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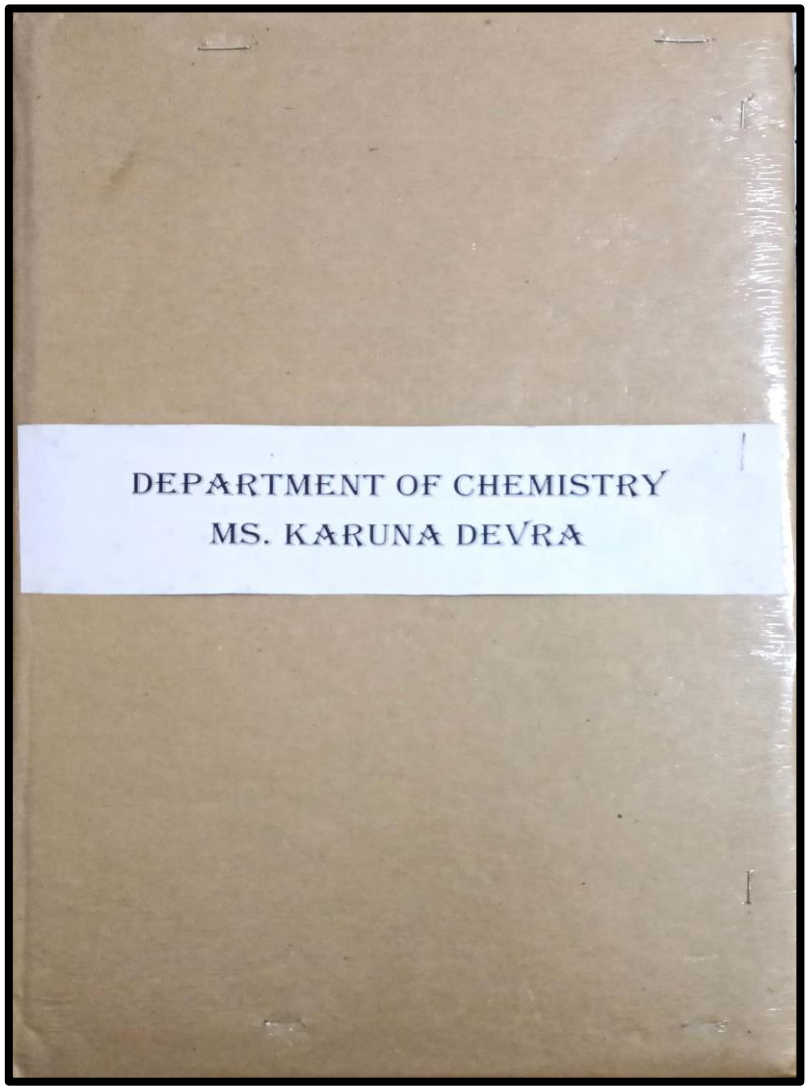
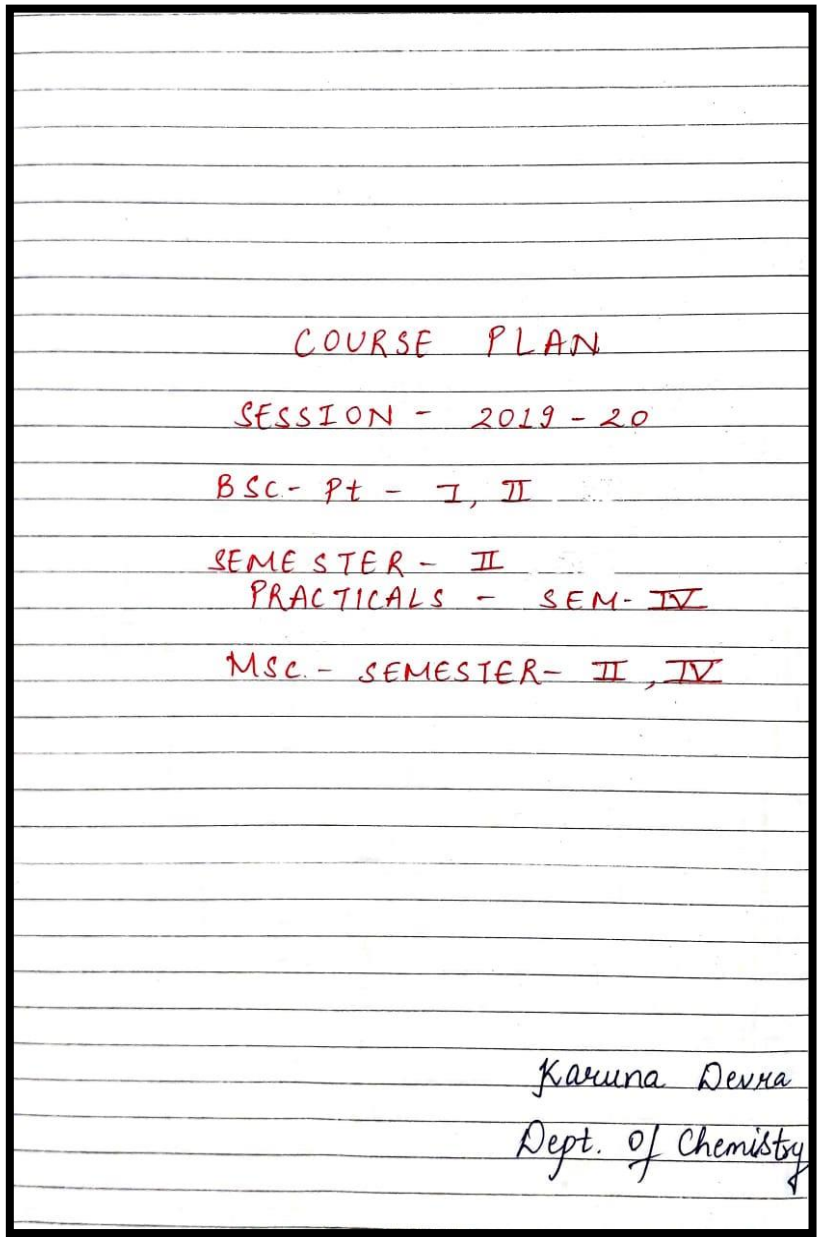


COURSE_PLAN_2019-20_MS_KARUNA_DEVRA


COURSE PLAN
SESSION - 2019-20
BSc- Pt - I, II
SEMESTER - II
PRACTICALS - SEM- IV
MSc.- SEMESTER- II, IV
Karuna Devra
Dept. of Chemistry

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.		

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B.Sc. II (SEMESTER IV)

PRACTICALS (CHE-403)

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 IV DECEMBER-JANUARY	**Organic Chemistry** **(A) Chromatography** (i) Separation , Rf values and identification of organic compounds. (ii) Preparation and separation of 2,4-dinitrophenylhydrozone of acetone,2- butanone, hexan-2- and 3-one using toluene and light petroleum (40:60:). (iii) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5)	Separation of organic compounds by chromatographic method	Demonstration of the exercise	Understand the practical applications of various aspects of chemistry	*Knowledge Based* Practical File Work *Understanding Based* -To identify the given organic compound. - To determine the transition temperature of the given substance by thermometric method ($MnCl_2.4H_2O$) *Higher Order*	Knowledge--30 Understanding-50 Higher Order-20

FEBRUARY	**(B) Qualitative Analysis** Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.	Identification of an organic compound	Demonstration of the exercise		*Thinking Skills Based* Viva Voce	
MARCH-APRIL	**Physical Chemistry (Any Four)** 1. Determination of the transition temperature of the given substance by thermometric method (e.g.$MnCl_2$,$4H_2O$/$SrBr_2$. $2H_2O$) 2. To study the effect of a solute(e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol-water system. 3. To construct the phase diagram of two component (e.g. diphenylaminebenzophenone)	Determination of the transition temperature, enthalpy of neutralization	Exercises with Use of different Apparatus and Demonstration of the exercise			

	system by cooling curve method. 4. To determine the solubility of benzoic acid at different temperatures and to determine DH of the dissolution process. 5. To determine the enthalpy of neutralization of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionization of the weak acid/weak base.					

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

GROUP THEORY AND SPECTROSCOPY (CHEM-204)

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** **Symmetry and Group theory in Chemistry** Symmetry elements and Symmetry operation, definitions of group, sub-group, relation between orders of finite group and its subgroup, Conjugacy relation and classes. Point symmetry group. Group multiplication table (C_2, C_{2h}	Symmetry and Group theory.	Diagrams, Tables, Chart.	Interpret the symmetry and group theory in chemical science.	*Knowledge Based* -What are the basic principles of ESR? -State Mutual exclusion principle. *Understanding Based* -Differentiate between Plane of symmetry and Axis of symmetry. -Explain Resonance	Knowledge-25 Understanding-45 Higher Order-30

	C_{2v}, C_{3v})				Raman effect. *Higher Order Thinking Skills Based* - Construct group multiplication table of C_{3v} using appropriate example. -Derive classical theory of Raman effect.s	
	Raman Spectroscopy Classical and quantum theories of Raman effect. Pure rotational, vibrational and vibrational-rotational Raman spectra, selection rules, mutual exclusion principle. Resonance Raman spectroscopy, coherent anti Stokes Raman spectroscopy (CARS).	Raman Spectroscopy and its applications.	PPT, Diagrams			

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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.				

