HKE Society's

A.V.Patil Degree college of Arts,Science & Commerce, Aland.

Department of Chemistry

LESSON PLAN 2021-22

Semester : 1st (NEP) Paper : DSC 1 Analytical org. chemistry -I

Month	Teaching learning plan	Lecture hour	Teaching method
November	**Unit 1 Language of analytical chemistry:** Definitions of analysis, determination, measurement, techniques and methods, Classification of analytical techniques. Choice of an analytical method - accuracy, precision, sensitivity, selectivity, method validation	1	Lect. method
November	and limit of detection (LOD), Limit Of quantification (LOQ), linear dynamic range (working range).	1	Group discussion
November	Errors and treatment of analytical data Limitations of analytical methods — Errors: Determinate and indeterminate errors, absolute error, relative error, minimization of errors	3	seminar
November	Statistical treatment Of finite samples -mean, median, range, standard deviation and varianc	1	Practical method
November	Basic laboratory practices, calibration of glassware	2	Practical method
November	General rule for performing quantitative determinations (volumetric and gravimetric), Safety in Chemical laboratory, Rules Of fire prevention and accidents, First aid. Precautions to be taken while handling toxic chemicals, concentrated/fuming acids and organic solvents.	3	Practical method
December	**Unit 2 Titrimetric analysis:** Basic principle of titrimetric analysis. Classification, Preparation and dilution of reagents/solutions, Normality, Molarity and Mole fraction.	1	Group discussion
December	Acid-base titrimetry: Titration curves for strong acid vs strong base, weak acid vs strong base and weak base vs strong acid titrations	2	seminar
December	Complexometric titrimetry: Indicators for EDTA titrations	2	ICT
December	Applicationdetermination of hardness of water.		Group discussion
December	Redox titrimetry: Balancing redox equations titration curves, Theory of redox indicators	3	ICT
December	Precipitation titrimetry: Titration curves, titrants	3	ICT

	and standards, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences		
December	Gravimetric Analysis: Requisites of precipitation, mechanism of precipitation. Factors influencing precipitation, Co-precipitation, post-precipitation,	2	Lect. method
December	Advantages of organic reagents over inorganic reagents, reagents used in gravimetry (8-hydroxy quinoline (oxine) and dimethyl glyoxime (DMG)		
January-22	**Unit -3 Organic chemistry.** Classification and nomenclature of organic compounds, Hybridization, Shapes of organic molecules, Influence of hybridization on bond properties	2	Group discussion
January	, Types of chemical bonding, localized and delocalized, conjugation and cross conjugation, concept of resonance, electronic displacements: Inductive effect, Electromeric effect, Resonance	3	Practical method
January	Concept of resonance, aromaticity	1	Practical method
January	**Mechanisms of Organic Reactions** Types of bonds breaking Types of reagents Chemistry of Aliphatic hydrocarbons. Carbon-Carbon Sigma bonds	3	seminar
January	Chemistry of alkanes . Addition of HBr to propene Addition of hydrogen halides to alkenes, mechanism, regioselectivity and relative rates of addition	3	Practical method
January	Diels-Alder reaction, Allylic and benzylic bromination and mechanism	2	Practical method
February	**Unit – 4** Nucleophilic substitution at saturated carbon	3	Practical method
February	Stereochemistry and factors effecting SN^1 and SN reactions	1	Group discussion
February	Aromatic Electrophilic substitution reactions, Mechanisms	2	seminar
February	Aromatic nucleophilic substitution reaction	2	ICT

HOD of the Dept.

HEAD
Dept. Of Chemistry
A.V. Patil Degree College
ALAND, Dist:Kalaburagi.

