.

4. Liquid fuels: petroleum, refining of petroleum.

5. Cracking (Thermal and catalytic), reforming.

6. Synthetic petrol - Bergius and Fischer Tropsch's process

7. Knocking, anti knocking agents, octane number.

8. Diesel fuel: Cetane number. Other liquid fuels: LPG, biodiesel, kerosene, fuel oil, benzol, tar, power alcohol.

9. Gaseous fuels: natural gas, coal gas, producer gas, oil gas, water gas, biogas.

10. Combustion: Calorific value and its determination, bomb calorimeter. HCV and LCV values of fuels.

11. Numerical problems.

12. Analysis of flue gas by Orsats method. Rocket fuels, solid propellants, liquid propellants, monopropellants, bipropellants.

13. Non conventional energy resources: Nuclear fuels- nuclear reactor.

14. Nuclear fission, nuclear fusion, sources of nuclear fuels, disposal of radio active wastes, reprocessing of nuclear fuels.

15. Solar, hydro, wind and tidal energies. Bio fuels, H_2 as a non polluting fuel.

PRACTICAL PAPER – 5 (SEMESTER V) DSC E

PREPARATION OF ORGANIC COMPOUNDS AND TLC

1. Introduction
2. Preparation of Tribromophenol and Tribromoaniline
3. Preparation of Benzilideneaniline
4. Acetylation of aniline, Benzoylation of Aniline and Phenol.
5. Nitration: Preparation of nitro benzene and p-nitro acetanilide.
6. Halogenation: Preparation of p-bromo acetanilide
7. Diazotization and coupling*:* Preparation of phenyl azo-β-naphthol.
8. Oxidation: Preparation of benzoic acid from benzyl chloride.
9. Reduction: Preparation of m-nitro aniline from m-dinitro benzene.
10. Esterification: Preparation of methyl p-nitro benzoate from p-nitro benzoic acid.
11. Methylation: Preparation of β- naphthyl methyl ether.
12. Condensation: Preparation of benzilidine aniline and Benzoyl aniline.
13. Synthesis of drugs –paracetamol and aspirin
14. Determination of R_f Values and identification of organic compounds: Preparation and separation of 2,4-dinitrophenyl hydrazones of acetone and 2-butanone using toluene and light petroleum (40:60).
15. Record correction

PRACTICAL PAPER – 6

PHYSICAL CHEMISTRY EXPERIMENTS

1. Introduction
2. Determination of specific reaction rate of the hydrolysis of methyl/ethyl acetate catalyzed by hydrogen ion at room temperature.
3. Determination of rate of decomposition of hydrogen peroxide.
4. Determination of order of saponification of ethyl acetate.
5. Determination of distribution coefficient of iodine between water and carbon tetra chloride.
6. Determination of molecular status and partition coefficient of benzoic acid in Toluene and water.
7. Determination of Density using Piconometer.
8. Determination of Viscosity using Viscometer.
9. Determination of Surface tension using Stalgnometer.
10. Determination of Refractive index using Abbe refractometer.
11. Calculation of Parachor & Refrachor.
12. Adsorption of acetic acid on animal charcoal and verification of Freundlich isotherm.
13. Repetition of experiments.
14. Revision.
15. Record correction.

Semester VI, Paper VII
UNIT – I Inorganic Chemistry – F **15 Lectures**

Topics to be covered	No. of Hours
Molecular symmetry: Concept of symmetry in chemistry – symmetry operations, symmetry elements	1
Rotational axis of symmetry and types of rotational axis; Plane of symmetry and types of planes	1
Improper rotational axis of symmetry; Inversion centre and identity element.	1
The symmetry operations and point groups. Flow chart for the identification of molecular point groups	1
Determination of point groups: H_2O, H_2O_2, NH_3	1
Determination of point groups: $XeOF_4$, and Trans-1,2-dichloroethylene.	1
Reactivity of metal complexes: Labile and inert complexes:	1
Definitions with examples;Ligand substitution reactions – S_N1 and S_N2 reactions	1
Substitution reactions of square planar complexes – Trans-effect and applications of trans-effect.	1
Hard and soft acids bases (HSAB): Classification, Pearson's concept of hardness and softness,.	1
application of HSAB principles – Stability of compounds / complexes, predicting the feasibility of a reaction	1
Spectrophotometry General features of absorption – spectroscopy, Beer-Lambert's law and its limitations	1
transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers	2
Application of Beer-Lambert law for quantitative analysis of 1. Chromium in $K_2Cr_2O_7$, 2.Manganese in manganous sulphate, 3. Iron (III) with thiocyanate.	1

Name of the Teacher: Dr. K. Ravi Kiran Head, Departmentof Chemistry

Signature: Signature:

