

VIVEKANANDA DEGREE COLLEGE
Rajajinagar, II Stage, Bangalore 560055


LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

ANNEXURE-
1.2
Criterion 01
Metric -1.1.1

Programme: B.Sc.
Course/Paper Name: Chemistry Paper-I
Semester: I SEM
Class: I B.Sc.

Total Hours: 52 hours

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:		Name of the Faculty: Prof.			
1	Atomic Structure Derivation of expressions of for radius, energy and ionisation energies of hydrogen like atoms. Wave particle duality. Uncertainty principle. Schrodinger wave equation-derivation. Postulates of quantum mechanics. Significance of terms- (i) Hamiltonian operator; (ii) eigen function Ψ (significance of ψ and ψ^2); (iii) eigen values. Application of Schrodinger equation: (i) to particle in one dimensional box (ii) to the hydrogen atom Expressing the solution as a product of $\psi_{n,l,m}(r, \theta, \phi) = \psi_{n,l}(r)\psi_{l,m}(\theta, \phi)$	13 hours	Black board		
Total hours:13					
Unit 2 :		Name of the Faculty: Prof.			
2	Chemical bonding Ionic bond: Lattice energy, Born-Haber cycle, Born-Lande equation (derivation not	13 hours	Black board		


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required.
Covalent bond: Valence bond approach; hybridization and directional characteristics of sp , sp^2 , sp^3 , sp^2d , sp^3d^2 . Shapes of $BeCl_2$, BF_3 , $SiCl_4$, PCl_5 , SiF_6^{2-} . VSEPR theory.
 Weak interactions: i). Hydrogen bond: Intra molecular and Intermolecular types, anomalous properties of HF , H_2O , NH_3 , alcohols, carboxylic acids, nitro phenols and bio molecules.
 ii) van der Waal's forces: Noble gases and molecular crystals (dry ice, Iodine and solid SO_2)
Metallic bond: Band theory, electrical properties of metals, semiconductors and insulators.

Total hours:13

Internal Assessment Test/Quiz/Assignment – 01

Unit 3:


Name of the Faculty:

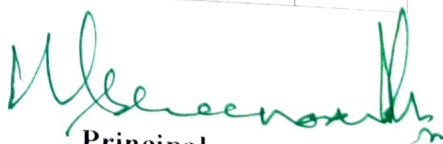
5	<p>Fundamentals of organic chemistry. Bond cleavage – homolytic and heterolytic. Types of reagents – electrophilic and nucleophilic reagents. Reactive intermediates - generation and relative stabilities of carbocation, carbanion, carbon free radicals and carbenes – explanation for stability and reactivity based on inductive, resonance and hyperconjugation effects.</p>	4hours	Black board		
6	<p>Isomerism: structural and stereoisomerism Concept of isomerism - structural isomerism, stereo isomerism - geometrical and optical isomerism, chiral center – definition and</p>	4 hours	Black board		

	<p>required.</p> <p>Covalent bond: Valence bond approach: hybridization and directional characteristics of sp, sp^2, sp^3, sp^2d, sp^3d^2. Shapes of B_2Cl_2, BF_3, $SiCl_4$, PCl_5, SF_6. VSEPR theory.</p> <p>Weak interactions: i). Hydrogen bond: Intra molecular and Intermolecular types, anomalous properties of HF, H_2O, NH_3, alcohols, carboxylic acids, nitro phenols and bio molecules.</p> <p>ii) van der Waal's forces: Noble gases and molecular crystals (dry ice, Iodine and solid SO_2)</p> <p>Metallic bond: Band theory, electrical properties of metals, semiconductors and insulators.</p>				
Total hours:13					
Internal Assessment Test/Quiz/Assignment – 01					
Unit 3:		Name of the Faculty:			
5	<p>Fundamentals of organic chemistry. Bond cleavage – homolytic and heterolytic. Types of reagents – electrophilic and nucleophilic reagents. Reactive intermediates - generation and relative stabilities of carbocation, carbanion, carbon free radicals and carbenes – explanation for stability and reactivity based on inductive, resonance and hyperconjugation effects.</p>	4hours	Black board		
6	<p>Isomerism:structural and stereoisomerism</p> <p>Concept of isomerism - structural isomerism, stereo isomerism - geometrical and optical isomerism, chiral center – definition and</p>	4 hours	Black board		

<p>aromaticity- Huckel's rule (Examples: cyclopentadienyl anion, cycloheptatrienylcation, benzene, naphthalene, anthracene and phenanthrene). Antiaromaticity. General mechanism of aromatic electrophilic substitution. Mechanism of nitration of benzene including evidence for the formation of nitronium ion, energy profile diagram and isotopic effect. Orienting influence of substituents in toluene, chlorobenzene, nitrobenzene And phenol.</p>			
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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21


ANNEXURE-
1.2
Criterion 01
Metric -1.1.1

Programe: B.Sc.
Course/Paper Name: Chemistry Paper-II
Semester: II SEM
Class: 1 B.Sc.

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Total Hours: 52 Hours					
Unit 1:		Name of the Faculty: Prof.			
1	Chemical Energetics	13 hours	Black board		
Total hours:13					
Unit 2 :		Name of the Faculty: Prof.			
2	Chemical equilibrium	5 hours	Black board		
3	Ionic Equilibrium	8 hours	Black board		
Total hours:13					
Internal Assessment Test/Quiz/Assignment – 01					
Unit 3:		Name of the Faculty:			
4	Alkyl halides and aryl halides	9 hours	Black board		
5	Organometallic compounds	4 hours	Black board		
Total hours :13					
Unit 4:		Name of the Faculty: Prof.			
6	Alcohols, Phenols, Ethers and Epoxides	13 hours	Black board		
Total hours :13					


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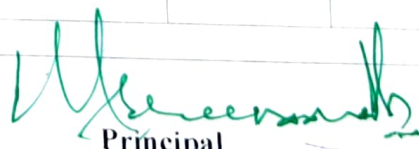
Programme: B.Sc.
Course/Paper Name: Chemistry Paper-III
Semester: III sem
Class: II B.Sc

		Total Hours:			
Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
		Name of the Faculty:			
Unit 1:					
1	Chemical kinetics: review of terms –order, rate & molecularity. II Order reactions, definitions with examples, derivation. Theories of reaction rates, experimental determination of kinetics.	7 hours	Black board		
2	Thermodynamics I Review of terms, I law of thermodynamics, II law of thermodynamics Carnot cycle, entropy, reversible and irreversible process.	6 hours	Black board		
Total hours:13					
		Name of the Faculty:			
Unit 2 :					
3	Gibb's free energy, criterion for equilibrium, Nernst heat theorem and III law of thermodynamics.	4 hours	Black board		
4	Surface chemistry: Theories of adsorption, adsorption isotherm Catalysis: types and theories with example, heterogeneous catalysis.	4 hours	Black board		
5	Organic and inorganic polymers:	3 hours	Black board		

	Polymerization – preparation and applications. Compounds of some non-metals. Compounds of non-metals	2 hours	Black board		
Total hours :13					
Internal Assessment					
Test/Quiz/Assignment – 01					
Unit 3:			Name of the Faculty:		
6	Metallurgy: Ellingham's diagrams and extraction of some metals.	5 hours	Black board		
7	Alcohols and thiols: Introduction & classification, some of naming reactions, reactions of alcohols, glycols and glycerols.	8 hours	Black board		
	Thiols: nomenclature and classification and reactions methods of preparation.		Black board		
Total hours :13					
Unit 4:			Name of the Faculty: Prof.		
8	Phenols- Classification, reactions and conversions	3 hours	Black board		
9	Ethers and epoxides: Methods of preparations and reactions.	4 hours	Black board		
10	Fertilizers: Introduction and functions of essential plant nutrients.	4 hours	Black board		
11	Organo metallic compounds : preparation and applications.	2 hours	Black board		
Total hours :13					


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Programme: B.Sc.

Course/Paper Name: Chemistry Paper-IV


Semester: IV SEM


Class: II B.Sc.

Sl. No.	Topic covered	Total Hours:			
		No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:		Name of the Faculty:			
1	Phase equilibria – degrees of freedom, phase rule, two component systems, effect of temperature on solubility of compounds.	7 hours	Black board		
2	Solid state: Crystalline and amorphous solids, anisotropy, types of crystalline solids, space lattice and unitcell; liquid crystals; super conducting solids.	6 hours	Black board		
Total hours:13					
Unit 2 :		Name of the Faculty:			
3	Water technology – physical, chemical and biological impurities; treatment of water for domestic and industrial purposes.	3 hours	Black board		
4	Nuclear and radio chemistry – types of radiation, properties, atomic and mass numbers; radioactive decay,	8 Hours	Black board		

	group displacement law; artificial radioactivity and carbon dating.				
5	Powder metallurgy- advantages and applications.	2 hours	Black board		
Total hours:13					
Internal Assessment					
Test/Quiz/Assignment – 01					
Unit 3:			Name of the Faculty:		
6	Steel – phase diagram, composition. Alloys of steel and heat treatment of steels.	5 hours	Black board		
7	Aldehydes and ketones : Preparation and properties ; mechanisms of some important reactions.	8 hours	Black board		
Total hours : 13					
Unit 4:			Name of the Faculty: Prof.		
8	Carboxylic acids: preparation, acidic strength, reactions and a few mechanisms of important reactions.	5 hours	Black board		
9	Tautomerism and Enolates – introduction, types and preparation.	4 hours	Black board		
10	Environmental chemistry- different layers in atmosphere and green house effect.	4 hours	Black board		
Total hours :13					


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Programme: B.Sc.

Course/Paper Name: Chemistry Paper-V (ORGANIC CHEMISTRY)

Semester: V SEM


Class: III B.Sc


Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: Stereochemistry		Name of the Faculty:			
1	Elements of symmetry, isomerisms due free rotation, meso compounds, diastereomers, racemisation, resolution, geometric isomerism in alkenes and oximes; alicyclic compounds and bicyclic systems.	8 hours	Black board		
Total hours: 8 hours					
Unit 2 : Amines		Name of the Faculty:			
2	Classification, preparation, properties and strengths. Heterocyclic compounds: classification, structure, preparation and properties.	5 hours	Black board		
3	Heterocyclic compounds: classification, structure, preparation and properties.	4 Hours	Black board		
Total hours: 9 hours					
Internal Assessment					
Test/Quiz/Assignment – 01					
Unit 3: Natural products		Name of the Faculty:			
4	Carbohydrates: introduction, classification, monosaccharides, epimers and anomers, mutarotation, elucidation of structure of glucose, disaccharides, conversions of glucose to fructose and vice versa,	4 hours	Black board		

	glycosidic bond.			
5	Terpenes and terpenoids. Classification, structural elucidation of citral and zingiberene, structures of terpenes and their uses;	6 hours	Black board	
6	Alkaloids - classification, structures of few alkaloids and uses, structural elucidation of nicotine.	5 hours	Black board	
Total hours: 9 hours				
Unit 4: Spectroscopy Of Organic compounds Name of the Faculty: _____				
7	Introduction, UV - visible spectroscopy, IR spectroscopy and NMR spectroscopy ; introduction green chemistry- Principle and synthesis of ibuprofen.		Black board	
8	Industrial organic chemistry: introduction, classification, synthesis and uses of synthetic dyes.		Black board	
Total hours : 15 hours				


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Programme: B.Sc.


Course/Paper Name: Chemistry Paper-VI (Physical chemistry)

Class: III B.Sc

Sl. No.	Topic covered	Total Hours:		
		No. of Lecture Hours	Methodology/pedagogy	Date
Unit 1: Electrochemistry-I		Name of the Faculty:		
1	Molar conductance, conductometric titration, Transport number, Kohlrausch's law. Debye-Huckel-Onsager reactions; types of cells, Nernst equation and numerical problems and Arrhenius theory.	10 hours	Black board	
Total hours: 10 hours				
Unit 2 : Electrochemistry-II		Name of the Faculty:		
2	Weston-Cadmium cell, Weston cell, liquid junction potentials, types of electrodes, determination of pH, solubility of salts and solubility products; potentiometric titrations with numerical examples.	5 hours	Black board	
3	Ionic equilibria : Hydrolysis of salts, effect of temperature and dilution; common-ion effect; buffer action, application of buffers; indicators and numeric problems.	3 Hours	Black board	
Total hours: 15 hours				
Internal Assessment				
Test/Quiz/Assignment – 01				
Unit 3: Physical Spectroscopy		Name of the Faculty:		

4	Dipole moment, induced dipole; structure of molecules; magnetic properties, electrical properties of solids, pyroelectricity; Thomson effect, Seebeck effect and Peltier effect.	5 hours	Black board		
5	Chemical spectroscopy 1 : Radiation and matter; Born-Oppenheimer approximations; rotational spectra of diatomic molecules; rotational energy of different quantum levels; selection rule and numericals.	4 hours	Black board		
Total hours :9 hours					
Unit 4: Physical Spectroscopy -II			Name of the Faculty:		
6	Vibrational spectroscopy.	4 hours			
7	Raman spectroscopy, electronic spectroscopy.	3 hours			
8	Electroanalytical methods.	5 hours			
Total hours :12 hours					


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Programme: B.Sc.