Principal of College

PRINCIPAL
H. K. E. SOCIETY'S
A.V. Patil Degree College,
ALAND

Semester : 1st

Paper : OE -1 Chemistry in daily life

Month	Teaching learning plan	Lecture hour	Teaching method
November	**Unit 1 Dairy Products**. Composition of milk and milk products, Analysis of fat content, minerals in milk and butter. Estimation of added water in milk Beverages	1	Lect. method
November	Analysis of caffeine in coffee and tea, detection Of chicory in coffee, chloral hydrate in toddy, determination of methyl alcohol in alcoholic beverages Food additives, adulterants, and contaminant	1	Group discussion
November	Food preservatives like benzoates, propionates, sorbates, disulphites, Artificial sweeteners:	3	seminar
November	Artificial food colorants: Coal tar dyes and non-permitted colors and metallic salts. Analysis of pesticide residues in food	1	Practical method
December	**UNIT 2 : Vitamins**: Classification and Nomenclature. Sources, deficiency diseases, and structures of Vitamin Al, Vitamin Bl, Vitamin C, Vitamin D, Vitamin E & Vitamin Kl	2	Practical method
December	Oils and fats Composition of edible oils, detection of purity, rancidity of fats and oil	3	Practical method
December	Tests for adulterants like argemone oil and mineral oils. Halphen test.	1	Group discussion
January-22	Soaps & Detergents. Definition, classification, manufacturing of soaps and detergents, composition and uses	2	seminar
January	**Unit – 3 Chemical and Renewable Energy Sources** principles and applications of primary & secondary batteries and fuel cells.	2	ICT
January	Basics of solar energy, future energy storer		Group discussion
January	Polymers: Basic concept Of polymers, classification and characteristics of polymers	3	ICT
January	Applications of polymers as plastics in electronic, automobile components, medical fields, and aerospace materials.	3	ICT
January	Problems of plastic waste management. Strategies for the development of environment-friendly polymers	2	Test

Semester : 3rd

Course: Chemistry(CBCS)

Month	Teaching learning plan	Lecture hour	Teaching method
November	**UNIT 1 Solutions:** Thermodynamics of ideal solution. Deviation of roults law.	1	Lect. method
November	Vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions.	1	Group discussion
November	Partial miscibility of liquids: Critical solution temperature Immiscibility of liquids	3	seminar
November	Nernst distribution law and its applications, solvent extraction.	1	Practical method
November	**UNIT 2 : Phase equilibrium** Phases, components and degrees of freedom of a system, criteria of phase equilibrium	2	Practical method
November	Derivation of Clausius - Clapeyron equation and its importance	3	Practical method
December	Phase diagrams of one-component systems	1	Group discussion
December	Phase diagram two component systems involving eutectics, congruent and incongruent melting points (lead-silver, FeCl3-H2O and Na-K only).	2	seminar
December	**UNIT 3: Conductance** Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes	2	ICT
December	Kohlrausch law	1	Group discussion
December	Transference number its determination Hittorf and Moving boundary methods. Ionic mobility.	3	ICT
December	Applications of conductance measurements solubility and solubility products of sparingly soluble salts, ionic product of water	3	ICT
December	Conductometric titrations (only acid-base).	2	Lect. method
December	**UNIT 4 : Electrochemistry** Reversible and irreversible cells. Concept of EMF of a cell Types of electrodes	2	ICT
December	calculation of thermodynamic properties: *G*, *H* and *S* from EMF data. Liquid junction potential and salt bridge	2	Group discussion
December	Potentiometric titrations -qualitative treatment	3	Practical method
January -22	**UNIT 5 : p Block elements**	2	Lect.

	Compounds of Boron : Preparation, properties, structure and uses of borazole		method
January	Structure and uses of interhalogens of the type AB, AB3, AB5 and AB7.	2	Group discussion
January	Pseudo halogens - Preparation and properties of cyanogens and thiocyanogen	2	Group discussion
January	**UNIT 6 Amines & diazonium salts** *Preparation:* from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamide .	2	Practical method
January	*Reactions:* Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO2, Schotten Baumann Reaction	2	Practical method
February	Electrophilic substitution (case aniline	3	seminar
February	Diazonium salt & preparation	1	Group discussion
February	**UNIT 7 Amino acids & Peptides** Preparation and chemical reactions of AA	3	Practical method
February	Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins.	1	Lect. method
February	Determination of Primary structure of Peptides	3	Practical method
February	Synthesis of simple peptides	2	seminar
February	**Carbohydrates**: Classification, and General Properties	1	Lect. method
February	Determination of configuration of monosaccharides	2	seminar
February	Structure of disacharrides, ascending and descending in monosaccharides.	1	Lect. method

HOD of the Dept.

HEAD
Dept. Of Chemistry
A.V. Patil Degree College
ALAND, Dist:Kalaburagi.

Principal of College

PRINCIPAL
H. K. E. SOCIETY'S
A.V. Patil Degree College,
ALAND

Semester : 5th Semester (CBCS) Course: Chemistry

Month	Teaching learning plan	Lecture hour	Teaching method
November	**BASIC ANALYTICAL CHEMISTRY** Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy	1	Lect. method
November	reliability of results, rejection of results, Methods of reporting analytical data	1	Group discussion
November	minimization of errors, significant figures and computations, mean, median and standard deviations,	3	seminar
November	**Gravimetric Analysis** General principles, completion of precipitation. co-precipitation and post-precipitation, digestion (ageing), filtration, washing of precipitates,	1	Practical method
November	. . Types of filter papers types of crucibles, general errors and precautions in gravimetric analysis	2	Practical method
November	a few common gravimetric determinations-iron as ferric oxide in ferrous ammonium sulphate solution, sulphate as barium sulphate in ammonium sulphate solution.	3	Practical method
December	**Spectroscopy** Introduction, advantage of spectroscopic methods. Principle, and applications of UV-VIS, IR, NMR spectroscopy in organic analysis	1	Group discussion
December	Meaning of the terms chromophore,auxochrophore, bathochromic and hypsochromophoric shifts with examples.	2	seminar
December	Equivalent and non-equivalent protons, chemical shift, spin-spin coupling, (n+1) rule, Shielding and deshielding of protons in NMR spectroscopy	2	ICT
December	**Organometallic Compounds** The Grignard reagent: synthesis and application of methyl magnesium iodide. Reformatsky Reaction .	2	Group discussion
December	**Oraganosulphur compounds** Thiol: Nomenclature, methods of formation and chemical reactions of thiols	3	ICT
December	Thioethers- Nomenclature, methods of preparation and chemical reactions	3	ICT
January -22	**Heterocyclic compounds** Definition and classification, methods of synthesis and reactions of furan, thiophene pyrrole	3	Lect. method
January	**Colligative properties** Osmosis and Osmotic Pressure: Semi permeable membrane, natural and artificial semi permeable examples. Osmosis and osmotic pressure-determination of osmotic pressure by Berkeley and Hertley's method	3	Practical method
January	, Raoult's Law, relative lowering of vapour pressure of solvent, its determination by dynamic method (Oswald's & Walker	2	Group discussion

January	Elevation in boiling point: definition and its relationship with relative lowering of vapour pressure	3	Practical method
February	Depression in freezing point: Definition and its relationship to the lowering of vapour pressure, cryoscopic constant of the solvent,relation between depression in freezing point and molecular mass of solute(to be derived from Clepeyron- Claussius equation).	2	seminar
February	determination of molecular mass of solute by cryoscopic method.	2	seminar
February	**8. Thermodynamics II** Limitation of First law (need of second law). Spontaneous process With examples. Different statements of second law of thermodynamics. Carnot's cycle	3	Practical method
February	. Carnot's cycle, efficiency of the heat engine, carnot's theorem, concept of entropy	2	seminar
February	Gibb's free energy function - useful work, significance of free energy change - Derivation of Gibb's Helmholtz equation.	3	Practical method
February	Clapeyron - Clausius equation and its applications.	2	seminar

HOD of the Dept.
HEAD
Dept. Of Chemistry
A.V. Patil Degree College
ALAND, Dist:Kalaburagi.

Principal of College
PRINCIPAL
H. K. E. SOCIETY'S
A.V. Patil Degree College,
ALAND

Semester : 2nd Sem

Paper : DSC Inorganic & Analytical chem.

Month	Teaching learning plan	Lecture hour	Teaching method
March -22	Unit— I Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation	1	Lect. method
March -22	, significance of W and g/. Quantum numbers and their significance.	1	Group discussion
March -22	Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations- Electronic configurations of the elements (Z=I-30)	3	seminar
March -22	effective nuclear charge, shielding/screening effect, Slater's rules. Variation of effective nuclear charge in Periodic	1	Practical method
April -22	Normalized and orthogonal wave functions. Sign of wave functions.	2	Practical method
April -22	Unit – 2 s, p, d and f-block elements, the long form of periodic table	3	Practical method
April -22	a) Atomic radii (van der Waals) (b) Ionic and crystal radii. b) Covalent radii Ionization enthalpy, successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.	1	Group discussion
April -22	(c) Electron gain enthalpy, trends of electron gain enthalpy. Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-	2	seminar
May -22	Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity	2	ICT
May -22	Trends in the chemistry of the compounds of groups 13 to 17	2	Group discussion
May -22	**Unit – 3 <u>Gaseous State</u>** Elementary aspects of kinetic theory of gases, Ideal and real gases. Boyle temperature (derivation not required), Molecular velocity, collision frequency	3	ICT
May -22	collision diameter, Collision cross section, collision number and mean free path and coefficient of viscosit	3	ICT
June -22	**<u>Unit – 4 Liquid Crystals</u>** Explanation, classification with examples- Smetic, nematic, cholesteric, dics shaped and polymeric. Structures of nematic and cholesteric phases ecular	2	Test

	arrangements in nematic and cholesteric liquid crystals.		
June -22	. Applications of liquid crystals in LCDs and thermal sensing.	3	ICT
July -22	Forms of solids: Unit cell and space lattice, anisotropy of crystals, size and shape of crystals,	2	seminar
July -22	Laws of Crystallography: Law of constancy of interfacial angles, Law of rational indices, Law of symmetry	2	Group discussion
July -22	Distribution Law Nernst Distribution Law - Statement and its derivation. Distribution constant, factors affecting distribution constant,	3	ICT
July -22	Application of Distribution Law in Solvent extraction. Derivation for simple and multiple extraction, Principles of distribution law in Parkes Process of desilverisation of lead	2	Group discussion

