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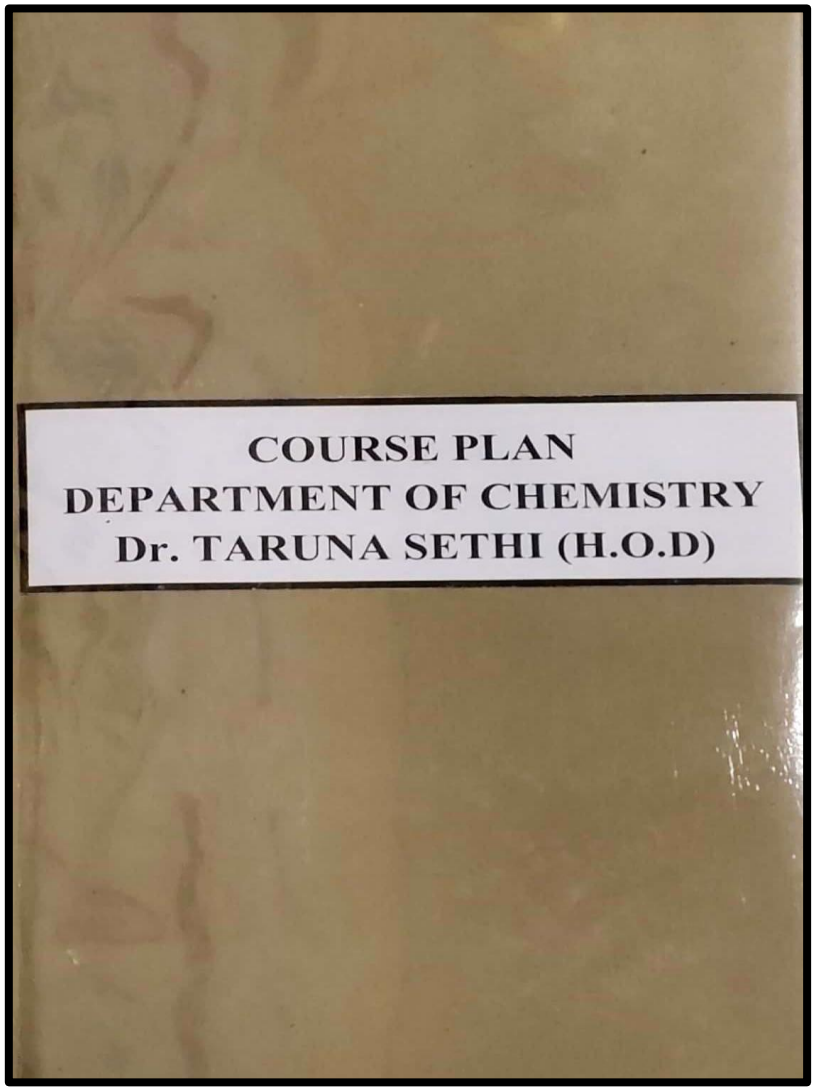

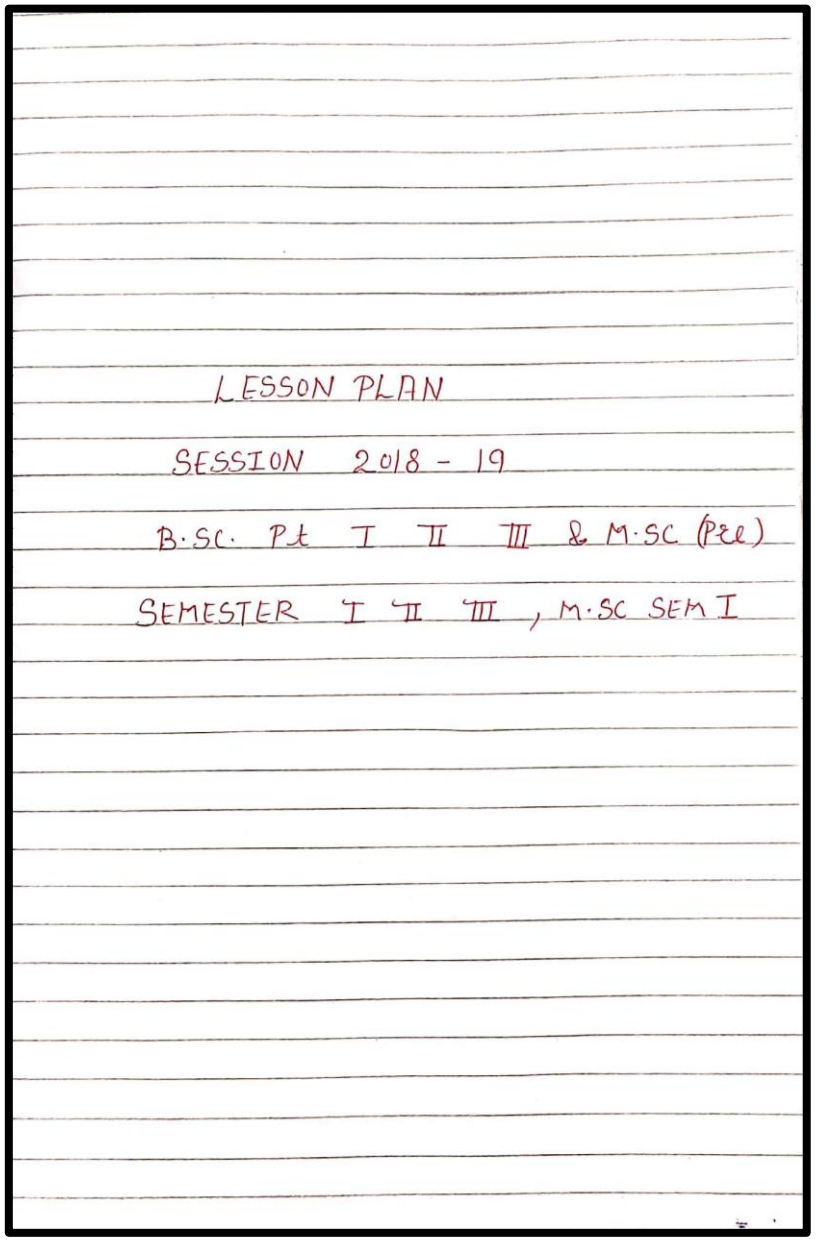
LESSON PLAN
SESSION 2018 - 19
B.SC. Pt I II III & M.SC (Pre)
SEMESTER I II III, M.SC SEM I

B.Sc. II (SEMESTER III)

INORGANIC CHEMISTRY (PAPER I) (CHE-301)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext; 10 Int) Credit: 03

COURSE PLAN

SEM III Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM I JULY	UNIT I **Chemistry of Elements of First Transition Series** Characteristic properties of d-block elements. General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states.	Characteristic properties of first and second transition series	PPT, Flow Charts, Quiz	Assess the chemistry of the first, second and third transition series.	*Knowledge Based* - Which element is radioactive in lanthanide series? - List three ferromagnetic metals. *Understanding Based* - Classify acids and bases according to lewis concept. -Compare ionic radii of 3d and 4d transition series.	Knowledge--50 Understanding-35 Higher Order-15
	Chemistry of Elements of Second and Third Transition series General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry	Comparative Periodic trends in properties of 3d, 4d and 5d series.	PPT, Demonstration, Flipped Classroom.			

AUGUST	UNIT II **Coordination Compounds** Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6), limitations of VBT	Werner's Theory and VBT	PPT, Models, Group Discussions	Predict chemical properties of Coordination compounds, Lanthanides and Actinides.	*Higher Order Thinking Skills Based* -Justify that tetrahedral complexes are high spin complexes. -Elaborate Werner's theory of coordination compounds.	
	Chemistry of Lanthanides Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, separation of lanthanides (ion-exchange method only).	Extraction and Properties of lanthanides	Flow Charts, Diagrams			
	Chemistry of Actinides General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides. Comparison of actinides with lanthanides.	General features of Actinides	Group discussions			
SEPTEMBER-OCTOBER	UNIT III **Acids and Bases** Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and	Classification of Acids and Bases	PPT, Flow Charts	Illustrate oxidation reduction behaviour and		

	Lewis concepts of acids and bases.			aqueous and non aqueous solvents.		
	Non-aqueous Solvents Physical properties of a solvent, types of solvents and their general characteristics reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.	Chemical reactions in non aqueous solvents	Group discussions, Flipped Classroom			
	Oxidation and Reduction Use of redox potential data-analysis of redox cycle, redox stability in water-Frost, Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements.	Redox potential data analysis	Diagrams, Flow Charts			

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(AUTONOMOUS)
AJMER

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

B.Sc. III (SEMESTER V)

INORGANIC CHEMISTRY (PAPER I) (CHE-501)

