GUJRANWALA GURU NANAK KHALSA COLLEGE, CIVIL LINES, LUDHIANA AFFILIATED TO PANJAB UNIVERSITY, CHANDIGARH

Academic Calendar for the session <u>2017-18</u> with Under Graduate & Post Graduate Chemistry Course having Semester System of examination:-

SummerVacation 01-06-17 To 09-07-17 (39 days)

Thursday Sunday

Academic Calendar

Colleges Open on and normal 10-07-17

Admission for on-going Classes **Monday**

Admission Schedule

Normal Admission for on- 17 (12 days)

goingand new classes (except for Saturday

those classes in which admission

isthroughPU-CET[P.G])

Late Admission for, -17 (7days)
ongoingClassesand new Monday
classes) to beallowed by
thePrincipal of theCollege with
late fee of Rs.560/- perstudent.

Commencement of Teaching

- (i) Late Foron-going classes
- (ii) For new admission

 Classes(those admitted through PU-CET (P.G)

 tentative

 Late admission in Panjab

University, affiliated Colleges to

14-08-17(12days)

be allowed by the Vice
Chancellor with fee of Rs.

2040/-per student

Academic Term -I (a)	22-07-17	То	29-09-17	(57 teaching
1 st & 3 rd & 5 th semester	Saturday		Fridayd	ays)
Autumn Break	30-09-17	То	09-10-17	(10days)
Tuesday Mo	onday			
Academic Term -I (b)	10-10-17	То	01-12-17	(57 teaching
Tuesday	7	Friday	days)	

Total teaching days of Academic Term I = 57 + 42 = 99 Days

BAC	HELOR	OF SC	IENCE	Session	ı 2017-	2018(First Seme	ster)
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof.	B.ScI	Paper-III	July	III^{rd}	UNIT-I	UNIT-I (8 Hrs.)
	Sunny		Physical			Mathematical	Mathematical Concepts and Evaluation of Analytical Data :
			Chemistry-			Concepts and	Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation
			A			Evaluation of	and integration of functions like ex, xn, sin x, log x; maxima and minima, partial
						Analytical Data:	differentiation and reciprocity relations.
						Logarithmic	Terms of mean and median, precision and accuracy in chemical analysis, determining
						relations, curve	accuracy of methods, improving accuracy of analysis, data treatment for series involving
						sketching, linear	relatively few measurements, linear least squares curve fitting, types of errors, standard
						graphs and	deviation.
						calculation of slopes	UNIT-II (7Hrs.)
					IV^{th}	Differentiation and	Gaseous States:
						integration of	Postulates of kinetic theory of gases, deviation from ideal behavior, Van der Waal's equation
						functions like ex, xn,	of state.
						sin x, log x	Critical Phenomena : PV isotherms of real gases, continuity of states, the isotherms of Van

		Angust	T St	Maxima and minima,	der Waal's equation, relationship between critical constants and Van der Waal's constants,
		August	1		
				partial differentiation	the law of corresponding states, reduced equation of state.
				and reciprocity	Molecular Velocities: Root mean square, average and most probable velocities. Qualitative
			nd	relations	discussion of the Maxwell's distribution of molecular velocities, collision number, mean free
			II nd	Terms of mean and	path and collision diameter.
				median, precision	Liquification of gases (based on Joule-Thomson effect).
				and accuracy in	UNIT-III (8 Hrs.)
				chemical analysis,	Chemical Kinetics-I:
				determining accuracy	Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction-
				of methods	concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of
			III rd	Immuning agains	rates, mathematical characteristics of simple chemical reactions – zero order, first order,
			111	Improving accuracy	second order, pseudo order, half life and mean life. Determination of the order of reaction –
				of analysis, data	differential method, method of integration, method of half life period and isolation method.
				treatment for series	Radioactive decay as a first order phenomenon.
				involving relatively	Chemical Kinetics-II:
				few measurements,	Theories of Chemical Kinetics: Effect of temperature on rate of reaction, Arrhenius equation,
				linear least squares	concept of activation energy. Simple collision theory based on hard sphere model, transition
				curve fitting, types of	state theory (equilibrium hypothesis).
				errors, standard	Expression for the rate constant based on equilibrium constant and thermodynamic aspects.
				deviation.	Catalysis and general characteristics of catalytic reactions, Homogeneous catalysis, acid-base
			IV th	UNIT-II	catalysis and enzyme catalysis including their mechanisms, Michaelis Menten equation for
				Gaseous States:	
				Postulates of kinetic	enzyme catalysis and its mechanism.
				theory of gases,	
				deviation from ideal	
				behavior, Van der	
				Waal's equation of	
				state.	
				Critical Phenomena	
				: PV isotherms of	
				real gases,	
				, ₀ ,	
			V^{th}	Continuity of states,	
				the isotherms of Van	
				der Waal's equation,	
				relationship between	
				critical constants and	
				Vander Waal's	
				constants	
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			September	II^{nd}	The law of	
					corresponding	
					states, reduced	
					equation of state.	
					Molecular	
					Velocities: Root	
					mean square, average	
					and most probable	
					velocities.	
				III^{rd}	Qualitative	
					discussion of	
					the Maxwell's	
					distribution of	
					molecular velocities,	
					collision number,	
				IV th	Mean free path and	
					collision diameter.	
					Liquification of	
					gases (based on	
					Joule-Thomson	
					effect).	
				V th	Chemical Kinetics-I	
					:	
					Chemical kinetics	
					and its scope, rate of	
					a reaction, factors	
					influencing the rate	
					of a reaction-	
					concentration,	
			October	AT	JTUMN BREAK	
			2 2000 21	II nd	Temperature,	
					pressure, solvent,	
					light, catalyst.	
					Concentration	
					dependence of rates	
					mathematical	
					characteristics of	
					simple chemical	
L	l	İ			simple chemical	

				reactions – zero order	
				first order, pseudo	
				order, half life and	
				mean life.	
			$\mathrm{III}^{\mathrm{rd}}$	Determination of the	
				order of reaction -	
				differential method,	
			IV th	Method of	
				integration, method	
				of half	
				life period and	
				isolation method.	
				Radioactive decay as	
				a first order	
				phenomenon.	
				Chemical Kinetics-	
				II:	
				Theories of Chemical	
				Kinetics: Effect of	
				temperature on rate	
				of reaction,	
			V th	Arrhenius equation,	
				concept of	
				activation energy.	
				Simple collision	
				theory based on hard	
				sphere model,	
				transition state theory	
				(equilibrium	
				hypothesis).	
		November	I st	Expression for the	
				rate constant based	
				on equilibrium	
				constant and	
				thermodynamic	
				aspects. Catalysis	
				and general	
				characteristics of	

						catalytic reactions,	
						Homogeneous	
						catalysis,	
					II^{nd}	Acid-base catalysis	
						and enzyme catalysis	
						including their	
						mechanisms,	
						Michaelis Menten	
						equation for enzyme	
						catalysis and its	
						mechanism	
2.	Prof.	B.Sc-I	Paper-II	July	III rd	UNIT-I	UNIT-
	Ruchika		Organic			Structure and	Structu
			chemistry-			Bonding :	Hybridi
			A			Hybridization, bond	chemic
						lengths and bond	inductiv
						angles, bond energy,	Mechai
						localized and	Curved
						delocalized chemical	headed
						bond, Vander Waals	and n
						interactions,	interme
					IV th	Resonance,	exampl
						hyperconjugation,	determi
						aromaticity,	and ster
						inductive and field	UNIT -
						effects, hydrogen	Alkane
						bonding.	Isomeri
				August	\mathbf{I}^{st}	Mechanism of	reaction
						Organic Reactions:	physica
						Curved arrow	of alkar
						notation, drawing	formati
						electron movements	rings (c
						with arrows, half-	ring: ba
						headed and double-	UNIT-
						headed arrows,	Stereo
						homolytic and	Concep
						heterolytic bond	molecu
						breaking. Types of	enantio
	•	•					•

UNIT-I (8 Hrs.)

