Lesson Plan Format (2021-22)	
Name of the Assistant Professor : Manu Kumar Bhandoria	
Subject: Chemistry Paper: Inorganic Chemistry Sem: 1st Sem	
Week	**Topic**
1	Ch1- Atomic Structure Idea of de Broglie Matter Waves
2	Heisenberg Uncertainty Principle, Atomic orbitals, Quantam Numbers
3	Radial and angular wave funtions and Probability distribution curve, Shapes of s, p, d orbitals
4	Ch 2- Periodic Properties General Principles of periodic table Aufbau and Pauli exclusion principles Hund's multiplicity rule
5	Electronic configuration of elements, Effective Nuclear charge , Slater's Rules , Atomic and Ionic radii, Ionization energy. Electron affinity and Electronegativity - definition
6	Electron affinity and Electronegativity - definition, Methods of determination or evaluation, Trends in periodic table (in s& p block elements)
7	Ch 3- Covalent Bond, Valence bond theory and its limitations, Directional characteristics of covalent bond
8	Various types of hybridization and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PF5, SF6, IF7 SO42-, ClO4-)
9	Valence shell electron pair repulsion(VSEPR)5 theory to NH3, H3O+, SF4, ClF3, ICl2- and H2O.
10	MO theory of heteronuclear (CO and NO) diatomic molecules, bondstrength and bond energy *Percentage ionic character from dipole moment and electron negativity difference.
11	Ch 4- Ionic Solids Ionic structures (NaCl,CsCl,ZnS(Zinc Blende), CaF2) radius ratio effect, Coordination number, limitation of radius ratio rule, lattice defects
12	Semiconductors, Lattice energy (methamtical derivation excluded), Born-Haber cycle
13	Solvation energy and its relation with solubility of ionic solids
14	Ploarizing power and polarisability of ions *Fajan's rule.
15	Revision of difficult concepts of inorganic chemistry

Lesson Plan Format (2021-22)	
Name of the Assistant Professor : Manu Kumar Bhandoria	
Subject: Chemistry Paper: Physical Chemistry Sem: 1st Sem	
Week	**Topic**
1	Ch1- Gaseous States Maxwell's distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity
2	Average velocity and most probable velocity, Collision diameter, Collision number Collision frequency and mean free path
3	Deviation of real gases from ideal behaviour, Derivation of Vanderwaal's Equation of State and its application in the calculation Boyel's temperature (compressions factors) ,Explanation of behaviour of real gases using Vander Waal's Equation.

4	Ch 2- Critical Phenomenon Critical temperature, Critical pressure, Critical volume and their determination, PV isothrems of real gases and continuity of states
5	The isotherm of Vander Waal's equation, Relationship between critical constants and Vander Waal's Constants
6	Critical Compressibilty factor, The law of corresponding states, Liquification of gases
7	Ch3- Liquid States Introduction, Structure of liquids, Properties of Liquids
8	Surface tension, Viscosity vapour pressure , Optical rotaiton and their determinations
9	Ch-4 Solid State Classification of solids, Laws of crystallography (introduction), (i) Law of constancy of interfacial angles
10	(ii) Law of rationality of indices, (iii) Law of symmetry
11	Symmetry elements of crystals, Definition of unit cell & space lattice
12	Bravails lattices , Crystal system , X raydiffraction by crystals
13	Derivation of Bragg equation, Determination of crystal structure of NaCl, KCl.
14	Liquid crystals: Difference between solids, liquid and liquid crystals, types of liquid crystals
15	Applications of liquid crystals.
16	Revision of difficult concepts of physical chemistry

Lesson Plan Format (2021-22)

Name of the Assistant Professor : Kavita Yadav

Subject: Chemistry **Paper: Organic Chemistry** **Sem: 1st Sem**

Week	Topic
1	**Section A**:- Structure and Bonding- Localised and delocalized chemical bond, vanderwaal's interactions, Resonance
2	Hyperconjugation, Inductive, Electromeric, comparison of electronic effects
3	Stereochemistry of Organic compound-I
4	Optical isomerism, elements of symmetry, molecular chirality, Enantiomers and diastereomers
5	Resolution of enantiomers, Inversion, retension and racemisation
6	**Section B**:- Stereochemistry of Organic compound-II, RS nomenclature
7	Geometric isomerism, Conformational isomerism
8	**SectionC**:- Mechanism of organic reactions, Electropjile and nucleophile, Types of organic reactions
9	Reactive Intermediates- Carbocation, carbanion, freeradical, nitrene,carbenes and arynes
10	**Section D**:- Alkanes and cycloalkanes, IUPAC Nomenclature
11	Isomerism, Method of prepration and properties
12	Cycloalkanes- nomenclature, synthesis and derivaties, photochemical (2+2) cycloadditon reactions
13	Dehalogenation of dihalides, Baeyers strain theory
14	Theory of strainless rings, Pyrolysis of Calcium and barium salt
15	Revision of previous concepts
16	Revision of previous difficults topics