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN

SEMV Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM I JULY	**UNIT I** **Metal-ligand Bonding in Transition Metal Complexes** An elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters. Crystal field stabilization energy (CFSE). Crystal field effects for weak and strong fields, Comparison of CFSE for octahedral and tetrahedral complexes.	Metal-ligand Bonding in Transition Metal Complexes	PPT, Flow charts	Summarize Metal ligand bonding and various thermodynamic and kinetic aspects of transition metal complexes.	*Based* - Define Thermodynamic Stability - List any two roles of Ca in Body? *Understanding Based* - Compare paramagnetic and diamagnetic substances. - Give relationship between stepwise and overall formation constant. *Higher Order Thinking Skills*	Knowledge--40 Understanding-40 Higher Order-20
	Thermodynamic and Kinetic Aspect of Metal Complexes A brief outline of thermodynamic stability of metal complexes and factors	Stability of metal complexes, Trans effect	Group discussions			

	affecting the stability, Substitution reactions in square planar Trans effect, Trans effect series, theories of Trans effect, mechanism of substitution reactions, Factors affecting the rate of substitution reactions in square planar complexes.				*Based* - Predict Structure and bonding in $(NPCl_2)_3$ - Explain the Pearson's HSAB Concept.	
AUGUST	**UNIT II** **Magnetic Properties of Transition Metal Complexes** Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d-metal complexes.	Magnetic Properties of Transition Metal Complexes	Flipped classrooms, Quiz	Explain magnetic properties and electronic spectra of transition metal complexes.		
	Electronic Spectra of Transition Metal Complexes Types of electronic transition, selection rules of d-d transitions, spectroscopic ground state, spectrochemical series. Orgel-energy level diagram for d^1 and d^9 states,	Electronic Spectra of Transition Metal Complexes	Diagrams, Charts			

	discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.					
SEPTEMBER-OCTOBER	**UNIT III** **Basics of Bioinorganic Chemistry** Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Role of metal ions present in biological systems with special reference to Na^+, K^+, Mg^{2+} and Ca^{2+} ions: Na/K pump; Nitrogen fixation.	Role of metal ions in Biological Processes	PPT, Quiz	Predict hard and soft acid base character of various compounds.		
	Hard and Soft Acids and Bases(HSAB) Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness, applications of HSAB concept.	Hard and soft acid base Character	Charts, Group discussions			
	Silicones and Phosphazenes	Preparation and properties of Silicones	Quiz, Diagrams			

	Silicones and phosphazenes as examples of Inorganic polymers, preparation, Properties and applications of Silicones and Phossphazenes, nature of bonding in triphosphazenes	and Phosphazenes				

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(AUTONOMOUS)
AJMER

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

B.Sc. III (SEMESTER V)

PRACTICALS (CHE-503)

Max. Marks: 50(40Ext; 10 Int) Min Marks: 20(16 Ext;4 Int) Credit: 02

COURSE PLAN

SEM Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM I JULY	**(A) Instrumentation** • **Colorimetry** Job's method and Mole-ratio method • Adulteration- Food stuffs. • Effluent analysis, water analysis. • Solvent Extraction: Separation and estimation of Mg(II) and Fe(II) • Ion Exchange Method: Separation and estimation of	Use of various instruments like colorimeter.	Exercises with Use of different Apparatus, instruments like pH meter	Understand the practical applications of various aspects of chemistry	*Knowledge Based* Practical File Work *Understanding Based* To detect the components of the organic mixture *Higher Order Thinking Skills Based* Viva Voce	Knowledge--30 Understanding-50 Higher Order-20

	Mg(II) and Zn(II)					
AUGUST	**Synthesis** • Sodium trioxalato ferrate (III), $Na_3[Fe(C_2O_4)_3]$ • Ni-DMG complex,$[Ni(DMG)_2]$ • Copper tetrammine complex $[Cu(NH_3)_4]SO_4$. • cis-and trans-bisoxalato diaqua chromate (III) ion.	Methods of Synthesis of various inorganic compounds	Demonstration of the exercise			
SEPTEMBER-OCTOBER	**Organic Qualitative Analysis** Analysis of an organic mixture containing two solid components using water, $NaHCO_3$, NaOH for separation and preparation of suitable derivatives	Detection of organic compounds in binary mixture	Demonstration of the exercises			

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Tarn

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

SOPHIA GIRLS' COLLEGE, AJMER (*AUTONOMOUS*)
M.Sc. CHEMISTRY (PREVIOUS)
SEMESTER I

INORGANIC CHEMISTRY (CHEM-101)

MAX. MARKS: 100 (70 EXT; 30 INT) **MIN. MARKS: 40 (28 EXT;12 INT)**

COURSE PLAN

SEM/ Month	Unit/Topic	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM I JULY	**Unit - I** VSEPR, Walsh diagrams of tri atomic molecules, dπ-pπ bonds, bonds, Bent's rule, simple reactions of covalently bonded molecules	Stereochemistry and bonding in main group compounds	PPT, 3-D Models	Predict stereochemistry and bonding in main group compounds	*Knowledge Based* -What is VSEPR theory? -Define archaeroboranes *Understanding Based* -Compare the properties of	Knowledge-25 Understanding-45 Higher Order-30

	Higher boranes, carboranes, metalloboranes and metallocarboranes	Metals Clusters	PPT, Diagrams		boranes and carboranes. - Classify Labile and Inert Complexes. *Higher Order Thinking Skills Based* - Explain dπ-pπ bonding. - Elaborate SN^1CB mechanism.	
AUGUST	**Unit - II** Energy profile of reaction, reactivity of metal complexes, inert and labile , kinetic applications of valence bond and crystal field theories, kinetics of octahedral substitution, acid hydrolysis, base hydrolysis, conjugate base mechanism	Fundamentals of Transition Metal Complexes	PPT, Match the following	Assess the chemical behaviour of transition metal complexes.		
SEPTEMBER-OCTOBER	**UNIT - III** Anation reaction, reactions without metal ligand bond cleavage.Substitution reactions in square planar	Reaction Mechanism of Transition Metal Complexes	3-D Models, Match the following	Summarize the reaction mechanism of transition metal complexes.		

	complexes, the trans effect, mechanism of the substitution reaction, Redox reaction, electron transfer reactions, outer & inner sphere type reactions, cross reactions and Marcus-Hush theory.					

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

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M.SC CHEMISTRY (PREVIOUS)
Practicals (CHEM-105)

SEM/ Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM III JULY	**INORGANIC PREPARATIONS** • Tris(thiourea)copper (II)sulphate. • Cis –Potassium Diaquatrioxalatochromate(III). • SodiumDiamminetetrathio cynatochromate(III). • Tris(acetylacetonato)mang anese(II). • Potassium Trioxalatoferrate(III). • Purssian Blue. • Hexamminecobalt(III) • Hexanitro-N-cobaltate(III). • Vanadyl acetylacetonate • Dichloridobis(pyridine)coba lt(II). • Hexamminenickle(II) chloride. • Bis(dimethylglyoximato)nic kel (II). • Tetramminecopper(II) sulphate.	Methods of Synthesis of various inorganic compounds	Demonstration of the exercise	Understand the practical applications of various aspects of chemistry	*Knowledge Based* - Practical File Work *Understanding Based* To study the strength of strong and weak acids in a given mixture conductometric ally. -To separate nad identifify the components of the given organic ternary mixture. *Higher Order Thinking Skills Based*	Knowledge--20 Understanding-40 Higher Order-40