UNIT – II Organic Chemistry – F **15 Lectures**

Topics to be covered	No. of Hours
Carbohyates: Classification and nomenclature-Classification into mono,oligo and polysaccharides into pentoses, hexoses etc., into aldoses and ketoses. MONOSACCHARIDES: All discussion to be confined to (+) glucose as an example of aldose and (-) fructose as example of ketohexoses	1
CHEMICAL PROPERTIES : Evidences for the straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n-hexane, cyanohydrin, formation, reduction of Tollens and Fehliings reagent and oxidation to gluconic and saccharic acids).	1
STRUCTURAL ELUCIDATION: Number of optically active, isomers possible for the structure configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required).	1
EVIDENCES FOR CYCLIC STRUCTURE: Evidences for cyclic structure of glucose (Some negative aldehyde tests and mutarotation). Cyclic structure of glucose proposition of cyclic structure (Pyranose structure, anomeric carbon and anomers. PROOF FOR THE RING SIZE: Proof for the ring size (methylation, hydrolysis and oxidation reaction). Different ways of writing pyranose structure (Haworth formula and chair conformational formula).	1
STRUCTURE OF FRUCTOSE: Evidence of 2-ketohexoses structure (Formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-n-hexane). Same osazone formation from glucose and fructose, hydrogen bonding in Osazone, Cyclic structure for fructose (Furanose structure and Haworth formula)	1
INTERCONVERTION OF MONOSACCHARIDES: Aldopentose to aldohexose (Kiliani-Fischer method), Epimers, Epimerisation-Lobry de bruyn van Ekenstein rearrangement. Aldohexose-Aldopentose eg.D-glucose to D-arabinose by Ruffs degratdation. Aldohexose(+) glucose to ketohexose (-)fructose and ketohexose(fructose) to aldohexose(glucose)	1
STEREOCEMISTRY OF CARBON COMPOUNDS: INTRODUTION	1
ISOMERISM: Definition, classification into constitutional isomerism and stereoisomerism. Constitutional into-chain, functional, positional and metamerism. Stereoisomerism into conformational and configurational isomerism based on energy. Representation of Wedge, Newman, Fischer and Saw-horse formulae.	1
Conformational isomerism: Definition, conformations of ethane, propane, n-butane. Stability and energy diagram. Conformatiaons of cyclobutane, cyclopentane, and cyclohexane. Stability and energy diagram. Configurational isomerism: Definition-Division into Geometric and Optical isomerism. Geometric isomerism with reference to alkenenes – Cohn-Ingold-Prelogs rules, E&Z.	1
OPTICAL ISOMERISM: Definition, enantiomers. Wave nature of light, planne polarised light, optical rotation and specific rotation. Criteria for optical activity-Non superimpossibility of mirror images.	1
PLANE OF SYMMETRY: Definition of plane of symmetry, center of symmetry and axis of symmetry simple axis (Cn) and alternating axis(Sn). Absence of plane of symmetry, center and axis of symmetry and presence of only single fold axis of symmetry(Cn).	1
CHIRAL CENTER: Definition of chiral center. Classification of chiral molecules into asymmetric and dissymmetric molecules.	1
ASYMMETRIC MOLECULES: Asymmetric molecules eg.Glyceraldehyde, Lactic acid, Alanine (with chiral centre). Disymmetric molecules eg.Tartaric acid with similar chiral centre and dissimilar chiral centre. Calculation of number of enantiomers and mesomers.	2
ASSIGNMENT OF CONFIGURATION: Assignment of configuration into D, L & R,S configuration for asymmetric and dissymmetric molecules. Racemic mixture-Racemisation and Resolution techniques.	1

Name of the Teacher: Mrs. G. Dhanalakshmi Head, Departmentof Chemistry

Signature: Signature

UNIT – III Physical Chemistry – F **15 Lectures**

Topics to be covered	No. of Hours
Thermodynamics The first law of thermodynamics-statement.	1
Definition of internal energy and enthalpy.Heat capacities and their relationship.	1
Joule's law-Joule-Thomson coefficient.	1
Calculation of w, q, dU and dH for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes.	1
State function. Temperature dependence of enthalpy of formation-Kirchoff's equation	1
Second law of thermodynamics.Different Statements of the law.	1
Carnot cycle and its efficiency.Carnot theorem.	1
Thermodynamic scale of temperature. Concept of entropy, entropy as a state function,	1
entropy changes in cyclic, reversible, and irreversible processes and reversible phase change.	1
Calculation of entropy changes with changes in V & T and P&T.	1
Entropy of mixing inert perfect gases. Entropy changes in spontaneous and equilibrium processes.	1
The Gibbs (G) and Hlmholtz (A) energies. A &G as criteria for thermodynamic equilibrium and spontaneity-advantage over entropy change.	1
Gibbs equations and the Maxwell relations.	2
Variation of G with P, V and T,	1