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Manu Kumar Bhandoria

Class B.Sc. 2nd Sem Subject: CHEMISTRY Paper: Inorganic Chemistry

Week	Topic
1	Hydrogen bonding and Vanderwaal's forces: Hydrogen bonding- Definition, types, effects on properties
2	Applications of hydrogen bonding and various types of vanderwaal's forces
3	Metallic bond- Introduction, band theory of metallic bond
4	Semiconductors-Introduction, Types and applications
5	s-block elements: Comparative study of the elements
6	Doagonal relationship, hydrides
7	Solvation and complexation tendencies
8	Chemistry of Noble gases: Reactivity, chemistry of Xenon
9	Structure and bonding of fluorides, oxides and oxyfluorides of xenon
10	p-block elements: comparative study
11	Boron family: Diborane-properties and structure
12	Borazene- chemical properties and structure , Halides of B and Al
13	Carbon family-Catenation, pπ-dπ bonding, carbides
14	Fluorocarbons, silicates and their structure, silicons
15	Nitrogen Family, Oxygen family, Halogens

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Manu Kumar Bhandoria

Class B.Sc. 2nd Sem Subject: CHEMISTRY Paper: Physical Chemistry

Week	Topic
Week 1	Ch1- Chemical Kinetics Rate of reaction and expressing and measuring the rate of reaction, Factors affecting the rate of reaction and conc. dependence of the reaction rates
Week 2	Zero order and first order reactions and their integrated rate expression, Half life period, Pseudofirst order reactions and kinetics of second order reactions
Week 3	Second and third order reactions and their integrated rate expressions with characterstics, Mechanism of reaction rate and Rate law
Week 4	Molecularity and order of reaction and methods for the determination of rate of
Week 5	Arrhenius equation, Theories of reaction rates, Collision theory for unimolecular reaction
Week 6	Transition state theory and effect of pressure on reaction rate
Week 7	Ch3-Electrochemistry *Electrolytic Conduction and its types
Week 8	Molar conductivty and its measurement
Week 9	Arrehemius Theory of Ionization
Week 10	Ostwald dilution law, Strong and weak electrolytes
Week 11	Debye Huckel Theory of Strong electrolytes and Migration of ions
Week 12	Discharge of ions on electrolysis
Week 13	Transport number and its determination
Week 14	Kohlrausch Law and its applications
Week 15	Conductometric titrations and buffer solutions

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Kavita Yadav

Class B.Sc. 2nd Sem Subject: CHEMISTRY Paper: Organic Chemistry

Week	Topic
1	Alkene: Nomenclature, mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halide
2	Saytzeff's rule, Hoffmann elimination, physical properties of alkene
3	Chemical reactions of alkene
4	Chemical properties of alkene continued.
5	Arenes and Aromaticity: Nomenclature of benzene derivatives, aromatic nucleus and side chain.
6	Aromaticity: Huckel rule, annulenes, aromatic, anti-aromatic and non-aromatic
7	Aromatic electrophilic substitution, mechanism of nitration, halogenations, sulphonation and friedal crafts reaction
8	Energy profile diagram. Activating , deactivating substituents and orientation
9	Dienes: Nomenclature and classification, isolated, conjugated and cumulated dienes
10	Structure of butadiene reactions, Chemical reactions-1,2 and 1,4 additions
11	Diels-Alder reaction, Alkynes:structure, bonding and nomenclature
12	Chemical reactins of alkynes
13	Alkyl and Aryl halides: Nomenclature, classification and preparation
14	Chemical reactins of alkyl halides
15	Mechanism and stereochemistry of SN reactions

Lesson Plan Format (2021-22)	
Name of the Assistant Professor : Kavita Yadav	
Subject: Chemistry Paper: Inorganic Chemistry Sem: 3rd Sem	
Subject:	**Topic**
Week 1	Ch1- Chemistry of Elements of Ist transition series Definition of transtion elements
Week 2	Position in the periodic table
Week3	General characteristics & properties of Ist transition elements
Week4	Structure & properties of some compounds of transition elements- TiO_2, $VOCl_2$, $FeCl_3$, $CuCl_2$ and $Ni(CO)_4$
Week 5	Ch 2- Chemistry of Elements of IInd &IIIrd transition series General characteristics and properties of the IInd and IIIrd transition elements, Stereochemistry, Revision
Week 6	Ch3- Coordination Compounds, Werner's coordination theory, Effective atomic number, concept of Chelates
Week 7	Nomenclature of coordination compounds
Week 8	Isomerism in coordination compounds
Week 9	Valence bond theory of transition metal complexes.
Week 10	Ch4- Non- aqueous Solvents Physical properties of a solvent
Week 11	Types of a solvent and their general characteristics
Week 12	Reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2
Week 13	Revision of difficult concepts of inorganic chemistry
Week 14	Test and discussion
Week 15	Revision of difficult concepts of inorganic chemistry

Lesson Plan (2021-22)	
Name of the Assistant Professor : Manu Kumar Bhandoria	
Subject: Chemistry Paper: Physical Chemistry Sem: 3rd Sem	
Week	**Topic**
Week 1	Thermodynamic Terms Intoduction
Week 2	Thermodynamic Properties and equlibrium
Week 3	1st law of thermodynamic, Internal energy and enthalpy
Week 4	Heat capacities and relation between them
Week 5	Joule Thomson cofficient for Ideal and Real gases
Week 6	Inversion temp and calculation of work and heat
Week 7	Change in internal enrgy and enthalpy for Isothermal and Adiabatic process
Week 8	Reversible process, Euilibrium constant and free energy
Week 9	Chemical potential and its characterstics
Week 10	Thermodynamic derivation of Law of Chemical equilibrium
Week 11	Temp dependence of equiibrium constant
Week 12	Clausius- Clapeyron Equation
Week 13	Nernst distribution law- Thaermodynamic derivation

Week 14	Degree of Hydrolysis and hdrolysis constant
Week 15	Equlibrium constant and Process of extraction

Lesson Plan (2021-22)	
Name of the Assistant Professor : Kavita Yadav	
Subject: Chemistry	**Paper: Organic Chemistry** **Sem: 3rd Sem**
Week	**Topic**
1	**Section A:-** Alcohols:- Nomenclature and method of preparation
2	Physical and Chemical properties of alcohols
3	Dihydric alcohols- nomenclature, method of preparation, pinacol-pinacolone rearrangement
4	Epoxides:- Synthesis and Chemical properties, Reactions of RMgX and RLi with epoxides
5	**Section B**:- Phenols- Nomenclature, Preparation and Physical properties.
6	Reactions of Phenols
7	**Section C**:- UV Spectroscopy, Absorption Laws, Molar absorptivity *Presentation and analysis of UV Spectra
8	Types of electronic transitions
9	Effect of conjugation, Concepts of Chromophore and Auxochrome
10	Bathochromic, Hypsochromic, hyperchromic and hypochromic shift, Woodward-Fieser rules
11	Applications of UV Spectroscopy
12	**Section D**:- Carboxylic acid and Acid derivatives, Nomenclature, prepration and physical properties
13	Reactions of carboxylic acid, Acid Chlorides- preparation and properties
14	Esters- preparation and properties, Amides- preparation and properties
15	Acid anhydrides- preparation and properties, Mechanism of esterification and hydrolysis
16	Revision of difficult topics
17	Revision of difficult topics

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Kavita Yadav

Class B.Sc. 4th Sem Subject: CHEMISTRY Paper: Inorganic Chemistry

Week	Topic
1	Chemistry of f-block elements lanthanides: electronic structure, oxidation states
2	Ionic radii and lanthanide contraction
3	Complex formation, occurrence and isolation of lanthanide compounds
4	Chemistry of lanthanides compounds
5	Chemistry of f-block elements Actinides: General features
6	Chemistry of actinides, separation of Np, Pu and Am from U
7	Comparison of properties of lanthanides and actinides and with T.E.
8	Theory of Qualitatives and Quantitative Inorganic Analysis-I
9	Chemistry of analysis of various acidic radicals in typical combinations
10	Chemistry of analysis of various acidic radicals including their removal in the analysis of basic radical
11	Chemistry of analysis of various acidic radicals including their removal in the analysis of basic radical
12	Theory of Qualitatives and Quantitative Inorganic Analysis-II
13	Chemistry of analysis of various groups basic radicals
14	Theory of precipitation, co-precipitation, post-precipitation
15	Purification of precipitates