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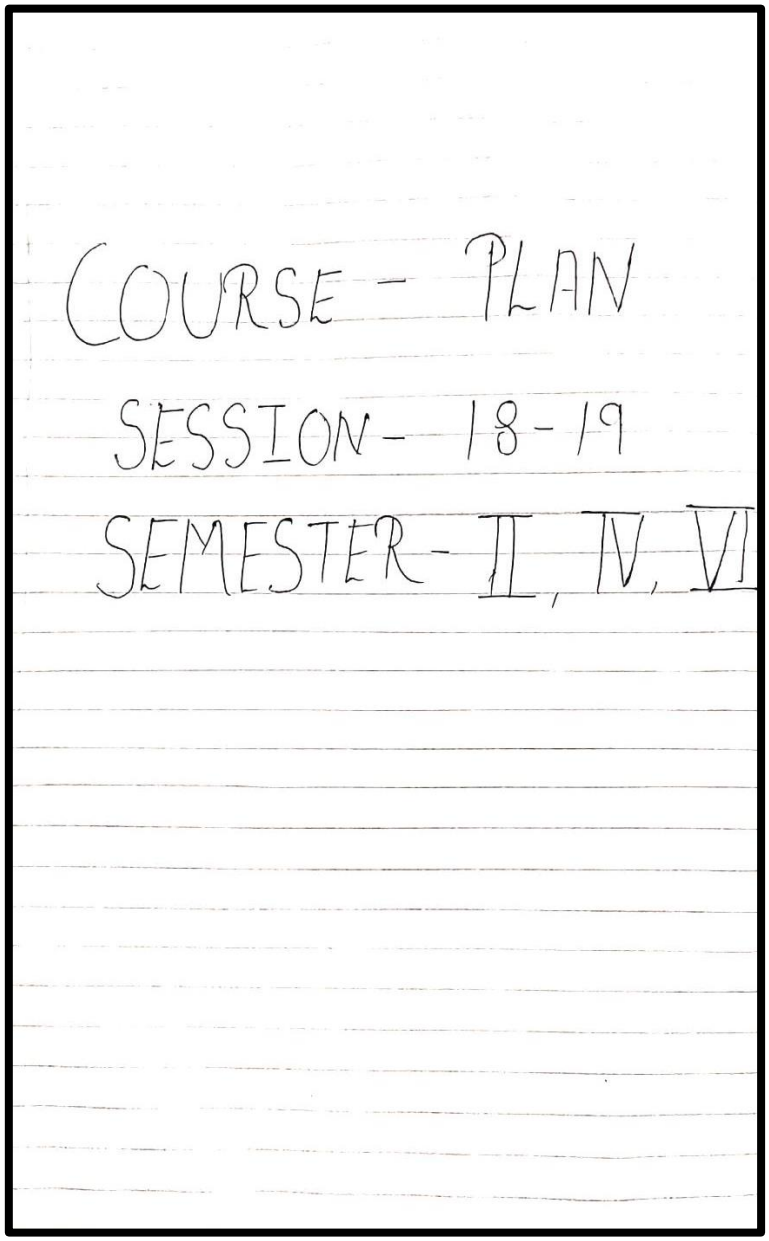
AJMER

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer


COURSE - PLAN
SESSION - 18-19
SEMESTER - II, IV, VI

SOPHIA GIRLS' COLLEGE, AJMER (*AUTONOMOUS*)
B. Sc. I (SEMESTER II)

PHYSICAL CHEMISTRY (PAPER I) (CHE-201)

Max. Marks: 75 (50 Ext; 25 Int) Min. Marks: 30(20 Ext; 10 Int) Credit: 03

COURSE PLAN

SEM II Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM II DECEMBER -JANUARY	**UNIT I** **Solid State** Definition of space lattice, unit cell. Laws of crystallography Symmetry elements in crystals. Wiess parameter system, ,Millar's indices. X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of crystal structure (Laue's method and powder method).	Laws of crystallography, and symmetry elements.	PPT, Chart, Visual 3- D Models	Predict properties of solid state and colloidal states of matter.	*Knowledge Based* -Define Unit cell. -Illustrate law of rational Indices *Understanding Based* -Compare Miller and Weiss parameters. -Derive Vander Wall Constants *Higher Order Thinking Skills Based* -Discuss application of Colloids. -Explain Maxwell's distribution of molecular velocities.	Knowledge--60 Understanding-30 Higher Order-10
	Colloidal State Definition and classification of colloids. Solids in liquids (sols): properties- kinetic, electrical, electrosmosis; stability of colloids, precipitation of colloid, protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions);	Properties of Colloids	Flow Chart, Diagram, Quiz			

	types of emulsions, preparation & application, deemulsification, Emulsifier. Liquids in solids (gels): classification, properties and application, general applications of colloids.					
FEBRUARY	**UNIT II** **Gaseous States** Kinetic theory of gases, Deviation of real gases from ideal behaviour, causes of deviation, Vander Waals equation of state.	Nature of real gases	Demonstration, PPT	Review various phenomenon of gaseous state.		
	PV isotherms of real gases, continuity of states, relationship between critical constant and Vander Waals constants, calculation of Vander Waal's constant, law of corresponding states, reduced equation of state.	Critical Phenomenon of real gases	Flipped Classroom, Quiz			
	Molecular velocities: Root mean square, average and most probable velocities, Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter, Liquifaction of gases (by various methods).	Velocity of gaseous molecules and Maxwell Boltzmann law	Group discussions			

MARCH-APRIL	**UNIT III** Types of solution, Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions, activity and activity coefficient. Dilute solution, colligative properties, relative lowering of vapour pressure, Osmosis, Elevation of boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.	Solutions, Dilute Solutions and Colligative Properties	PPT, Chart, Diagrams.	Summarize the properties of dilute solutions and explain colligative properties.		