Name of the Teacher: Head, Departmentof Chemistry

Signature: Signature:

Semester-VI **Paper VIII**

UNIT – I Inorganic Chemistry – F **15 Lectures**

Topics to be covered	No. of Hours
MetalCarbonylclusters: Carbon monoxide as a ligand – Molecular orbitals of CO - Donor and Acceptor molecular orbitals of CO;	1
Bonding modes of CO- Terminal and Bridging; Evidence for multiple bonding from Bond lengths and Stretching frequencies;	1
Classification in to Low Nuclearity and High Nuclearity carbonyl clusters; Factors favouring Metal-Metal bonding	1
18 Valence electron rule and its application to Low Nuclearity carbonyl clusters	1
structure, bonding and shapes of metal carbonyls of $[V(CO)_5]^-$, $[Cr(CO)_6$, $Ni(CO)_4$,:	1
structure, bonding and shapes of metal carbonyls of $Fe(CO)_5$, $Fe_2(CO)_9$,$Mn_2(CO)_{10}$ and $Co_2(CO)_8$;	1
M_3 and M_4 clusters : structural patterns in $M_3(CO)_{12}$ (M=Fe,Ru,Os)	1
structural patterns in $M_4(CO)_{12}$(M=Co,Rh,Ir) Clusters	1
Relative stability of Bridging and Non- bridging structures	1
Metal carbonyl scrambling in $Fe_2(CO)_4(cp)_2$	1
High Nuclearity clusters M_5,M_6,M_7,M_8 and M_{10} Clusters	1
Polyhedral skeletal electron pair theory and Total Electron Count theory	1
Wades rules – Capping rule, Structural patterns in $[Os_6(CO)_{18}]^{2-}$, $[Rh_6(CO)_{16}]$, $[Os_7(CO)_{21}]$	2
$[Rh_7(CO)_{16}]^{3-}$, $[Os_8(CO)_{22}]^{2-}$, $[Os_{10}C(CO)_{24}]^{2-}$ and $[Ni_6(CO)_{12}]^{2-}$.	1

Name of the Teacher: Dr. K. Ravi Kiran Head, Departmentof Chemistry

Signature: Signature:

UNIT – II Organic Chemistry – F **15 Lectures**

Topics to be covered	No. of Hours required
O.F1.1 pericyclic reactions	
Introduction to pericyclic reactions	1
LCAO concept for the formation of molecular orbitals	1
Symmetry properties of m & σ HOMO & LUMO	1
Thermal & photochemical pericyclic reactions	1
Types of pericyclic reactions with examples	1
O.F1.2 SYNTHETIC STRATEGIES	
Introduction to retrosynthesis	1
Disconnection, symbol, synthon,SE,FGI,TM with examples.	1
Linear,convergent,and combinatorial synthesis with examples	1
Retrosynthesis of 1) acetophenone 2) cyclohexene	1
Retrosynthesis of ethyl bromide and overview of the topic	1
O.F1.3 ASSYMETRIC SYNTHESIS	
Introduction to chirality	1
Definition of asymmetric synthesis, enantiomeric excess,diasterotopic excess	**1**
Stereospecific reaction definition examples	1
Stereoselective reaction with examples and overview	2
	15hrs

Name of the Teacher: Mrs. P.Revathi Head, Department of chemistry

Signature: Signature:

UNIT –III Physical Chemistry – F **15 Lectures**

Topics to be covered	No. of Hours
Materials science Superconductivity, characteristics of superconductors,	1
Meissner effect, types of superconductors and applications.;	1
Nanomaterials- synthetic techniques, bottom-up-sol-gel method, top-down- electro deposition method.	1
Properties and applications of nano-materials.	1
Composites-definition, general characteristics,	1
Particle reinforces and fiber reinforces composites and their applications.	1
Catalysis Homogeneous and heterogeneous catalysis, comparison with examples	1
Kinetics of specific acid catalyzed reactions, inversion of cane sugar.	1
Kinetics of specific base catalyzed reactions, base catalyzed conversion of acetone to diacetone alcohol.	1
Acid and base catalyzed reactions- hydrolysis of esters, mutarotation of glucose.Catalytic activity at surfaces.	1
Mechanisms of heterogeneous catalysis. Langmuir-Hinshelwood mechanism	1
Enzyme catalysis: Classification, characteristics of enzyme catalysis.	1
Kinetics of enzyme catalyzed reactions-MichaelisMenton law, significance of Michaelis constant (K_m) and maximum velocity (V_{max}). Factors affecting enzyme catalysis-	2
Effect of temperature, pH, concentration and inhibitor. Catalytic efficiency.Mechanism of oxidation of ethanol by alcohol dehydrogenase.	1

Name of the Teacher: Head, Departmentof Chemistry

Signature: Signature: