DEPARTMENT OF CHEMISTRY

LESSON PLAN

2019-2020

Dr.S.JHANCY MARY

LESSON PLAN

2019-2020

ODD SEMESTER

PHYSICAL CHEMISTRY

III B.Sc. -Chemistry - 5 hours /week

Week	Topics	Reference Books
1	Chemical Kinetics: order and molecularity - Methods to determine the rate of the reactions-derivation of rate constants of I, II, III and zero order reactions and examples.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
2	Derivation for time for half change with examples-Methods to determine the order of reactions – Experimental methods in the study of kinetics of reactions- Volumetry, Manometry.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
3	Polarimetry, Dilatometry and Colorimetry Effect of temperature on the rate of reactions – Arrhenius equation and concept of energy of activation.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
4	Collision theory and derivation of rate constant for bimolecular reactions –Lindemann ‘s theory of unimolecular reactions.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008.

		Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
5	Theory of Absolute Reaction Rates-thermodynamic derivation for the rate constant for a bimolecular reaction from it-Comparison of Collision theory and ARRT-significance of entropy and free energy of activation.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
6	Complex reactions : types - consecutive, parallel and reversible reactions (no derivation, only examples).	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
7	Photochemistry-laws of light absorption and laws of photochemistry-Jablonski diagram-Fluorescence and Phosphorescence.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
8	Primary and secondary reactions – quantum yield - Experimental determination, Eder's and Uranyl oxalate actinometers.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.

9	Kinetics of Hydrogen – Bromine reaction, photolysis of aldehyde-photosensitization-Chemiluminescence. Lasers- uses of lasers.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Jainudeen, Chemical Kinetics and Photochemistry, 1st Edition, Jazeeme publication, 1982.
10	Phase equilibria – Gibbs phase rule –statement, definition of terms and derivation - applications to one component systems – Water and Sulphur systems.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Gurtu, Phase Rule, 2nd Edition, Pragathi Prakash Publications, 1972.
11	Thermal analysis and cooling curves – reduced phase rule - Two component system – lead silver system - freezing mixtures - compound formation with congruent melting point.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Gurtu, Phase Rule, 2nd Edition, Pragathi Prakash Publications, 1972.
12	Zn-Mg system, Ferric Chloride water system - incongruent melting point, Na-K system, CST and effect of impurity on Phenol – Water system.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. Gurtu, Phase Rule, 2nd Edition, Pragathi Prakash Publications, 1972.
13	Catalysis-definition-homogeneous catalysis-function of a catalyst in terms of Gibbs free energy of activation. Heterogenous catalysis-Mechanisms of surface reactions.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008.
14	Simple decompositions on surfaces -Kinetics of unimolecular surface reactions. Enzyme catalysis-Derivation of Michaelis Menton equation.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical

		Chemistry, 43rd Edition, Vishal Publishing Co., 2008.
15	Adsorption - physisorption and chemisorption - Freundlich adsorption isotherm -Langmuir adsorption isotherm - BET equation (no derivation) - applications of adsorption.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008.

I M.Sc. 1 hour/week

KINETICS AND PHOTO CHEMISTRY

S.No	Topics	Reference Books
1	Partition functions and activated complex-Eyring equation	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
2	Derivation of rate constant	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
3	Determination of free energy, enthalpy and entropy of activation and their significance	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
4	Potential energy surfaces	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
5	Potential energy surfaces	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
6	Applications of ACT to reactions in solution - effect of pressure	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
7	Effect of dielectric constant -single sphere model	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
8	Effect of dielectric constant -double sphere model	Chemical Kinetics by Laidler

		Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
9	Effect of ionic strength on reactions in solution	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
10	Cage effect	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
11	Kinetic isotope effect	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
12	Kinetic isotope effect	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
13	Linear free energy relationships– Hammett equation	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
14	Linear free energy relationships– Hammett equation	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -
15	Linear free energy relationships– Taft equation	Chemical Kinetics by Laidler Kinetics Kinetics and Mechanisms of Chemical Transformations by J.Rajaram J.C. Kuriacose -

LESSON PLAN

2019-2020

EVEN SEMESTER

ELECTRO CHEMISTRY

III B.Sc.Chemistry - 5 hours /week

Week	Topics	Reference Books
1	Electrochemistry: Conductance - Metallic and electrolytic conductors - specific, equivalent and molar conductance.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
2	Measurement of conductance- variation of conductance with dilution for strong and weak electrolytes (qualitative explanation). Transport number and its determination by Hittorf's method.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
3	Ionic mobility - determination of ionic mobility – effect of temperature and concentration on ionic mobility, Ionic conductance - Kohlrausch's law and its applications.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
4	Theory of strong electrolytes - Debye – Huckel - Onsager theory-verification of Onsager equation.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.

5	Wein effect and Debye Falkenhagen effect-ionic strength - activity and activity coefficients of strong electrolytes.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
6	Applications of conductivity measurements – degree of hydrolysis, solubility product and conductometric titrations.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
7	EMF: Galvanic cells-reversible and irreversible electrodes and cells - standard cell -emf and its measurement.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
8	Types of electrodes – electrode reactions- electrode potentials - reference electrodes-standard electrode potentials. Derivation of Nernst equation for electrode potential and cell emf - sign conventions	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
9	Electrochemical series and its applications-formation of cells - electrode and cell reactions – cell emf	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008.

		B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
10	Chemical cells and Concentration cells with and without transference – examples and derivation of expressions for their emf's.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
11	Liquid junction potential - Applications of emf measurements-calculation of ΔG, ΔH, ΔS and equilibrium constants.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
12	Determination of pH using hydrogen, quinhydrone and glass electrodes - Potentiometric titrations.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
13	Applications of Concentration cells - determination of valency of ions - transport number – ionic product of water.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
14	Solubility product– Polarization - decomposition potential - over voltage - storage cells -lead acid battery - mechanism of discharging and recharging	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008.

		B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.
15	Fuel cells – types of fuel cells – Hydrogen – Oxygen fuel cell.	R. Puri, L. R Sharma and M.S Pathania, Principles of Physical Chemistry, 43rd Edition, Vishal Publishing Co., 2008. B.K Sharma, Electrochemistry, 4th Edition, Goel Publishing House, 1990.

Lesson Plan for the year 2019- 2020

THERMODYNAMICS

1 hour/week

Dr.S.Jhancy Mary

Week	Portions to be covered	Reference
Week 1	Thermodynamics and Mathematical Probability	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose
Week 2	Sterling approximation	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose
Week 3	Lagrange's method of indeterminate multipliers	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose
Week 4	Distribution and most probable distribution	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose
Week 5	Distinguishable and Indistinguishable particles	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose
Week 6	Statistical Mechanics-Maxwell-Boltzmann distribution law-Derivation and applications	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose

Week 7	Bose–Einstein distribution law- derivation and applications	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose
Week 8	Fermi –Dirac distribution law- Derivation and applications	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose
Week 9	Comparison of the distribution laws	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose

Week 10	Relation between partition and thermodynamic functions	Statistical Thermodynamics by M.C. Gupta Thermodynamics by Rajaram Kuriacose

Auxilium College (Autonomous), Vellore - 6

Odd Semester Lesson Plan

2019-2020

Dr. J. Rosaline Ezhilarasi

UCCHG16-Inorganic Chemistry, No. of hours per week - 4

Week	Unit	Portions to be Covered	References
I	I	General characteristics of d block elements and comparative study of Ti and V group elements.	Inorganic Chemistry by P. L. Soni and Puri & Sharma.
II	I	Comparative study of Cr, Mn and Fe group elements.	Inorganic Chemistry by P. L. Soni and Puri & Sharma.
III	I	Chemistry of lanthanides and actinides.	Modern Inorganic Chemistry by R. D. Madan.
IV	II	Metallurgy and metallurgical processes - general methods of extraction, various concentration, refining and reduction methods.	Modern Inorganic Chemistry by R. D. Madan.
V	II	Extraction, properties and uses of Ti, Zr, Pt and Th.	Modern Inorganic Chemistry by R. D. Madan and Advanced Inorganic Chemistry by Cotton and Wilkinson.
VI	II	Extraction, properties and uses of U. Preparation and uses of ammonium molybdate, vanadium pentoxide, uranium hexa fluoride. Steel alloys - heat treatment of steel.	Modern Inorganic Chemistry by R. D. Madan.
VII	III	Fundamental particles of the nucleus - nucleon terminology, nuclides, isotopes, isobars, isotones, mirror nuclei and isomers.	Essentials of Nuclear Chemistry by H J Arnikar.

VIII	III	Nuclear forces operating between the nucleons- meson exchange theory and nuclear fluid theory, N/P ratio, curves, stability belts, the whole number rule and packing fraction.	Essentials of Nuclear Chemistry by H J Arnikar and Elements of Nuclear Chemistry by A. K. Srivastava & P. C. Jain.
IX	III	Natural radioactivity - properties of radioactive rays -radioactive series including neptunium series - group displacement law -rate of disintegration and half-life period.	Modern Inorganic Chemistry by R. D. Madan.
X	IV	Nuclear binding energy: Mass defect - simple calculations involving mass defect and B.E per nucleon - magic numbers - liquid drop model - shell model.	Modern Inorganic Chemistry by R. D. Madan, Essentials of Nuclear Chemistry by H J Arnikar and Elements of Nuclear Chemistry by A. K. Srivastava & P. C. Jain.
XI	IV	Artificial radioactivity - induced radioactivity - nuclear transmutation reactions.	Modern Inorganic Chemistry by R. D. Madan.
XII	IV	Nuclear fission - nuclear energy - nuclear reactors - breeder reactor, nuclear power projects in India, nuclear fusion – thermonuclear reactions – energy source of the sun. and the stars.	Modern Inorganic Chemistry by R. D. Madan, Essentials of Nuclear Chemistry by H J Arnikar.
XIII	V	Biological importance of Fe, Zn, Mg and Co.	Fundamental Concepts of Applied Chemistry by Jayashree Ghosh and epgpathshala.
XIV	V	Biological role of Mo, Na, K, Ca and P.	Fundamental Concepts of Applied Chemistry by Jayashree Ghosh and epgpathshala.

XV	V	Inorganic medicinal chemistry - radio pharmaceuticals, chelate therapy and contrast agents in MRI.	Fundamental Concepts of Applied Chemistry by Jayashree Ghosh and epgpathshala.

Auxilium College (Autonomous), Vellore - 6

Odd Semester Lesson Plan

2019-2020

Dr. J. Rosaline Ezhilarasi

UCCHD16-General Chemistry III, No. of hours per week - 2

Week	Unit	Portions to be Covered	References
I	V	The Solid State - differences between crystalline and amorphous solids.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
II	V	Symmetry in crystal systems – plane, axes and centre of symmetry, Elements of symmetry.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
III	V	Unit cell, space lattice, Bravais lattices, law of rational indices and Miller indices.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
IV	V	X - ray diffraction – derivation of the Bragg's equation.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
V	V	Experimental methods – Laue's method and powder method.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
VI	V	Types of crystals -characteristics of molecular and covalent crystals.	Principles of Physical Chemistry by B. R. Puri, L.

			R Sharma and M.SPathania.
VII	V	Characteristics of metallic and ionic crystals.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
VIII	V	Imperfections in crystal systems – Schottky and Frenkel defects, metal excess and metal deficiency defects.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
IX	V	Semiconductors – band theory of solids, intrinsic semiconductors, extrinsic semiconductors – n-type and p-type semiconductors.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
X	V	Three-dimensional close packing of spheres – ccp and hcp – characteristics of hcp, ccp and bcc structures,	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
XI	V	Interstitial sites in closely packed arrangement of atoms – triangular, tetrahedral and octahedral sites, radius ratio rule and its effect on the shapes of ionic crystals.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
XII	V	Structures of ionic crystals-NaCl, CsCl, ZnS, Wurtzite, Fluorite and Rutile.	Principles of Physical Chemistry by B. R. Puri, L. R Sharma and M.SPathania.
XIII	III	Dicarboxylic acids – acid strengths, general methods of preparation and properties.	A Textbook of Organic Chemistry by Bahl and Arun Bahl.
XIV	III	Preparation and properties of oxalic and malonic acids.	A Textbook of Organic Chemistry by Bahl and

			Arun Bahl.
XV	III	Preparation and properties of succinic, glutaric and adipic acids.	A Textbook of Organic Chemistry by Bahl and Arun Bahl.

Auxilium College (Autonomous), Vellore - 6

Odd Semester Lesson Plan

2019-2020

Dr. J. Rosaline Ezhilarasi

PCCHK15-Molecular Spectroscopy, No. of hours per week - 2

Week	Unit	Portions to be Covered	References
I	III	Mossbauer spectroscopy - Mossbauer effect,recoilless emission and absorption, Doppler effect.	Physical Methods in Inorganic Chemistry by R.S. Drago.
II	III	Instrumentation, hyperfine interaction - chemical isomer shift, quadruple interaction and magnetic splitting.	Physical Methods in Inorganic Chemistry by R.S. Drago.
III	III	Interpretation of spectra - bonding and structures of Fe^{2+} and Fe^{3+} compounds, Sn^{2+} and Sn^{4+} compounds and detection of oxidation states and in-equivalent MB atoms, Applications of Mossbauer spectroscopy.	Physical Methods in Inorganic Chemistry by R.S. Drago.
IV	IV	ESR - principle, origin of an EPR signal, derivative spectra, g value - factors affecting the magnitude of g values, anisotropy.	Physical Methods in Inorganic Chemistry by R.S. Drago.
V	IV	Hyperfine interactions – hyperfine coupling constant, relative intensities of EPR signals,	Physical Methods in Inorganic Chemistry by

		hyperfine splitting in Cu and Mn compounds, Interpretation of the spectra of simple carbon centered free radicals, zero field splitting and Kramer's degeneracy.	R.S. Drago.
VI	IV	Electron delocalization – Mc Connell's equation, line width in solid state EPR, Applications of EPR spectroscopy.	Physical Methods in Inorganic Chemistry by R.S. Drago.
VII	IV	Photoelectron spectroscopy – Photo electric effect, UV and X-ray PES, Koopmans' theorem, fine structure in PES, interpretation of photo electron spectra of H_2 and N_2.	Physical Methods in Inorganic Chemistry by R.S. Drago.
VIII	IV	Interpretation of photo electron spectra of O_2, CO, NO, N_2O, H_2O, azide, HCl and NH_3.	Physical Methods in Inorganic Chemistry by R.S. Drago.
IX	IV	Electron Spectroscopy for Chemical Analysis – applications of ESCA.	Physical Methods in Inorganic Chemistry by R.S. Drago.
X	V	Rotational spectroscopy: Classification of molecules, rigid rotor model, selection rules, intensity of spectral lines, effect of isotopic substitution.	Fundamentals of Molecular Spectroscopy by C.N. Banwell.
XI	V	Non rigid rotator, microwave spectra of polyatomic molecules.	Fundamentals of Molecular Spectroscopy by C.N. Banwell.
XII	V	Vibrational spectroscopy: Harmonic oscillator, selection rules, vibrational energy of diatomic molecules, zero-point energy, force constant and	Fundamentals of Molecular Spectroscopy by C.N.

		bond strength; anharmonicity, Morse potential energy diagram.	Banwell.
XIII	V	Franck Condon principle, vibrational spectra of poly atomic molecules. Vibration-rotation spectroscopy, P, Q, R, branches.	Fundamentals of Molecular Spectroscopy by C.N. Banwell.
XIV	V	Breakdown of Born-Oppenheimer approximation, vibration of polyatomic molecules, normal modes of vibration, overtones, hot bands, Fermi resonance.	Fundamentals of Molecular Spectroscopy by C.N. Banwell.
XV	V	Raman: Classical and quantum theories of Raman effect, pure rotational, vibrational and vibrational-rotational Raman spectra, selection rules, stokes and anti-stokes lines, mutual exclusion principle.	Fundamentals of Molecular Spectroscopy by C.N. Banwell.

AUXILIUM COLLEGE (AUTONOMOUS) VELLORE – 6

PG & Research Department of Chemistry

Dr. (Mrs.) J. Rosaline Ezhilarasi

Even Semester (2019-2020)
LESSON PLAN

Programme	B.Sc. Chemistry
Programme Code	U17
Semester	VI
Course	Coordination Chemistry
Course Code	UCCHJ16
Hours	4 hours/week
Credits	4
Total Hours	60 hours
Max Marks	100
Course Instructor/ Coordinator	Dr. (Mrs.) J. Rosaline Ezhilarasi

Week / Date	No. of Hours	Units	Topics	Teaching Methodology	Learning Resources	Method of Evaluation
1	4	I	Co-ordination compounds: Molecular compounds, difference between double salts and complex compounds, Definition of terms used, classification of ligands – based on denticity and charge. Chelation – tendency of polydentate ligands to form chelates and applications of chelate	Interactive Lecture method Inquiry based learning Expository learning method	Inorganic Chemistry by R.D.Madan Coordination Chemistry by Subash and Sathish	Class test

			formation.			
2	4	I	Nomenclature of coordination compounds.	Participatory Learning, Peer teaching	Coordination Chemistry by M. Satake Y. Mido.	Slip test
3	4	I	Isomerism in complexes: structural isomerism – conformation isomerism, ionization isomerism, hydrate isomerism, linkage isomerism, ligand isomerism, co-ordination isomerism, coordination position isomerism. polymerization isomerism, geometrical isomerism in 4- and 6- coordinate complexes.	Collaborative Learning Class room discussion	Coordination Chemistry by Gurdeep Chatwal and M. S. Yadav Inorganic Chemistry by R.D.Madan Concise Inorganic Chemistry by J. D. Lee A Text Book of Inorganic Chemistry by A. K. De	Audience Response System
4	4	I	Optical isomerism-optical activity, conditions, optical isomerism in 4- and 6-coordinated complexes.	Collaborative learning Inquiry based learning	Inorganic Chemistry by R.D.Madan	Slip test
5	4	II	Theories of coordination compounds - Werner's theory – postulates, designation and formation of Co(III) ammine complexes, experimental verification.	Interactive Lecture method	Concise Coordination Chemistry by R Gopalan and V Ramalingam. Selected Topics in Inorganic	Take-home exam

					Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan.	
6	4	II	Sidgwick theory – electronic concept of coordinate bond, EAN rule, limitations.	Inquiry based learning Participatory learning	Inorganic Chemistry by R.D.Madan	Audience Response System
7	4	II	Theory of bonding - valence bond theory – assumptions, VBT as applied to octahedral, (inner orbital and outer orbital) - hybridization, geometry and magnetic properties.	Inquiry based learning Collaborative learning	Inorganic Chemistry by R.D.Madan Concise Coordination Chemistry by R Gopalan and V Ramalingam.	Audience Response System Short answer test
8	4	II	VBT as applied to tetrahedral and square planar complexes - hybridization, geometry and magnetic properties, failures of VBT.	Inquiry based learning	Selected Topics in Inorganic Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan.	Audience Response System
9	4	III	Crystal Field theory – salient features, splitting of d - orbitals in octahedral, tetrahedral and square planar complexes, crystal field stabilization energy - factors affecting the magnitude of Δ_o - spectrochemical series.	Expository learning	Inorganic Chemistry by R.D.Madan, Concise Coordination Chemistry by R Gopalan and V Ramalingam, Selected	Home reading

					Topics in Inorganic Chemistry by Malik, Tuli and R. D. Madan.	
10	4	III	Filling up t_{2g} and e_g orbitals with electrons in octahedral and tetrahedral complexes - low spin and high spin complexes.	Collaborative learning Peer teaching	Inorganic Chemistry by R.D.Madan Concise Coordination Chemistry by R Gopalan and V Ramalingam.	Audience Response System
11	4	III	Calculation of CFSE in octahedral and tetrahedral complexes, uses of crystal field stabilization energy values.	Learning by teaching Group discussion	Inorganic Chemistry by R.D.Madan, P.L. Soni and Puri & Sharma	Audience Response System
12	4	III	Explanation of magnetic properties, colour and geometry using CFT, limitations of CFT, Comparison between VBT and CFT.	Experiential learning Role playing Simulation based learning	Selected Topics in Inorganic Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan.	Home test
13	4	IV	Covalency in transition metal complexes - evidences for covalency. Molecular Orbital theory - postulates, metal orbitals and LGOs suitable for Γ-bonding in octahedral geometry.	Expository learning	Selected Topics in Inorganic Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan.	Class test

14	4	IV	Construction of qualitative MO energy level diagrams for ∫ –bonding in octahedral complexes. Metal orbitals and LGOs suitable for π -bonding in octahedral geometry, effect of π-bonding on the magnitude of Δ_o.	Participatory Learning	Selected Topics in Inorganic Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan. Advanced Inorganic Chemistry by J. D. Lee	Short answer test
15	4	IV	Construction of π MOs for donor and acceptor ligands, relation between pi bonding ability of ligands and spectrochemical series.	Participatory Learning	Selected Topics in Inorganic Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan.	Audience Response System
16	4	IV	Comparison between CFT and MOT - similarities and differences.	Lecture method Inquiry based learning	Selected Topics in Inorganic Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan.	Audience Response System
17	4	V	Pi acceptor ligands: metallic carbonyls – synergic effect, synthesis, properties and uses of carbonyls of Ni, Cr and Fe.	Interactive Lecture method Reading Assignments	Inorganic Chemistry by R.D.Madan, P.L. Soni and Puri & Sharma	Assignment
18	4	V	Carbonyls of Co, Mn, Mo and W – synthesis, properties and uses.	Personalized learning	Selected Topics in Inorganic	Assignment

					Chemistry, Wahid U. Malik, G. D. Tuli and R. D. Madan.	
19	4	V	Bonding, hybridization and structures of carbonyls of Ni, Cr, Fe.	Interactive Learning	Inorganic Chemistry by R.D.Madan, P.L. Soni and Puri & Sharma	Audience Response System
20	4	V	Bonding, hybridization and structures of carbonyls of Co, Mn, Mo and W.	Interactive Learning	Inorganic Chemistry by R.D.Madan, P.L. Soni and Puri & Sharma	Audience Response System

Programme	B.Sc. Chemistry
Programme Code	U17
Semester	IV
Course	General Chemistry - IV
Course Code	UCCHE16
Hours	5 hours/week
Credits	5
Total Hours	45/75 hours
Max Marks	100
Course Instructor/ Coordinator	Dr. (Mrs.) J. Rosaline Ezhilarasi