Structure and Bonding:

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Van der Waals interactions, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions:

Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents—electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates—Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species. Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

UNIT -II (7 Hrs.)

Alkanes and Cycloalkanes:

Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes Mechanism of free radical halogenation of alkanes: Orientation, reactivity and selectivity. Cycloalkanes – nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitation. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds

UNIT-III (8 Hrs.)

Stereochemistry of Organic Compounds I:

Concept of isomerism, Types of isomerism. Optical isomerism – Elements of symmetry, nolecular chirality, enantiomers, stereogenic center, optical activity, properties of nantiomers, chiral and achiral molecules with two stereogenic centers, diastereomers, threo

	:
reagents electrophiles and erythro diastereomers, meso compounds, resolution of enantiomers,	, inversion, retention
and nucleophiles. and racemization.	D 0 C
II nd Types of organic Relative and absolute configuration, sequence rules, D & L and I	R & S systems of
reactions. Energy nomenclature.	
considerations. UNIT-IV (7 Hrs.)	
Reactive Stereochemistry of Organic Compounds II:	
intermediates— Geometric isomerism: Determination of configuration of geometric isom	
Carbocations, nomenclature, geometric isomerism in oximes and alicyclic compour	
carbanions, free isomerism—Conformational analysis of ethane and n-butane; conformat	
radicals, carbenes, axial and equatorial bonds, conformation of mono and disubstituted cycl	
arynes and nitrenes Newman projection and Sawhorse formulae, Fischer and flying wedge for	ormulae.
(with examples). Difference between configuration and conformation.	
III rd Assigning formal	
charges on	
intermediates and	
other ionic species.	
Methods of	
determination of	
reaction mechanism	
(product analysis,	
intermediates,	
isotope effects,	
kinetic and	
stereochemical	
studies).	
IV th UNIT- II	
Alkanes and	
Cycloalkanes:	
Isomerism in	
alkanes, sources,	
methods of formation	
(with special	
reference to Wurtz	
reaction, Kolbe	
reaction, Corey-	
House reaction and	
decarboxylation of	
carboxylic acids),	

			and chemical	
			reactions of alkanes	
	Septer	mber I st	Mechanism of free	
			radical halogenation	
			of alkanes:	
			Orientation,	
			reactivity and	
			selectivity.	
			Cycloalkanes –	
			nomenclature,	
			methods of	
			formation, chemical	
			reactions	
		\mathbf{H}^{nd}	Baeyer's strain	
		"	theory and its	
			limitation. Ring	
			strain in small rings	
			(cyclopropane and	
			cyclobutane), theory	
			of strainless rings.	
			The case of	
			cyclopropane ring:	
			banana bonds	
		$\mathrm{III}^{\mathrm{rd}}$	UNIT-III	
		""	Stereochemistry of	
			Organic	
			Compounds I:	
			Concept of	
			isomerism, Types of	
			isomerism.	
			Optical isomerism –	
			Elements of	
			symmetry, molecular	
			chirality,	
			enantiomers,	
			stereogenic center,	
		IV th	Optical activity,	
			properties of	
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enantiomers, chiral and achiral molecules with two stereogenic centers, diastereomers, threo and erythro	
molecules with two stereogenic centers, diastereomers, threo	
stereogenic centers, diastereomers, threo	
diastereomers, threo	
and arythro	
and erythro	
diastereomers, meso	
compounds,	
V th Resolution of	
enantiomers,	
inversion, retention	
and racemization.	
Relative and absolute	
configuration,	
sequence rules, D &	
L and R & S systems	
of nomenclature.	
October AUTUMN BREAK	
$oxed{II^{ m nd}} oxed{UNIT-IV}$	
Stereochemistry of	
Organic	
Compounds II:	
Geometric	
isomerism:	
Determination of	
configuration of	
geometric isomers. E	
& Z system of	
nomenclature	
III rd Geometric isomerism	
in oximes and	
alicyclic compounds.	
alicyclic compounds.	
alicyclic compounds. Conformational isomerism— Conformational	
alicyclic compounds. Conformational isomerism— Conformational analysis of ethane	
alicyclic compounds. Conformational isomerism— Conformational	

				November	I st	cyclohexane, axial and equatorial bonds, conformation of mono and disubstituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation	
3.	Prof. Jyoti	B.ScI	Paper-I Inorganic Chemistry-A	July	III rd	UNIT-I Atomic Structure: Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of Y and Y2 Quantum numbers, radial and angular wave functions and probability distribution curves	UNIT-I (8 Hrs.) Atomic Structure: Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of Ψ and Ψ², quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements and ions. UNIT-II (7 Hrs.) Periodic Properties: Position of elements in the periodic table; effective nuclear charge and its calculations. Atomic and ionic radii, ionization energy, electron affinity and electronegativity—definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behaviour. UNIT-III (7 Hrs.) Chemistry of Noble Gases and s-Block Elements: Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds. Comparative study diagonal relationships, salient features of hydrides, solvation.
				August	I st	Shapes of s, p, dorbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the	compounds. Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls. UNIT-IV (8 Hrs.) Chemical Bonding-I: Covalent Bond – Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple

			alamanta and iar	the section of the DE DE CHI DE CE IE C.C. V.E. DE DE C.C.
		Π^{nd}	elements and ions.	inorganic molecules and ions. BeF ₂ , BF ₃ , CH ₄ , PF ₅ , SF ₆ , IF ₇ , SnCl ₂ , XeF ₄ , BF ₄ , PF ₆ , SnCl ²⁻ ₆ .
		11	UNIT-II	Valence shell electron pair repulsion (VSEPR) theory to NH ₃ , H ₃ O+, SF ₄ , ClF ₃ , ICl ⁻ ₂ and
			Periodic Properties	H ₂ O. MO theory, homonuclear (elements and ions of 1st and 2nd row), and heteronuclear
			:Position of elements	(BO,CN, CO ⁺ , NO ⁺ , CO, CN ⁻), diatomic molecules. Percentage ionic character from dipole
			in the periodic table;	moment and electronegativity difference.
			effective nuclear	
			charge and its	
			calculations. Atomic	
			and ionic	
		ba d	radii,	
		$\mathrm{III}^{\mathrm{rd}}$	Ionization energy,	
			electron affinity and	
			electronegativity—	
			definition, methods	
			of determination or	
			evaluation,	
		IV th	Trends in periodic	
			table and	
			applications in	
			predicting and	
			explaining the	
		41.	chemical behaviour.	
		V th	UNIT-III	
			Chemistry of Noble	
			Gases and s-Block	
			Elements : Chemical	
			properties of the	
			noble gases,	
			chemistry of xenon,	
			structure and	
			bonding in xenon	
			compounds.	
	Se	eptember II nd	Comparative study,	
			diagonal	
			relationships, salient	
			features of hydrides,	
		$\mathrm{III}^{\mathrm{rd}}$	Solvation and	
			complexation	

			tendencies including
			their function in
			biosystems, an
			introduction to alkyls
			and aryls.
		IV th	UNIT-IV
		1 '	Chemical Bonding-I
			: Covalent Bond –
			Valence bond theory
			and its limitations,
			directional
			characteristics of
		+th	covalent bond,
		V th	Various types of
			hybridization and
			shapes of simple
			inorganic molecules
			and ions. BeF ₂ , BF ₃ ,
			CH ₄ , PF ₅ , SF ₆ , IF ₇ ,
			SnCl ₂ , XeF ₄ , BF ₄ ,
			PF ₆ , SnCl ² ₆
	October	A	UTUMN BREAK
		II^{nd}	Valence shell
			electron pair
			repulsion (VSEPR)
			theory to NH ₃ , H ₃ O+,
			SF_4 , CIF_3 , ICI_2 and
			H_2O .
		III rd	
			MO theory
		IV th	Homonuclear
			(elements and ions of
		L	1st and 2nd row),
		V th	Heteronuclear (BO,
			CN, CO ⁺ , NO ⁺ , CO,
			CN ⁻)
	November	Ist	Diatomic molecules.
			Percentage ionic
	1		character from dipole

			moment and	
			electronegativity	
			difference.	

BAC	HELOR	OF SC	IENCE	5	Session	2017-2018(Third S	emester)
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof. Sunny	B.Sc II	Paper-XI Physical Chemistry- A	July	III rd	UNIT-I Liquid State: Intermolecular forces, structure of liquids (a qualitative description) Structural differences between solids, liquids	differences between solids, liquids and gases. <i>Liquid Crystals</i> : Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell. UNIT-II (7 Hrs.)
				August	I st	and gases Liquid Crystals: Difference between liquid crystal, solid and liquid Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.	Chemical Equilibrium: Equilibrium constant and free energy. Thermodynamic derivation of law of mass of mass action. Le - Chatelier's principle. Reaction isotherm and Reaction isochore-Clapeyron equation and Clausius —Clapeyron equation, applications. UNIT-III (8 Hrs.) Thermodynamics-II: Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of Entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as
					III rd	UNIT-II Chemical Equilibrium: Equilibrium constant and free energy.	a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. UNIT-IV (7 Hrs.) Thermodynamics-III: Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz
					IV th	Thermodynamic derivation of law of mass of mass action. Le - Chatelier's principle. Reaction isotherm and Reaction isochore-Clapeyron equation and Clausius —Clapeyron equation, applications.	functions; Gibbs function (G) and Helmholtz functions (A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

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		Sep	otember II ^{no}		
				Thermodynamics-II:	
				Second Law of	
				Thermodynamics: Need	
				for the law, different	
				statements of the law,	
				Carnot cycle and its	
				efficiency	
			III		
				Thermodynamic scale	
				of temperature.	
				Concept of Entropy:	
				Entropy as a state	
				function	
			IV	Entropy as a function of	
				V & T, entropy as a	
				function of P & T,	
				entropy change in	
				physical change	
			V th	Clausius inequality,	
				entropy as a criteria of	
				spontaneity and	
				equilibrium.	
		Oct	tober	AUTUMN BREAK	
			Π^{no}	Entropy change in ideal	
				gases and mixing of	
				gases.	
			$\overline{\mathrm{III}}^{\scriptscriptstyle 1}$		
				Thermodynamics-III:	
				Third Law of	
				Thermodynamics:	
				Nernst heat theorem,	
				statement and concept	
				of residual entropy,	
			IV		
				absolute entropy from	
				heat capacity data.	
				Gibbs and Helmholtz	
L				S1005 und Hemmonz	

					1	for ations	
					V th	functions (C) and	
					V	Gibbs function (G) and	
						Helmholtz	
						functions (A) as	
						thermodynamic	
						quantities,	
				November	Ist	A & G as criteria for	
						thermodynamic	
						equilibrium and	
						spontaneity,	
						their advantage over	
						entropy change.	
					II^{nd}	Variation of G and A	
						with P, V and T.	
2.	Prof.	B.Sc-II	Paper-X	July	$\mathrm{III}^{\mathrm{rd}}$	UNIT-I	UNIT-I (8 Hrs.)
	Ruchika		Organic			Alcohols and Phenols:	Alcohols and Phenols:
			chemistry-			Classification and	Classification and nomenclature. Monohydric alcohols-Nomenclature, methods of
			A			nomenclature	formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen
							bonding. Acidic nature. Reactions of alcohols. Dihydric and Trihydric alcohols-
					IV th	Monohydric alcohols-	Nomenclature, methods of formation, chemical reactions of vicinal glycols and glycerol.
						Nomenclature, methods	Preparation of phenols, physical properties and acidic character. Comparative acidic
						of formation by	strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of
						reduction of aldehydes,	phenols-electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of
						ketones, carboxylic	Fries rearrangement, Claisen rearrangement, Gatterman synthesis, and Reimer-Tiemann
						acids	reaction.
						and esters	UNIT-II (8 Hrs.)
				August	I st	Hydrogen bonding.	Aldehydes and Ketones I
						Acidic nature. Reactions	Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones
						of alcohols. Dihydric	with particular reference to the synthesis of aldehydes from acid chorides, synthesis of
						and Trihydric alcohols-	aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from
						Nomenclature, methods	carboxylic acids. Physical properties.
						of formation, chemical	UNIT-III (7 Hrs.)
						reactions of vicinal	Aldehydes and Ketones-II
						glycols and glycerol.	Mechanism of nucleophilic additions to carbonyl group with particular emphasis on
					II^{nd}	Preparation of phenols,	benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and
						physical properties and	its derivatives. Wittig reaction, Mannich reaction. Use of acetals as protecting group.
						acidic character.	Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV,
						Comparative acidic	Clemmensen, Wolff-Kishner, LiAIH ₄ and NaBH ₄ reductions.

			strengths of alcohols	UNIT-IV
			and	Carboxylic Acids: (7 Hrs.)
				Nomenclature, structure and bonding, physical proper
			phenols, resonance stabilization of	effects of substitutions on acid strength. Preparations
			phenoxide ion	carboxylic acids. Hell-Volhard-Zelinsky reaction. Synt
		III rd		
		1111	Reactions of phenols-	amides, Reduction of carboxylic acids. Mechanism
			electrophilic aromatic	formation and chemical reactions of halo acids. Hydrox
			substitution,	acids(structural features only). Methods of format
			acylation and	unsaturated monocarboxylic acids. Dicarboxylic acids:
			carboxylation.	of heat and hydrating agents.
			Mechanisms of Fries	
		th	rearrangement	
		IV th	Claisen rearrangement,	
			Gatterman synthesis,	
			and Reimer-Tiemann	
		-st	reaction.	
	Septem	iber I st	UNIT-II	
			Aldehydes and	
			Ketones I	
			Nomenclature and	
			structure of the carbonyl	
			group. Synthesis of	
			aldehydes and ketones	
			with particular reference	
			to the synthesis of	
			aldehydes from acid	
			chorides,	
		Π^{nd}	Synthesis of aldehydes	
			and ketones using 1,3-	
			dithianes,	
			synthesis of ketones	
			from nitriles and from	
			carboxylic acids,	
			Physical properties.	
		$\mathrm{III}^{\mathrm{rd}}$	UNIT-III	
			Aldehydes and	
			Ketones-II	
			Mechanism of	
 1		ı		<u> </u>

perties, acidity of carboxylic acids, as of carboxylic acids. Reactions of nthesis of acid chlorides, esters and m of decarboxylation. Methods of roxyl acids: Malic, tartaric and citric nation and chemical reactions of s: Methods of formation and effects

				nucleophilic additions to
				carbonyl group with
				particular emphasis on
1				benzoin, aldol, Perkin
1				and Knoevenagel
1				condensations.
i			IV th	Condensation with
				ammonia and its
				derivatives. Wittig
				reaction, Mannich
				reaction. Use of acetals
				as protecting group
			V th	Oxidation of aldehydes,
				Baeyer-Villiger
				oxidation of ketones,
				Cannizzaro
				reaction, MPV,
				Clemmensen, Wolff-
İ				Kishner, LiAIH ₄ and
				NaBH ₄ reductions.
		October		AUTUMN BREAK
			II^{nd}	UNIT-IV
				Carboxylic Acids:
				Nomenclature, structure
				and bonding, physical
				properties, acidity of
				carboxylic acids, effects
				of substitutions on acid
				strength.
			III^{rd}	Preparations of
				carboxylic acids.
				Reactions of carboxylic
				acids. Hell-Volhard-
				Zelinsky reaction
			IV th	Synthesis of acid
			1	chlorides, esters and
				amides, Reduction of
				carboxylic acids.
		1	1	carboxyric acius.

				November	I st	Mechanism of	
				11070111001		decarboxylation.	
						Methods of formation	
						and chemical reactions	
						of halo acids. Hydroxyl	
						acids: Malic, tartaric	
						and citric acids	
						(structural features	
						only).	
					II nd	Methods of formation	
					11	and chemical reactions	

						monocarboxylic acids.	
						Dicarboxylic acids: Methods of formation	
						and effects of heat and	
2	Prof.	D.C.	Daman IV	T1	III rd	hydrating agents. UNIT-I	UNIT-I (8 Hrs.)
3.		B.Sc	Paper-IX	July	111		\ '
	Manpreet Kaur	II	Inorganic			Chemistry of Elements	Chemistry of Elements of First Transition Series:
	Kaur		Chemistry-			of First Transition Series:	Characteristic properties of <i>d</i> -block elements. Properties of the elements of the first transition series, their simple compounds and complexes, illustrating relative stability of
			A			Characteristic properties	their oxidation states, coordination number and geometry.
						of <i>d</i> -block elements.	UNIT-II (7 Hrs.)
					IV th	II.	
					1 V	Properties of the	Chemistry of Elements of Second and Third Transition Series: General characteristics, comparative treatment with their 3 <i>d</i> -analogues in respect of ionic
						elements of the first	
						transition series, their	radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.
						simple compounds and	UNIT-III (8 Hrs.)
						complexes, illustrating	Chemistry of Coordination Compounds-I Werner's coordination theory and its experimental verification, effective atomic number
						relative stability of their	
						oxidation states,	concept, chelates, nomenclature of coordination compounds, isomerism in coordination
						coordination number	compounds
				A	I st	and geometry.	UNIT-IV (7 Hrs.) Chemistry of Coordination Compounds-II
				August	1	Properties of the	Valence bond theory of transition metal complexes. Properties of Coordination
						elements of the first	compounds i.e. magenetic properties, colours (Qualitative approach only), use of
						transition series, their	coordination compounds.
						simple compounds and	coordination compounds.
						complexes, illustrating	
						relative stability of their	

				oxidation states,	
				coordination number	
				and geometry.	
			II^{nd}	Properties of the	
				elements of the first	
				transition series, their	
				simple compounds and	
				complexes, illustrating	
				relative stability of their	
				oxidation states,	
				coordination number	
				and geometry.	
			III^{rd}	UNIT-II	
				Chemistry of Elements	
				of Second and Third	
				Transition Series:	
				General characteristics	
			IV^{th}	Comparative treatment	
				with their 3d-analogues	
				in respect of ionic radii,	
				oxidation states,	
				magnetic behaviour,	
				spectral properties and	
			th	stereochemistry.	
			V th	Comparative treatment	
				with their 3 <i>d</i> -analogues	
				in respect of ionic radii,	
				oxidation states,	
				magnetic behaviour,	
				spectral properties and	
		g	nd	stereochemistry.	
		September	II^{nd}	UNIT-III	
				Chemistry of	
				Coordination	
				Compounds-I	
				Werner's coordination	
				theory and its	
				experimental	

		1	
		verification	
	$\mathrm{III}^{\mathrm{rd}}$	Effective atomic	
		number concept,	
		chelates,	
	IV th	Isomerism in	
		coordination	
		compounds	
	V th	Isomerism in	
		coordination	
		compounds	
October	Α	UTUMN BREAK	
	Π^{nd}	UNIT-IV	
		Chemistry of	
		Coordination	
		Compounds-II	
		Valence bond theory of	
		transition metal	
		complexes	
	$\mathrm{III}^{\mathrm{rd}}$	Properties of	
		Coordination	
		compounds i.e.	
		magenetic	
		properties, colours (
		Qualitative approach	
		only),	
	IV^{th}	Properties of	
		Coordination	
		compounds i.e.	
		magenetic	
		properties, colours (
		Qualitative approach	
		only),	
	V th	Properties of	
		Coordination	
		compounds i.e.	
		magenetic	
		properties, colours (
		Qualitative approach	

			only),	

S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof. Jyoti	B.Sc III	Paper- XVII Inorganic Chemistry- A	July	III rd	UNIT-I Metal – Ligand Bonding in Transition Metal Complexes: Limitations of	Limitations of valence bond theory, an elementary idea of crystal – field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal field parameters, Spectro chemical Series.
					IV th	valence bond theory, an elementary idea of crystal – field theory Crystal field splitting	Thermodynamic and Kinetic Aspects of Metal Complexes: A brief outline of thermodynamic and Kinetic stability of metal complexes and factor affecting the stability, substitution reactions of square planar complexes.
						in octahedral complexes	
				August	I st	Crystal field splitting in tetrahedral complexes	properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a br
					II nd	Crystal field splitting in square planar complexes, factors affecting the crystal – field parameters, Spectro chemical Series.	
					III rd	UNIT-II Thermodynamic and Kinetic Aspects of Metal Complexes : A brief outline of thermodynamic and	

				metal complexes	
				_	
			IV^{th}	Factors affecting the	
				stability square	
				planar complexes	
				F	
			V th	Factors affecting the	
				substitution reactions	
				of square planar	
				complexes	
			nd		
		September	II^{nd}	UNIT-III	
				Organometallic	
				Chemistry:	
				Definition,	
				nomenclature and	
				classification of	
				organometallic	
				compounds.	
			III rd		
			111	Preparation,	
				properties, bonding	
				and applications of	
				alkyls and aryls of	
				Li, Al	
			IV th	Preparation,	
				properties, bonding	
				and applications of	
				alkyls and aryls of	
				Hg, Sn and Ti,	
			V th	A brief account of	
			,	metal – ethylenic	
1				complexes and	
				homogeneous	
1				hydrogenation,	
		October	AU	JTUMN BREAK	

	1				II nd	Mononuclear	
					11	carbonyls and the	
						nature of bonding in	
						metal carbonyls	
					III rd		
					III	UNIT-IV	
						Bioinorganic	
						Chemistry:	
						Essential and trace	
						elements in	
						biological processes	
					IV th	Metalloporphyrins	
						with special	
						reference to	
						haemoglobin and	
						myoglobin.	
					V^{th}	Biological role of	
						alkali and alkaline	
						earth metal ions.	
				November	Ist	Nitrogen fixation.	
2.	Prof.	B.Sc-	Paper-	July	III^{rd}	UNIT-III	UNIT-I (7 Hrs.)
	Manpreet	III	XVIII			Spectroscopy:	Heterocyclic Compounds:
	Kaur		Organic			Nuclear magnetic	Introduction: Molecular orbital picture and aromatic character of pyrrole, furan, thiophene
			chemistry-			resonance (NMR)	and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the
			Α			spectroscopy. Proton	mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in
						magnetic resonance	pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction
						(¹ H NMR)	to condensed – five and six – membered heterocycles. Preparation and reactions of indole,
						spectroscopy,	quinoline and isoquinoline with special reference to Fisher indole synthesis. Skraup synthesis
					IV th	Nuclear shielding	and Bischler— Napieralski synthesis. Mechanism of electrophilic substitution reactions of
						and deshielding,	indole, quinoline and isoquinoline.
						chemical shift and	UNIT-II (7 Hrs.)
						molecular structure,	Electromagnetic Spectrum: Absorption Spectra-II:
				August	I st	Spin-spin splitting	Infrared (IR) absorption spectroscopy – Molecular vibrations, Hooke's law, selection rules,
				Tugust	1	and coupling	intensity and position of IR bands, measurement of IR spectrum, fingerprint region,
				1		1 0	
						Lonstants area of	i characteristic absorbtions of various functional groups and interpretation of ik spectra of i
						constants, area of	characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Problems pertaining to the structure elucidation of simple
					II nd	signals	simple organic compounds. Problems pertaining to the structure elucidation of simple
					$ m II^{nd}$	signals Interpretation of	simple organic compounds. Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.
					$\mathrm{II}^{\mathrm{nd}}$	signals	simple organic compounds. Problems pertaining to the structure elucidation of simple

	1		'	ethyl bromide,	Nuclear magnetic resonance (NMR) spectroscopy. Proton magnetic resonance (¹ H NMR)
	1	1	'	ethanol,	spectroscopy, nuclear shielding and deshielding, chemical shift and
	1	1	'	acetaldehyde, 1,1,2-	molecular structure, spin-spin splitting and coupling constants, area of signals, interpretation
	1	1	'	tribromoethane, ethyl	of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde,
1	1	1	'	acetate, toluene and	1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone.
	1	1	'	acetophenone.	UNIT-IV (8 Hrs.)
	1		IV^{th}	Applications of NMR	Carbohydrates:
	1	September	\mathbf{I}^{st}	UNIT-II	Classification and nomenclature. Monosaccharides, mechanism of osazone formation,
]]	1		'	Electromagnetic	interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.
]]	1	1	'	Spectrum:	Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose
	1	1	'	Absorption Spectra-	into mannose. Formation of glycosides, ethers and esters. Determination of ring size of
]	1		'	II:	monosaccharides. Cyclic structure of D (+) – glucose. Mechanism of mutarotation. Structure
	1	1	'	Infrared (IR)	
1	1	1	'	absorption	and polysaccharides (starch and cellulose) without involving structure determination.
	1		'	spectroscopy –	
	1	1	'	Molecular vibrations,	
	1	1	'	Hooke's law,	
]]	1	1	'	selection rules	
	1		II^{nd}	Intensity and position	
]]	1	1	'	of IR bands,	
	1	1	'	measurement of IR	
	1	1	'	spectrum, fingerprint	
	1		'	region,	_
	1		$\mathrm{III}^{\mathrm{rd}}$	Characteristic	
	1	1	'	absorptions of	
	1	1	'	various functional	
	1		'	groups and	
	1	1	'	interpretation of IR	
	1	1	'	spectra of simple	
	1	1	'	organic compounds	
	1		IV^{th}	Problems pertaining	
1	1	1	'	to the structure	
1	1	1	'	elucidation of simple	
1	1	1	'	organic compounds	
	1		'	using UV, IR and	
	1		'	PMR spectroscopic	
	1		'	techniques.	_
			V^{th}	UNIT-IV	
					·

				Carbohydrates:
				Classification and
				nomenclature.
				Monosaccharides
		October	AU	JTUMN BREAK
			II^{nd}	Mechanism of
				osazone formation,
				interconversion of
				glucose and fructose,
				chain lengthening
				and chain shortening
				of aldoses.
				Configuration of
				Configuration of
				monosaccharides.
				Erythro and threo
			rd	diastereomers
			III rd	Conversion of
				glucose into
				mannose. Formation
				of glycosides, ethers
				and esters.
				Determination of ring
				size of
				monosaccharides.
				Cyclic structure of D
				(+) – glucose.
				Mechanism of
				mutarotation.
				Structure of ribose
				and deoxyribose
			IV th	An introduction to
			1 V	disaccharides
				(maltose, sucrose and
				lactose) and
				polysaccharides
				(starch and cellulose)
				without involving
				structure

		1			determination.	
					UNIT-I	
					Heterocyclic	
		1			Compounds:	
		1			Introduction :	
		1			Molecular orbital	
		1			picture	
		1	November	I st	Aromatic character	
			1 VO VOITION		of pyrrole, furan,	
		1			thiophene and	
1		1			pyridine. Methods of	
ļ					synthesis and	
1		1				
1		1			chemical reactions	
		1			with particular	
					emphasis on the	
1		1			mechanism of	
					electrophilic	
ļ		1			substitution.	
ĺ		1			Mechanism of	
· ·		1			nucleophilic	
1		1			substitution reactions	
					in pyridine	
1		1			derivatives.	
					Comparison of	
					basicity of pyridine,	
1		1			piperidine and	
					pyrrole.	
				II^{nd}	Introduction to	
					condensed – five and	
					six – membered	
1		1			heterocycles.	
1		1			Preparation and	
1		1			reactions of indole,	
1		1			quinoline and	
į					isoquinoline with	
		1			special reference to	
ļ		1			Fisher indole	
ļ		1			synthesis. Skraup	
ļ		1			synthesis. Skraup	
			<u> </u>	<u> </u>	synthesis and	

Г				ı			D: 11	,
							Bischler-	
							Napieralski	
							synthesis.	
							Mechanism of	
							electrophilic	
							substitution reactions	
							of indole, quinoline	
							and isoquinoline.	
	3.	Dr.	B.Sc	Paper-XIX	July	$\mathrm{III}^{\mathrm{rd}}$	UNIT-I	UNIT-I (8 Hrs.)
		Gurpreet	III	Physical			Elementary	Elementary Quantum Mechanics-I:
		Kaur		Chemistry-			Quantum	Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids,
				A			Mechanics-I:	Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect. De Broglie
							Black-body radiation,	hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian
							Planck's radiation	operator, Schrodinger wave equation and its importance, physical interpretation of the wave
							law, photoelectric	function, postulates of quantum mechanics, particle in a one dimensional box. Schrodinger
							effect,	wave equation for H-atom, separation into three equations (without derivation), quantum
						IV^{th}	Heat capacity of	numbers and their importance, hydrogen like wave functions, radial wave functions, angular
							solids, Bohr's model	wave functions.
							of hydrogen atom (no	UNIT-II (7 Hrs.)
							derivation) and its	Elementary Quantum Mechanics-II:
							defects, Compton	Molecular orbital theory, basic ideas – criteria for forming M.O. from A.O., construction of
							effect. De Broglie	M.O.'s by LCAO $-H_2^+$ ion. Calculation of energy levels from wave functions, physical
							hypothesis,	picture of bonding and antibonding wave functions, concept of σ , σ^* , π , π^* orbitals and their
					August	I st	The Heisenberg's	characteristics. Hybrid orbitals – sp, sp ² , sp ³ ; calculation of coefficients of A.O.'s used in
					Tagast	•	uncertainty principle,	these hybrid orbitals. Introduction to valence bond model of H ₂ , comparison of M.O. and
							Sinusoidal wave	V.B. models.
							equation,	UNIT-III (8 Hrs.)
							Hamiltonian	Photochemistry-I:
							operator, Schrodinger	Interaction of radiation with matter, difference between thermal and photochemical
							wave equation and its	processes. Laws of Photochemistry: Grothus – Drapper law, Stark – Einstein law, Jablonski
							importance,	diagram depicting various processes occurring in the excited state.
						II nd	Physical	UNIT-IV (7 Hrs.)
						11	interpretation of the	Photochemistry-II:
							<u> </u>	Qualitative description of fluorescence, phosphorescence, non-radiative processes (internal
							1	conversion, intersystem crossing), quantum yield, photosensitized reactions – energy transfer
							r	processes (simple examples). Photochemistry of carbonyl compounds and alkenes.
							quantum mechanics,	processes (simple examples).1 notoenemistry of carbonyl compounds and aixenes.
							particle in a one	
L							dimensional box.	

			$\mathrm{III}^{\mathrm{rd}}$	Schrodinger wave	
				equation for H-atom,	
				separation into three	
				equations (without	
				derivation), quantum	
				numbers and their	
				importance,	
			IV th	Hydrogen like wave	
			1,	functions, radial	
				wave functions,	
				angular wave	
				functions.	
				Tunctions.	
			V th	UNIT-II	
			,	Elementary	
				Quantum	
				Mechanics-II:	
				Molecular orbital	
				theory, basic ideas –	
				criteria for forming	
				M.O. from A.O.,	
		September	II nd	Construction of	
		Бергениест	11	M.O.'s by LCAO –	
				H_2^+ ion. Calculation	
				of energy levels from	
				wave functions,	
				physical picture of	
				bonding and	
				antibonding wave	
				functions,	
			III rd	Concept of σ , σ^* , π ,	
			111	π^* orbitals and their	
				characteristics.	
				Hybrid orbitals – sp, sp ² , sp ³ ; calculation	
				of coefficients of	
				A.O.'s used in these	
				hybrid orbitals.	
			1	nyona oronais.	

		IV th	Introduction to	
			valence bond model	
			of H ₂ , comparison of	
			M.O. and V.B.	
			models.	
			UNIT-III	
			Photochemistry-I:	
			Interaction of	
			radiation with matter	
		V th	Difference between	
		'	thermal and	
			photochemical	
			processes. Laws of	
			Photochemistry:	
			Grothus – Drapper	
			law, Stark – Einstein	
			law,	
	October	Autumn		
	October	II nd	Jablonski diagram	
		11	depicting various	
			processes occurring	
			in the excited state.	
		III rd	UNIT-IV	
		111	Photochemistry-II:	
			Qualitative	
			description of	
			fluorescence,	
			phosphorescence,	
			non-radiative	
			processes (internal	
			conversion,	
			intersystem crossing)	
		IVth	Quantum yield,	
		1 v ui	photosensitized	
			reactions – energy transfer processes	
			(simple examples).	
		V^{th}	Photochemistry of	

			carbonyl compounds
			and alkenes.

MAS'	TER OF	SCIENC	E S	Session 201'	7-2018	S(First Semester)	
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Dr. Geeta	M.ScI	CH-411	August	\mathbf{I}^{st}	UNIT1 Stereochemistry	UNIT 1 (15 Hrs.)
	Jallan		Inorganic			And Bonding In Main Group	Stereochemistry And Bonding In Main Group Compounds VSEPR,
			Chemistry-I			Compounds VSEPR, Walsh	Walsh diagrams (tri and tetra-molecules), $d\pi$ -p π bonds, Bent rule and
						diagrams (tri and tetra-	energetics of hybridization, some simple reactions of covalently bonded
						molecules), $d\pi$ -p π bonds, Bent	molecules.
						rule	UNIT 2 (15 Hrs.)
					II^{nd}	Energetics of hybridization,	Metal Ligand Bonding
						some simple reactions of	Limitations of crystal field theory, molecular orbital theory, octahedral,
						covalently bonded molecules	tetrahedral and square planar complexes, π bonding and molecular orbital
					III^{rd}	UNIT 2	theory.
						Metal Ligand Bonding	UNIT 4 (15Hrs)
						Limitations of crystal field	Reaction Mechanism of Transition Metal Complexes –II
						theory,	Acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis,
					IV^{th}	Molecular orbital theory,	conjugate base mechanism, direct and indirect evidences in favour of
						octahedral,	conjugate mechanism, reactions without metal-ligand bond cleavage.
					V^{th}	Tetrahedral, Square planar	Substitution reactions in square planar complexes, the trans effect,
						complexes,	mechanism of substitution reaction, Redox reactions, electron transfer
				September	I st	π bonding and molecular orbital theory	reactions, mechanism of one electron transfer reactions, outer sphere type reactions, cross reactions and Marcus Hush Theory, inner sphere type

					II^{nd}	Unit IV	reactions.
						Reaction Mechanism of	
						Transition Metal Complexes –	
						II	
						Acid hydrolysis,	
					$\mathrm{III}^{\mathrm{rd}}$	Factors affecting acid	
						hydrolysis,	
					IV^{th}	Base hydrolysis, conjugate base	
						mechanism,	
				October		AUTUMN BREAK	
					II^{nd}	Reactions without metal-ligand	
						bond cleavage Substitution	
						reactions in square planar	
						complexes,	
					$\mathrm{III}^{\mathrm{rd}}$	The trans effect, mechanism of	
						substitution reaction Redox	
						reactions,	
					IV^{th}	Electron transfer reactions,	
						mechanism of one electron	
						transfer reactions	
					V th	Outer sphere type reactions,	
						cross reactions	
				November	I st	Marcus Hush Theory	
					II nd	Inner sphere type reactions.	
2.	Prof. Jyoti	M.Sc-I	CH-411	August	Ist	UNIT 3	UNIT3 (15Hrs.)
			Inorganic			Metal-Ligand Equilibria In	Metal-Ligand Equilibria In Solution
			Chemistry-I			Solution Stepwise and overall	Stepwise and overall formation constant and their interaction, trends in
					nd	formation constant	stepwise constants, factors affecting the stability of metal complexes with
					II^{nd}	Interaction trends in stepwise	reference to the nature of metal ion and ligand, chelate effect and its
					rd	constants	thermodynamic origin, determination of binary formation constants by pH
					$\mathrm{III}^{\mathrm{rd}}$	Factors affecting the stability of	spectrophotometry.
					th	metal complexes	Reaction Mechanism of Transition Metal Complexes-I
					IV^{th}	Reference to the nature of metal	Energy profile of a reaction, reactivity of metal complexes, inert and labile complexes, kinetic application of valance bond and crystal field theories,
					th	ion and ligand	kinetics of octahedral substitution.
					V th	Chelate effect	Americs of octaneural substitution.
				September	\mathbf{I}^{st}	Thermodynamic origin of	
						chelate efffect	
						<u> </u>	

					III rd IV th	Determination of binary formation constants Using pH spectrophotometry. Reaction Mechanism of Transition Metal Complexes-I Energy profile of a reaction	
				October	II nd	AUTUMN BREAK Reactivity of metal	
					III rd	complexes,Inert and labile complexes Kinetic application of valance	
						bond theory	
					IV th	Kinetic application of crystal field theories	
				November	I st	Kinetics of octahedral substitution.	
2.	Dr. Arvinder Kaur	M.Sc-I	CH-412 Organic chemistry-II	August	I st	UNIT 3 Aliphatic Nucleophilic Substitution The SN2, SN1	UNIT 3 (10 Hrs.) Aliphatic Nucleophilic Substitution The SN2, SN1, mixed SN1 and SN2 and SET mechanisms. Theneighbouring group mechanism, neighbouring group participation by π
					II nd	Mixed SN1 and SN2, SET mechanisms.	and σ bonds, Classical and non-classical carbocations, norbornyl system. common carbocation rearrangements. The SNi mechanism. Nucleophilic
					III rd	The neighbouring group mechanism, Neighbouring group participation by π and σ bonds,	substitution at an allylic, aliphatic, trigonal and a vinylic carbon. Reactivity effects of substrate structure, attacking nucleophile, leaving group and reaction medium, phase transfer catalysis, ambident nucleophile, regioselectivity.
					IV th	Classical and non-classical carbocations	UNIT 4 (8 Hrs.) Aromatic Electrophilic Substitution
					V th	Norbornyl system. common carbocation rearrangements	The arenium ion mechanism, orientation and reactivity, energy profile diagrams. The ortho/para ratio, ipso attack, orientation in other ring systems. Quantitative treatment of reactivity in substrates and electrophiles.
				September	I st	The SNi mechanism. Nucleophilic substitution at an allylic, aliphatic	Diazonium coupling, Vilsmeyer reaction, Gattermann-Koch reaction.
					II^{nd}	Trigonal and a vinylic carbon. Reactivity effects of substrate structure,	
					III^{rd}	Attacking nucleophile, leaving	

	1			1			
					th	group and reaction medium,	
					IV th	Phase transfer catalysis ambident	
						nucleophile, regioselectivity.	
				October		AUTUMN BREAK	
					II nd	UNIT 4	
						Aromatic Electrophilic	
						Substitution	
						The arenium ion mechanism	
						orientation and reactivity,	
						Energy profile diagrams.	
					$\mathrm{III}^{\mathrm{rd}}$	The ortho/para ratio, ipso attack,	
						Orientation in other ring	
						systems.	
					IV th	Quantitative treatment of	
						reactivity in substrates	
					V^{th}	Diazonium coupling	
				November	\mathbf{I}^{st}	Vilsmeyer reaction	
					II^{nd}	Gattermann-Koch reaction.	
3.	Dr.	M.ScI	CH-412	August	\mathbf{I}^{st}	UNIT 1	UNIT 1
	Gurpreet		Organic			Nature of Bonding in Organic	Nature of Bonding in Organic Molecule (15 Hrs.)
			chemistry-II			Molecule	Delocalized chemical bonding, conjugation, Cross conjugation, resonance
						Delocalized chemical bonding,	hyper conjugation, Bonding in fullerenes, Tautomerism, Aromaticity in
						conjugation	benzenoid and non benzenoid compd. Alternant and non alternant
					I^{Ind}	Cross conjugation, resonance	hydrocarbons, Huckel's rule. Energy level of π M.O., Annulenes, anti
						hyper conjugation,	aromaticity, aromaticity, Homo aromaticity, PMO approach. Bonds weaker
					III^{rd}	Bonding in fullerenes,	than covalent, addition compound, crown ether complexes and cryptands,
						Tautomerism, Aromaticity in	Inclusion compound, cyclo dextrins, Catenanes & rotaxanes. Effect of
						benzenoid and non benzenoid	structure on reactivity-resonance and field effects, steric effect, quantitative
						compd.	treatment. The Hammett equation and linear free energy relationship,
					IV^{th}	Alternant and non alternant	substituent and reaction constants. Taft equation.
						hydrocarbons, Huckel's rule.	UNIT 2 (15 Hrs.)
					V th	Energy level of π M.O.,	Stereochemistry
						Annulenes, anti aromaticity,	Conformational analysis of cyclo alkanes, decalins, effect of confirmation
						aromaticity, Homo aromaticity,	on reactivity. Confirmation of sugars, Steric strain due to undesirable
				Control 1	⊤st	•	crowding of resolution, entatiotropic and diasterotropic atoms. Stereo
				September	I st	PMO approach. Bonds weaker	specific and stereo selective synthesis, chirality due to helical shape.
						than covalent, addition	Stereochemistry of compounds containing N,S,P.
						compound, crown ether	UNIT 4 (7Hrs.)
						complexes	