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Tarq

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

B.Sc. III (SEMESTER VI)

PHYSICAL CHEMISTRY (PAPER I) (CHE-601)

Max. Marks: 75 (50Ext; 25 Int) Min. Marks: 30 (20 Ext; 10 Int) Credit: 03

COURSE PLAN

SEM VI Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM VI DECEMBER-JANUARY	**UNIT I** **Elementary Quantum Mechanics** Black-body radiation, Planck's radiation law, photoelectric effect, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect. de Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.	Various aspects of Quantum Mechanics	PPT, Flow charts	Explain Quantum mechanics and Photochemistry	*Knowledge Based* - Define Black Body Radiation. - Write Franck Condon principle. *Understanding Based* - Derive Schrodinger Wave Equation. - Differentiate Stoke and Anti-stoke lines. *Higher Order Thinking Skills Based* - Describe	Knowledge--40 Understanding-40 Higher Order-20

	Photochemistry Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of Photochemistry : Grothus - Drapper law, Stark-Einstein law, Jablonski diagram Quantum efficiency and reasons for high and low quantum yields, photosensitized reactions- energy transfer processes.	Qualitative description of Photochemistry and Photosensitized reactions	Group discussions, PPT		Jablonski Diagram. - Explain kinetics of Enzyme Catalysis.	
FEBRUARY	**UNIT II** **Spectroscopy** Spectroscopy and its importance in Chemistry, difference between atomic and molecular spectroscopy, Absorption and emission spectroscopy, electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.	Various spectroscopic techniques	Flipped classrooms, Quiz	Summarize the principles of various spectroscopic techniques.		

	Rotational Spectrum Diatomic molecules, Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, Maxwell-Boltzmann distribution, determination of bond length, qualitative description of non-rigid rotor, isotope effect.	Qualitative description of rotational spectroscopy	Diagrams, Charts			
	Vibrational Spectrum Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups. Raman Spectrum concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules.	Infrared and Raman spectrum	Quiz, group discussions			

	Electronic Spectrum Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank-Condon principle. Qualitative description of σ, Π and n M.O., their energy levels and the respective transitions.	Concept of Electronic spectrum	Models, diagrams			
MARCH-APRIL	**UNIT III Chemical Kinetics and Catalysis** Chemical kinetics and its scope, rate of reaction, factors influencing the rate of a reaction. Determination of the order of reaction, Radioactive decay as a first order phenomenon. Experimental methods of chemical kinetics, Theories of chemical kinetics-effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory, Expression for the rate constant based on equilibrium constant and thermodynamic aspects. Complex reaction kinetics, parallel reaction, reversible reaction and conjugative	Kinetics of Enzyme catalyzed reactions	PPT, Quiz	Assess the kinetics of various chemical reactions		

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PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Tarú

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

B.Sc. III (SEMESTER VI)

PRACTICALS (CHE-603)

Max. Marks: 50(40Ext; 10 Int) Min. Marks: 20(16 Ext; 4Int) Credit: 02

COURSE PLAN

SEM Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM VI DECEMBER - JANUARY	**A) Laboratory Techniques** **Column Chromatography** (i) Separation of fluorescene and methylene blue (ii) Separation of leaf pigments from spinach leaves (iii) Resolution of racemic mixture of (±) mandelic acid	Principle, phenomenon and applications of Column Chromatography	Exercises with Use of column chromatography	Understand the practical applications of various aspects of chemistry.	*Knowledge Based* Practical File Work *Understanding Based* To synthesize various organic compounds. *Higher Order Thinking Skills Based* Viva Voce	Knowledge--30 Understanding-50 Higher Order-20
FEBRUARY	**(B) Synthesis of organic compounds** (i) m-dinitrobenzene (ii) p-nitroacetanilide (iii) Methyl orange (iv) Methyl red	Methods of Synthesis of various organic compounds	Demonstration of the exercise			

MARCH-APRIL	**(C) PHYSICAL CHEMISTRY** (i) To determine the strength of the given acid conductometrically using standard alkali solution. (ii) To verify Beer-Lambert law for $KMnO_4/K_2Cr_2O_7$ and determine the concentration of the given solution of the substance.	Verification of Beer-Lambert Law	Demonstration of the exercises			