Week / Date	No of Hours	Units	Topics	Teaching Methodology	Learning Resources	Method of Eval
1	3	IV	Thermodynamics - types of systems – isolated, closed, open, homogeneous and heterogeneous systems, phase, state of a system, state variables. Thermodynamic equilibrium - thermal, mechanical and chemical equilibria, extensive and intensive properties, processes and their types – isothermal, adiabatic and isobaric processes, reversible and irreversible processes, nature of work and heat.	Scientific method of teaching Reading Recitation Peer group teaching	Principles of Physical Chemistry by Puri & Sharma Textbook of Physical Chemistry by P.L. Soni	Audience Respons System Outside class test
2	3	IV	The first law of thermodynamics - concept of internal energy, statements of I law, state functions, exact and inexact differentials, the Euler reciprocal relation, enthalpy of a system, enthalpies of vaporization	Deductive/Analytic/Rule G method of teaching Problem solving method Collaborative learning	Textbook of Physical Chemistry by P.L. Soni Principles of Physical Chemistry by	Audience Respons System Home work

			and fusion, heat capacity of a system - relationship between C_p and C_v in gaseous systems - calculation of w, ΔU, q and ΔH for expansion and compression of ideal gases under reversible and irreversible isothermal conditions.		Puri & Sharma	Slip test
3	3	IV	Adiabatic expansion – calculation of w, ΔU and ΔH, final temperatures in reversible and irreversible adiabatic expansions, Comparison of isothermal and adiabatic expansions, Zerothlaw of thermodynamics. Thermochemistry - heat of reaction, exothermic and endothermic reactions, relationship between q_p and q_v.	Heuristic method Mind mapping method Problem solving method Peer group teaching	Principles of Physical Chemistry by Puri & Sharma Textbook of Physical Chemistry by P.L. Soni	Audience Respons System Home work
4	3	IV	Standard enthalpy changes of reactions, standard enthalpies of combustion, neutralization and formation, determination of enthalpies of reactions, variation of enthalpy of reaction with temperature - Kirchhoff's equations. Bond energies-definition, calculation and applications of bond energies.	Group Discussion Open book assignments Cooperative Learning Peer group teaching Problem solving method	Principles of Physical Chemistry by Puri & Sharma Thermodyna mics by J. N. Gurtu	Audience Respons System Home test
5	3	IV	The Second law of thermodynamics - need for	Heuristic method	Thermodyna mics by J. N.	Audience Respons System

			the second law, statements of II law, spontaneous processes, Carnot's cycle - efficiency of a heat engine- Carnot's theorem (statement only).	Recitation Participatory learning	Gurtu	Home work
6	3	V	Entropy – the concept of entropy, entropy changes in isothermal expansion of an ideal gas, in reversible and irreversible processes, entropy change accompanying change of phase.	Lecture method Problem solving Recitation	Thermodynamics by Rajaram & Kuriakose	Take-home test
7	3	V	Calculation of entropy changes with changes in T, V, and P, entropy changes in different processes, entropy of a mixture of ideal gases, entropy of mixing, physical significance of entropy.	Lecture method Open book reading Problem solving	Principles of Physical Chemistry by Puri & Sharma	Audience Respons System
8	3	V	Helmholtz and Gibbs free energy functions, variation of free energy change with T and P. Maxwell's relations, criteria for reversible and irreversible processes, Gibbs-Helmholtz equation.	Participatory learning Peer teaching	Thermodynamics by J. N. Gurtu Principles of Physical Chemistry by Puri & Sharma	Short answer test Audience Respons System

9	3	V	Partial molar properties – concept of chemical potential, the Gibbs-Duhem equation, variation of chemical potential with temperature and pressure, chemical potential in a system of ideal gases, Clausius- Clapeyron equation – applications.	Interactive lecture method Group discussion	Thermodynamics by J. N. Gurtu, Rajaram& Kuriakose Principles of Physical Chemistry by Puri & Sharma	Audience Respons System Take home exam
10	3	V	Third law of thermodynamics - Nernst heat theorem, statement of third law, determination of absolute entropies of solids, liquids and gases, residual entropy.	Reading Recitation Interactive lecture method	Principles of Physical Chemistry by Puri & Sharma	Audience Respons System
11	3	III	Aromaticity – Huckel's rule and its applications.	Lecture method Inquiry based learning	Advanced Organic Chemistry by Bahl & Arun Bahl	Assignment
12	3	III	Heterocyclic compounds - preparation, properties and uses of furan, thiophene, pyrrole.	Learning by teaching Participatory learning	Textbook of Organic Chemistry by P.L.Soni and K.S. Tewari	Outside class test
13	3	III	Preparation, properties and uses of pyridine, quinoline and isoquinoline.	Interactive lecture Group discussion	Textbook of Organic Chemistry by P.L.Soni and K.S. Tewari	Outside class test

14	3	III	Phenols - preparation, properties and uses of dihydric and trihydric phenols, acidic character of phenols.	Collaborative learning	Textbook of Organic Chemistry by P.L.Soni and K.S. Tewari	Outside class test Assignment
15	3	III	Mechanism of Kolbe's reaction, Riemer-Teimann reaction, Gattermann reaction, Mannich and Houben –Hoesch reactions.	Expository learning	Textbook of Organic Chemistry by P.L.Soni and K.S. Tewari Modern Organic Chemistry by M.K.Jain	Audience Respons System Home test

Programme	M.Sc. Chemistry
Programme Code	P14
Semester	II
Course	Advanced Coordination Chemistry
Course Code	PCCHE19
Hours	5 hours/week
Credits	4
Total Hours	30/75 hours
Max Marks	100
Course Instructor/ Coordinator	Dr. (Mrs.) J. Rosaline Ezhilarasi

Week / Date	No of Hours	Units	Topics	Teaching Methodology	Learning Resources	Method of Evaluation
1	2	II	CFT- salient features of CFT, crystal field splitting of d-orbitals in octahedral complexes – factors affecting the magnitude of Δ_o	Inductive teaching and learning	Concise Coordination Chemistry by R. Gopalan Selected Topics in Inorganic Chemistry by Malik Tuli Madan Inorganic Chemistry by R.D.Madan	Assignment Take-home test
2	2	II	Crystal field splitting of d-orbitals in octahedral, tetrahedral, tetragonal and square planar complexes, consequences of splitting – high-spin and low-spin complexes, distribution of d-electrons.	Inquiry based learning Participatory learning	Inorganic Chemistry by R.D.Madan Inorganic Chemistry by Puri & Sharma Advanced Inorganic Chemistry by Cotton & Wilkinson	Home work
3	2	II	CFSE- calculation of CFSE for various d systems in O_h and T_d fields.	Active and Collaborative learning Peer teaching	Coordination Chemistry by M. Satake Y. Mido and Gurdeep Chatwal and M. S. Yadav	Class test Self- evaluation

4	2	II	Uses of CFSE values, applications of CFT, limitations.	Interactive lecture method	Concise Inorganic Chemistry by J. D. Lee A Text Book of Inorganic Chemistry by A. K. De	Class test Self-evaluation
5	2	II	Jahn-Teller distortion – theorem, z-in and z-out cases.	Expository learning Peer teaching	Selected Topics in Inorganic Chemistry by Malik Tuli Madan	Audience Response Sys
6	2	II	Causes and consequences of Jahn-Teller distortion	Inquiry based learning	Concise Coordination Chemistry by R. Gopalan	Audience Response Sys
7	2	II	MOT- experimental evidences for metal-ligand covalent bonding in complexes, σ and π– bonding in O_h complexes.	Interactive lecture method	Selected Topics in Inorganic Chemistry by Malik Tuli Madan	Constructed response qu Home test
8	2	II	Effects of π –bonding on the value of Δ_o, comparison of CFT with MOT.	Inquiry based learning	Selected Topics in Inorganic Chemistry by Malik Tuli Madan	Assignment Home test
9	2	IV	Electron transfer reactions (redox reactions): Outer Sphere Mechanism-characteristics.	Interactive lecture method with role playing	Concise Coordination Chemistry by R. Gopalan	Audience Response Sys

10	2	IV	Factors influencing OSM, cross reactions – Marcus-Hush principle.	Participatory learning	Concise Coordination Chemistry by R. Gopalan	Home work
11	2	IV	Characteristics of Inner Sphere Mechanism.	Interactive lecture method with role playing	Concise Coordination Chemistry by R. Gopalan	Audience Response Sys
12	2	IV	Factors influencing ISM, OSM versus ISM.	Collaborative learning	Concise Coordination Chemistry by R. Gopalan	Home work
13	2	IV	Two electron transfers, Non-complementary electron transfer reactions, Reactions of the coordinated ligands, geometrical and optical isomerization reactions, electron transfer reactions in biological systems – Cytochromes, Rubredoxins and Ferredoxins.	Interactive lecture method Self-learning	Concise Coordination Chemistry by R. Gopalan Coordination Chemistry by M. Satake Y. Mido and Gurdeep Chatwal and M. S. Yadav	Audience Response Sys Class test
14	2	IV	Ligand substitution reactions in square-planar complexes – mechanism	Lecture method	Selected Topics in Inorganic Chemistry by Malik Tuli Madan	Take-home exam
15	2	IV	Influence of entering, leaving and central metal ion on the reactivity of square planar complexes of Pt (II).	Interactive lecture cum Participatory learning	Physical Methods in Inorganic Chemistry by Drago	Audience Response Sys Slip test

Kindly include as many rows as required

Learning Resources – all print, electronic and digital resources must be specified with (at least basic) details for students' reference.

Student Centric Methods	:	Methods of instruction that focus on products of learning by the students (refer to the following)
Participative Learning	:	Participatory Learning and Action is a family of approaches, methods, attitudes, behaviours and relationships, which enable and empower people to share, analyze and enhance their knowledge of their life and conditions, and to plan, act, monitor, evaluate and reflect.
Experiential Learning	:	Is a process of learning through experience and is more specifically defined as "learning through reflection on doing".
Problem Based Learning (PBL)	:	Is a student-centred pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material. The PBL process does not focus on problem solving with a defined solution, but it allows for the development of other desirable skills and attributes. This includes knowledge acquisition, enhanced group collaboration and communication.

AUXILIUM COLLEGE (AUTONOMOUS) VELLORE – 6.

LESSON PLAN
2019-2020

UCCHH16

Organic Chemistry

Week	**No of Hours**	**Units**	**Content**	**Reference**
I	4	I	Stereoisomerism: Optical isomerism - Projection formulae: Fischer, Flying wedge, Sawhorse and Newmann projection formulae- Cahn – Ingold – Prelog rules – R-S notations for optical isomers with one and two asymmetric carbon atoms.	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
II	4	I	Optical activity in compounds not containing asymmetric carbon atoms – Biphenyls (atropisomerism), allenes and spiranes	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari

			Geometrical isomerism: Cis - trans, syn – anti and E-Z notations	Organic Reaction Mechanisms – Tewari
III	4	I	Geometrical isomerism in maleic and fumaric acids and unsymmetrical ketoximes – methods of distinguishing geometrical isomers using melting point, dipole moment, dehydration, cyclisation and heat of combustion and hydrogenation.	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
IV	4	II	Tautomerism: Definition- keto- enol tautomerism (identification, acid and base catalysed mechanisms, preparations and characteristics), nitro-acinitro tautomerism and amido-imido tautomerism.	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
V	4	II	Conformational analysis: Conformational analysis of ethane and n- butane	Reaction and reagents – O.P.Agarwal

			including energy diagrams – conformers of cyclohexane – axial and equatorial bonds – ring flipping showing axial equatorial inter conversions	Organic Stereochemistry-Tewari Organic Reaction Mechanisms – Tewari
VI	4	II	conformers of mono and di substituted cyclohexanes – 1:2 and 1:3 interactions	Reaction and reagents – O.P.Agarwal Organic Stereochemistry-Tewari Organic Reaction Mechanisms – Tewari
VII	4	III	Active methylene group – Characteristic reactions of active methylene groups in Malonic, Acetoacetic and cyano acetic esters and their synthetic uses.	Reaction and reagents – O.P.Agarwal Organic Stereochemistry-Tewari Organic Reaction Mechanisms – Tewari
VIII	4	III	Organic photochemistry: Carbonyl polarization – Reactivity of carbonyl group - acidity of alpha hydrogen. Photochemistry of carbonyl compounds	Reaction and reagents – O.P.Agarwal Organic Stereochemistry-Tewari

				Organic Reaction Mechanisms – Tewari
IX	4	III	Norrish type I and II reactions. Photo reduction, addition and isomerization.	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
X	4	IV	Reaction Mechanisms: Mechanism of Aldol, Benzoin and Darzen condensation– Claisen, Cannizaro, Reformatsky,	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
XI	4	IV	Perkin, Knoevenagal, Michael addition, haloform, Dakin, Wittig and Dieckmann reactions.	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari

XII	4	IV	Mechanism of reduction with sodium borohydride, $LiAlH_4$, Wolf Kishner and MPV reduction.	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
XIII	4	V	Molecular rearrangements: Classification as anionotropic – cationotropic and inter molecular – intra molecular. Pinacol-Pinacolone rearrangement Beckmann	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
XIV	4	V	Claisen rearrangement (sigmatropic), Paraclaisen rearrangement, Favorskii rearrangements, Fries rearrangements (two mechanisms),	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari Organic Reaction Mechanisms – Tewari
XV	4	V	Benzidine rearrangement**.** (Mechanism, evidence for carbonium ion intermediate formation – migratory attitude – inter / intra molecular rearrangement)	Reaction and reagents – O.P.Agarwal Organic Stereochemistry- Tewari

PCCHJ15

SYNTHETIC ORGANIC CHEMISTRY

Week	**No of Hours**	**Units**	**Content**	**Reference**
I	2	I	Retrosynthesis, disconnection approach, synthons, linear and convergent Synthesis	Disconnection Approach- Stuart Warren
II	2	I	One group C-X disconnection and two group C-X disconnection. Umpolung of reactivity	Disconnection Approach- Stuart Warren
III	2	I	Protection of functional groups (hydroxyl, amino, carbonyl and carboxyl groups).	Disconnection Approach- Stuart Warren
IV	2	I	Synthesis of target molecules based on disconnection and synthon approach - Longifolene, camphor	Disconnection Approach- Stuart Warren

V	2	I	Reserpine	Disconnection Approach- Stuart Warren
VI	2	I	Saccharine, paracetamol, morpholine.	Disconnection Approach- Stuart Warren
VII	2	II	Assymmetric synthesis asymmetric induction methods, Chiral auxilliary, Chiral pool.	Advanced Organic Chemistry by Clayden & Greeves
VIII	2	II	Substrate, Chiral catalyst, Chiral reagent,	Advanced Organic Chemistry by Clayden & Greeves
IX	2	II	Enantiomeric excess	Advanced Organic Chemistry by Clayden & Greeves

X	2	II	kinetic resolution methods	Advanced Organic Chemistry by Clayden & Greeves
XI	2	II	Optical resolution	Advanced Organic Chemistry by Clayden & Greeves
XII	2	II	Diastereomeric excess, enantio-discrimination.	Advanced Organic Chemistry by Clayden & Greeves
XIII	2	V	Preparation of various phenoxides.	Organic synthesis by Puneet Karnard
XIV	2	V	Epoxide rearrangement, Stereoselective Claisen rearrangement.	Organic synthesis by Puneet Karnard
XV	2	V	Retro Diel's Alder reaction.	Organic synthesis by Puneet Karnard

UCCHA19

General Chemistry I

Week / Date	**No of Hours**	**Units**	**Topics**	**Content**
I	2	I	Valency, oxidation number, oxidation and reduction in terms of oxidation number, calculation of oxidation state - acids, bases, salts, oxidizing and reducing agents. Oxidation, reduction and redox reactions (definition and examples)	Advanced inorganic Chemistry – R.D. Madan
II	2	I	Oxidising and reducing agents (definition and examples). Balancing chemical equations - oxidation number method.	Advanced inorganic Chemistry – R.D. Madan

III	2	I	Balancing chemical equations - ion electron method.	Advanced inorganic Chemistry – R.D. Madan
IV	2	II	Modern periodic law, general classification of elements in periodic table, general characteristics of s, and p block elements	Advanced inorganic Chemistry – R.D. Madan
V	2	I	General characteristics of d and f block elements	Advanced inorganic Chemistry – R.D. Madan
VI	2	IV	Acids and Bases- concepts- Arrhenius, Lowry-Bronsted and Lewis acid – base theory, acid- base equilibria,	Physical Chemistry – Puri and Sharma
VII	2	IV	Definition of pH of strong and weak acid solutions, calculation.	Physical Chemistry – Puri and Sharma
VIII	2	IV	Hard and soft acids and bases – definition	Physical Chemistry – Puri and Sharma

IX	2	IV	Buffer solutions, relative strength of acids and bases from Ka and K_b values	Physical Chemistry – Puri and Sharma
X	2	IV	Henderson-Hasselbalch equations.	Physical Chemistry – Puri and Sharma
XI	2	V	Common ion effect, concept of sparingly soluble salts,	Practical Chemistry – O.P Pandey
XII	2	V	Solubility product principle, relation between solubility and solubility product.	Practical Chemistry – O.P Pandey
XIII	2	V	Application of common ion effect and solubility product principle in inorganic qualitative analysis,	Practical Chemistry – O.P Pandey
XIV	2	V	Eliminating the interfering radicals, significance of sodium carbonate extract	Practical Chemistry – O.P Pandey
XV	2	V	Spot test reagents – Magneson, Aluminon, Nesslers, Thiourea, Cupferon and DMG.	Practical Chemistry – O.P Pandey

UECHC16

Chemistry of Natural Products

Week	No of Hours	Units	Content	Reference
I	4	I	Carbohydrates: Classification, Chain lengthening and shortening of aldoses, Epimerisation, Constitution of glucose,Reactions of glucose- osazone formation, Cyclic structure- pyranose and furanose forms,Mutarotation and its mechanism	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol I – Gurdeep Chatwal
II	4	I	Determination of ring size – Haworth projection formula, Constitution of fructose, Reactions of fructose – osazone, Configuration of glucose and fructose	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol I – Gurdeep Chatwal
III	4	I	Constitution of sucrose, maltose, starch and cellulose	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol I – Gurdeep Chatwal

IV	4	II	Classification of aminoacids- essential and nonessential aminoacids, Preparation of alpha aminoacids and properties- Zwitter ions, Isoelectric points	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol I – Gurdeep Chatwal
V	4	II	Synthesis of peptides, Classification of proteins, Denaturation	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol I – Gurdeep Chatwal
VI	4	II	Primary and secondary structure of proteins- Helical and Sheet structure	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol I – Gurdeep Chatwal
VII	4	III	Nucleic acid, Nucleoside, Nucleotide, Phosphodiester bonds, types of nucleic acids	Organic chemistry- Anupa and Anup and Bahl, Chemistry of Natural Products- Vol II – Gurdeep Chatwal
VIII	4	III	RNA and DNA structures,Sequencing of DNA, Synthesising an oligonucleotide array	Organic chemistry- Anupa and Anup and Bahl, Chemistry of Natural Products- Vol II – Gurdeep Chatwal

IX	4	III	Denaturation of RNA and DNA, Replication, Transcription and Translation, Protein synthesis	Organic chemistry- Anupa and Anup and Bahl, Chemistry of Natural Products- Vol II – Gurdeep Chatwal
X	4	IV	Terpenes- Classification, Isoprene rule, Structure elucidation of geraniol, alpha pinene, alpha terpineol	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol II – Gurdeep Chatwal
XI	4	IV	Structure elucidation of camphor, Alkaloids- Classification, General methods of structure determination.	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol II – Gurdeep Chatwal
XII	4	IV	Structure elucidation of coniine, piperine and nicotine	Advanced organic chemistry- Bahl and Bahl, Chemistry of Natural Products- Vol II – Gurdeep Chatwal
XIII	4	V	Flavones- Sources, Isolation, Separation,Purification and properties.Structure elucidation of flavone	Chemistry of Natural Products- Vol II – Gurdeep Chatwal

XIV	4	V	Structure elucidation of flavone, Vitamins-Source, Classification.	Chemistry of Natural Products-Vol I and Vol II – Gurdeep Chatwal
XV	4	V	Structure elucidation of pyridoxine, thiamine and ascorbic acid	Chemistry of Natural Products-Vol I – Gurdeep Chatwal

PECHG15

Organometallic and Bioinorganic Chemistry

Week	No of Hours	Units	Content	Reference
I	3	I	Introduction-18 electron rule and EAN rule – calculation, hapacity-definition.	Organometallic chemistry of transition metals by Robert H. Crabtree
II	3	I	Metal carbonyl complexes and poly nuclear carbonyl complexes-- Preparation and properties, Structure and Bonding.	Organometallic chemistry of transition metals by Robert H. Crabtree
III	3	I	Carbonylate ion, Carbonyl hydride complex- Preparation and properties, Structure	Organometallic chemistry of transition metals by Robert H. Crabtree

			and Bonding.	
IV	3	II	Nitrosyl complex, Metal alkyls - Preparation and properties, Structure and Bonding.	Organometallic chemistry of transition metals by Robert H. Crabtree
V	3	I	Carbenes, Carbynes and carbides, non-aromatic alkenes and alkyne complex, metallocenes - Preparation and properties, Structure and Bonding.	Organometallic chemistry of transition metals by Robert H. Crabtree
VI	3	IV	Metallo porphyrin and respiration (cytochromes).	Bioinorganic chemistry by Asim K Das
VII	3	IV	Interaction between heme and dioxygen - Structure and function of haemoglobin	Bioinorganic chemistry by Asim K Das

VIII	3	IV	Ferredoxin and Rubredoxin, Blue copper protein.	Bioinorganic chemistry by Asim K Das
IX	3	IV	Ion transport in membranes, Na, K balance, calcium in living cells (transport and regulation) selectivity of Ca^{2+} over Mg^{2+}	Bioinorganic chemistry by Asim K Das
X	3	IV	Nitrogen fixation-atmospheric, industrial and biological.	Bioinorganic chemistry by Asim K Das
XI	3	V	Biological role of metalloenzymes - carboxy peptidases	Bioinorganic chemistry by Asim K Das
XII	3	V	Carbonic anhydrase- catalase,	Bioinorganic chemistry by Asim K Das
XIII	3	V	Peroxidase, oxatransferase enzymes, xanthine oxidase.	Bioinorganic chemistry by Asim K Das

XIV	3	V	Metals used for diagnosis.	Bioinorganic chemistry by Asim K Das
XV	3	V	Chemotherapy with particular reference to anticancer drugs (platinum ammine halides, metallocenes and their halides).	Bioinorganic chemistry by Asim K Das

UCCHB19

General Chemistry II

Week	No of Hours	Units	Content	Reference
I	2	I	Electron displacement effects – Inductive effect – effect on bond length, dipole moment, reactivity of alkyl halides	Reaction mechanisms including reaction intermediates by Aluwaliah
II	2	I	Strength of carboxylic acids and basic character of amines, Electromeric effect, comparison with inductive effect	Reaction mechanisms including reaction intermediates by Aluwaliah
III	2	I	Mesomeric effect, comparison with inductive effect	Reaction mechanisms including reaction intermediates by Aluwaliah
IV	2	II	Hyperconjugation, Steric effect	Reaction mechanisms including reaction intermediates by Aluwaliah

V	2	I	Bond fission- homolytic and heterolytic, reaction intermediates, carbocations- generation, structure, stability and reactions	Reaction mechanisms including reaction intermediates by Aluwaliah
VI	2	IV	Cabanions- generation, structure, stability and reactions	Reaction mechanisms including reaction intermediates by Aluwaliah
VII	2	IV	Free radicals- generation, structure, stability and reactions	Reaction mechanisms including reaction intermediates by Aluwaliah
VIII	2	IV	Generation of benzyne, nitrenes and carbenes	Reaction mechanisms including reaction intermediates by Aluwaliah
IX	2	IV	Alkanes- chemical properties, mechanism of halogenation of alkanes	Advanced organic chemistry by Bahl and Bahl
X	2	IV	Alkynes- acidity of alkynes, formation of acetylides	Advanced organic chemistry by Bahl and Bahl
XI	2	V	Addition reactions with water, hydrogen halides, halogens	Advanced organic chemistry by Bahl and Bahl

XII	2	V	Oxidation, ozonolysis and hydroxylation with $KMnO_4$	Advanced organic chemistry by Bahl and Bahl
XIII	2	V	Exceptional properties of Lithium, diagonal relationship of Lithium and Magnesium	Advanced inorganic Chemistry – R.D. Madan
XIV	2	V	Lithium- occurrence, ores, extraction from phosphate and silicate ores and uses	Advanced inorganic Chemistry – R.D. Madan
XV	2	V	Preparation, properties and uses of lithium carbonate	Advanced inorganic Chemistry – R.D. Madan

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.