Semester : 2ND Semester (NEP)

Course: OE — 2: Molecules of Life

Month	Teaching learning plan	Lecture hour	Teaching method
March -22	**Unit— I Carbohydrates** Classification of carbohydrates, reducing and non-reducing sugars, General properties of glucose and fructose, their open chain structures	2	Lect. method
March -22	monosaccharides, structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.	3	Group discussion
March -22	Amino Acids, Peptides and Proteins Classification of amino acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins	3	seminar
April -22	. Determination of primary structure of peptides.	1	Practical method
April -22	**UNIT 2 : Enzymes and correlation with drug action** Mechanism of enzyme action, factors affecting enzyme action, Co-enzymes and cofactors and their role in biological reactions	2	Practical method
April -22	, Specificity of enzyme action (including stereospecificity) ,	3	Practical method

April -22	Enzyme inhibitors and their importance, phenomenon of inhibition	1	Group discussion
May -22	Drug action-receptor theory. Structure—activity relationships of drug molecules, binding role of —OH group, -NH2 group, double bond	2	seminar
May -22	and aromatic ring Lipids Introduction to lipids, classification. Biological importance of triglycerides, phospholipids, I coli ids, and steroids cholesterol	2	ICT
May -22	**unit – 3 Nucleic Acids** Components of nucleic acids: Adenine, guanine, thymine and cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides	3	Group discussion
May -22	Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA (types of RNA), Genetic Code, Biological roles of DNA	3	ICT
June -22	RNA: Replication, Transcription and Translation.	3	ICT
June-22	Concept of Energy in Biosystems Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells	2	Lect. method
July -22	ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change. Conversion of food into energy	2	ICT
July -22	pathways of Carbohydrate- Glycolysis, Fermentation, Krebs Cycle	2	Group discussion
July -22	Overview of catabolic pathways of Fats and Proteins	3	Practical method

HOD of the Dept.

HEAD
Dept Of Chemistry
A.V. Patil Degree College
ALAND, Dist:Kalaburagi.

Principal of College

PRINCIPAL
H. K. E. SOCIETY'S
A.V. Patil Degree College,
ALAND

Semester : 4th Semester (CBCS)

Course: Chemistry

Month	Teaching learning plan:	Lecture hour	Teaching method
March -22	Transition elements: General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties,	3	Lect. method
March -22	ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu.	3	Group discussion
March -22	Lanthanoids and actinoids: Electronic configurations, oxidation states, colour, magnetic properties	3	seminar
March -22	contraction, separation of lanthanides	1	Practical method
April -22	UNIT 2 : Valence bond theory VBT of CN No. 4 &6	2	Lect. method
April -22	Structural and stereoisomerism in complexes with coordination numbers 4 and 6.	3	Practical method
April -22	Drawbacks of VBT & IUPAC Nomenclature	2	seminar
April -22	**CFT** Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields.	2	ICT
May -22	Factors affecting the magnitude of D. Spectrochemical series.		Group discussion
May -22	Comparison of CFSE for Oh and Ta complexes, Tetragonal distortion of octahedral geometry.	3	ICT
May -22	John teller Distortion	2	ICT
May -22	**Kinetic theory of gases** Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.	2	Lect. method
June -22	van der Waals equation of state for real gases. Boyle temperature		
June -22	Maxwell Boltzmann distribution laws of molecular velocities and molecular energies	2	Group discussion
July -22	Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules	3	Practical method
July -22	**Liquids** Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer	2	Practical method
July -22	Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).	1	Lect. method
July -22	**Solids** Forms of solids. Symmetry elements, unit cells,	2	Group

	crystal systems, Bravais lattice types and identification of lattice planes		discussion
June -22	Laws of Crystallography, Law of rational indices. Miller indices	3	seminar
July -22	. X-Ray diffraction by crystals, Bragg's law. Structures of NaCl, KCl and CSCl	3	Practical method
July -22	Defects in crystals. Glasses and liquid crystals.	2	Practical method
July -22	**Unit chemical kinetics** The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates.	3	Practical method
July -22	Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions	1	Group discussion
July -22	. Concept of activation energy and its calculation from Arrhenius equation.	2	seminar
July -22	Theories of Reaction Rates	2	ICT

HOD of the Dept.
HEAD
Dept. Of Chemistry
A.V. Patil Degree College
ALAND, Dist:Kalaburagi.

Principal of College
PRINCIPAL
H. K. E. SOCIETY'S
A.V. Patil Degree College,
ALAND

Semester : 6th Semester (CBCS) Course: Chemistry

Month	Teaching learning plan	Lecture hour	Teaching method
March -22	**UNIT**: I: **INDUSTRIAL CHEMISTRY Cement** Introduction, definition, raw materials, grades of cement	1	Lect. method
March -22	Manufacture of Portland cement (by dry and wet process). Mechanism of setting of cement.	3	Group discussion
March -22	Ceramics , clay and glasses Ceramics: Introduction, classification -clay definition, properties and uses	1	seminar
March -22	Refractories: classification - acid, base and neutral refractories	1	Practical method
April -22	Glass: Properties, types, manufacture of soda glass	2	Practical method
April -22	Composition and applications of borosilicate, metallic glass, optical glasses and polycarbonate glass, safety glass, fire and bullet proof glass.	3	Practical method
April -22	Paints Introduction, requirement of paints, constituents of paints, formulation failure of paints films (reasons), emulsion paints	1	Group discussion
April -22	manufacture of white lead using Dutch process and uses. Pigments: Red pigments, white	2	seminar
May -22	Varnishes: Spirit and Oil Varnishes	2	ICT
May -22	**oils and fats**. Composition Determination of saponification value and iodine value of oils and fats. Manufacture of soaps		Group discussion
May -22	Synthetic detergents (Syndets) manufacture of sodium lauryl sulphate and sodium do decyl benzene sulphonate. Cleansing action of soaps.	3	ICT
May -22	**Synthetic polymer** Classification with examples, synthesis and uses of low density and high density polyethene,	3	ICT
May -22	Synthesis & uses nylon 6, nylon 6,6, bakelite and terylene.	2	Lect. method
May -22	**Synthetic Dye** Introduction, classification based on structure, chromophore theory of colour		
May -22	Synthesis of congo red, bismarck brown, malachite green and alizarin	2	Group discussion

June -22	. Synthesis and elucidation of structure of nicotine.Structural formula and uses of Quinine and Atropine.	3	Practical method
June -22	**Terepens** occurance classification isoprene rule	1	Lect. method
June -22	structural elucidation, structural elucidation of Citral. Structural formula and uses of menthol, a- pinene and camphor	1	Group discussion
June -22	**Hormones**: Introduction, classification with examples. Hormone secreting glands	1	seminar
June -22	Synthesis and importance of Adrenaline and thyroxin. Biological importance of insulin and oxytocin.	3	Practical method
June -22	Vitamins: Introduction, classification with examples, synthesis of vitamin C. Biological importance of vitamins A, B1, B2, B6, C, and D	2	Practical method
June -22	Protection and deprotection of amino, carboxyl groups	3	Practical method
July -22	**Molecular spectroscopy** Electromagnetic radiation, regions of the spectrum. Basic features of different spectrometers, statement of Born-Oppenheimer approximation, degrees of freedom	1	Group discussion
July -22	determination of bond length, qualitative description of non-rigid rotator, isotopic effect. Problems.	2	seminar
July -22	Vibrational spectrum: Infrared spectrum:-Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum	2	ICT
July -22	Raman spectrum: Pure rotational and pure vibrational Raman spectra of diatomic molecules.		Group discussion
July -22	**Electrochemical cell** (Dry cell) Secondary cell (lead storage cell and Nickel-cadmium cell), Fuel cells, construction and working of Hydrogen- oxygen fuel cell and its importance.	3	ICT
July -22	**Radiation chemistry** Introduction, units of radiation, dosimeters-Friche dosimeter and Ceric sulphate dosimeter	3	ICT
July -22	Use of radio isotopes in Tracer technique, Agriculture, Medicine, Food Preservation, and carbon dating	2	Lect. method

HOD of the Dept.

HEAD
Dept. Of Chemistry
A.V. Patil Degree College
ALAND, Dist:Kalaburagi.

Principal of College

PRINCIPAL
H. K. E. SOCIETY'S
A.V. Patil Degree College,
ALAND