MARCH-APRIL	**UNIT - III** **Electron Spin Resonance Spectroscopy** Basic principles, zero field splitting and Kramer's degeneracy, "g" value, factors affecting the "g" value Hyperfine splitting, Hyperfine coupling constant, Isotropic and anisotropic hyperfine coupling constants, application to study of free radicals, determination of oxidation state of metal and to transition metal complexes(having one unpaired electron) including biological systems.	Concept of electron spin resonance spectroscopy	3-D Models, Match the following	Assess the electron spin resonance spectroscopy.		

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M.Sc. CHEMISTRY (FINAL)
SEMESTER IV

GROUP-B ORGANIC CHEMISTRY
ORGANOMETALLICS AND DISCONNECTIONS -CHEM-401(B)

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 IV **DECEMBER-JANUARY**	**Unit- I** **Organometallic Reagents** Principles, preparations, properties and applications of the following in organic synthesis with mechanistic details. **Transition Metal organic compounds** Cu, Pd, Ni, Fe, Co, Rh, Cr and Ti Compounds.	Methods of preparations and properties of organometallic compounds of transition metal complexes	Diagrams, PPT, Charts.	Analyse organometallic reagents of transition metals.	*Knowledge Based* - Define Synthon and Synthetic equivalent. - What do you understand by Regioselectivity? *Understanding Based* -Explain principle of protection of carbonyl	Knowledge--25 Understanding-45 Higher Order-30

	Protecting Groups Principle of Protection of alcohol, amine, carbonyl and carboxyl group.	Protection of specific organic compounds	Flow charts and tables		compounds -How Nitro compounds can act as an acyl anion equivalent? How one can synthesis ketones from Nitro compounds?	
FEBRUARY	**Unit-II** **One Group C-C Disconnections** Alcohols and carbonyl compounds, regioselectivity. Alkene Synthesis, use of acetylenes and aliphatic nitro compounds in organic synthesis.	Understanding Disconnection methods and reactions in organic synthesis.	Quiz, Diagrams, Models	Elaborate disconnection approach	*Higher Order Thinking Skills Based* -Differentiate between stereoselectivity and stereospecificity. -Discuss stereochemistry of Vitamin D and give	

	Two Group C-C Disconnections Diels-Alder reactions 1,3-difunctionalised compounds. -unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalized compounds . Micheal addition and Robinson annelation.		Charts, Flipped classrooms		its retrosynthesis also.	
MARCH-APRIL	**Unit-III** **Synthesis of Some Complex Molecules** Application of disconnection approach in the synthesis of following compounds : Camphor, Longifoline, Cortisone, Reserpine, Vitamin D, Juvabione, Aphidicolin and Fredericamycin A.	Applications of disconnection in synthesis of complex molecules.	PPT, Flow charts	Implement the application of disconnection approach in the synthesis of complex organic compounds.		

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SOPHIA GIRLS' COLLEGE, AJMER (*AUTONOMOUS*)
M.SC CHEMISTRY (FINAL)
ELECTIVE (ORGANIC & INORGANIC)
SEMESTER IV

ANALYTICAL CHEMISTRY- CHEM-404(A,B)

MAX MARKS: 100 (70EXT; 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 IV DECEMBER-JANUARY	**Unit-I** **Data analysis and statistics** Types and sources of errors, Accuracy and precision, Significant figures; Mean ,Median and Standard Deviation, Rejection of results, Q-Test, Tests of significance, Comparison of the means of two samples, Analysis of Variance, Replicate determinations, Correlation, Regression, Uses of Statistics.	Concepts of data analysis	Diagrams, PPT, Charts.	Implement statistical methods of analysis to various problems and extraction techniques.	*Knowledge Based* - What is absolute error? - Define Gas Chromatography	Knowledge--25 Understanding-45 Higher Order-30

	Solvent Extraction Partition: The theory of Extraction, Mechanism of solvent extraction, Extraction involving ion association complexes, Synergistic extraction, Solvent extraction by macromolecules, Techniques for solvent extraction, Applications, Solid phase extraction (SPE), Solid phase micro extraction (SPME).	Techniques of Solvent extraction.	Demonstration, Tables			

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