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Manu Kumar Bhandoria

Class B.Sc. 4th Sem Subject: CHEMISTRY Paper: Physical Chemistry

Week	Topic
1	Different laws of thermodynamics and Cyclic process
2	Carnot Cycle and its efficiency, Carnot theorem
3	Entropy change in reversible and irreversible process
4	Entropy change on mixing of ideal gases, standard entropy change
5	Gibbs free energy function and variation of free energy and work function
6	Criteria of spontaneity of feasibility of a reaction, Nernst Heat theorem
7	Third law of thermodynamics and its verification, Boltzmann entropy equation
8	Electrochemical and electrolytic cell
9	Electrode potential and calculation of EMF of a cell
10	Reversible and irreversible cells and electrodes
11	Thermodynamics of cell reactions- Calculations of ΔH, ΔG and ΔS for cell reactions
12	Applications of electrochemical series & Activity and activity coefficient
13	Thermodynamics of a reversible cell
14	Themodynamics of single elctrode potential and Dervivation of Nernst equation
15	Electrolytic polarization, Deposition potential and overvoltage

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Kavita Yadav

Class B.Sc. 4th Sem Subject: CHEMISTRY Paper: Organic Chemistry

Week	Topic
1	Infrared (IR) absorption spectroscopy: Molecular vibrations, Hooke's law
2	Selection rules, Intensity and position of IR band, measurement of IR spectrum, Finger print region
3	Characteristic absorptions of Functional groups and interpretation of IR spectra
4	Interpretation of IR spectra continued and applications of IR
5	Amines: Structure and nomenclature, physical properties, separation of 1^o, 2^o, and 3^o amines
6	Preparation of alkyl and aryl amines
7	Preparation of alkyl and aryl amines continued
8	Diazonium Salts: Diazotisation, structure of diazonium chlorides, reactions of diazonium
9	Coupling reaction and its synthetic applications
10	Nitro compounds : Preparation and properties
11	Aldehydes and Ketones: Nomenclature and structure of carbonyl compounds
12	Synthesis of aldehyde and ketones
13	Physical properties and comparison of reactivities
14	Mechanism of nucleophilic substitution reactions, benzoin, aldol, perkin and knoevenagel condensations
15	Condensation with ammonia and its derivatives, wittig, mannich, Baeyer-villiger oxidation, cannizzaro reaction, MPV, Clemmensen, wolf-kishner, LiAlH4 and NaBH4 reductions

Lesson Plan (2019-20)

Name of the Assistant Professor : Manu Kumar Bhandoria

Subject: Chemistry Paper: Inorganic Chemistry Sem: 5th Sem

Week	Topic
1	Ch1- Meta-ligand Bonding in Transition Metal Comlexes Limitations of valence bond theory
2	An elementary idea of crystal-field theory
3	Crystal field spliting in octahedral,tetrahedral and squre planar complexes
4	Factor affecting the crystal field parameters.
5	Ch2- Thermodynamic and Kinetic Aspects of Metal Complexes A brief ouline of thermodynamic stability of metal complexe and factors affecting the stability
6	Substitution reactions of square planar complexes of Pt(II)
7	Ch3- Magnetic Properties of Transition Metal Complexe Types of magnetic behavior
8	Methods of determining magnetic susceptibility, spin only formula
9	L-S coupling and Correlation of L and S values
10	Orbital contribution to magnetic moments
11	Application of magnetic moment data for 3d metal complexes.
12	Ch4- Electron Spectra of Transition Metal Complexes Types of electronic transitions
13	Selection rules for d-d transitions
14	Spectroscopic ground states and Spectrochemical series
15	Orgel-energy level diagram for d1 and d9 states discussion of the electronic spectrum of [Ti(H2O)6]+ complex ion.

Lesson Plan (2021-22)

Name of the Assistant Professor : Manu Kumar Bhandoria

Subject: Chemistry Paper: Physical Chemistry Sem: 5th Sem

Week	Topic
1	Ch1- Quantam Mechanics-I, Black Body radiation, Plank's radiation law
2	Photoelectric effect, Heat capacity of solids, Compton effect
3	wave function and its significance of Postulates of quantum mechanics
4	Quantum mechanical operator, Commutations relations
5	Hamiltonial operator, Hermitian operator
6	Average value of square of Hermitian as a postive quantity
7	Role of operators in quantum mechanics, To show quantum mechanically that position and momentum cannot predicated simultaneously
8	Determination of wave function energy of a patricle in one dimensional box
9	Pictorial representation and its significance
10	Ch2- Physical Propertise and Molecular Structure Optical activity, Polarization- (clausius - Mossotti equation)
11	Orientation of dipoles in an electric field, dipole moment , included dipole moment
12	Measurement of dipole moment - temperature method and refractivity method *dipole moment and structure of molecules.
13	Magnetic permeability, Magnetic susceptibility and its determination.
14	Application of magnetic susceptibility

15	Magnetic properties - paramagnetism, diamagnetism and ferromagnetics.
16	Revision

Lesson Plan (2021-22)