Lesson Plan for the Year 2019– 2020

ODD SEMESTER

Programme	**B.Sc. Chemistry**
Programme Code	**U17**
Semester	**I**
Course	**General Chemistry-I**
Course Code	**UCCHA20**
Hours	**3**
Credits	**5**
Total Hours	**45**
Max Marks	**40+60**
Course Instructor/Coordinator	**Dr. V. Sugantha Kumari**

Week	Portions to be covered	Reference	Teaching methodology
I	Unit –IV Gaseous state - kinetic gas equation, derivation, gas laws from the kinetic gas equation, types of velocities - mean, Root Mean Square Velocity (RMS), Most Probable Velocities (MPV), calculation of molecular velocities. (No derivation).	i) Principles of Physical Chemistry by Puri and Sharma ii)Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
II	Maxwell's distribution of molecular velocities (derivation), equipartition of energy, collision number, Collision diameter, mean free path, definition.(No derivation)	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
III	Equipartition of energy, collision number, Collision diameter, mean free path, definition.(No derivation)	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
IV	Real gases – deviation from ideal behavior – van der Waals' equation- Virial equation of state, Boyle's temperature (No derivation).	i) Principles of Physical Chemistry by Puri and Sharma	Chalk and Board

		ii) Textbook of Physical Chemistry by P.L.Soni.	
V	Joule's law, Joule Thomson effect, Joule Thomson Coefficient and its derivation, inversion temperature and its significance. (No derivation)	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
VI	Liquid State - qualitative treatment of the structure of liquids, surface tension – Definition, effects of surface tension, experimental determination – capillary rise method – drop weight method, applications	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
VII	Viscosity – definition, effects of viscosity on temperature and pressure, experimental determination - Saybolt Viscometer and Ostwald's Viscometer method	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board

VIII	Unit –III Concept of Hybridization – definition, characteristics of hybrid orbitals, modes of hybridization	i) Advanced Organic Chemistry by B.S Bahl and Arun Bahl	Chalk and Board
IX	Hybridization – tetra valency of carbon, geometry of molecules - methane, ethane, ethylene, acetylene and benzene	ii) Advanced Organic Chemistry by B.S Bahl and Arun Bahl	Chalk and Board
X	Unit –V Classical Mechanics –the e/m of an electron, Rutherford's scattering experiments, Rutherford atomic model.	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
X1	The Bohr theory of hydrogen atom, Sommerfeld extension of the Bohr theory.	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
XII	Photoelectric effect and Compton effect- Wave mechanical concept of the atom, de Broglie's relationship	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board

XIII	Davisson and Germer experiment, wave nature of electron, Heisenberg's uncertainty principle	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
XIV	Quantum mechanics- postulates of quantum mechanics, concept of operators, angular wave function, Eigen values, Schrodinger wave equation (no derivation) and significance of wave functions.	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board
XV	Radial and angular wave functions, probability distribution of electrons, radial probability distribution curves.	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and Board

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.

Lesson Plan for the Year 2019– 2020

ODD SEMESTER

Programme	**M.Sc. Chemistry**
Programme Code	**P14**
Semester	**III**
Course	**Electrochemistry**
Course Code	**PCCHL15**
Hours	**3**
Credits	**4**
Total Hours	**45**
Max Marks	**40+60**
Course Instructor/Coordinator	**Dr. V. Sugantha Kumari**

Week	Portions to be covered	Reference	Teaching Methodology
I	Unit –I : Activity and Activity coefficient, Mean ionic and Mean ionic activity coefficient, Ionic Strength and related problems. Debye Huckel Theory of Strong electrolytes	i) Introduction to Electrochemistry by Samuel Glasstone ii) Principles of Physical Chemistry by Puri and Sharma	Chalk and Board
II	Unit-I: Determination of activity coefficient by electrochemical method. Debye Huckel limiting law qualitative and quantitative verification of Debye Huckel Limiting law	i) Introduction to Electrochemistry by Samuel Glasstone ii) Principles of Physical Chemistry by Puri and Sharma	Chalk and Board
III	Unit-II: Different types of current-kinetic current, catalytic current, current for reversible and irreversible system.	i) Analytical Chemistry by Khopkar ii) Instrumental Methods of Chemical analysis by M.S. Yadav	Chalk and Board

IV	Qualitative and quantitative application of polarography to inorganic system	i) Analytical Chemistry by Khopkar i) Instrumental Methods of Chemical analysis by M.S. Yadav	Chalk and Board
V	Unit-II: Amperometric titrations, theory Types of titration curves	i) Analytical Chemistry by Khopkar ii) Instrumental Methods of Chemical analysis by M.S. Yadav	Chalk and Board
VI	Unit-II: Successive titration, Indicator electrode application	i)Instrumental Methods of Chemical analysis by M.S. Yadav ii) Analytical Chemistry by Khopkar iii) Principles of Physical Chemistry by Puri and Sharma	Chalk and Board
VII	Unit-II: Cyclic Voltammetry and its application	i) Instrumental Methods of Chemical analysis by M.S. Yadav	Chalk and Board

		ii) Analytical Chemistry by Khopkar iii) Principles of Physical Chemistry by Puri and Sharma	
VIII	Unit-III: Electrode-electrolyte interface- electrical double layer-Electrocapillary maximum. Lippmann Equation.	i) Modern Electrochemistry by J. Bockris and Reddy ii) Introduction to Electrochemistry by Samuel Glasstone	Chalk and Board
IX	Unit-III: Structure of double layers - Helmholtz Perrin, Guoy-Chapmann Model of double layers.	i)Modern Electrochemistry by J. Bockris and Reddy ii) Introduction to Electrochemistry by Samuel Glasstone	Chalk and Board
X	Unit-III: Stern model of electrical double layers. Fick's law of diffusion-Factors affecting Fick's law of diffusion-Significance.	i) Modern Electrochemistry by J. Bockris and Reddy	Chalk and Board

		ii) Introduction to Electrochemistry by Samuel Glasstone	
XI	Unit-III: Membrane potential – current across the biological membrane– Axon membrane	i) Modern Electrochemistry by J. Bockris and Reddy ii) Introduction to Electrochemistry by Samuel Glasstone	Chalk and Board
XII	Unit-III- Electrokinetic phenomena- Electroosmosis, Electrophoresis, Sedimentation Potential and Streaming potential.	i) Modern Electrochemistry by J. Bockris and Reddy ii) Introduction to Electrochemistry by Samuel Glasstone	Chalk and Board
XIII	Unit-IV: Over potential- mechanism of the hydrogen and oxygen evolution reaction. Rates of simple electrode reactions- elementary electron –electrode process.	i) Modern Electrochemistry by J. Bockris and Reddy ii) Introduction to Electrochemistry by Samuel Glasstone	Chalk and Board

XIV	Unit-IV: Butler-Volmer equation for single step electron transfer reaction, significance of electron exchange current density and symmetry factor. Rates of multistep electrode reactions, Butler–Volmer equation for a multistep reaction, transfer coefficient and its significance.	i) Modern Electrochemistry by J. Bockris and Reddy ii) Introduction to Electrochemistry by Samuel Glasstone	Chalk and Board
XV	Unit-IV: Corrosion of metals – Theories of corrosion- types of corrosion-Pourbaix diagram Passivation of metals- Flade Potential- Evan's diagram Electro deposition – principle and applications, electrochemical reactions of technological interest.	i) Modern Electrochemistry by J. Bockris and Reddy ii) Introduction to Electrochemistry by Samuel Glasstone	Chalk and Board

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Lesson Plan for the Year 2019 – 2020

ODD SEMESTER

Programme	**M.Sc. Chemistry**
Programme code	**P14**
Semester	**I**
Course	**Polymer Chemistry**
Course Code	**PECHA19**
Hours	**1**
Credits	**4**
Total Hours	**15**
Max Marks	**40+60**
Course Instructor/Coordinator	**Dr. V. Sugantha Kumari**

Week	Portions to be covered	Reference	Teaching Methodology
I	Unit –II : Polymer Characterization methods - Crystalline nature- degree of crystallinity, degree of crystallisability .	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
II	X-ray diffraction studies.	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
III	Glass transition temperature (Tg) – Definition, Factors affecting glass transition temperature	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
IV	Importance of glass tranisition temperature-	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board

V	Relationship between glass transition temperature and melting point.	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
VI	Study of polymers – Differential Scanning Calorimetric (DSC)	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
VII	Thermo gravimetric analysis of polymers	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
VIII	Relation to structure - surface morphology- Scanning Electron Microscopy (SEM).	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board

IX	Size of the particle determination – Transmission Electron Microscopy (TEM)	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
X	Biopolymers- natural– starch, cellulose, chitosan and silk	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
XI	Synthetic polymers - polyvinyl alcohol (PVA), polyvinylpyrrolidone and polylactic acid.	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer	Chalk and Board
XII	Biomedical application of biopolymers- dental materials, ophthalmology, orthopeadic Implants,	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer iii) Polymer Science and Technology by R. Joel	Chalk and Board
XIII	Biomedical application of biopolymers in tissue	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar	Chalk and Board

	engineering and drug delivery.	ii) Textbook of Polymer Science by F.W. Billmeyer iii) Polymer Science and Technology by R. Joel	
XIV	Industrial Applications of biopolymers- packaging, food packaging.	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer iii) Polymer Science and Technology by R. Joel	Google Meet
XV	Industrial application of biopolymers in automotive and electronics application	i) Polymer Science by V.R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar ii) Textbook of Polymer Science by F.W. Billmeyer iii) Polymer Science and Technology by R. Joel	Google Meet

Week	Portions to be covered	Reference	Platform (LMS)
I	Alkanes- chemical properties, mecha of free radical reactions, halogenat alkanes	Advanced Organic Chemistry by B.S Bahl and Arun Bahl	Google Meet
II	Alkenes- addition reactions of alkene with hydrogen, halogens, hydrogen halides Markownikoff's rule and anti Markownikoff's rule (peroxide effect), sulphuric acid, water.	Advanced Organic Chemistry by B.S Bahl and Arun Bahl	Google Meet
III	Markownikoff's rule and anti Markownikoff's rule (peroxide effect), sulphuric acid, water.	Advanced Organic Chemistry by B.S Bahl and Arun Bahl	Google Meet
IV	Hydroboration, ozonolysis, hydroxylatio with $KMnO_4$, allylic substitution by NB	Advanced Organic Chemistry by B.S Bahl and Arun Bahl	Google Meet
V	Dienes- types, stability and 1,2 and 1,4 addition reactions Diels–Alder reaction and its application.	Advanced Organic Chemistry by B.S Bahl and Arun Bahl	Google Meet

VI	Mesomorphic stateLiquid crystals– classification, thermotropic and lyotropic, Smectic, Nematic and Cholestric liquid crystals	i) Principles of Physical Chemistry by Puri and Sharma ii) Textbook of Physical Chemistry by P.L.Soni.	Chalk and talk method
VII	Molecular arrangements and its applications.	Principles of Physical Chemistry by Puri and Sharma	Chalk and talk method
VIII	Solutions- solutions of gases in liquids, Henry's law. Solutions of liquids in liquids- Raoult's law	Advanced Organic Chemistryby B.S Bahl and Arun Bahl	Chalk and talk method
IX	Binary liquid mixturesand ideal solutions Deviations from ideal behaviour,	Advanced Organic Chemistryby B.S Bahl and Arun Bahl	Chalk andtalk method
X	Vapour pressure-composition curves and boiling point composition curves	Principles of Physical Chemistry by Puri and Sharma	Chalk and talk method
X1	Distillation -types of distillation, fractional distillation, steam distillation.	Principles of Physical Chemistry by Puri and Sharma	Chalk and talk method

XII	Vacuum distillation, column distillation and azeotropic distillation.	Principles of Physical Chemistry by Puri and Sharma	Chalk and talk method
XIII	Colloidal State- colloidal systems classification of colloids	Principles of Physical Chemistry by Puri and Sharma .	Chalk and talk method
XIV	Preparation of colloidal solutions, dispersion methods and condensation methods	Principles of Physical Chemistry by Puri and Sharma Textbook of Physical Chemistry by P.L.Soni.	Chalk and talk method
XV	Properties of colloidal systems Tyndall effect, importance and applications of colloids	Principles of Physical Chemistry by Puri and Sharma Textbook of Physical Chemistry by P.L.Soni.	Chalk and talk method

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Lesson Plan for the Year 2019 ±2020

EVEN SEMESTER

II M.Sc., Chemistry

PCCHM15-Natural Products and Bioorganic Chemistry

Week	Portions to be covered	Reference	Platform (LMS)
I	Amino acids- metabolism of amino acids-oxidative deamination, transamination reactions	Organic Chemistry by I. L. Finar. Organic Chemistry of Natural Products by Gurdeep R. Chatwal	Chalk and talk method
II	Metabolism of amino acids Urea cycle.	Organic Chemistry by I. L. Finar. Organic Chemistry of Natural Products by Gurdeep R. Chatwal	Chalk and talk method
III	Peptides- synthesis of tripeptide Bergmann Zervas method, Hydrazinolysis and DCC methods	Organic Chemistry by I. L. Finar. Organic Chemistry of Natural Products by Gurdeep R. Chatwal	Chalk and talk method

IV	Solid phase peptide synthesis- Merrifield synthesis.	Organic Chemistry by I. L. Finar. Organic Chemistry of Natural Products by Gurdeep R. Chatwal	Chalk and talk method
V	Structural aspects of proteins- primary, secondary and tertiary structure of proteins.	Organic Chemistry by I. L. Finar. Organic Chemistry of Natural Products by Gurdeep R. Chatwal	Chalk and talk method
VI	Determination of structure of proteins by XRD method	Organic Chemistry by I. L. Finar. Organic Chemistry of Natural Products by Gurdeep R Chatwal	Chalk and talk method
VII	Determination of structure of proteins by cryoscopy method and NMR.	Organic Chemistry by I. L. Finar.	Chalk and talk method

		Organic Chemistry of Natural Products by Gurdeep R. Chatwal	
VIII	Biosynthesis of amino acids- phenylalanine	Principles of Biochemistry by Nelson and Cox Lehninger.	Chalk and talk method
IX	Biosynthesis of tyrosine and proline only	Principles of Biochemistry by Nelson and Cox Lehninger.	Chalk and talk method
X	Nucleic acids- introduction- types of nucleic acids- structure of nucleosides and nucleotides.DNA RNA-polynucleotide chain	Principles of Biochemistry by Nelson and Cox Lehninger.	Chalk and talk method
XI	Structural features of DNA Watson-Crick Model.	Principles of Biochemistry by Nelson and Cox Lehninger.	Chalk and talk method
XII	Structure of RNA-Primary and Secondary structure of RNA	Principles of Biochemistry by Nelson and Cox Lehninger.	Chalk and talk method
XIII	Chemical and enzymatic hydrolysis of nucleic acid	Principles of Biochemistry by	Chalk and talk method

		Nelson and Cox Lehninger.	
XIV	DNA sequence determination by chemical and enzymaticmethods	Principles of Biochemistry by Nelson and Cox Lehninger.	Chalk and talk method
XV	Genetic code origin and evolution,	Principles of Biochemistry by Nelson and Cox Lehninger.	Chalk and talk method

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Lesson Plan for the Year 2019 ±2020

EVEN SEMESTER

Programme	**M.Sc. Chemistry**
Programme code	**P14**
Semester	**II**
Course	**Group Theory and Quantum Chemistry**
Course Code	**PCCHF19**
Hours	**3**
Credits	**4**
Total Hours	**45**
Max Marks	**40+60**
Course Instructor/Coordinator	**Dr. V. Sugantha Kumari**

Week	Portions to be covered	Reference	Platform (LMS)
I	Introduction- symmetry elements and symmetry operations, group postulates and types of groups, sub groups, abelian and non-abelian groups	Group Theory and Its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	Google Meet
II	Group multiplication table, similarity transformations and classes of symmetry operations	Group Theory and Its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	Google Meet
III	Molecular point groups- point groups of molecules, point groups of tetrahedral and octahedral molecules. Identification of symmetry operations and determination of point groups.	Group Theory and Its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	Google Meet
IV	Matrices- matrix representations of symmetry operations,	Group Theory and its Applications to Chemistry by K. V. Raman	Google Meet

	reducible and irreducible representations.	Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	
V	Orthogonality theorem and its consequences, properties of irreducible representations, labelling of irreducible representations.	Group Theory and its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	Chalk and talk method
VI	Crystallographic symmetry - the 32 crystallographic point groups - space groups - screw axis - glide planes - comparison of crystallographic symmetry with molecular symmetry.	Group Theory and its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	Chalk and talk method
VII	Construction of character table for C_{2V} and C_{3V} point groups - explanation for the complete character table for C_{2V} and C_{3V} point groups.	Group Theory and its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	Chalk and talk method

		Group theory and its application by A. Salahuddin Kunju and G. Krishnan	
VIII	Selection rules for vibrational IR and Raman spectra. Mutual exclusion rule for molecules with centre of symmetry.	Group Theory and its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan	Chalk and talk method
IX	Applications to molecular vibrations (IR and Raman) for determining symmetry of normal modes of vibration in nonlinear molecules H_2O, CH_4, BF_3 and NH_3 using group theory	Group Theory and its Applications to Chemistry by K. V. Raman Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan Group theory and its application by A. Salahuddin Kunju and G. Krishnan	Chalk and talk method
X	Hybrid orbitals in nonlinear molecules CH_4, XeF_4, BF_3, SF_6, NH_3. Application of group	Group Theory and its Applications to Chemistry by K. V. Raman	Chalk and talk method

	theory to electronic spectra of ethylene and formaldehyde.	Group Theory in Chemistry by M. S. Gopinathan and V. Ramakrishnan Group theory and its application by A. Salahuddin Kunju and G. Krishnan	
XI	Approximation methods variation methods trial wave function- application of variation method to hydrogen and helium atoms.	Quantum Chemistry by R. K. Prasad Quantum Chemistry by D. A. Mcquarrie Quantum Chemistry by A. K. Chandra	Chalk and talk method
XII	Perturbation method and its application to particle in one dimensional box.	Quantum Chemistry by R. K. Prasad Quantum Chemistry by D. A. Mcquarrie Quantum Chemistry by A. K. Chandra	Chalk and talk method
XIII	Born Oppenheimer approximation- treatment of molecules- application to helium atom. Hydrogen molecule	Quantum Chemistry by R. K. Prasad Quantum Chemistry by	Chalk and talk method

	Heiter-London theory or valence bond treatment energy level diagram.	D. A. Mcquarrie Quantum Chemistry by A. K. Chandra	
XIV	Linear Combination of Atomic Orbitals (LCAO)- molecular orbital theory for hydrogen molecule ion and hydrogen molecule.	Quantum Chemistry by R. K. Prasad Quantum Chemistry by D. A. Mcquarrie Quantum Chemistry by A. K. Chandra	Chalk and talk method
XV	Huckel's theory for conjugated molecules- ethylene, butadiene and benzenesemi empirical methods- Slater orbital and Hartree Fock-Self Consistent Field (HFSCF) methods.	Quantum Chemistry by R. K. Prasad Quantum Chemistry by D. A. Mcquarrie Quantum Chemistry by A. K. Chandra	Chalk and talk method

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Lesson Plan for the year 2019 – 2020

ODD SEMESTER

UACHA19 - Allied chemistry I

Week	Portions to be covered	Reference	Platform (LMS)
1	Chemical kinetics - rate of reaction, rate law, factors affecting rate of the reaction	Principles of Physical Chemistry B. R. Puri, L. R Sharma and M.S Pathania	Chalk and Board
2	Molecularity and Order of the reaction, difference between order and molecularity	Principles of Physical Chemistry B. R. Puri, L. R Sharma and M.S Pathania	Chalk and Board
3	Methods of determining the order of a reaction, Collision theory for a bimolecular reaction	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and Board
4	Derivation of rate constant of a first order reaction and half life period, Arrhenius theory- effect of temperature on reaction rate	Principles of Physical Chemistry B. R. Puri, L. R Sharma and M.S Pathania	Chalk and Board
5	Introduction to qualitative and quantitative analysis, Principles of volumetric analysis	Principles of Inorganic Chemistry B.R Puri, L. R Sharma, and Kalia K. C	Chalk and Board
6	Separation and purification techniques	Textbook of Allied	

	– extraction, distillation and crystallization	Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and Board
7	Chromatography- column chromatography - principle, packing of columns, method of separation, identification of compounds and applications.	Fundamentals of analytical chemistry Skoog, Douglas A. West, Donald M	Chalk and Board
8	Paper chromatography – principle, procedure, R_f value and applications	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and Board
9	Thin layer chromatography - principle, procedure, R_f value and applications	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and Board
10	Cements, setting of cements	Industrial chemistry Jain and Jain	Chalk and Board
11	Explosives - TNT	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and Board
12	Nitroglycerine and Dynamite	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and Board

I M.Sc. Chemistry – semester I

PCCHC19 – KINETICS AND PHOTOCHEMISTRY

Week	Portions to be covered	Reference	Platform (LMS)
1	Catalysis- Homogeneous catalysis - Acid-Base catalysis – types of acid-base catalysis specific and general acid-base catalysis. Mechanisms and kinetics of acid-base catalysed reactions- protolytic and prototropic mechanism – Bronsted catalysis law	Chemical kinetics by Laidler Chemical kinetics by Rajaram Kuriocose	Chalk and Board
2	Enzyme catalysis – types of enzyme catalysis, rate of enzymes catalysed reaction by Michaelis-Menton mechanism – study of effect of substrate concentration, pH and temperature on enzyme catalysed reactions – inhibition in enzyme catalysed reactions.	Chemical kinetics by Laidler Chemical kinetics by Rajaram Kuriocose	Chalk and Board
3	Heterogeneous catalysis - surface reactions, types - physisorption and chemisorption, difference between physisorption and chemisorption, Lennard-Jones plots, Adsorption isotherms- Langmuir and BET isotherms – Postulates and derivations.	Chemical kinetics by Laidler Chemical kinetics by Rajaram Kuriocose	Chalk and Board
4	Kinetics of surface reactions – unimolecular and bimolecular reactions, catalysis by semiconductor oxides (n-type and p-type). Mechanism of heterogeneous catalytic reactions, Langmuir and Rideal-Eley mechanism-adsorption co-efficient and its significance.	Chemical kinetics by Laidler Chemical kinetics by Rajaram Kuriocose	Chalk and Board
5	Complex reactions- definition with examples, kinetics of reversible, consecutive and parallel reaction, Fast reactions - relaxation methods - pressure and temperature jump methods	Chemical kinetics by Laidler Chemical kinetics by Rajaram Kuriocose	Chalk and Board
6	Chain reactions - types of chain reaction (Stationary and non-stationary, General treatment of chain reactions – chain length – explosion limits.	Chemical kinetics by Laidler Chemical kinetics by	Chalk and Board

		Rajaram Kuriocose	
7	Rice Herzfeld mechanism – order of reactions of unity, one-half and three-halves for photolysis of acetaldehyde, Stopped flow and flash photolysis methods.	Chemical kinetics by Laidler Chemical kinetics by Rajaram Kuriocose	Chalk and Board
8	Photochemistry - Introduction, Absorption and emission of radiation – intensity distribution in the electronic, vibrational species - Franck Condon Principle, Jablonski diagram- radiative and non-radiative processes- fluorescence and phosphorescence	Fundamentals of photochemistry by Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Chalk and Board
9	E-type and P- type delayed fluorescence - spin forbidden radiative transition - internal conversion and intersystem crossing, E-type and P- type delayed fluorescence - spin forbidden radiative transition - internal conversion and intersystem crossing	Fundamentals of photochemistry by Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Chalk and Board
10	Decay of electronically excited states, Dissociation and predissociation of diatomic molecules - energy transfer process. Photophysical processes - kinetics of unimolecular and bimolecular photophysical processes- kinetic treatment of excimer and exciplex formation.	Fundamentals of photochemistry by Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Chalk and Board
11	Quenching - static and dynamic quenching- Stern-Volmer equation, Photochemical reactions - Photo assisted mechanism, hydrogen and halogen reactions	Fundamentals of photochemistry by Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Chalk and Board
12	Kinetics of photochemical reaction, photoredox, photosubstitution, photoisomerization and	Fundamentals of photochemistry by	Chalk and

	photosensitized reactions.	Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Board
13	Photovoltaic and photogalvanic cells, photo assisted electrolysis of water, application of solar energy conversion, G value - radiolysis of water – hydrated electron, Ion pair yield.	Fundamentals of photochemistry by Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Chalk and Board
14	Radiation chemistry – Interaction of high-energy radiation with matter -primary and secondary processes.	Fundamentals of photochemistry by Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Chalk and Board
15	Photocatalysis – applications of TiO_2 photocatalyst for oxidation of organic pollutants – photochemical reaction of vision.	Fundamentals of photochemistry by Mukherjee Photochemistry by Singh Photochemistry by Gurdeep Raj	Chalk and Board

II M.Sc. Chemistry – Semester III

PCCHL15 - ELECTROCHEMISTRY

Week	Portions to be covered	Reference	Platform

			(LMS)
1	Fuel cells - efficiency, Types of fuel cells	Electrochemistry by Bockris and Reddy	Chalk and Board Online PPT
2	Alkaline fuel cell, phosphoric acid fuel cell	Electrochemistry by Bockris and Reddy	Chalk and Board
3	High temperature and solid polymer electrolyte fuel cell	Electrochemistry by Bockris and Reddy	Chalk and Board
4	Kinetics of fuel cell	Electrochemistry by Bockris and Reddy	Chalk and Board
5	general development of fuel cell technology	Electrochemistry by Bockris and Reddy	Chalk and Board
6	Electrochemical sensors- ion selective electrodes	Electrochemistry by D.R. Crow	Chalk and Board
7	Problems with ion selective electrode	Electrochemistry by D.R. Crow	Chalk and Board
8	Chemically modified electrodes – gas sensing electrodes	Electrochemistry by D.R. Crow	Chalk and Board
9	Principle and working of Enzyme electrodes	Electrochemistry by D.R. Crow	Chalk and Board
10	Sensors based on modified metal oxide field effect transistors (MOSFET)	Electrochemistry by D.R. Crow	Chalk and Board
11	The wall jet ring disc electrodes (WJRDE).	Electrochemistry by D.R. Crow	Chalk and Board
12	Debye Huckel Limiting law - derivation	Physical chemistry by Puri and Sharma	Chalk and Board
13	Quantitative verification of Debye Huckel limiting law	Physical chemistry by Puri and Sharma	Chalk and Board
14	Qualitative verification of Debye Huckel limiting law	Physical chemistry by Puri and Sharma	Chalk and Board
15	Debye Huckel limiting law at appreciable	Physical chemistry by	Chalk and Board

	concentration	Puri and Sharma	

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Lesson Plan for the year 2019- 2020

EVEN SEMESTER

UACHB19- ALLIED CHEMISTRY

Week / Date	**No of Hours**	**Units**	**Topics**	Teaching Platform	**Learning Resources ***
I week	2	III	Ionic equilibria, strong and weak electrolytes, common ion effect,	Chalk and Board	Allied chemistry by Gopalan and sundaram.
II Week	2	III	Definition of pH, buffer solution.	Chalk and Board	Electrochemistry by M.S.Yadav.
III Week	2	III	Electrochemical cells- construction	Chalk and Board	
IV Week	2	III	Definition of emf, standard electrode potential,	Chalk and Board	Electrochemistry by Samuel
V Week	2	III	Types of cells- primary and secondary, standard hydrogen electrode, calomel electrode.	Chalk and Board	Electrochemistry by M.S.Yadav.
VI Week	2	III	Electrophoresis, electrodialysis, and electro-osmosis.	Chalk and Board	Electrochemistry by M.S.Yadav.
VII Week	2	IV	Photochemistry – laws of light absorption – Lamberts		Allied chemistry by Gopalan and

			law and Lambert-Beer's Law.	Chalk and Board	sundaram.
VIII	2	IV	Grotthus – Draper law and Stark – Einstein law.	Chalk and Board	Photochemistry by Mukherjee.
IX Week	2	IV	Quantum yield – examples of photochemical reaction – kinetics of hydrogen – halogen reaction.	Chalk and Board	Photochemistry by Mukherjee.
X Week	2	IV	Jablonski diagram – fluorescence, phosphorescence, photosensitization, and chemiluminescence.	Chalk and Board	Allied chemistry by Gopalan and sundaram.
XI Week	2	V	Causes and treatment of Cancer, AIDS.	Chalk and Board	General reference from net.
XII Week	2	V	Causes and treatment of Diabetes.	Chalk and Board	

I M.Sc. Chemistry/I M.Sc. Electronic media – semester II

PNHRA 19 - HUMAN RIGHTS

week /	No of Hours	Units	Topics	Teaching Methodology	Learning Resources

Date					
I – III	6	1	Types of rights, elements of rights	Chalk and Board	College book and reference from net
IV-VI	6	2	Indian Constitution, Federalism characteristics, Directive principles, Constitutional remedies	Chalk and Board	College book and reference from net
VI – IX	6	3	Indian constitution, rights, articles	Chalk and Board	College book and reference from net
X-XII	6	4	Universal declaration of Human Rights, Organs of UDHR	Chalk and Board	College book and reference from net
XIII-XV	6	5	Human trafficking, problems of children and adult, National children policy	Chalk and Board	College book and reference from net

II M.Sc. Chemistry – Semester III

PCCHO15 - THERMODYNAMICS

Week / Date	No of Hours	Units	Topics	Learning Platform	Learning Resources *
I Week	4	I	Partial molar properties - Partial molar free energy (Chemical potential) - Partial molar volume and Partial molar heat content-their significance.	Chalk and Board	Thermodynamics by Rajaram Curiocose.
II Week	4	I	Variation of chemical potential with temperature and pressure, Duhem	Chalk and Board	Thermodynamics for students

			Margules equation - Determination of partial molar properties by general method, method of intercept.	Chalk and Board	Samuel Glasstone. Physical Chemistry by Puri and Sharma.
III Week	4	I	Determination of partial molar properties by Direct method, Apparent molar properties. Definition of fugacity-Variation of fugacity with temperature and pressure.	Chalk and Board	Physical Chemistry by Puri and Sharma.
IV Week	4	I	Concept of activity and activity co-efficient. Determination of standard free energies - Choice of standard states -determination of activity and activity co-efficient of non-electrolytes.	Chalk and Board	Physical Chemistry by Puri and Sharma
V Week	2	III	Factorization of molecular partition function, Mixture of gases.	Chalk and Board	Thermodynamics by Rajaram Curiocose.
VI Week	4	III	Evaluation of the independent molecular partition function-Translational, Rotational, Vibrational, Electronic and Nuclear partition function	Chalk and Board	Thermodynamics for students by Samuel Glasstone.
VII Week	4	III	Law of equi partition of energies.Heat capacity of solids - Einstein model and Debye model.	Chalk and Board	Physical Chemistry by Puri and Sharma
VIII Week	4	IV	Nuclear spin statistics – ortho - para nuclear states - ortho		Thermodynamics by Rajaram Curiocose.

			para hydrogen Nuclear spin statistics of Deuterium, Application of statistical thermodynamics	Chalk and Board Chalk and Board	Thermodynamics for students by Samuel Glasstone.
IX Week X Week	4 4	IV IV	Electron gas in metals, Black body radiation - Planck's distribution law, Stefan-Boltzmann law, Wein's law Uses of spectroscopic and structural data to calculate thermodynamic functions	Chalk and Board Chalk and Board	Physical Chemistry by Puri and Sharma Physical Chemistry by Puri and Sharma
XI Week XII Week XIII Week XIV Week	4 4 4 4	V V V V	Non equilibrium thermodynamics: Postulates of non equilibrium thermodynamics - conservation of mass and energy - entropy production entropy Production in chemical reactions - entropy flow in open systems. Transformation properties of rates and affinities - linear laws relative to fluxes and forces. Curie's theorem, Onsagar's reciprocity relation, Relaxation phenomenon.	Chalk and Board Chalk and Board Chalk and Board Chalk and Board	Thermodynamics by Rajaram Curiocose. Thermodynamics for students by Samuel Glasstone. Physical Chemistry by Puri and Sharma Thermodynamics by Rajaram Curiocose.

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.

Lesson Plan for the year 2019 – 2020

ODD SEMESTER

SKILL-BASED ELECTIVE

II B.Sc. CHEMISTRY

USCHB316 - MEDICINAL CHEMISTRY

Week	Unit	Portions to be covered	Reference	Teaching Methodology
1	I	First Aid - important rules of first aid, first aid box, cuts and abrasion.	A Textbook of Pharmaceutical Chemistry Dr. Jayashree Ghosh	Chalk and board
2	I	Bruises, bleeding, fractures, burns and poisonous bites.	A Textbook of Pharmaceutical Chemistry Dr. Jayashree Ghosh	Chalk and board

3	I	Detection of hallucinogens, poisons and antidotes for poisoning.	A Textbook of Pharmaceutical Chemistry Dr. Jayashree Ghosh	Chalk and board
4	II	Common Medicines - analgesics, antipyretics and anti-inflammatory agents.	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
5	II	Antiseptics, antibiotics and antidepressants.	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
6	II	Disinfectants, sedatives, anesthetics – definition, examples, uses and side effects.	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
7	III	Indian medicinal plants - medicinal properties of neem, keezhanelli, sembaruthy, thulsi and thoothuvalai.	Indian Medicinal plants An Illustrated Dictionary C. P. Khare	Chalk and board

8	III	Nithya kalyani, rose, turmeric, garlic, senavu, nerunji and curry leaves	Indian Medicinal plants An Illustrated Dictionary C. P. Khare	Chalk and board
9	III	Perandai, thipili, vallarai, karunjeeragam and flax seeds.	Indian Medicinal plants An Illustrated Dictionary C. P. Khare	Chalk and board
10	IV	Medicaments in formulations - aerosol inhalations, capsules, creams and emulsions.	Practical Pharmaceutical Chemistry A.H.Beckett and J.B.Stenlake	Chalk and board
11	IV	Eye drops, injections, ointments and suppositories.	Practical Pharmaceutical Chemistry A.H.Beckett and J.B.Stenlake	Chalk and board
12	IV	Tablets, tonic, syrup and hydrogels – definition, examples and uses.	Practical Pharmaceutical Chemistry A.H.Beckett and J.B.Stenlake	Chalk and board
13	V	Medical applications of polymers – biomaterials - definition and characteristics, ceramic	Biomaterials Sujatha V. Bhat	Chalk and board

		implants and metallic implants.		
14	V	Biomedical applications of polyurethane, polydimethylsiloxane, polyalkylsulphone and polymethylmethacrylate.	Biomaterials Sujatha V. Bhat	Chalk and board
15	V	Acrylic hydro gels, poly vinyl chloride, polypropylene, polyethylene and polylactic acid.	Biomaterials Sujatha V. Bhat	Chalk and board

UACHA319 – Allied Chemistry I

Week	Unit	Portions to be covered	Reference	Teaching Methodology
1	I	Aromatic compounds-aromaticity and Huckel's rule	Advanced Organic Chemistry B.S Bahl and Arun Bahl	Chalk and board
2	I	Examples of benzenoid and nonbenzenoid compounds. benzene, naphthalene, anthracene, pyridine and quinoline, azulene and ferrocene	Advanced Organic Chemistry B.S Bahl and Arun Bahl	Chalk and board

3	I	Preparation, properties and uses of naphthalene.	Advanced Organic Chemistry B.S Bahl and Arun Bahl	Chalk and board
4	I	Heterocyclic compounds-preparation, properties and uses of furan, thiophene and pyrrole.	Advanced Organic Chemistry B.S Bahl and Arun Bahl	Chalk and board
5	I	Electrophilic substitution in benzene-mechanism of nitration, halogenation, alkylation, acylation and sulphonation	Advanced Organic Chemistry B.S Bahl and Arun Bahl	Chalk and board
6	III	Polymer chemistry-classification of polymers	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
7	III	Natural and synthetic rubbers.	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
8	III	Preparation and uses of nylon 6, 6 and terylene	Fundamental Concepts of	Chalk and board

			Applied Chemistry Dr. Jayashree Ghosh	
9	III	Preparation and uses of polyethylene	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
10	III	Preparation and uses of PVC	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
11	III	Protein fibres – chemical composition and properties of wool and silk	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
12	V	Explosives – TNT , nitroglycerine and Dynamite	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and board
13	V	Industrial chemistry-fuel gases - natural gas, water gas, semi water gas, carburetted water gas,	Textbook of Allied Chemistry	Chalk and board

		oil gas and producer gas	V.Veeraiyan and A.N.S. Vasudevan	
14	V	Cement-composition, setting of cement and uses,	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and board
15	V	Types of glasses.	Textbook of Allied Chemistry V.Veeraiyan and A.N.S. Vasudevan	Chalk and board

PCCHB19 – STRUCTURAL INORGANIC CHEMISTRY

Week	Unit	Portions to be covered	Reference	Teaching Methodology
1	I	Acids and bases, proton transfer equilibria in water – solvent leveling effects, aqua acids, periodic trends in aqua acids – simple oxo acids – anhydrous oxides – polyoxo compound formation.	Inorganic Chemistry D.F.Shrivers, P.W.Atkins and C.H. Langford	Chalk and board
2	I	Lewis acid - base concepts, Hard and soft acids and bases - group characteristics of Lewis acids, Lux - Flood theory of acids and bases and Usanovich acids and bases.	Inorganic Chemistry D.F.Shrivers, P.W.Atkins and C.H. Langford	Chalk and board
3	I	Super acids and superbases, nonaqueous solvents, classification, protic and aprotic solvents, heterogeneous acids and bases - symbiosis and proton sponges.	Inorganic Chemistry D.F.Shrivers, P.W.Atkins and C.H. Langford	Chalk and board

4	II	Structure of complex solids -layered structures, conducting ionic solids, graphite - solids held together by covalent bonding, Diamond – Madelung constants, Imperfections in crystals – stoichiometric defects - Schottky, controlled valency, F-center and Frenkel defect.	Inorganic Chemistry, Principles, Structure and Reactivity J.E. Huheey	Chalk and board
5	II	Non-stoichiometric defects - metal excess defect, metal deficient defect, impurity defect. Band theory of solids, Intrinsic and extrinsic semiconductors, piezoelectric and pyroelectric crystals, Superconductivity – Meissner effect, critical temperature and Critical magnetic Field.	Inorganic Chemistry, Principles, Structure and Reactivity J.E. Huheey	Chalk and board
6	II	BCS theory, Type I and Type II superconductor, ternary Oxides, structure of 123 oxides (YBa-Cu-O) and applications of	Inorganic Chemistry D.F.Shrivers, P.W.Atkins and C.H. Langford	Chalk and board

		high temperature superconducting materials.		
7	III	Structure of simple solids, unit cell and crystal structures, close packing of spheres and holes in closed packed structures.	Inorganic Chemistry D.F.Shrivers, P.W.Atkins and C.H. Langford	Chalk and board
8	III	Structure of metals and alloys, non closed packed structures, atomic radii of metals, polytypism, polymorphism of metals.	Inorganic Chemistry D.F.Shrivers, P.W.Atkins and C.H. Langford	Chalk and board
9	III	Alloys - substitutional solid solutions, interstitial solid solutions of non metals , intermetallic compounds, characteristic and structure of ionic solids, binary phases (AX and AX_2), ternary phases (ABO_3 and AB_2O_4).	Inorganic Chemistry D.F.Shrivers, P.W.Atkins and C.H. Langford	Chalk and board

10	IV	Structure and bonding I - polyacids - isopolyacids and heteropolyacids of molybdenum and tungsten, Dawson and Keggins structure of poly acids, heteropolyanions and heteropoly blues.	Advanced Inorganic Chemistry F.A. Cotton and G. Wilkinson	Chalk and board
11	IV	Inorganic polymers - Silicates, structures, properties, correlation and applications, molecular sieves, feldspar, zeolites and ultramarines and its application.	Inorganic Chemistry, Principles, Structure and Reactivity J.E. Huheey	Chalk and board
12	IV	Polysulphur – nitrogen compounds, structure and bonding in tetrasulphur tetranitride, polythiazyl and S_xS_y compounds, and polyorgano phosphazenes.	Inorganic Chemistry, Principles, Structure and Reactivity J.E. Huheey	Chalk and board

13	V	Structure and Bonding II - boron hydrides, introduction, classification of boranes, diborane, tetra borane, pentaborane, hexaborane and decaborane, polyhedral boranes - Wade's rule - closo, nido and arachno structures and hydroboration.	Advanced Inorganic Chemistry F.A. Cotton and G. Wilkinson	Chalk and board
14	V	Carboranes - closo, nido and arachno structures of carboranes, metallocarboranes closo, nido and arachno, structures of carboranes.	Advanced Inorganic Chemistry F.A. Cotton and G. Wilkinson	Chalk and board
15	V	Structure and bonding of boronitrides and metal clusters- chemistry of low molecularity metal clusters (upto trinuclear metal clusters).	Advanced Inorganic Chemistry F.A. Cotton and G. Wilkinson	Chalk and board

EVEN SEMESTER

PCCHD19 – ORGANIC REACTIONS AND MECHANISMS

Week	Portions to be covered	Reference	Teaching Methodology
1	Unit I Oxidation by quinones, selenium dioxide, osmium tetroxide,	Reaction Mechanism in Organic Chemistry By S. M. Mukherji S. P. Singh	Chalk and Board
2	Unit I Oxidation by lead tetraacetate, formation of C-C bond in phenol coupling, acetylenic coupling.	Reactions, Rearrangements and Reagents By S. N. Sanyal	Chalk and Board
3	Unit I Oxidation by chromic acid (Jones reagent), chromium trioxide – pyridine (Sarett's reagent), DMSO-DCC (Pfitzer-Moffatt reagent).	Reaction Mechanism in Organic Chemistry By S. M. Mukherji S. P. Singh	Chalk and Board
4	Unit I Oppenauer oxidation, Dakin reaction and Swern oxidation.	Reactions, Rearrangements and Reagents By S. N. Sanyal	Chalk and Board
5	Unit III Wagner-Meerwein, Demjanov, Dienone – Phenol earrangement.	Advanced Organic Chemistry Reactions, Mechanisms and Structure By Jerry March	PPT

6	Unit III Favorski, Baeyer-Villiger, Wolf, rearrangements.	Reactions, Rearrangements and Reagents By S. N. Sanyal	PPT
7	Unit III Curtius, Lossen and Von-Richter rearrangements.	Reactions, Rearrangements and Reagents By S. N. Sanyal	PPT
8	Unit III Schmidt rearrangement. Nitrenes – Singlet and triplet nitrenes. Methods of generating nitrenes and their reactions.	Advanced Organic Chemistry Reactions, Mechanisms and Structure By Jerry March	Chalk and Board
9	Unit IV Reaction mechanisms and applications of Michael addition, Skraup and Ullmann reactions.	Reactions, Rearrangements and Reagents By S. N. Sanyal	Chalk and Board
10	Unit IV Reaction mechanisms and applications of Hunsdicker, Nef and HVZ.	Reactions, Rearrangements and Reagents By S. N. Sanyal	Chalk and Board
11	Unit V Photochemical excitation - fate of the excited molecules - study of photo chemical reaction of ketone. Norrish type I and Norrish type II reaction.	Reaction Mechanism in Organic Chemistry By S. M. Mukherji S. P. Singh	Chalk and Board

12	Unit V Photocyclo addition – Paterno - Buchi reduction - photo cycloaddition of α-β unsaturated ketones- di-pi methane rearrangement.	Reaction Mechanism in Organic Chemistry By S. M. Mukherji S. P. Singh	Chalk and Board
13	Unit V Pericyclic reactions - classification, orbital symmetry - Woodward Hoffmann rules. Analysis of electrocyclic reaction -Types - 4n and 4n + 2 systems	Reaction Mechanism in Organic Chemistry By S. M. Mukherji S. P. Singh	Chalk and Board
14	Unit V Cyclo addition – Types – [2+2] and [4+2] cycloaddition reactions. Sigmatropic reactions- 1, n Hydrogen shift, Cope rearrangement and Claisen rearrangement.	Reaction Mechanism in Organic Chemistry By S. M. Mukherji S. P. Singh	Chalk and Board
15	Unit V Correlation diagrams for butadiene - cyclobutene system.	Reaction Mechanism in Organic Chemistry By S. M. Mukherji S. P. Singh	Chalk and Board

PCCHM15 – NATURAL PRODUCTS AND BIOORGANIC CHEMISTRY

Week	Unit	Portions to be covered	Reference	Teaching Methodology
1	V	Nucleic acid and types	Enzyme Chemistry Hermann Dugas	Chalk and board
2	V	Enzyme Chemistry- Enzyme mechanism of alpha chymotrypsin.	Enzyme Chemistry Hermann Dugas	Chalk and board
3	V	Wobbles Hypothesis	Enzyme Chemistry Hermann Dugas	Chalk and board
4	V	Coenzyme chemistry - Prosthetic groups and apo enzymes	Enzyme Chemistry Hermann Dugas	Chalk and board
5	V	Gene transcription and translation	Enzyme Chemistry Hermann Dugas	Chalk and board
6	V	Coenzyme thiamine pyrophosphate	Enzyme Chemistry Hermann Dugas	Chalk and board

7	V	Coenzyme thiamine pyrophosphate.	Enzyme Chemistry Hermann Dugas	Chalk and board
8	V	Enzymes in synthetic organic chemistry.	Enzyme Chemistry Hermann Dugas	Chalk and board
9	V	Structure, biological function and mechanism of reactions catalysed by pyridoxal phosphate	Enzyme Chemistry Hermann Dugas	Chalk and board
10	V	Structure, biological function and mechanism of reactions catalysed by coenzyme A	Enzyme Chemistry Hermann Dugas	Chalk and board
11	V	Structure, biological function and mechanism of reactions catalysed thiamine pyrophosphate.	Enzyme Chemistry Hermann Dugas	Chalk and board
12	V	Structure and Biological functions of NADP	Enzyme Chemistry Hermann Dugas	Chalk and board
13	V	Structure and Biological functions FAD.	Enzyme Chemistry Hermann Dugas	Chalk and board
14	V	Structure and Biological functions of lipoic acid.	Enzyme Chemistry Hermann Dugas	Chalk and board
15	V	Structure and Biological functions Vitamin B_{12}.	Enzyme Chemistry	Chalk and board

			Hermann Dugas	

USCHB416 - MEDICINAL CHEMISTRY

Week	Unit	Portions to be covered	Reference	Teaching Methodology
1	I	First Aid - important rules of first aid, first aid box, cuts and abrasion.	A Textbook of Pharmaceutical Chemistry Dr. Jayashree Ghosh	Chalk and board
2	I	Bruises, bleeding, fractures, burns and poisonous bites.	A Textbook of Pharmaceutical Chemistry Dr. Jayashree Ghosh	Chalk and board
3	I	Detection of hallucinogens, poisons and antidotes for poisoning.	A Textbook of Pharmaceutical Chemistry Dr. Jayashree Ghosh	Chalk and board
4	II	Common Medicines - analgesics, antipyretics and anti-inflammatory agents.	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board

5	II	Antiseptics, antibiotics and antidepressants.	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
6	II	Disinfectants, sedatives, anesthetics – definition, examples, uses and side effects.	Fundamental Concepts of Applied Chemistry Dr. Jayashree Ghosh	Chalk and board
7	III	Indian medicinal plants - medicinal properties of neem, keezhanelli, sembaruthy, thulsi and thoothuvalai.	Indian Medicinal plants An Illustrated Dictionary C. P. Khare	Chalk and board
8	III	Nithya kalyani, rose, turmeric, garlic, senavu, nerunji and curry leaves	Indian Medicinal plants An Illustrated Dictionary C. P. Khare	Chalk and board
9	III	Perandai, thipili, vallarai, karunjeeragam and flax seeds.	Indian Medicinal plants An Illustrated Dictionary C. P. Khare	Chalk and board

10	IV	Medicaments in formulations - aerosol inhalations, capsules, creams and emulsions.	Practical Pharmaceutical Chemistry A.H.Beckett and J.B.Stenlake	Chalk and board
11	IV	Eye drops, injections, ointments and suppositories.	Practical Pharmaceutical Chemistry A.H.Beckett and J.B.Stenlake	Chalk and board
12	IV	Tablets, tonic, syrup and hydrogels – definition, examples and uses.	Practical Pharmaceutical Chemistry A.H.Beckett and J.B.Stenlake	Chalk and board
13	V	Medical applications of polymers – biomaterials - definition and characteristics, ceramic implants and metallic implants.	Biomaterials Sujatha V. Bhat	Chalk and board
14	V	Biomedical applications of polyurethane, polydimethylsiloxane, polyalkylsulphone and polymethylmethacrylate.	Biomaterials Sujatha V. Bhat	Chalk and board
15	V	Acrylic hydro gels, poly vinyl chloride, polypropylene, polyethylene and polylactic acid.	Biomaterials Sujatha V. Bhat	Chalk and board

USCHD616 – SBE: FOOD CHEMISTRY

Week	Unit	Portions to be covered	Reference	Teaching methodology
1	I	Food and food adulteration, food types, advantages and disadvantages.	Food Science By B.Srilakshmi	Chalk and board
2	I	Food adulteration- adulteration in food grains, milk, butter, ghee, ice creams and cakes, pepper, turmeric,	Food Science By B.Srilakshmi	Chalk and board
3	I	Food adulteration in chilli powder, edible oils, coffee and tea powder, fruits and vegetables. Detection of adulterants by simple analytical techniques.	Food Science By B.Srilakshmi	Chalk and board
4	II	Food additives - definition, structure , advantages and disadvantages of artificial sweeteners -saccharin, cyclamate and aspartate	Food Chemistry By Lillian Hoagland Meyer	PPT

5	II	Food flavours-esters, aldehydes and heterocyclic compounds Food colours, emulsifying agents, preservatives and leavening agents- baking powder, baking soda and yeast	Food Chemistry By Lillian Hoagland Meyer	PPT
6	II	Antioxidants- propyl gallate, butylated hydroxyl anisole and butylated hydroxyl toluene.	Food Chemistry By Lillian Hoagland Meyer	Chalk and board
7	III	Food poison and beverages - food poisons- pesticides and chemical poisons.	Food Chemistry By Seema Yadav	Chalk and board
8	III	First aid for poison consumed victims. Beverages - soft drinks- soda, carbonated drinks, fruit juices,	Food Chemistry By Seema Yadav	Chalk and board
9	III	Alcoholic beverages- examples and composition. Addiction to alcohol- diseases of liver. Deaddiction measures.	Food Science By B.Srilakshmi	Chalk and board
10	IV	Edible oils - fats, oils, sources of oils, saturated and unsaturated fats, importance of MUFA and PUFA,	Food Science By B.Srilakshmi	Chalk and board

11	IV	Iodine value, RM value, harmful effects of trans fat, saponification values and their significance.	Food Science By B.Srilakshmi	Chalk and board
12	IV	Rancidity- types, hydrolytic and oxidative, test for rancidity, prevention of rancidity.	Food Science By B.Srilakshmi	Chalk and board
13	V	Vegetables and Fruits - classification, composition, nutritive value of green leafy vegetables, roots and tubers, other vegetables.	Food Science By B.Srilakshmi	Chalk and board
14	V	Pigments- water insoluble and water soluble pigments. Vegetable cookery- preparation, changes during cooking, loss of nutrients during cooking.	Food Science By B.Srilakshmi	Chalk and board
15	V	Fruits- classification, composition, ripening of fruits, chemical fruit ripening, storage of fruits	Food Science By B.Srilakshmi	Chalk and board

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Lesson Plan for the year 2019 -2020

ODD SEMESTER

UCCHA19 – General Chemistry - I

Week	Unit	Portions to be covered	Reference	Platform (LMS)
1	I	Periodicity of properties – definition.	R.D.Madan Modern Inorganic Chemistry	Chalk and Board
2	I	Factors affecting and periodicity of Atomic radii.	R.D.Madan Modern Inorganic Chemistry	Chalk andBoard
3	I	Factors affecting and periodicity of ionic radii	R.D.Madan Modern Inorganic Chemistry	Chalk andBoard
4	I	Factors affecting and periodicity of and ionization potential.	R.D.Madan Modern Inorganic Chemistry	Chalk andBoard
5	I	Factors affecting and periodicity of electron affinity.	R.D.Madan Modern Inorganic Chemistry	Chalk andBoard
6	I	Factors affecting and periodicity of electronegativity.	R.D.Madan Modern Inorganic Chemistry	Chalk andBoard
7	I	Determination of electronegativity – Pauling's scale and Mulliken's scale.	R.D.Madan Modern Inorganic Chemistry	Chalk andBoard

8	III	IUPAC system of nomenclature of organic compounds: alkanes, alkyl substituents, alkyl halides.	B.S Bahl and Arun Bahl, Advanced Organic Chemistry	Chalk andBoard
9	III	IUPAC System nomenclature for complex organic compounds-alkenes, alkynes. IUPAC System nomenclature for complex organic compounds - alkyl substituents-Cycloalkanes.	B.S Bahl and Arun Bahl, Advanced Organic Chemistry	Chalk andBoard
10	III	IUPAC System nomenclature for Compounds having functional groups - alcohols, ethers, aldehydes.	B.S Bahl and Arun Bahl, Advanced Organic Chemistry	Chalk andBoard
11	III	IUPAC System nomenclature for Compounds having functional groups - ketones, carboxylic acids, esters, nitro compounds.	B.S Bahl and Arun Bahl, Advanced Organic Chemistry	Chalk andBoard
12	III	IUPAC System nomenclature for Compounds having functional groups - aromatic compounds and substituted aromatic compounds, poly functional and heterocyclic compounds.bicyclic and spiro compounds.	B.S Bahl and Arun Bahl, Advanced Organic Chemistry	Chalk andBoard

III - B.Sc. Chemistry – Semester V

SBE: USCHC516- SMALL SCALE CHEMISTRY

Week	Unit	Portions to be covered	Reference	Platform (LMS)
1	I	Objectives and characteristics of small-scale industries-Types of SSI-Roles of SSI in Indian economy-problems of SSI –	Dr. V. Balu, Entrepreneurship and Small Business Promotion.	Chalk and Board
2	I	Steps in starting SSI-Laws for SSI – Finance Management-Quality control-definition and advantages-	Dr. V. Balu, Entrepreneurship and Small Business Promotion.	Chalk and Board
3	I	Marketing and branding- Advertising definition, objectives, advertising media.	Dr. V. Balu, Entrepreneurship and Small Business Promotion,	Chalk and Board
4	II	Soaps – definition- main fatty and non- fatty raw materials -Types of soaps-manufacture of laundry soap and bathing soap.	B.K.Sharma, Industrial Chemistry	Chalk and Board
5	II	Mechanism of cleansing action of soap. Composition, preparation and advantages of herbal soaps.	B.K.Sharma, Industrial Chemistry	Chalk and Board
6	II	Detergents-Classification of surfactive agents-manufacture of detergents. Shampoo-Composition and manufacture of egg and herbal shampoo.	B.K.Sharma, Industrial Chemistry	Chalk and Board
7	III	Cosmetics –definition, kinds of cosmetics.	B.K.Sharma, Industrial Chemistry	Chalk and Board
8	III	Preparation of face powder, face cream and lipstick.	B.K.Sharma, Industrial Chemistry	Chalk and Board
9	III	Perfumes- definition, essential ingredients in perfumes, classification of essential oils- preparation of perfumes.	B.K.Sharma, Industrial Chemistry	Chalk and Board
10	IV	Camphor – production, biosynthesis and applications. Bleaching powder - preparation, properties and uses.	B.K.Sharma, Industrial Chemistry	Chalk and Board
11	IV	Biogas- composition, production and uses. Handmade paper from bagasse- composition of bagasse and uses.	B.K.Sharma, Industrial Chemistry	Chalk and Board

12	IV	Asofoetida - composition, cultivation, manufactures and uses. Composition and manufacture of safety matches and agarbattis.	B.K.Sharma, Industrial Chemistry	Chalk and Board
13	V	Recycling of synthetic organic polymers – applications of PET, PVC, HDPE, and polystyrene.	B.K.Sharma, Industrial Chemistry	Chalk and Board
14	V	Reverse osmosis of water - production and applications. Coconut oil – manufacture by dry and wet processes and uses.	B.K.Sharma, Industrial Chemistry	Chalk and Board
15	V	Vulcanization of rubber, making an eraser. Pencils - forms of graphite, adhesion and lengthwise graphitization method and uses.	B.K.Sharma, Industrial Chemistry	Chalk and Board

III - B.Sc./B.A/B.Com/BBA – Semester V

NME: UGCHA519- FOOD AND NUTRITION CHEMISTRY

Week	Unit	Portions to be covered	Reference	Platform (LMS)
1	I	Nutrition and Health - concept, classification of foods. Nutrients - macro and micro nutrients.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
2	I	Carbohydrates - sources, classification, functions, deficiency diseases, energy requirements, blood sugar level.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
3	I	Carbohydrates metabolism - Glycolysis, Glyconeogenesis, Glycogenolysis.	AmbigaShanmugam, Fundamentals of Biochemistry for Medical Students, 8th Edition, 2016.	Chalk and Board
4	II	Proteins-sources, classification, functions.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
5	II	Proteins - deficiency diseases, energy requirements and metabolism.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
6	II	Fats - Sources, classification, functions, deficiency diseases, energy requirements and metabolism.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
7	III	Vitamins– classification, difference between fat soluble and water soluble vitamins. Fat soluble vitamins (A, D, E and K),	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board

8	III	Water soluble vitamins (Thiamine, Riboflavin, Niacin Pyridoxine, Pantothenic acid,) sources, functions, deficiency diseases and daily requirements.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
9	III	Water soluble vitamins (Foliate, Choline, Biotin Cyanocobalamin, Ascorbic acid) sources, functions, deficiency diseases and daily requirements.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
10	IV	Minerals – classification, major elements (Ca, P, Na, K, Fe, Mg, I and F)	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
11	IV	Trace elements (Zn, Cu, Co, Se, Mo) - sources, functions, deficiency diseases and recommended requirements.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
12	IV	Balanced diet - Recommended diet for adult - Indian men and women. Diet in pregnancy and lactation.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
13	V	Vegetables – Nutritive value of green leafy vegetables, roots and tubers. Vegetable cookery (preliminary preparation, changes during cooking, loss of nutrients during cooking).	B.Srilakshmi, Food Sciences, 5th Edition, New Age International Publishers, 2010.	Chalk and Board
14	V	Fruits – Nutritive value of fruits, pigments, water, cellulose and pectic substances, flavour constituents, polyphenols, bitterness in fruits.	B.Srilakshmi, Food Sciences, 5th Edition, New Age International Publishers, 2010.	Chalk and Board
15	V	Ripening of fruits – chemical ripening. Storage of fruits. Antioxidants - antioxidant properties of vegetables and fruits.	B.Srilakshmi, Food Sciences, 5th Edition, New Age International Publishers, 2010.	Chalk and Board

II M.Sc. Chemistry – Semester III

PCCHK15 -MOLECULAR SPECTROSCOPY

Week	Unit	Portions to be covered	Reference	Platform (LMS)
1	I	Ultra violet spectroscopy - types of electronic transitions – chromophore and auxochrome - factors influencing positions and intensity of absorption bands -	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
2	I	Absorption spectra of dienes, polyenes and alpha, beta unsaturated carbonyl compounds-Woodward Fischer rule –	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
3	I	The effect of steric hindrance to coplanarity – charge transfer spectral absorption.	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
4	I	IR Spectroscopy - vibrational frequencies and factors affecting them - identification of functional groups- intra and inter molecular hydrogen bonding -	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
5	I	Applications of finger print region – far IR region	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy	Chalk and Board

			R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	
6	I	Metal ligand stretching vibrations for metal carbonyls, sulphates, cyanides, nitro and nitrito complexes.	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
7	II	Mass spectroscopy – Principles - measurement techniques - (E_1, C_l, ED, FAB, SIMS)	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
8	II	Presentation of spectral data - molecular ions, isotope ions - Nitrogen rule and ring rule, fragment ions of odd and even electron types	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
9	II	Rearrangement ions-factors affecting cleavage patterns – simple and multi center fragmentation	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
10	II	McLafferty rearrangement -Mass spectra of phenols, aldehyde, lactones, nitro compounds,	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board

11	II	McLafferty rearrangement -Mass spectra of esters, acetals and ketals, hetero aromatic compounds and sulphides.	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
12	II	Principle and introduction to GC-MS.	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
13	III	NMR spectroscopy – Introduction – nuclear spin – Larmor frequency – relaxation process – chemical shift – shielding constants –	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
14	III	Ring current and aromaticity – shifts for 1H and 13C, spin spin interaction – nuclear magnetic double resonance – nuclear overhauser effect.	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board
15	III	Application of ^{1}H NMR, ^{13}C NMR, ^{31}P NMR, ^{19}F NMR and their applications to inorganic systems.	Dr.H.Kaur, Spectroscopy William Kemp, Organic Spectroscopy R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric Identification of Organic Compounds	Chalk and Board

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Lesson Plan for the year 2019 – 2020

EVEN SEMESTER – II/IV

PCCHD19 – ORGANIC REACTIONS AND MECHANISMS

Week / Date	No of Hours	Units	Topics	Teaching Platform	Learning Resources
I	1	2	Catalytic reduction – reduction by metals (Cu, Pd, Ni),	Chalk and Board	S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism
II	1	2	Wolf- Kishner reduction and its modification, Clemmensen reduction,	Chalk andBoard	S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism
III	1	2	Birch, MPV Reduction.	Chalk andBoard	S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism
IV	1	2	Reduction with $LiAlH_4$, $NaBH_4$,	Chalk andBoard	S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism
V	1	2	Reduction with tritertiary butoxyaluminium hydride, sodium cyanoborohydride,	Chalk andBoard	S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism
VI	1	2	selectivity in reduction of 4-t-butylcyclohexanone using selected hydrides.	Chalk andBoard	S.M. Mukherji and S.P. Singh, Organic Reaction Mechanism
VII	1	4	Reaction mechanism and applications – Barton.	Chalk andBoard	Sanyal S.N.Bharathi Bhawan, Reactions, Rearrangements and Reagents
VIII	1	4	Reaction mechanism and applications – Simmon-Smith	Chalk andBoard	Sanyal S.N.Bharathi Bhawan, Reactions, Rearrangements and Reagents
IX	1	4	Reaction mechanism and applications – Mannich	Chalk andBoard	Sanyal S.N.Bharathi Bhawan, Reactions, Rearrangements and Reagents
X	1	4	Reaction mechanism and applications – Stobbe	Chalk andBoard	Sanyal S.N.Bharathi Bhawan, Reactions, Rearrangements and Reagents
XI	1	4	Reaction mechanism and applications – Darzen	Chalk andBoard	Sanyal S.N.Bharathi Bhawan, Reactions, Rearrangements and Reagents
XII	1	4	Reaction mechanism and applications – Chichibabin	Chalk andBoard	Sanyal S.N.Bharathi Bhawan, Reactions, Rearrangements and Reagents

II M.Sc. Chemistry Sem IV
PCCHM15 – NATURAL PRODUCTS AND BIOORGANIC CHEMISTRY

Week / Date	No of Hours	Units	Topics	Teaching Platform	Learning Resources
I	2	1	Synthesis and reactions of Imidazole, Oxazole, thiazole, flavones,	Chalk and Board	I.L. Finar, Organic Chemistry.
II	2	1	Synthesis and reactions of isoflavones, anthocyanins. and	Chalk andBoard	I.L. Finar, Organic Chemistry.
III	2	1	Synthesis and reactions of pyrimidines (cytosine and uracil only)	Chalk andBoard	I.L. Finar, Organic Chemistry.
IV	2	1	Synthesis and reactions of purines (adenines, guanine only)	Chalk andBoard	I.L. Finar, Organic Chemistry.
V	2	1	Synthesis of Vitamin A (Reformatsky and Wittig reaction methods only)	Chalk andBoard	I.L. Finar, Organic Chemistry.
VI	2	1	Total synthesis of Morphine, Quinine and Papaverine.	Chalk andBoard	I.L. Finar, Organic Chemistry.
VII	2	3	Definition, Classification, Properties-Saponification, rancidity, oxidation, hydrogenation,	Chalk andBoard	U.Satyanarayana and Chakrapani, Fundamentals of Biochemistry.
VIII	2	3	Definition, Classification, Properties-halogenations reactions – Iodine number Saponification number, Acetyl number-	Chalk andBoard	U.Satyanarayana and Chakrapani, Fundamentals of Biochemistry.
IX	2	3	Metabolism of lipids-Beta oxidation of fatty acids	Chalk andBoard	U.Satyanarayana and Chakrapani, Fundamentals of Biochemistry.
X	2	3	Biosynthesis of fatty acids	Chalk andBoard	U.Satyanarayana and Chakrapani, Fundamentals of Biochemistry.
XI	2	3	Metabolism of cholesterol	Chalk andBoard	U.Satyanarayana and Chakrapani, Fundamentals of Biochemistry.
XII	2	3	Conversion of Cholesterol to Progesterone, Oestrone and Testosterone.	Chalk andBoard	U.Satyanarayana and Chakrapani, Fundamentals of Biochemistry.

III - B.Sc./B.A/B.Com/BBA – Semester VI

NME: UGCHA619- FOOD AND NUTRITION CHEMISTRY

Week	Unit	Portions to be covered	Reference	Platform (LMS)
1	I	Nutrition and Health - concept, classification of foods. Nutrients - macro and micro nutrients.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
2	I	Carbohydrates - sources, classification, functions, deficiency diseases, energy requirements, blood sugar level.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
3	I	Carbohydrates metabolism - Glycolysis, Glyconeogenesis, Glycogenolysis.	AmbigaShanmugam, Fundamentals of Biochemistry for Medical Students, 8th Edition, 2016.	Chalk and Board
4	II	Proteins-sources, classification, functions.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
5	II	Proteins - deficiency diseases, energy requirements and metabolism.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
6	II	Fats - Sources, classification, functions, deficiency diseases, energy requirements and metabolism.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
7	III	Vitamins– classification, difference between fat soluble and water soluble vitamins. Fat soluble vitamins (A, D, E and K),	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board

8	III	Water soluble vitamins (Thiamine, Riboflavin, Niacin Pyridoxine, Pantothenic acid,) sources, functions, deficiency diseases and daily requirements.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
9	III	Water soluble vitamins (Foliate, Choline, Biotin Cyanocobalamin, Ascorbic acid) sources, functions, deficiency diseases and daily requirements.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
10	IV	Minerals – classification, major elements (Ca, P, Na, K, Fe, Mg, I and F)	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
11	IV	Trace elements (Zn, Cu, Co, Se, Mo) - sources, functions, deficiency diseases and recommended requirements.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
12	IV	Balanced diet - Recommended diet for adult - Indian men and women. Diet in pregnancy and lactation.	Shrinandan Bansal, Food and Nutrition, 2nd Edition, AI.T.B.S Publishers, India, 2010.	Chalk and Board
13	V	Vegetables – Nutritive value of green leafy vegetables, roots and tubers. Vegetable cookery (preliminary preparation, changes during cooking, loss of nutrients during cooking).	B.Srilakshmi, Food Sciences, 5th Edition, New Age International Publishers, 2010.	Chalk and Board
14	V	Fruits – Nutritive value of fruits, pigments, water, cellulose and pectic substances, flavour constituents, polyphenols, bitterness in fruits.	B.Srilakshmi, Food Sciences, 5th Edition, New Age International Publishers, 2010.	Chalk and Board
15	V	Ripening of fruits – chemical ripening. Storage of fruits. Antioxidants - antioxidant properties of vegetables and fruits.	B.Srilakshmi, Food Sciences, 5th Edition, New Age International Publishers, 2010.	Chalk and Board

4	Unit II: p block elements -Boron family-comparative study of elements and compounds- oxides, hydroxides, halides and hydrides.	• Modern Inorganic Chemistry - R.D.Madan • Textbook of Inorganic Chemistry- P.L Soni
5	Unit II: Preparation, properties, uses and structures of $LiAlH_4$, $NaBH_4$ and Borozole.	• Modern Inorganic Chemistry - R.D.Madan • Textbook of Inorganic Chemistry- P.L Soni
6	Unit II: Preparation, properties, uses and structures of Diborane.	• Modern Inorganic Chemistry - R.D.Madan • Textbook of Inorganic Chemistry- P.L Soni
7	Unit II: Carbon family - comparative study of elements and compounds- hydrides, oxides and halides.	• Modern Inorganic Chemistry - R.D.Madan • Textbook of Inorganic Chemistry- P.L Soni
8	Unit II: Classification of silicates, chemistry of silicones and their applications.	• Modern Inorganic Chemistry - R.D.Madan • Textbook of Inorganic Chemistry- P.L Soni
9	Unit IV: Aliphatic Nucleophilic Substitution - mechanism of S_N1 and $S_N2$reactions	• Advanced Organic Chemistry- B.SBahl, and Arun Bahl • Modern Organic Chemistry-M.K Jain and S.C Sharma
10	Unit IV: Mechanism of S_Ni reactions. Effect of structure of substrate, solvent, nucleophile and the leaving group	• Advanced Organic Chemistry- B.SBahl, and Arun Bahl • Modern Organic Chemistry-M.K Jain and S.C Sharma
11	Unit IV: Aromatic nucleophilic substitution - benzyneand intermediate complex mechanism	• Advanced Organic Chemistry- B.SBahl, and Arun Bahl • Modern Organic Chemistry-M.K Jain and S.C Sharma
12	Unit IV: Effect of substituents on reactivity,Orientation and reactivity in substituted benzenes	• Advanced Organic Chemistry- B.SBahl, and Arun Bahl • Modern Organic Chemistry-M.K Jain and S.C Sharma
13	Unit IV: Aromatic electrophilic substitution reaction in benzene and substituted benzenes-nitration and halogenation	• Advanced Organic Chemistry- B.SBahl, and Arun Bahl • Modern Organic Chemistry-M.K

		Jain and S.C Sharma
14	Unit IV: Sulphonation, Friedel-Craft's acylation reaction mechanism	• Advanced Organic Chemistry-B.SBahl, and Arun Bahl • Modern Organic Chemistry-M.K Jain and S.C Sharma
15	Unit IV: Friedel-Craft's alkylation reaction mechanism	• Advanced Organic Chemistry-B.SBahl, and Arun Bahl • Modern Organic Chemistry-M.K Jain and S.C Sharma

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.

Programme	M.Sc. Chemistry
Programme Code	P14
Semester	I
Course	Stereochemistry and conformational analysis
Course Code	PCCHA19
Hours	5
Credits	5
Total Hours	75
Max Marks	100
Course Instructor/ Coordinator	Ms. Revathy T

Lesson Plan for the year 2019 – 2020

Week	Portions to be covered	Reference
1	Unit 1: Chirality and optical activity - symmetry elements, asymmetric and dissymmetric molecule. Projection formula - Sawhorse, Newmann and Fischer projections and its interconversions.	• Advanced Organic Stereochemistry by N.Tewari • Stereochemistry – Conformation and Mechanism by P.S.Kalsi
2	Unit 1: Nomenclature - Absolute configuration - R/S and D/L, Relative configurations - threo/erythro and syn/anti. Dissymmetry of allenes, biphenyls - atropisomerism, spiro compounds, transcyclooctene, cyclononene and molecules with helical structures.	• Advanced Organic Stereochemistry byN.Tewari • Stereochemistry – Conformation and Mechanism by P.S.Kalsi
3	Unit 1: Stereo specific and stereo selective reactions - definition and examples. Asymmetric synthesis -	• Advanced Organic Stereochemistry byN.Tewari • Stereochemistry –

	Cram's rule. Geometrical isomerism - E/Z nomenclature of olefins, Geometrical and optical isomerism of disubstituted cyclopropane, cyclobutane and cyclopentanes.	Conformation and Mechanism by P.S.Kalsi
4	Unit 2: Conformational analysis of di-substituted cyclohexanes and their stereo chemical features - Geometric and optical isomerism of these derivatives.Conformation and reactivity of cyclohexene - Allylic 1,2 and 1,3 strain and related compound alkyldiene cyclohexane.	• Advanced Organic Stereochemistry by N.Tewari • Stereochemistry – Conformation and Mechanism byP.S.Kalsi • Stereochemistry of Organic CompoundsbyD. Nasipuri
5	Unit 2: Conformation of cyclohexanone-2-alkyl and 3-alkyl ketone effect and reactivity of cyclohexanone in comparison with cyclopentanones. Conformations of six membered rings containing hetero atoms.	• Stereochemistry – Conformation and Mechanism by P.S.Kalsi • Stereochemistry of Organic Compoundsby D. Nasipuri • Stereochemistry of Carbon Compoundsby Ernest L. Eliel
6	Unit 2: Conformation and stereochemistry of cis and trans decalin and 9-methyl decalin.Quantitative correlation between conformation and reactivity - Curtin-Hammett principle.	• Stereochemistry – Conformation and Mechanism byP.S.Kalsi • Stereochemistry of Organic CompoundsbyD. Nasipuri • Stereochemistry of Carbon Compounds by Ernest L. Eliel
7	Unit 3: S_N2 reaction - kinetics, mechanism and factors influencing the reaction. S_N1 reaction - kinetics, mechanism, factors influencing the reactions, Rearrangement reaction.	• Stereochemistry – Conformation and Mechanismby P.S.Kalsi • Stereochemistry of Carbon Compounds by Ernest L. Eliel
8	Unit 3: Mixed S_N1 and S_N2 reactions – competition between S_N1 and S_N2 mechanism.Substitution by ambident nucleophiles, substitution at allylic, vinylic, benzylic and aryl halides	• Stereochemistry – Conformation and Mechanism by P.S.Kalsi • Stereochemistry of Organic CompoundsbyD. Nasipuri
9	Unit 3: SET (single electron transfer)- Mechanism - Neighbouring group participation – introduction of an acyclic open chain system, Π systems of aromatic rings, cyclic system, double bond and σ bond.	• Stereochemistry – Conformation and Mechanism by P.S.Kalsi • Stereochemistry of Organic Compoundsby D. Nasipuri
10	Unit 4: E_1, E_2, E_1CB reaction – kinetics, mechanism and evidences.E_1, E_2 and E_1CB variables- mechanistic spectrum, competition between elimination and substitution.	• Stereochemistry – Conformation and Mechanism byP.S.Kalsi • Stereochemistry of Organic Compoundsby D. Nasipuri

11	Unit 4: Stereochemistry of E_2 - syn and anti elimination reaction, orientation of the double bond.Regiochemistry of E_1, E_2 and E_1CB reactions with examples.	• Stereochemistry – Conformation and Mechanism by P.S.Kalsi • Stereochemistry of Organic CompoundsbyD. Nasipuri
12	Unit 4: Pyrolytic eliminations - acyclic and alicyclic systems, Molecular rearrangements during elimination.Grob's fragmentations - Incorporation of fragmentation - Mechanism of fragmentation - Mechanism allied to E_1 and E_2 elimination.	• Stereochemistry – Conformation and Mechanism by P.S.Kalsi • Stereochemistry of Organic CompoundsbyD. Nasipuri
13	Unit 5: Optical Rotatory Dispersion and Circular Dichroism- terminology- optical rotation, circular birefringence, circular dichroism and cotton effect.Plain curves – Application of plain curves – determination of structure, configuration, conformation and optical activity.	• Stereochemistry of Carbon Compounds by Ernest L. Eliel • Stereochemistry of Organic CompoundsbyD. Nasipuri
14	Unit 5: Rotatory dispersion of ketones - structure, configuration, conformation of unsaturated ketones. Emperical and semiempirical rules- The Axial haloketone rule	• Stereochemistry of Carbon Compounds by Ernest L. Eliel • Stereochemistry of Organic CompoundsbyD. Nasipuri
15	Unit 5: Octant rule (Configuration and Conformation), Absolute configuration and ketal formation.	• Stereochemistry of Carbon Compounds by Ernest L. Eliel • Stereochemistry of Organic Compoundsby D. Nasipuri

AUXILIUM COLLEGE (AUTONOMOUS) VELLORE – 6.

LESSON PLAN

Programme	M.Sc Chemistry
Programme Code	P14
Semester	II
Course	Advanced Coordination Chemistry
Course Code	PCCHE19
Hours	3
Credits	4
Total Hours	45
Max Marks	100
Course Instructor/ Coordinator	Ms. T. Revathy

Week / Date	**No of Hours**	**Units**	**Topics**	**Teaching Methodology & Student Centric Methods ***	**Learning Resources ***	**Method of Evaluation**
I	3	I	Thermodynamic and kinetic stability-stepwise and overall stability constant- Relationship between both the constants	Chalk and board	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	Concept Checking Questions(CCQ)
II	3	I	Trend in K-value - Irving-Williams series - Factors affecting the stability of complexes	Chalk and board	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	CCQ

III	3	I	Determination of stability constants by spectrophotometric, polarographic and potentiometric methods	Chalk and board, Demo video	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	Written test
IV	3	I	Detection of complex formation, Optical rotatory dispersion and circular dichroism- application to complexes	Chalk and board	• Essentials of Coordination Chemistry by Vasishta bhatt • Inorganic Chemistry by Purcell and Kotz	CCQ
V	3	I	Macrocyclic Ligands: Thermodynamic and kinetic template effect-structure, stability and applications of porphyrins, corrins, Schiffbases, Crown ethers and crypts	Powerpoint, Seminar	• Coordination Chemistry of Macrocyclic Compounds by Gordon A Melson • The chemistry of macrocyclic ligand complexes by Leonard F. Lindoy	Discussion
VI	3	III	Types of absorption spectra – ligand spectra, counter - ion spectra, CT spectra, ligand field spectra –R-S coupling- Microstates – Hund's rule	Chalk and board	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	Problem solving activity
VII	3	III	Term states for 'd' – ions-Selection Rules– Laporte's and spin selection rule, Splitting of terms in oh and td complexes	Chalk and board	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	Problem solving activity
VIII	3	III	Correlation diagrams – Orgel diagrams and Tanabe-Sugano diagrams-Spectra of different d systems – Racah parameters-nephelauxetic	Chalk and board	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	Problem solving activity
IX	3	III	Charge Transfer spectra-Classification-Ligand to Metal, Metal to Ligand, Intervalence and Intra Ligand Charge transfer	Chalk and board	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	Written test

X	3	III	Magnetic characteristics of transition metal complexes - types- determination of magnetic susceptibility - Guoy and Faraday's method - magnetic criterion of bond type in complex and orbital contribution to magnetic moment.	Powerpoint, Demo video	• Physical Inorganic Chemistry- A Coordination Chemistry Approach by S. F. A. Kettle • Concise Coordination Chemistry by R. Gopalan	CCQ
XI	3	V	Trans effect – Trans effect series – theories and applications, cis effect	Chalk and board	• Concise Coordination Chemistry by R. Gopalan • Coordination Chemistry by Ajay Kumar	Assignment
XII	3	V	Mechanisms of substitutions in octahedral complexes- Dissociative, Associative and Interchange (I_a and I_d) mechanisms.	Chalk and board	• Inorganic Chemistry by Purcell and Kotz • Concise Coordination Chemistry by R. Gopalan	CCQ
XIII	3	V	Hydrolysis reactions –acid and base hydrolysis reactions of six-coordinated Co(III) ammine complexes – mechanisms – evidences	Chalk and board	• Inorganic Chemistry by Purcell and Kotz • Advance Inorganic Chemistry by Gurdeep Raj	Written Test
XIV	3	V	Replacement of coordinated water – mechanisms – evidences - rates of water replacement - orbital occupation effects.	Chalk and board	• Advance Inorganic Chemistry by Gurdeep Raj • Inorganic Chemistry by Purcell and Kotz	Written Test
XV	3	V	Synthesis of Pt and Co compounds- Metal complexes in medicinal chemistry, industrial processes and agriculture.	Seminar by students & Group discussion	• Inorganic Chemistry by Purcell and Kotz • Descriptive inorganic, Coordination, and Solid-state chemistry by Glen E. Rodgers • Concise Coordination Chemistry by R. Gopalan	Group Discussion and assignment

AUXILIUM COLLEGE (AUTONOMOUS) VELLORE – 6.

LESSON PLAN

Programme	M.Sc Chemistry
Programme Code	P14
Semester	II
Course	Solid State chemistry and Nuclear chemistry
Course Code	PCCHN15
Hours	3
Credits	4
Total Hours	45
Max Marks	100
Course Instructor/ Coordinator	Ms. T. Revathy

Week / Date	**No of Hours**	**Units**	**Topics**	**Teaching Methodology & Student Centric Methods ***	**Learning Resources ***	**Method of Evaluation**
I	3	I	Structure of solids- Comparison of X-ray and Neutron diffraction- Structure of Cadmium iodide and Nickel arsenide	Visual aids (Models), Chalk and board	• Structural Inorganic Chemistry by A. F. Wells • E-Resources (wwwchem.uwimona.edu.jm)	Concept Checking Questions(CCQ)

II	3	I	Structure of Perovskite and spinels and inverse spinels, Formation of spinels	Visual aids (Models), Chalk and board	• Structural Inorganic Chemistry by A. F. Wells • Understanding Solids by Richard Tilley • E-Resources (wwwchem.uwimona.edu.jm)	Problem solving activity
III	3	I	Hall effect and its applications, Pyroelectricity, piezo electricity and ferro electricity	Chalk and board, Video clips	• Solid State Chemistry and its Applications by Anthony R. West • Solid State Chemistry- An Introduction by Smart and Moore	CCQ
IV	3	I	Magnetic properties of solids- Hysteresis loss and loops Types of magnetic behaviour- Dia, Para, Ferro, Anti Ferro, Ferri magnetism- Ferrites, Garnets.	Chalk and board	• Solid State Chemistry and its Applications by Anthony R. West • Understanding solid state physics by Sharon Ann Holgate	CCQ
V	3	II	Solid state electrolyte-β-alumina-application of solid state electrolytes.	Chalk and board	• Solid State Chemistry and its Applications by Anthony R. West • Solid State Electrochemistry by Peter G Bruce	CCQ
VI	3	II	Reactions in solid state and phase transition, Ferrites and its types.	Chalk and board	• Solid State Chemistry and its Applications by Anthony R. West • Solid State Chemistry by D K Chakrabarty	CCQ
VII	3	II	Garnets, Diffusion, Diffusion co-efficient, Diffusion mechanisms- Vacancy and interstitial diffusion.	Chalk and board	• Solid State Chemistry and its Applications by Anthony R. West • Solid State Chemistry by D K Chakrabarty	CCQ

VIII	3	III	Quark theory, The magnetic properties of the Nucleus-Bohr magneton, Nuclear magneton, the neutron magnetic moment and the structure of the nucleon.	Powerpoint & Chalk and board	• Essentials of Nuclear Chemistry by H.J.Arnikar	Problem solving activity
IX	3	III	The net magnetic moments of the nuclei -the spin I, the magnetic moment μ_I and Nordheim rules, Salient feature of the Liquid drop model with derivations	Chalk and board	• Essentials of Nuclear Chemistry by H.J.Arnikar	CCQ
X	3	III	Salient feature of the Fermi –Gas model and Collective model.	Chalk and board	• Essentials of Nuclear Chemistry by H.J.Arnikar •	CCQ
XI	3	III	Nuclear reaction cross-section, Q value, Threshold energy and compound nucleus theory	Chalk and board	• Essentials of Nuclear Chemistry by H.J.Arnikar	Assignment
XII	3	V	Detection and determination of activity by Cloud chamber, Bubble chamber	Video clips & Group discussion	• Solid State Physics by XXXX • Modern Physics by XXXX • E-Resources(	Group Discussion and assignment
XIII	3	V	Construction and working of Geiger-Muller counter, Scintillation and Cherenkov counters	Video clips & Group discussion	• Solid State Physics by XXXX • Nuclear Chemistry by Maheshwar Sharon and Madhuri Sharon • E-Resources(	Group Discussion and assignment
XIV	3	V	Particle accelerators, Linear accelerators types and application	Seminar by students & Group discussion	• Solid State Physics by XXXX • Modern Physics by XXXX	Group Discussion and assignment

XV	3	V	Construction and working of Cyclotron and Synchrotron, Nuclear Reactor: Fast breeder reactors	Seminar by students & Group discussion	• Solid State Physics by XXXX • Modern Physics by XXXX	Group Discussion and assignment

AUXILIUM COLLEGE (AUTONOMOUS) VELLORE – 6.

LESSON PLAN

Programme	B.Sc Chemistry
Programme Code	U17
Semester	IV
Course	GENERAL CHEMISTRY – IV
Course Code	UCCHE16
Hours	2
Credits	5
Total Hours	30
Max Marks	100
Course Instructor/ Coordinator	Ms. T. Revathy

Week / Date	**No of Hours**	**Units**	**Topics**	**Teaching Methodology& Student Centric Methods ***	**Learning Resources ***	**Method of Evaluation**
I	2	I	Nitrogen family - preparations, properties and uses of hydrazine.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Textbook of Inorganic Chemistry by P.L Soni	Concept Checking Questions(CCQ)
II	2	I	Preparations, properties and uses of sodium bismuthate ($NaBiO_3$). Oxygen Family - comparative study of compounds- hydrides.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Textbook of Inorganic Chemistry by P.L Soni	CCQ

III	2	I	Oxygen Family - comparative study of compounds- halides- Hexafluorides, Tetrahalides, Dihalides, Dimeric monohalides.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Textbook of Inorganic Chemistry by P.L Soni	CCQ
IV	2	I	Oxygen Family - comparative study of compounds- Oxides- Monooxides, Dioxides, Trioxides and Heptoxides, oxyacids.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Textbook of Inorganic Chemistry by P.L Soni	CCQ
V	2	I	Halogens - Comparative study of elements and compounds of halogens- hydracids, oxyacids.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Textbook of Inorganic Chemistry by P.L Soni	CCQ
VI	2	I	Inter halogen compounds, Noble gases - Position in the periodic table.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Textbook of Inorganic Chemistry by P.L Soni	CCQ
VII	2	I	Clathrates and its applications, Hybridisation and geometry of XeF_2 and XeF_4.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Textbook of Inorganic Chemistry by P.L Soni	Problem solving activity
VIII	2	I & II	Hybridisation and geometry ofXeF_6 and $XeOF_4$. Cycloalkanes-Baeyer strain theory and theory of strainless rings.	Chalk and board	• Modern Inorganic Chemistry by R.D.Madan • Advanced Organic Chemistryby B.SBahl, and Arun Bahl	Problem solving activity
IX	2	II	Preparation using Wurtz reaction, Dieckmann's ring closure and reduction of aromatic hydrocarbons,Substitution and ring opening reactions.	Chalk and board	• Advanced Organic Chemistryby B.SBahl, and Arun Bahl • Modern Organic Chemistry by M.K Jain and S.C Sharma	CCQ

X	2	II	Elimination reaction: Types, orientation of double bond- Hoffmann and Saytzeff's rules.	Chalk and board	• Advanced Organic Chemistryby B.SBahl, and Arun Bahl • Modern Organic Chemistry by M.K Jain and S.C Sharma	Assignment
XI	2	II	Mechanisms of E1 and E2 reactions and evidences.	Chalk and board	• Advanced Organic Chemistryby B.SBahl, and Arun Bahl • Modern Organic Chemistry by M.K Jain and S.C Sharma	CCQ
XII	2	II	Factors affecting elimination reaction.	Chalk and board	• Advanced Organic Chemistryby B.SBahl, and Arun Bahl • Modern Organic Chemistry by M.K Jain and S.C Sharma	CCQ
XIII	2	II	Elimination vs Substitution.	Chalk and board	• Advanced Organic Chemistryby B.SBahl, and Arun Bahl • Modern Organic Chemistry by M.K Jain and S.C Sharma	CCQ
XIV	2	II	Reactivities of methyl, ethyl, propyl, isopropyl, n-butyl, vinyl and benzyl halides.	Chalk and board	• Advanced Organic Chemistryby B.SBahl, and Arun Bahl • A Textbook of Organic Chemistry by K.S Tewari and M.K Vishnoi	CCQ
XV	2	II	Cis and trans eliminations-mechanisms.	Chalk and board	• Advanced Organic Chemistryby B.SBahl, and Arun Bahl • A Textbook of Organic Chemistry by K.S Tewari and M.K Vishnoi	CCQ

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Lesson Plan for the year 2019 – 2020 (ODD SEMESTER)

UCCHD19-GENERAL CHEMISTRY- III

Week	Portions to be covered	Reference	Platform (LMS)
Week 1	**UNIT – 1**: Calculation of Formula weight or Molecular weight and Mole concept. Relationship between Molar Mass, Mole and Avagadro Number	**Chemistry 2e** by Paul Flowers, Klaus Theopold, Richard Langley &William Robinson	Chalk & Board
Week 2	**UNIT – 1**: Solutions- definition and properties, concentration terms, Molarity, Formality and Normality – definition, mathematical expression and Comparison.	**1. Chemistry 2e** by Paul Flowers, Klaus Theopold, Richard Langley &William Robinson. **Modern Analytical Chemistry** by David Harvey	Chalk & Board
Week 3	**UNIT – 1** : Equivalent weight calculation – for an acid, base, oxidizing agent. Volumetric Analysis- principle. Definition of Titrant, Titrand and Indicator.	**Chemistry 2e** by Paul Flowers, Klaus Theopold, Richard Langley &William Robinson. **Modern Analytical Chemistry** by David Harvey	Chalk & Board
Week 4	**UNIT – 1:** Preparation of Solutions and Standardization of Commercial acids. Primary and Secondary standards – Characteristics with Examples.	**Modern Analytical Chemistry** by David Harvey	Chalk & Board
Week 5	**UNIT – 1:** Theory of Acid-base titrations. Theory of acid-base indicators.	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 6	**UNIT – 1:** Theory of Redox titrations. Theory of Redox indicators.	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 7	**UNIT – 1:** Theory of Complexometric titrations and	**Analytical Chemistry** by Gary Christian	Chalk & Board

	their indicators.		
Week 8	**UNIT – 1:** Theory of Iodometry and Iodimetry titrations and their indicators.	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 9	**UNIT – 1:**Theory of Precipitation titrations and adsorption indicators.	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 10	**UNIT – 1:** Types of errors, minimizing the errors, accuracy and precision, significant figures.	**Modern Analytical Chemistry** by David Harvey	Chalk & Board
Week 11	**UNIT – III:** Acidity of Alkynes	**Textbook of Organic Chemistry** by Bahl & Arun Bahl	Chalk & Board
Week 12	**UNIT – III:** Formation of Acetylides. Addition Reactions with water, hydrogen halides, halogens	**Textbook of Organic Chemistry** by Bahl & Arun Bahl	Chalk & Board
Week 13	**UNIT – III:**, oxidation, ozonolysis and Hydroxylation with $KMnO_4$	**Textbook of Organic Chemistry** by Bahl & Arun Bahl	Chalk & Board
Week 14	**UNIT – III:** Carboxylic acids - Ionisation of carboxylic acids-acidity constants-comparison of acid strengths of substituted haloacids.	**Textbook of Organic Chemistry** by Bahl & Arun Bahl	Chalk & Board
Week 15	**UNIT – III:** acid strengths of substituted benzoic acids-Conversion of acids to their derivatives.	**Textbook of Organic Chemistry** by Bahl & Arun Bahl	Chalk & Board