Course/Paper Name: Chemistry Paper-VII (Inorganic Chemistry)

Semester: VI sem


Class: III B.Sc


Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: Coordination and Organometallic Compounds-I					
Name of the Faculty:					
1	Ligands – Definition, classification and nomenclature; Werner’s theory, EAN Rule; Valence bond theory; Crystal field theory; Isomerism in complexes; Synthesis and structure of organo metallic compounds.	10 hours	Black board		
Total hours: 10 hours					
Unit 2 : Co-ordination and Organometallic compounds II					
Name of the Faculty:					
2	Metal carbonyls; eighteen electron rule and its deviations; application of co-ordination compounds and Monsanto acetic acid process.	4 hours	Black board		
3	Industrial materials I: Refractories, abrasives, glass, ceramics and cement.	6 hours	Black board		
Total hours: 10 hours					
Internal Assessment					
Test/Quiz/Assignment – 01					
Unit 3: Industrial materials II: Name of the Faculty: Prof.					

4	Paints and varnishes, fuels, coal, explosives and propellants.	7 hours	Black board		
5	Bioinorganic chemistry	3 hours			
Total hours: 10 hours					
Unit 4: Chemistry of newer materials Name of the Faculty: Prof.					
6	Conducting polymers, super conductors, fullerenes, carbon nano tubes and nano materials.	10 hours	Black board		
Total hours : 10 hours					


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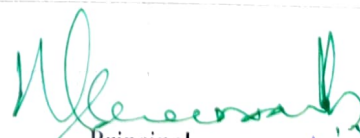
Programme: B.Sc.
 Course/Paper Name: Paper-VIII (Biochemistry)
 Semester: VI sem
 Class: III B.Sc

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: Introduction to Biochemistry		Total Hours:			
Name of the Faculty:					
1	Introduction to biochemistry	2 hours	Black board/ Lecture PPT		
2	Carbohydrates: amino sugars, sugar acids, sugar phosphates, structure and biological importance of oligo saccharides and polysaccharides.	4 hours	Black board/ Lecture PPT		
3	Lipids: Classification, fatty acids, triglycerides, phosphoglycerides, cholesterol and sphingoLipids.	4 hours	Black board/ Lecture PPT		
Total hours:10 hours					
Unit 2 : Proteins		Name of the Faculty:Prof.			
4	Proteins: Amino acids, peptide bonds, levels of organization of proteins, denaturation and renaturation and classification of proteins.	5 hours	Black board/ Lecture PPT		
5	Nucleic acids: Types, components, Chargaff's rule, polynucleotides - DNA and RNA – structure and biological roles; protein – nucleic acid interaction, chromatin and viral nuclear capsid	3 Hours	Black board/ Lecture PPT		
6	Hormones: Definition, classification; roles of insulin and glucagon; mediators of	2 hours	Black board/ Lecture PPT		

	hormone action.				
Total hours:10 hours					
Internal Assessment					
Test/Quiz/Assignment – 01					
Unit 3: Enzymes Name of the Faculty:					
7	Enzymes: active site, specificity, classification, enzyme substrate interaction, enzyme kinetics, Allosteric enzymes and enzyme inhibitors.	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.		
8	Biological oxidation : Bioenergetics; high energy phosphates, energy coupling in biological systems, redox potentials of important biological half reactions, calculation of energy yield from biological redox reaction, electron transport chain, oxidative and substrate level phosphorylation.	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.		
9	Biochemical techniques: Principle and applications of paper chromatography and TLC; cellulose acetate, electrophoresis and PAGE.	2 hours	Seminar		
Total hours:10 hours					
Unit 4: Metabolism Name of the Faculty:					
10	Catabolism and anabolism; carbohydrate metabolism – glycolysis, TCA cycle and energetics of cycle; gluconeogenesis; fatty acid metabolism; protein metabolism – amino acid degradation; urea cycle.	6 hours	Black board/ Lecture PPT		
11	Molecular biology: Central dogma, semi conservative replication; genetic code; transcription and translation; DNA finger printing	4 hours	Seminar		
Total hours:10 hours					


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