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Tarn

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

SOPHIA GIRLS' COLLEGE, AJMER *(AUTONOMOUS)*
M.Sc. CHEMISTRY (PREVIOUS)
SEMESTER II

COORDINATION CHEMISTRY(CHEM-201)

MAX. MARKS: 100 (70 EXT; 30 INT) **MIN. MARKS: 40 (28 EXT;12 INT)**

COURSE PLAN

SEM/ Month	Unit/Topic	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM II DECEMBER -JANUARY	**Unit – I** **Metal-Ligand Equilibria in Solution** Stepwise and overall formation constants and their interaction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand, chelate effect and its thermodynamic origin, determination of binary formation constants by pH-metry and spectrophotometry.	Factors affecting the stability of metal complexes ; nature of metal ion and ligand	Diagrams, Tables, Chart.	Analyse the aspects of metal-ligand equilibria in solution and metal-ligand bonding.	*Knowledge Based* - Define thermodynamic Stability. - Write any two limitations of Crystal field theory. *Understanding Based* - Give relation between overall	Knowledge-25 Understanding-45 Higher Order-30

	Metal Ligand Bonding Limitation of crystal field theory, molecular orbital theory- σ and π–bonding in octahedral, tetrahedral and square planar complexes.		PPT, Diagrams		stability constant β and stepwise stability constant. - Write a note on Spin Crossover.	
FEBRUARY	**Unit - II** Spectroscopic ground state, Selection rules for electronic spectra – Laporte and Spin selection rule, relaxation in rules, luminescence, Orgel diagrams for transition metal complexes (d_1-d_9 States). Charge transfer spectra, anomalous magnetic moments, magnetic exchange coupling and spin crossover.	Electronic Spectra and Magnetic Properties of Transition Metal Complexes	PPT, Chart	Summarize various concepts of electronic spectra and magnetic properties of transition metal complexes.	*Higher Order Thinking Skills Based* - Draw the Orgel energy level diagram for d^2 electronic configuration in octahedral complexes. -Discuss important reactions of transition metal nitrosyl, dinitrogen and dioxygen complexes.	
MARCH-APRIL	**UNIT - III** **Metal π-Complexes:** Metal carbonyls, structure	Structure and Bonding of Metal π-	3-D Models, Match the	Review various metal π-complexes.		

	and bonding. Vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding structure and important reactions of transition metal nitrosyl, dinitrogen and dioxygen complexes; tertiary phosphine as ligand.	Complexes	following			

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Tary

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer

M SC. CHEMISTRY (PREVIOUS)

GROUP THEORY AND SPECTROSCOPY (CHEM- 204) SEMESTER - II

FEBRUARY	**Unit - II** **Molecular spectroscopy** Energy levels, molecular orbitals, vibrational transitions, vibration progression and geometry of the excited states, Franck-Condon Principle, electronic spectra of polyatomic molecules, Emission spectra, radiative and non-radiative decay, internal conversion, spectra of transition metal complexes, charge- transfer spectra.	Molecular spectra	PPT, Chart	Analyse the molecular and photoelectron spectroscopy.		
	Photoelectron spectroscopy Basic principles, photo-electric effect, ionization process, Koopman's theorem. Photoelectron spectra of simple molecules. ESCA. Chemical information from ESCA. Auger electron spectroscopy-basic idea. Photoacoustic Spectroscopy: Basic principle of photoacoustic spectroscopy(PAS), PAS-gases and condensed systems, chemical and surface applications.	Photoelectron and Photoacoustic spectroscopy.				

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Head
Department of Chemistry
Sophia Girls' College
(Autonomous), Ajmer.

SOPHIA GIRLS' COLLEGE, AJMER (*AUTONOMOUS*)
M.SC CHEMISTRY (PREVIOUS)
Practicals (CHEM-205)

SEM/ Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM II DECEMBER-JANUARY	**INORGANIC PREPARATIONS** Separation and determination of two metal ions Cu-Ni, Ni-Mg, Cu-Fe,Cu-Ba etc. involving volumetric and gravimetric methods.	Methods of separation and determination of two metal ions	Demonstration of the exercise	Understand the practical applications of various aspects of chemistry	*Knowledge Based* - Practical File Work	Knowledge--20 Understanding-40 Higher Order-40

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(AUTONOMOUS)
AJMER

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Tatu

Head
Department of Chemistry
Sophia Girls College
(Autonomous), Ajmer