UGCHB519: NON MAJOR ELECTIVE: COSMETICS AND DYES

Week	Portions to be covered	Reference	Platform (LMS)
Week 1	**UNIT – 1**: Cosmetics Definition and Classification.	**Chemistry in Daily life** by Kirpal Singh	Chalk & Board
Week 2	**UNIT – 1**: Components of Cosmetics. Deodrants and Antiperspirants – definition and differences.	**Chemistry in Daily life** by Kirpal Singh	Chalk & Board
Week 3	**UNIT – 1**: Aerosols, Perfumes	**Chemistry in Daily**	Chalk & Board

	and Fragrances with examples. Pros and Cons of synthetic cosmetics.	**life** by Kirpal Singh	
Week 4	**UNIT – 2:** Basic Concept of Cosmetic Safety.	**Handbook of Cosmetic science and Technology** by Marc Paye, Andre´ O. Barel, and Howard I. Maibach	Chalk & Board
Week 5	**UNIT – 2:** Safety test items and Evaluation methods.	**Handbook of Cosmetic science and Technology** by Marc Paye, Andre´ O. Barel, and Howard I. Maibach	Chalk & Board
Week 6	**UNIT – 2:** Testing on human – Patch test and Usage Test.	**Handbook of Cosmetic science and Technology** by Marc Paye, Andre´ O. Barel, and Howard I. Maibach	Chalk & Board
Week 7	**UNIT – 3:** Herbal cosmetics – fruits and vegetables as haircare and skin care (apple, apricot, banana, carrot, cucumber, honey, lemon, tomato).	**Herbal Principles and Cosmetics** by Roland Hardman	Chalk & Board
Week 8	**UNIT – 3:** Perfumes and fragrances, skin care herbs – olive oil, sesame oil, black pepper, amla. Aromatherapy – various oils used in aromatherapy and their significance.	**Herbal Principles and Cosmetics** by Roland Hardman	Chalk & Board
Week 9	**UNIT – 3:** Standardization of herbs – importance, methods employed for standardization of herbal extracts.	**Herbal Principles and Cosmetics** by Roland Hardman	Chalk & Board
Week 10	**UNIT – 4:** Dyes - definition of dyes, requirements of a good dye i.e. Colour, chromophore and auxochrome, solubility, linearity, coplanarity, fastness, substantivity, definition of fastness and its properties and mordants with examples.	**Applied Chemistry** by Jayashree Ghosh	Chalk & Board
Week 11	**UNIT – 4:** Natural and	**Applied Chemistry**	Chalk & Board

	Synthetic Dyes - natural dyes - definition and limitations of natural dyes. Examples and uses of natural dyes with respect to henna, turmeric, saffron, indigo, chlorophyll –names of the chief dyeing material/s in each natural dye.	by Jayashree Ghosh	
Week 12	**UNIT – 4:** Synthetic dyes - definition of synthetic dyes, primaries and intermediates.	**Applied Chemistry** by Jayashree Ghosh. **The Chemistry of Synthetic Dyes and Pigments** by Lubs HA and Roberts E.	Chalk & Board
Week 13	**UNIT – 5:** Textile uses of dyes - impact of the textile and leather dye Industry on the environment with special emphasis on water pollution.	**Fundamental Concepts of Environmental Chemistry** by Sodhi G S	Chalk & Board
Week 14	**UNIT – 5:** biomedical uses – Tablets, syrups and capsules, DNA markers and therapeutics. Dyes in food and cosmetics.	**Colorants for Non-textile applications** by Freeman H S. & Peters A T.	Chalk & Board
Week 15	**UNIT – 5:** Properties of dyes used in food and cosmetics, commonly used food colors and their limits. Dyes sensitized solar cells – A tool to overcome the future energy crisis.	**Natural Food colorants** by Hendry G A F and Houghton J D. **Colorants for Non-textile applications** by Freeman H S. & Peters A T.	Chalk & Board

PECHE15: ELECTIVE IIIA: ANALYTICAL CHEMISTRY

Week	Portions to be covered	Reference	Platform (LMS)
Week 1	**UNIT – 1**: Thermal Analysis – Introduction and types. Thermo Gravimetric Analysis (TGA)- principle, instrumentation.	**Analytical Chemistry** by Usha Rani.	Chalk & Board
Week 2	**UNIT – 1**: Thermogravimetric	**Analytical**	Chalk & Board

	curves of $CaC_2O_4H_2O$, $MgCr_2O_4$, Hg_2CrO_4, Ag_2CrO_4, $AgNO_3$ and $Cu(NO_3)_2$.	**Chemistry** by Usha Rani.	
Week 3	**UNIT – 1:** Factors affecting TGA, Applications of TGA. DTG – Principles, Comparison of DTG&TGA	**Instrumental Methods of Chemical Analysis** by A K Srivatasava	Chalk & Board
Week 4	**UNIT – 1:** Differential Thermal Analysis (DTA) - principle, instrumentation, simultaneous TGA and DTA curves and applications.	**Instrumental Methods of Chemical Analysis** by A K Srivatasava. **Analytical Chemistry** by Usha Rani.	Chalk & Board
Week 5	**UNIT – 1:** Differential Scanning Calorimetry (DSC) principle, instrumentation and applications.	**Instrumental Methods of Chemical Analysis** by A K Srivatasava. **Analytical Chemistry** by Usha Rani.	Chalk & Board
Week 6	**UNIT – 1:** Thermometric titrations - principle, instrumentation and applications.	**Instrumental Methods of Chemical Analysis** by A K Srivatasava. **Analytical Chemistry** by Usha Rani.	Chalk & Board
Week 7	**UNIT – 2:**Chromatographic Techniques - Gas Chromatography (GC) - definition, principle, types, instrumentation - carrier gas, sample injection system, column, thermal compartment	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 8	**UNIT – 2:** detectors - Thermal Conductivity Detector (TCD), Ionization Detector (ID), Recorder and applications.	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 9	**UNIT – 2:**HPLC instrumentation - solvent delivery system, sample injection system, column, solvent.	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 10	**UNIT – 2:** detectors – UV detector, bulk property and solute property detectors,	**Analytical Chemistry** by Gary Christian	Chalk & Board

	recorder and applications		
Week 11	**UNIT – 2:** Super Critical Fluid Chromatography (SCFC) - properties, instrumentation, comparison with other types of chromatography	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 12	**UNIT – 2:** super critical fluid extraction and applications	**Analytical Chemistry** by Gary Christian	Chalk & Board
Week 13	**UNIT-5:** Environmental Chemistry - Water quality standards - BOD, COD - Analysis of Waste Water and its treatment – salinity of water and its treatment – Reverse Osmosis	**Instrumental Methods of Chemical Analysis** by Kaur	Chalk & Board
Week 14	**UNIT – 5:** Ambient air quality standards - Photochemical smog and oxides of nitrogen. Toxic Chemicals in environment - Toxicity of Mercury, Lead, Chromium	**Instrumental Methods of Chemical Analysis** by Kaur	Chalk & Board
Week 15	**UNIT – 5:** Analytical methods in Environmental Toxins	**Instrumental Methods of Chemical Analysis** by Kaur	Chalk & Board

Lesson Plan for the year 2019 – 2020 (EVEN SEMESTER)

ENVIRONMENTAL STUDIES

Week	Portions to be covered	Reference	Platform (LMS)
Week 1	**UNIT – 1**: Multidisciplinary nature of Environmental Studies, Scope and Importance	**UGC Syllabus book**	Chalk and Board
Week 2	**UNIT – 1**: Natural resources: Overexploitation of Water, Land and Energy.	**UGC Syllabus book**	Chalk and Board
Week 3	**UNIT – 1** : Natural Resources : Forest and Mineral	**UGC Syllabus book**	Chalk and Board

Week 4	**UNIT – 2:** Ecosystem: Types, Structure & Function.	**UGC Syllabus book**	Chalk and Board
Week 5	**UNIT – 2:** Ecosystem- Forest & Grassland.	**UGC Syllabus book**	Chalk and Board
Week 6	**UNIT – 2:** Desert & acquatic Ecosystem.	**UGC Syllabus book**	Chalk and Board
Week 7	**UNIT – 3:** Biodiversity & its values.	**UGC Syllabus book**	Chalk and Board
Week 8	**UNIT – 3:** India as a nation of MEGA biodiversity.	**UGC Syllabus book**	Chalk and Board
Week 9	**UNIT – 3:**Threats to Biodiversity & its conservation.	**UGC Syllabus book**	Chalk and Board
Week 10	**UNIT – 4:** Types of Environmental Pollution.	**UGC Syllabus book**	Chalk and Board
Week 11	**UNIT – 4:** Water, Air, Noise & Soil pollution – Causes, Effects.	**UGC Syllabus book**	Chalk and Board
Week 12	**UNIT – 4:** Rain water Harvesting and Solid Waste Management.	**UGC Syllabus book**	Chalk and Board
Week 13	**UNIT – 5:** Human Population & Environmental Pollution act.	**UGC Syllabus book**	Chalk and Board
Week 14	**UNIT – 5:** Climate Change, Afforestation and Sustainable Development.	**UGC Syllabus book**	Chalk and Board
Week 15	**UNIT – 5:** Environmental Protection Act.	**UGC Syllabus book**	Chalk and Board

UGCHB619: NON MAJOR ELECTIVE: COSMETICS AND DYES

Week	Portions to be covered	Reference	Platform (LMS)
Week 1	**UNIT – 1**: Cosmetics Definition and Classification.	**Chemistry in Daily life** by Kirpal Singh	Chalk & Board
Week 2	**UNIT – 1**: Components of Cosmetics. Deodrants and Antiperspirants – definition and differences.	**Chemistry in Daily life** by Kirpal Singh	Chalk & Board
Week 3	**UNIT – 1**: Aerosols, Perfumes and Fragrances with examples. Pros and Cons of synthetic cosmetics.	**Chemistry in Daily life** by Kirpal Singh	Chalk & Board
Week 4	**UNIT – 2:** Basic Concept of Cosmetic Safety.	**Handbook of Cosmetic science and**	Chalk & Board

		Technology by Marc Paye, Andre´ O. Barel, and Howard I. Maibach	
Week 5	**UNIT – 2:** Safety test items and Evaluation methods.	**Handbook of Cosmetic science and Technology** by Marc Paye, Andre´ O. Barel, and Howard I. Maibach	Chalk & Board
Week 6	**UNIT – 2:** Testing on human – Patch test and Usage Test.	**Handbook of Cosmetic science and Technology** by Marc Paye, Andre´ O. Barel, and Howard I. Maibach	Chalk & Board
Week 7	**UNIT – 3:** Herbal cosmetics – fruits and vegetables as haircare and skin care (apple, apricot, banana, carrot, cucumber, honey, lemon, tomato).	**Herbal Principles and Cosmetics** by Roland Hardman	Chalk & Board
Week 8	**UNIT – 3:** Perfumes and fragrances, skin care herbs – olive oil, sesame oil, black pepper, amla. Aromatherapy – various oils used in aromatherapy and their significance.	**Herbal Principles and Cosmetics** by Roland Hardman	Chalk & Board
Week 9	**UNIT – 3:** Standardization of herbs – importance, methods employed for standardization of herbal extracts.	**Herbal Principles and Cosmetics** by Roland Hardman	Chalk & Board
Week 10	**UNIT – 4:** Dyes - definition of dyes, requirements of a good dye i.e. Colour, chromophore and auxochrome, solubility, linearity, coplanarity, fastness, substantivity, definition of fastness and its properties and mordants with examples.	**Applied Chemistry** by Jayashree Ghosh	Chalk & Board
Week 11	**UNIT – 4:** Natural and Synthetic Dyes - natural dyes - definition and limitations of natural dyes. Examples and uses of natural dyes with respect to henna, turmeric, saffron, indigo,	**Applied Chemistry** by Jayashree Ghosh	Chalk & Board

	chlorophyll –names of the chief dyeing material/s in each natural dye.		
Week 12	**UNIT – 4:** Synthetic dyes - definition of synthetic dyes, primaries and intermediates.	**Applied Chemistry** by Jayashree Ghosh. **The Chemistry of Synthetic Dyes and Pigments** by Lubs HA and Roberts E.	Chalk & Board
Week 13	**UNIT – 5:** Textile uses of dyes - impact of the textile and leather dye Industry on the environment with special emphasis on water pollution.	**Fundamental Concepts of Environmental Chemistry** by Sodhi G S	Chalk & Board
Week 14	**UNIT – 5:** biomedical uses – Tablets, syrups and capsules, DNA markers and therapeutics. Dyes in food and cosmetics.	**Colorants for Non-textile applications** by Freeman H S. & Peters A T.	Chalk & Board
Week 15	**UNIT – 5:** Properties of dyes used in food and cosmetics, commonly used food colors and their limits. Dyes sensitized solar cells – A tool to overcome the future energy crisis.	**Natural Food colorants** by Hendry G A F and Houghton J D. **Colorants for Non-textile applications** by Freeman H S. & Peters A T.	Chalk & Board

PECHC19: ELECTIVE IIA: PHARMACEUTICAL CHEMISTRY

Week	Portions to be covered	Reference	Platform (LMS)
Week 1	**UNIT – 1**: Mechanism of drug action and metabolism of Drugs - Introduction, classification of drugs,	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 2	**UNIT – 1**: Mechanism of action, drug receptors, biological responses	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 3	**UNIT – 1:** The chemistry of drug receptor binding - covalent bond, hydrogen bond, Vanderwaals forces	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 4	**UNIT – 1:** Mechanism of Drug action	**Pharmaceutical Chemistry** by	Chalk & Board

		Jayashree Ghosh	
Week 5	**UNIT – 1:** Metabolism of Drugs – Chemical Pathways	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 6	**UNIT – 1:** phase I and phase II reactions, Biotransformation	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 7	**UNIT – 2:** Absorption of drugs - Routs of administration, factors affecting absorption	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 8	**UNIT – 2:** Digestion and absorption of proteins and fats	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 9	**UNIT – 2:** Assay of drugs - Chemical, biological, immunological assay	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 10	**UNIT – 2:** Biological role of some inorganic compounds - Sodium and their compounds, potassium and their compounds	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 11	**UNIT – 2:** Biological role of some inorganic compounds - Calcium and their compounds, Iodine and their compounds	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 12	**UNIT – 2:** Biological role of some inorganic compounds - Copper and their compounds, zinc and their compounds	**Pharmaceutical Chemistry** by Jayashree Ghosh	Chalk & Board
Week 13	**UNIT – 4:** Podophyllotoxins, mechanism of action, endochrine agents, taxol.	**Pharmaceutical, applied and Natural products Chemistry** by P S Kalsi & Sangeeta Jagtap	Chalk & Board
Week 14	**UNIT – 5:** Toxins and their medicinal value – Introduction and classification. Toxins from microbes to reptiles	**Pharmaceutical, applied and Natural products Chemistry** by P S Kalsi & Sangeeta Jagtap	Chalk & Board
Week 15	**UNIT – 5:** Blood clotting, anticoagulants	**Pharmaceutical, applied and Natural products Chemistry** by P S Kalsi & Sangeeta Jagtap	Chalk & Board

PCCHN19: SOLID STATE CHEMISTRY AND NUCLEAR CHEMISTRY

Week	Portions to be covered	Reference	Platform (LMS)
Week 1	**UNIT – 2**: Optical Properties of Solids – Luminescence & Phosphors.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 2	**UNIT – 2**: Lasers – Ruby Laser & Neodynium Laser	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 3	**UNIT – 4:** Bethe Notations and Introduction to Nuclear Reactions & Types	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 4	**UNIT – 4:** Direct, Photonuclear & Thermonuclear reactions.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 5	**UNIT – 4:** Modes of radioactive decay, Nuclear isomerism	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 6	**UNIT – 4:** Isomeric Transition, Internal conversion.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 7	**UNIT – 4:**Stellar Energy, Nucleosynthesis of light and heavy elements.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 8	**UNIT – 4:** Hydrogen burning, Carbon burning, e, x, r, p & x processes.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 9	**UNIT – 4:**Separation of Isotopes, Boron Isotope	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 10	**UNIT – 4:** Isotope exchange and Laser irradiation.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 11	**UNIT – 4:** Separation of Uranium isotopes	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 12	**UNIT – 4:** Ultracentrifugation and Laser irradiation.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 13	**UNIT-4:** Analytical applications of radioisotopes as traces.	**Essentials of Nuclear Chemistry**	Chalk & Board

		by H J Arnikar.	
Week 14	**UNIT – 4:** Isotope dilution analysis, Neutron activation analysis.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board
Week 15	**UNIT – 4:** Age determination by tritium and carbon-14 content.	**Essentials of Nuclear Chemistry** by H J Arnikar.	Chalk & Board

Dr. Sr. Jayasanthi

Auxilium College (Autonomous), Gandhi Nagar, Vellore – 632 006.
Lesson Plan for the year 2019 - 2020
Odd Semester
UECHA 16 – Analytical Chemistry

Week	Portions to be covered	Reference
1	**Unit 1:** Principle of gravimetric analysis, characteristic of precipitating agents – choice of precipitants and condition for precipitation.	R. Gopalan, P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand & Sand, Reprint 2017.
2	**Unit 1:** Specific and selective precipitants – DMG-cupferron, salicylaldehyde, ethylene diamine – use of sequestering agents.	R. Gopalan, P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand & Sand, Reprint 2017.
3	**Unit 1:** Co-precipitation – post precipitation – differences – reduction of error precipitation from homogeneous solution – Calculation in gravimetric methods. Data analysis – Precision and accuracy, types of errors, standard deviation.	R. Gopalan, P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand & Sand, Reprint 2017.
4	**Unit 2:** Paper and column chromatography: Principle, Experimental requirement and application	Skoog, Holler, Crouch, Instrumental analysis, Cengage Cleaning, Eleventh Reprint 2012
5	**Unit 2:** Thin Layer Chromatography: Principle, Experimental requirement and application	Skoog, Holler, Crouch, Instrumental analysis, Cengage Cleaning, Eleventh Reprint 2012
6	**Unit 2:** Ion Exchange Chromatography – Properties and types – Factors affecting ion exchange equilibria.	Skoog, Holler, Crouch, Instrumental analysis, Cengage Cleaning, Eleventh Reprint 2012
7	**Unit 3:** UV Visible Spectroscopy: Absorption laws – Calculations involving Beer-Lambert,s law.	Elementary Organic Spectroscopy, Y.R. Sharma, S. Chand and Company limited, Reprint 2012.
8	**Unit 3:** Instrumentation – Photocolorimeter and spectrophotometer – block diagram with description of components.	Elementary Organic Spectroscopy, Y.R. Sharma, S. Chand and Company limited, Reprint 2012.

9	**Unit 3:** Types of electronic transitions – chromophore and auxochromes – factors affecting absorption maximum and intensity	R. Gopalan, P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand & Sand, Reprint 2017.
10	**Unit 4:** Infrared Spectroscopy – Principle – types of stretching and bending vibrations.	Elementary Organic Spectroscopy, Y.R. Sharma, S. Chand and Company limited, Reprint 2012
11	**Unit 4:** Instrumentation – block diagram – source-monochromator-sample cell- sampling techniques – detector and recorders	R. Gopalan, P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand & Sand, Reprint 2017.
12	**Unit 4:** Identification of simple organic molecules from characteristic absorption bands.	Elementary Organic Spectroscopy, Y.R. Sharma, S. Chand and Company limited, Reprint 2012
13	**Unit 5:** Nuclear Magnetic Resonance Spectroscopy – Principle – Instrumentation with its different components Chemical shift, factors affecting chemical shift - shielding mechanism.	Gurdeep R. Charwal, Sham K. Anand , Spectroscopy, Himalaya Publishing House, Fifth Revised and Enlarged Edition – 2001
14	**Unit 5:** NMR spectrum of simple organic compounds – alcohols, aldehydes and ketones.	Elementary Organic Spectroscopy, Y.R. Sharma, S. Chand and Company limited, Reprint 2012.
15	**Unit 5:** Mass Spectrometry – Principle – Instrumentation - Mass spectrum of simple organic compounds – alcohols, aldehydes and ketones.	Elementary Organic Spectroscopy, Y.R. Sharma, S. Chand and Company limited, Reprint 2012.

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Lesson Plan for the year 2019- 2020
Odd Semester
PECHE 15 – Analytical Chemistry

Week	Portions to be covered	Reference
1	**Unit 3:** Atomic absorption spectrometry – principle - instrumentation with block diagram –Interferences in AAS -Difference between atomic absorption and emission method, advantages and disadvantages of AES,	P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, R. Gopalan, Sultan chand & Sons, Reprint 2017.
2	**Unit 3:** Difference between atomic absorption and emission method, advantages and disadvantages of AES	P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, R. Gopalan, Sultan chand & Sons, Reprint 2017.
3	**Unit 3:** Advantages of AAS over flame emission spectroscopy, disadvantage of AAS.	P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, R. Gopalan, Sultan chand & Sons, Reprint 2017.
4	**Unit 3:** Applications of AAS: Some typical analysis like determination of metal in biological system, lead in petrol.	Willard Merritt, Dean and Settle, Instrumental Methods of Analysis, CBS Publishers and Distributors Pvt. Ltd, Seventh Edition.
5	**Unit 3:** Photo acoustic spectroscopy – instrumentation with block diagram and applications.	Willard Merritt, Dean and Settle, Instrumental Methods of Analysis, CBS Publishers and Distributors Pvt. Ltd, Seventh Edition.
6	**Unit 4:** Computers in Chemistry - introduction to computers - hardware, software and programming languages.	C Programming – The ultimate way to learn the fundamentals of C-Language by Harry H. Chaudary
7	**Unit 4:** C – Programming: variables, constant, operators, input and output functions. Go To statement – functions, arrays.	C Programming – The ultimate way to learn the fundamentals of C-Language by Harry H. Chaudary

8	**Unit 4:** Pointers. Calculation of pH & Solubility Product	C Programming – The ultimate way to learn the fundamentals of C-Language by Harry H. Chaudary
9	**Unit 4:** Calculation of bond energy using Born-Lande equation. Introduction to internet service provided in India.	C Programming – The ultimate way to learn the fundamentals of C-Language by Harry H. Chaudary
10	**Unit 4:** Terms used in internet, www, http, html, TCP/IP band width, dialup service. ISDN and Search Engines.	C Programming – The ultimate way to learn the fundamentals of C-Language by Harry H. Chaudary
11	**Unit 5:** Toxic Chemicals in environment – Toxicity of Mercury.	Natural products chemistry – Sources, separations and Structure by Raymond cropper George Nicola .
12	**Unit 5:** Toxic Chemicals in environment – Toxicity of Lead.	Natural products chemistry – Sources, separations and Structure by Raymond cropper George Nicola .
13	**Unit 5:** Toxic Chemicals in environment – Toxicity of Chromium.	Natural products chemistry – Sources, separations and Structure by Raymond cropper George Nicola.
14	**Unit 5:** Analytical methods in environmental toxins.	Natural products chemistry – Sources, separations and Structure by Raymond cropper George Nicola.
15	**Unit 5:** Analytical methods in environmental toxins.	Natural products chemistry – Sources, separations and Structure by Raymond cropper George Nicola.