Name of the Assistant Professor : Kavita Yadav

Subject: Chemistry Paper: Organic Chemistry Sem: 5th Sem

Week	Topic
1	Carbohydrates I : Classification and nomenclature.
2	Monosaccharides, Osazone, Interconversion of Glucose and Fructose
3	Chain lengthening and Chain shortening of aldoses, Configuration of monosaccharides
4	Erythro and Threo diastereomers, Conversion of Glucose and Mannose, Formation of glycosides, ethers and esters
5	Determination of ring size of Glucose and Fructose & their open chain structure, Mechanism of Mutarotation, Structure of ribose and deoxyribose
6	Carbohydrates II: Introduction of Disaccharides (maltose, sucrose &lactose)
7	Polysaccharides (Starch and Cellulose), Structure of various carbohydrates
8	Organometallic Compounds:- Organomagnesium compounds- preparation and chemical properties
9	Organozinc compounds – preparation and chemical properties
10	Organolithium compounds- preparation and chemical properties
11	NMR Spectroscopy I-Principle, No. of signal and peak area, Equivalent and non-equivalent protons
12	Position of signal and chemical shift, Shielding and Deshielding of protons
13	Proton counting, Shifting of signals and coupling constant, Magnetic equivalence of protons
14	NMR Spectroscopy II
15	Discussion of NMR spectra of molecules
16	Revision

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Manu Kumar Bhandoria

Class. 6th Sem Subject: CHEMISTRY Paper: Inorganic Chemistry

Week	Topic
1	Organometallic chemistry: Nomenclature and classification of OMC
2	Preparation , properties and bonding of alkyl of Li and Al
3	Preparation , properties and bonding of alkyl of Hg and Sn
4	Metal-ethylenic complexes
5	MonoNuclear carbonyls and the nature of bonding in metal carbonyls
6	Acids and Bases, HSAB concept: Arrhenius, Bronsted-Lowry, Lux-Flood concept
7	Solvent system and Lewis concept of acids and bases
8	Concept of Hard and Soft acids and bases
9	Symbiosis, Electronegativity and hardness and softness
10	Bioinorganic Chemistry: Essential and Trace elements in biological processes
11	Metalloporphyrins(Haemoglobin and myoglobin)
12	Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}
13	Nitrogen fixation
14	Silicones
15	Phosphazenes

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Manu Kumar Bhandoria

Class. 6th Sem Subject: CHEMISTRY Paper: Physical Chemistry

Week	Topic
1	Theory of Elctronic Band Spectra and Franck Condon Principle
2	Term symbols and selection rules for molecular electronic transitions
3	Molecular orbitals, their energy levels, electronic transitions and electronic bands
4	Photochemical and thermochemical process and Laws pf photochemistry
5	Quantum efficiency/yield and its experimental determination for a photochemical reaction
6	Fluorescence and Phosphorescence on the basis of Jablonski Diagram, Chemiluminescence
7	Photosensitization and quenching
8	Photo inhibitors and photochemical equalibrium
9	Types of solutions, Ideal and Non Ideal solution
10	Vapour phase andd Raoult's law
11	Colligative properties

12	Abnormal molecular mass
13	Gibbs phase rule- Mathematical expression and various terms involved in it
14	Advantages and limitations of Phase rule, Phase diagram
15	Applications of phase rule to one- and two- component system

Lesson Plan (2021-22) Even Semester

Name of the Assistant Professor : Kavita Yadav

Class. 6th Sem Subject: CHEMISTRY Paper: Organic Chemistry

Week	Topic
1	Heterocyclic Chemistry-I : Pyrrole and Furan- prep^{n} and properties
2	Thiophene and Pyridine- prep^{n} and properties
3	Heterocyclic Chemistry-II: Indole- prep^{n} and properties
4	Quinoline and Isoquinoline - prep^{n} and properties
5	Organosulphur compounds: Thiols and Thioethers- prep^{n} and properties
6	Sulphonic acid and Sulphonamides- prep^{n} and properties
7	Sulphaguanidine and Synthetic Detergents
8	Discussion of important topics of section A and B
9	Organic synthesis via enolates: diethyl malonate
10	Organic synthesis via enolates: ethyl acetoacetate
11	Syhthetic Polymers:Addition or chain growth, free radiacl, ionic, Zeigler –Natta, condensation polymerisation
12	Vinyl polmers, polyester, polyamides
13	Formaldehyde resins, epoxy resin, polyurethanes, natural and synthetic rubbers
14	Amino Acids, Peptides and Proteins: Classification and preparation of amino acids
15	Peptides: Structure, nomenclature, end group analysis, selective hydrolysis and structure of proteins