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Rajajinagar, II Stage, Bangalore 560055

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-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, SF_6.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	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.	4hours	Black board		
6	**Isomerism:structural and stereoisomerism** Concept of isomerism - structural isomerism, stereo isomerism - geometrical and optical isomerism, chiral center – definition and	4 hours	Black board		

	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, SF_6.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	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.	4hours	Black board		
6	**Isomerism:structural and stereoisomerism** Concept of isomerism - structural isomerism, stereo isomerism - geometrical and optical isomerism, chiral center – definition and	4 hours	Black board		

	aromaticity- Huckel's rule (Examples: cyclopentadienyl anion, cycloheptatrieneylcation, 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.				

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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: 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	**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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ANNEXURE-1.2
Criterion 01
Metric -1.1.1

Programe: 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
	Unit 1:	**Name of the Faculty:**			
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 irreversibleprocess.	6 hours	Black board		
	Total hours:13				
	Unit 2 :	**Name of the Faculty:**			
3	Gibb's free energy, criterion for equilibrium,Nernst heat theorem and III law of thermodynamics.	4hours	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 andreactions 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 essentialplant nutrients.	4 hours	Black board		
11	Organo metallic compounds : preparation andapplications.	2 hours	Black board		
	Total hours :13				

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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

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Criterion 01
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Programe: B.Sc.
Course/Paper Name: Chemistry Paper-IV
Semester: IV SEM
Class: II B.Sc.

Total Hours:

Sl. No.	Topic covered	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, typesand preparation.	4 hours	Black board		
10	Environmental chemistry- different layers inatmosphere and green house effect.	4 hours	Black board		
	Total hours :13				

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ANNEXURE-1.2
Criterion 01
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Programe: 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, propertiesand 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 , disachcharides, conversions of glucose to fructose and vise 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 fewalkaloids 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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ANNEXURE-1.2
Criterion 01
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Programe: B.Sc.
Course/Paper Name: Chemistry Paper-VI (Physical chemistry)
Class: III B.Sc

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
	Unit 1: Electrochemistry-I	**Name of the Faculty:**			
1	Molar conductance, conductometric titration, Transport number,kohlrausch's law. Debye-Huckel-Onsagar 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 ofelectrodes, determination of pH, solubility of salts and solubility products; potentiometric titrations with numerical examples.	5hours	Black board		
3	Ionic equilibria : Hydrolysis of salts, effect of temperature and dilution; common-ion effect;buffer action, application of buffers; indicatorsand 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, pyro electricity; Thomsoneffect, Seebec effect and Peltier effect.	5hours	Black board		
5	Chemical spectroscopy 1 : Radiation and matter;born-Oppenheimer approximations; rotational spectra of diatomic molecules; rotaional 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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Programe: 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 structureof organo metallic compounds.	10 hours	Black board		
	Total hours: 10 hours				
	Unit 2 : Co-ordination and Oragano metallic compoundsII **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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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

ANNEXURE-1.2
Criterion 01
Metric -1.1.1

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

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
	Unit 1: Introduction to Biochemistry	**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 oforganization of proteins, denaturation and renaturation and classification of proteins.	5 hours	Black board/ Lecture PPT		
5	Nucleic acids: Types, components, Chargaff's rule, polynucelotides - DNA and RNA – structureand biological roles; protein – nucleic acid interaction, chromatin and viral nuclear capsid	3 Hours	Black board/ Lecture PPT		
6	Hormones: Definition, classification; roles ofinsulin and glucagon; mediators of	2 hours	Black board/ Lecture PPT		

	hormoneaction.				
	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 biologicalhalf 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 – glyclosis, TCA cycleand 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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