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Lesson Plan for the year 2019 - 2020
Even Semester
UECHF 16 – Pharmaceutical Chemistry

Week	Portions to be covered	Reference
1	**Unit 1:** Definition of the following terms - drug, nature and sources of drugs, pharmacy, pharmacodynamics, pharmacokinetics, pharmacology, molecular pharmacology, pharmacophore, toxicology. Bacteria, virus, difference between bacteria and virus, fungi, vaccine.	Pharmacetical Chemistry Jaya shree Ghoush
2	**Unit 1:** Causes, symptoms and drugs for anaemia, jaundice, cholera, malaria and filarial. Causes, symptoms and drugs for dengue fever, chikungunya, tyhoid. Diagnostic test for sugar, salt and cholesterol in blood and urine.	Applied Chemistry Jaya shree Ghoush
3	**Unit 1:** Indian medicinal plants - medicinal uses and chemical present in neem, keezhanelli, mango, adathoda, thoothuvalai, hibiscus, rose, tulsi, turmeric, curry leaves, ficus.	Pharmacetical Chemistry Jaya shree Ghoush
4	**Unit 2:** Sulphonamides – definition, synthesis and therapeutic uses of prontosil, sulphathiozole. Definition, synthesis and therapeutic uses of sulphafurazole and sulphapyridine.	Pharmacetical Chemistry Jaya shree Ghoush
5	**Unit 2:** SAR of prontosil. Antibiotics – definition, conditions, classifications. Properties, therapeutic uses and structure activity relationship.	Pharmacetical Chemistry Jaya shree Ghoush
6	**Unit 2:** Properties, therapeutic uses and structural activity relationship of chloramphenicol, tetracyclines. Antiseptics and disinfectants-definition and distinction, phenolic and chloro compounds.	Pharmacetical Chemistry Jaya shree Ghoush
7	**Unit 3:** Analgesics – definition, narcotic: natural, morphine and its derivatives, uses, SAR of morphine. Synthetic - pethidine, methodone, morphinan, benzomorphan – disadvantages and uses.	Pharmacetical Chemistry Lakshmi

8	**Unit 3:** Non-narcotic analgesics - salicylic acid and its derivatives, para-aminophenol derivatives, pyrazole derivative, indolyl and aryl acetic acid derivatives, ibuprofen, ketoprofen -therapeutic uses and adverse effects. Anaesthetics – definition, characteristics, classifications.	Pharmacetical Chemistry Lakshmi
9	**Unit 3:** Volatile general anaesthetics - ether, vinyl ether, chloroform, halothane, trichloroethylene, ethylchloride, nitrous oxide, cyclopropane – uses and disadvantages. Non-volatile general anesthetics - thiopental sodium, methohexitone, propanidid.	Pharmacetical Chemistry Jaya shree Ghoush
10	**Unit 4:** Cancer: definition, causes, treatment, drugs used (antineoplastics). AIDS - causes, symptoms, prevention, AZT, DDC.	Pharmacetical Chemistry Jaya shree Ghoush
11	**Unit 4:** Hypoglycemic drugs, diabetes - types - causes, control, insulin- preparation, uses. Oral hypoglycemic agents. Anticonvulsant agents - definition, types. Barbiturates, hydantoins, oxazolidenediones, succinimides.	Pharmacetical Chemistry Jaya shree Ghoush
12	**Unit 4:** Blood - grouping, composition, R_h factor. Blood pressure - hypertension and hypotension, treatment.	Pharmacetical Chemistry Jaya shree Ghoush
13	**Unit 5:** Cardiovascular drugs – definition, action, cardiac glycosides, anti-arrhythmic drugs- characteristics, classification, example - quinidine, propanol hydrochloride and uses.	Pharmacetical Chemistry Jaya shree Ghoush
14	**Unit 5:** Anti-hypertensive agents – aldomet, pentolinium tartrate, reserpine. Anti anginal agents – nitrites, dipyridamole.	Pharmacetical Chemistry Jaya shree Ghoush
15	**Unit 5:** Vasodilator, tolazoline hydrochloride, isoxsuprine hydrochloride, sodium nitroprusside, hydrallazine hydrochloride and papaverine. Organic Pharmaceutical aids: Preservatives, Colouring agent, Sweetening agent and flavouring agent.	Applied Chemistry Jaya shree Ghoush

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Lesson Plan for the year 2019 - 2020
Even Semester
PECHC19 – Pharmaceutical Chemistry

Week	Portions to be covered	Reference
1	**Unit 3**: Drug discovery-introduction. Discovery of Penicillin	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
2	**Unit 3**: Discovery of Lead compounds	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
3	**Unit 3**: Lead modification – Modification of functional group. SAR	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
4	**Unit 3**:QSAR – Hammett Equation, Taft equation, Hansch Analysis	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
5	**Unit 3**: Craig Plot, Drug Design using QSAR	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
6	**Unit 3**: Computer Aided Drug Design (CADD).	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
7	**Unit 4**: Cancer Chemotherapy – Types of Neoplasm	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
8	**Unit 4**: Causes of Cancer, Tumor Formation, Mechanism and metastasis.	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
9	**Unit 4**: Determination of drug response; Cytotoxic anticancer drugs – Alkylating agents and its mode of action.	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
10	**Unit 4**: Antimetabolites, antitumor antibiotics, pyrimidine antagonist.	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
11	**Unit 4**: Treatment of Cancer – Radiation, Surgery and Chemotherapy.	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra

12	**Unit 5**: Introduction of Nutraceutical chemistry	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
13	**Unit 5**: Nutraceuticals: Plant, animal and Microbial sources.	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
14	**Unit 5**: Anticoagulants: Blood coagulation – Pathway – Prevention of coagulation.	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra
15	**Unit 5**: Direct and indirect acting anticoagulation – Anticoagulation Theraphy.	**Medicinal Chemistry** by V K Ahuwalia & Madhu Chopra

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Lesson plan for the year 2019 – 2020

Odd Semester

PECHA19- POLYMER CHEMISTRY

Week	Unit	Portions to be covered	Reference
1	II	Characterization methods**,** crystalline nature, X-ray diffraction, degree of crystallinity	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
2	II	Differential Scanning Calorimetric (DSC) and Thermo Gravimetric Analysis of polymers (TGA)	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
3	II	Glass transition temperature (Tg), factors affecting glass transition temperature, crystallinity and melting point, Relation to structure, SEM, TEM	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
4	III	Hydrolysis, acidolysis and hydrogenation	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
5	III	Cyclisation, cross-linking and vulcanization	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
6	III	Graft and block copolymers, Thermal oxidation and mechanical degradation	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
7	III	Oxidative and photodegradation	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer

8	III	Mechanical properties of polymers, stress versus strain measurements	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
9	IV	Polymer technology- moulding, extrusion, casting of films and calendaring	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
10	IV	Molecular weights of polymers - viscometry, osmometry, light scattering	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
11	IV	Gel Permeation Chromatography (GPC), ultracentrifugation, biodegradation	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
12	V	Applications of polymers - industrially important polymers - natural and synthetic rubber,	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
13	V	polyester, polytetrafluoroethylene (Teflon) polystyrene, ion exchange resin	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
14	V	polyacrylonitrile, carbon fibres, polyacrylates, polyvinyl chloride (PVC)	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer
15	V	Electrically conducting polymers - poly acetylene - poly aniline	Polymer Science By V.R. Gowariker, Textbook of Polymer Science By Fred W. Billmeyer

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Lesson plan for the year 2019 – 2020

PCCHJ15 – SYNTHETIC ORGANIC CHEMISTRY

Week	Unit	Portions to be covered	Reference
1	III	Polymer supported reagents (synthesis of oligosaccharide)	Organic Reaction Mechanism By V. K. Ahluwalia
2	III	Micro oven synthesis (esterification, deesterification, hydrolysis)	Organic Reaction Mechanism By V. K. Ahluwalia, Organic Organic Chemistry By Jagadamba, Singh
3	III	Alkylation of enamines, active methylene compounds	Reactions, Rearrangements and Reagents By S. N. Sanyal, Organic Reactions and their Mechanisms By P. S. Kalsi
4	III	Phosphorous, nitrogen and sulphur ylides	Organic Reactions and their Mechanisms By P. S. Kalsi, Advanced Organic Chemistry, Part B By Francis A. Carey and Richard J. Sundberg
5	III	Robinson annulations, DCC, trimethyl silyl iodide, 1,3-dithiane (Umpolung),	Organic Reactions and their Mechanisms By P. S. Kalsi, Advanced Organic Chemistry, Part B By Francis A. Carey and Richard J. Sundberg
6	III	Diisobutylaluminium hydride (DIBAL), BBN, trimethyl silyl chloride	Organic Reactions and their Mechanisms By P. S. Kalsi, Advanced Organic Chemistry, Part B By Francis A. Carey and Richard J. Sundberg
7	IV	Principles and synthetic process involving phase transfer catalysis - nitriles from alkyl halides, benzoyl cyanides from benzoyl chlorides	Organic Synthesis: Special Techniques By V. K. Ahluwalia

8	IV	Preparation of alkyl fluorides from alkyl halides, alcohols from alkyl halides using PTC	Organic Synthesis: Special Techniques By V. K. Ahluwalia
9	IV	Preparation of azides from alkyl halides, sodium alkyl sulphonates from alkyl halides using PTC	Organic Synthesis: Special Techniques By V. K. Ahluwalia
10	IV	Preparation of alkyl nitrates, thiocyanates, cyanates and p-toluenesulphonates from alkyl halides using PTC	Organic Synthesis: Special Techniques By V. K. Ahluwalia
11	IV	Preparation of aryl ethers and thioethers, esterification using PTC	Organic Synthesis: Special Techniques By V. K. Ahluwalia
12	IV	Diazotransfer by phase transfer catalyst, dihalocarbenes	Organic Synthesis: Special Techniques By V. K. Ahluwalia
13	V	Transition metal catalyzed reactions - reaction and mechanism of Heck reaction and Suzuki cross coupling reaction	Organic Reactions and their Mechanisms By P. S. Kalsi, Advanced Organic Chemistry, Part B By Francis A. Carey and Richard J. Sundberg
14	V	Reaction and mechanism of carboxymethylation, hydro formylation	Organic Reactions and their Mechanisms By P. S. Kalsi, Advanced Organic Chemistry, Part B By Francis A. Carey and Richard J. Sundberg
15	V	Epoxide-allylic alcohol rearrangement	Comprehensive Organic Synthesis By D.Gelman, Comprehensive Heterocyclic Chemistry III By Katritzky

Week	Unit	Portions to be covered	Reference
1	I	Objectives and characteristics of small-scale industries-Types of SSI-Role of SSI in Indian economy-problems of SSI	Dr.V.Balu, Entrepreneurship and Small Business Promotion
2	I	Steps in starting SSI-Laws for SSI – Finance management-Quality control-definition and advantages	Dr.V.Balu, Entrepreneurship and Small Business Promotion
3	I	Marketing and branding- Advertising-definition, objectives, advertising media.	Dr.V.Balu, Entrepreneurship and Small Business Promotion
4	II	Soaps – definition- main fatty and non- fatty raw materials -Types of soaps-manufacture of laundry soap and bathing soap- mechanism of cleansing action of soap	B.N.Chakrabarty, Industrial Chemistry
5	II	Composition, preparation and advantages of herbal soaps	B.N.Chakrabarty, Industrial Chemistry
6	II	Detergents-Classification of surfactive agents-manufacture of detergents. Shampoo-Composition and manufacture of egg and herbal shampoo	B.N.Chakrabarty, Industrial Chemistry
7	III	Cosmetics –definition, kinds of cosmetics. Preparation of face powder, face cream and lipstick	A.N.Zamre, V.G.Ratolikar, A Textbook of Modern Applied Chemistry
8	III	Perfumes- definition, essential ingredients in perfumes	A.N.Zamre, V.G.Ratolikar, A Textbook of Modern Applied Chemistry
9	III	Classification of essential oils- preparation of perfumes	A.N.Zamre, V.G.Ratolikar, A Textbook of Modern Applied Chemistry
10	IV	Camphor – production, biosynthesis and applications. Bleaching powder - preparation, properties and uses.	B.K.Sharma, Industrial Chemistry
11	IV	Biogas- composition, production and uses. Handmade paper from bagasse- composition of bagasse and uses.	B.K.Sharma, Industrial Chemistry

12	IV	Asofoetida - composition, cultivation, manufactures and uses. Composition and manufacture of safety matches and agarbattis	B.K.Sharma, Industrial Chemistry
13	V	Recycling of synthetic organic polymers – applications of PET, PVC, HDPE, and polystyrene	B.K.Sharma, Industrial Chemistry
14	V	Reverse osmosis of water - production and applications. Coconut oil – manufacture by dry and wet processes and uses	B.K.Sharma, Industrial Chemistry
15	V	Vulcanization of rubber, making an eraser. Pencils - forms of graphite, adhesion and lengthwise graphitization method and uses. Hands on Training for the manufacture of soaps, phenyl and Agarbattis	B.K.Sharma, Industrial Chemistry

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Lesson plan for the year 2019 – 2020

Even Semester

PCCHF19 - GROUP THEORY AND QUANTUM CHEMISTRY

Week	Unit	Portions to be covered	Reference
1	III	Black body radiation	Quantum Chemistry By R. K. Prasad
2	III	Distribution of energy in the black body radiation	Quantum Chemistry By R. K. Prasad
3	III	Photoelectric effect, Bohr's quantum theory and subsequent developments	Quantum Chemistry By R. K. Prasad
4	III	Compton Effect	Fundamentals of Quantum Chemistry By R. Anantharaman

5	III	uantum mechanical postulates – operators, Hermitian property	Quantum Chemistry By R. K. Prasad
6	III	Particle in a box model (one and two dimensional cases)	Quantum Chemistry By D. A. Mcquarrie
7	III	Particle in a box model (three dimensional case)	Quantum Chemistry By D. A. Mcquarrie
8	III	Schrodinger equation for hydrogen atom and He atom, Origin of quantum numbers and their significance	Quantum Chemistry By D. A. Mcquarrie
9	IV	One dimensional harmonic oscillator	Quantum Chemistry By R. K. Prasad
10	IV	Normalization and the characteristics of the Eigen functions of a harmonic oscillator	Quantum Chemistry By D. A. Mcquarrie
11	IV	The recursion formula for the Hermite polynomials	Quantum Chemistry By D. A. Mcquarrie
12	IV	Selection rules of the harmonic oscillator	Quantum Chemistry By R. K. Prasad
13	IV	Space quantization of electronic orbitals	Quantum Chemistry By D. A. Mcquarrie
14	IV	The rigid rotor	Quantum Chemistry By D. A. Mcquarrie
15	IV	Particle in a ring, origin of quantum numbers and their significance	Quantum Chemistry By R. K. Prasad

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PECHG15 – ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY

Week	Unit	Portions to be covered	Reference
1	III	Addition reactions - 1,2 addition to double bonds	Inorganic Chemistry By J. Huheey and Organometallic chemistry of transition metals By Robert H. Crabtree
2	III	Carbonylation	Inorganic Chemistry By J. Huheey and Organometallic chemistry of transition metals By Robert H. Crabtree
3	III	Decarbonylation	Inorganic Chemistry By J. Huheey and Organometallic chemistry of transition metals By Robert H. Crabtree
4	III	Oxidative addition reactions	Inorganic Chemistry By J. Huheey and Organometallic chemistry of transition metals By Robert H. Crabtree
5	III	Reductive elimination reactions	Inorganic Chemistry By J. Huheey and Organometallic chemistry of transition metals By Robert H. Crabtree
6	III	Substitution reactions of octahedral complexes and their mechanisms	Selected Topics in Inorganic Chemistry By Wahid U. Malik, G. D. Tuli, R. D. Madan
7	III	Insertion reaction	Advanced Inorganic Chemistry By F. A. Cotton and G. Wilkinson and Organometallic chemistry of transition metals By Robert H. Crabtree
8	III	Rearrangement reactions of aluminium and tin compounds and their mechanisms	Advanced Inorganic Chemistry By F. A. Cotton and G. Wilkinson and Organometallic chemistry of transition metals By Robert H. Crabtree
9	III	Fluxional isomerism - definition, examples and mechanism	Inorganic Chemistry By M. C. Shriver, P. W. Atkins, C. H. Langford

10	IV	Hydrogenation of olefins (Wilkinson's catalyst), modification of the original catalyst	Advanced Inorganic Chemistry By F. A. Cotton and G. Wilkinson, Inorganic Chemistry By J. Huheey
11	IV	Hydroformylation of olefins using cobalt and rhodium catalyst (oxo process)	Advanced Inorganic Chemistry By F. A. Cotton and G. Wilkinson, Inorganic Chemistry By J. Huheey
12	IV	Oxidation of olefins to aldehydes and ketones (Wacker process)	Advanced Inorganic Chemistry By F. A. Cotton and G. Wilkinson, Inorganic Chemistry By J. Huheey
13	IV	Cyclo oligomerisation of acetylene using Nickel catalyst (Reppe's catalyst)	Advanced Inorganic Chemistry By F. A. Cotton and G. Wilkinson, Inorganic Chemistry By J. Huheey
14	IV	Olefin isomerization and its mechanism	Inorganic Chemistry By M. C. Shriver, P. W. Atkins, C. H. Langford
15	IV	Olefin metathesis and Polymer bound catalyst	Inorganic Chemistry By M. C. Shriver, P. W. Atkins, C. H. Langford

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UACHB19–ALLIED CHEMISTRY II

Week	Unit	Portions to be covered	Reference
1	I	Co-ordination chemistry – definition of the terms - ligands, chelate, chelation	Modern Inorganic Chemistry By R.D.Madan
2	I	Nomenclature of mononuclear complexes	Modern Inorganic Chemistry By R.D.Madan
3	I	Werner's theory	Modern Inorganic Chemistry By R.D.Madan

4	I	Pauling theory	Modern Inorganic Chemistry By R.D.Madan
5	I	Chemistry of EDTA	Modern Inorganic Chemistry By R.D.Madan
6	I	Chemistry of haemoglobin and chlorophyll	Modern Inorganic Chemistry By R.D.Madan
7	II	Stereochemistry	Modern Inorganic Chemistry By R.D.Madan
8	II	Elements of symmetry	Modern Inorganic Chemistry By R.D.Madan
9	II	R- S notation (one asymmetric carbon atom), E-Z nomenclature	Advanced Organic Chemistry By B.S.Bahl and ArunBahl
10	II	Isomerism of lactic acid and tartaric acid, Racemisation and resolution	Advanced Organic Chemistry By B.S.Bahl and ArunBahl
11	II	Geometrical isomerism of maleic and fumaric acids	Advanced Organic Chemistry By B.S.Bahl and ArunBahl
12	II	Keto-enol tautomerism	Advanced Organic Chemistry By B.S.Bahl and ArunBahl
13	V	Medicinal chemistry - definition and one example each for analgesics, antipyretics, antibiotics	A Textbook of Pharmaceutical Chemistry By Jayashree Ghosh
14	V	Definition and one example each for antiseptics, tranquilizers, sedatives and hypnotics	A Textbook of Pharmaceutical Chemistry By Jayashree Ghosh
15	V	Local anesthetics and general anesthetics	A Textbook of Pharmaceutical Chemistry By Jayashree Ghosh

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USCHC519 - SMALL SCALE CHEMISTRY

Week	Unit	Portions to be covered	Reference
1	I	Objectives and characteristics of small-scale industries-Types of SSI-Role of SSI in Indian economy-problems of SSI	Dr.V.Balu, Entrepreneurship and Small Business Promotion
2	I	Steps in starting SSI-Laws for SSI – Finance management-Quality control-definition and advantages	Dr.V.Balu, Entrepreneurship and Small Business Promotion
3	I	Marketing and branding- Advertising-definition, objectives, advertising media.	Dr.V.Balu, Entrepreneurship and Small Business Promotion
4	II	Soaps – definition- main fatty and non- fatty raw materials -Types of soaps-manufacture of laundry soap and bathing soap- mechanism of cleansing action of soap	B.N.Chakrabarty, Industrial Chemistry
5	II	Composition, preparation and advantages of herbal soaps	B.N.Chakrabarty, Industrial Chemistry
6	II	Detergents-Classification of surfactive agents-manufacture of detergents. Shampoo-Composition and manufacture of egg and herbal shampoo	B.N.Chakrabarty, Industrial Chemistry
7	III	Cosmetics –definition, kinds of cosmetics. Preparation of face powder, face cream and lipstick	A.N.Zamre, V.G.Ratolikar, A Textbook of Modern Applied Chemistry
8	III	Perfumes- definition, essential ingredients in perfumes	A.N.Zamre, V.G.Ratolikar, A Textbook of Modern Applied Chemistry
9	III	classification of essential oils- preparation of perfumes	A.N.Zamre, V.G.Ratolikar, A Textbook of Modern Applied Chemistry

10	IV	Camphor – production, biosynthesis and applications. Bleaching powder - preparation, properties and uses.	B.K.Sharma, Industrial Chemistry
11	IV	Biogas- composition, production and uses. Handmade paper from bagasse- composition of bagasse and uses.	B.K.Sharma, Industrial Chemistry
12	IV	Asofoetida - composition, cultivation, manufactures and uses. Composition and manufacture of safety matches and agarbattis	B.K.Sharma, Industrial Chemistry
13	V	Recycling of synthetic organic polymers – applications of PET, PVC, HDPE, and polystyrene	B.K.Sharma, Industrial Chemistry
14	V	Reverse osmosis of water - production and applications. Coconut oil – manufacture by dry and wet processes and uses	B.K.Sharma, Industrial Chemistry
15	V	Vulcanization of rubber, making an eraser. Pencils - forms of graphite, adhesion and lengthwise graphitization method and uses. Hands on Training for the manufacture of soaps, phenyl and Agarbattis	B.K.Sharma, Industrial Chemistry