	T				,
			II^{nd}	Cryptands, Inclusion compound,	Aromatic Nucleophilic Substitution
				cyclo dextrins, Catenanes &	The SNAr, SN1, benzyne and SRN1 mechanisms, Reactivity-effect of
				rotaxanes	substrate structure, leaving group and attacking nucleophile. The Von
			$\mathrm{III}^{\mathrm{rd}}$	Effect of structure on reactivity-	Richter, Sommelet-Hauser and smiles rearrangements.
				resonance and field effects,	
				steric effect, quantitative	
				treatment	
			IV^{th}	The Hammett equation and	
				linear free energy relationship,	
				substituent and reaction	
				constants. Taft equation.	
		October		AUTUMN BREAK	
			II^{nd}	UNIT 2	
				Stereochemistry	
				Conformational analysis of cyclo	
				alkanes, decalins, effect of	
				confirmation on reactivity.	
				Confirmation of sugars, Steric	
				strain due to undesirable	
				crowding of resolution,	
				entatiotropic	
			$\mathrm{III}^{\mathrm{rd}}$	Diasterotropic atoms. Stereo	
				specific and stereo selective	
				synthesis, chirality due to helical	
				shape.	
			IV^{th}	Stereochemistry of compounds	
				containing N,S,P.	
				UNIT 4	
				Aromatic Nucleophilic	
				Substitution	
				The SNAr, SN1	
		November	\mathbf{I}^{st}	Benzyne and SRN1	
				mechanisms, Reactivity-effect of	
				substrate structure, leaving	
				group	
			II^{nd}	Attacking nucleophile. The Von	
				Richter, Sommelet-Hauser and	
				smiles rearrangements.	
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4.	Prof.	M.Sc-I	CH-413	August	I st	UNIT 1
	Manpreet		Physical			Quantum Chemistry
	Kaur		Chmistry-I			Application of Schrodinger wave
						equation to particle in three
						dimensional box
					II^{nd}	Simple harmonic oscillator and
						rigid rotator.
					III^{rd}	Approximate Methods: The
						variation theorem, Linear
						variation Principle
					IV th	Perturbation theory (first order)
				September	\mathbf{I}^{st}	Second order and Non
						degenerate
					II^{nd}	Applications of variation method
						to the Helium atom
					III^{rd}	Applications of perturbation
						theory to the Helium atom
					IV th	Self-Consistent-Field theory
				October		AUTUMN BREAK
					II^{nd}	UNIT 2
						Angular Momentum:
						Ordinary ang. momentum,
						generalized angular momentum,
						eigen functions for angular
						momentum, eigen values of
					rd	angular momentum,
					$\mathrm{III}^{\mathrm{rd}}$	Operator using ladder operators,
					IV th	addition of angular-momenta,
					IV	Spin, anti symmetry and Pauli exclusion principle.
					V th	Molecular Orbital Theory:
					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Huckel theory of conjugated
						systems, bond order and charge
						density calculations,
				November	I st	Application to ethylene, allyl,
						butadiene,
					\mathbf{H}^{nd}	Application to cyclopropenyl
<u> </u>						

UNIT 1 (15 Hrs.)

Quantum Chemistry Application of Schrodinger wave equation to particle in three dimensional box, simple harmonic oscillator and rigid rotator. Approximate Methods: The variation theorem, Linear variation Principle, perturbation theory (first order, second order and Non degenerate), Applications of variation method and perturbation theory to the Helium atom. Self-Consistent-Field theory.

UNIT 2 (15 Hrs.)

Angular Momentum:

Ordinary ang. momentum, generalized angular momentum, eigen functions for angular momentum, eigen values of angular momentum, operator using ladder operators, addition of angular-momenta, spin, anti symmetry and Pauli exclusion principle.

Molecular Orbital Theory:

Huckel theory of conjugated systems, bond order and charge density calculations, application to ethylene, allyl, butadiene, cyclopropenyl system, cylobutadiene etc.

						system, cylobutadiene etc.	
4.	Prof. Sunny	M.Sc-I	CH-413 Physical Chmistry-I	August	Ist III rd IV th	UNIT 3 Thermodynamics: Classical Thermodynamics: Partial molal proporties, partial molal free energy, Volume & heat content and their significance, Determination of these quantities, concept of fugacity Determination of fugacity. Non ideal systems, excess functions for non ideal solutions, Activity, Activity coeff,	UNIT 3 Thermodynamics: Classical Thermodynamics: Partial molal proporties, partial molal free energy, volume & heat content and their significance, Determination of these quantities, concept of fugacity and determination of fugacity. Non ideal systems, excess functions for non ideal solutions, Activity, Activity coeff, Debye huckel theory for activity coeff. electrolyte solutions, determination of activity & activity coeff, ionic strength. Application of phase rule to 3-component system, second order phase transitions. Statistical Thermodynamics: Concept of distribution, thermodynamic probability & most probable distribution, ensemble averaging, postulates of ensemble averaging, canonical, grand canonical & micro canonical ensembles. UNIT 4
				September	IIIrd IV th	Debye huckel theory for activity coeff. electrolyte solutions, determination of activity & activity coeff, ionic strength. Application of phase rule to 3-component system, second order phase transitions. Statistical Thermodynamics: Concept of distribution, thermodynamic probability & most probable distribution, Ensemble averaging, postulates of ensemble averaging, canonical, grand canonical & micro canonical ensembles.	UNIT 4 (15 Hrs.) Statistical Thermodynamics: Corresponding distribution laws (using Lagrange's method of undetermined multipliers) Partition functions: Translational, Rotational, Vibrational, Electronic partitions functions. Calculation of Thermodynamic properties in terms of partition functions. Heat capacity, behavior of solids chemical equilibria and equilibrium constant in terms of partition function, F.D. statistics, distribution law and application to metals. Bose Einsteins statistics. Distribution law & application to Helium.
				October	H nd	AUTUMN BREAK UNIT 4 Statistical Thermodynamics: Corresponding distribution laws (using Lagrange's method of undetermined multipliers) Partition functions: Translational,	

				Rotational, Vibrational,	I
				Electronic partitions functions.	
			III^{rd}	Calculation of Thermodynamic	
				properties in terms of partition	
				functions. Heat capacity,	
				behavior of solids chemical	
				equilibria,	I
			IV th	equilibrium constant in terms of	
				partition function	
			V th	F.D. statistics, distribution law	
				and application to metals.	
		November	\mathbf{I}^{st}	Bose Einsteins statistics.	I
				Distribution law &	I
			nd		
			II^{nd}	Its application to Helium.	

End Semester 02-12-17 To 21-12-17 (17 days including

<u>Examinations</u>	Saturday		Thursda	y Saturday)
Semester Vacation	22-12-17	То	07-01-18	(17days)
(Winter Break)	Friday		Sunday	

Academic Term -II

2nd& 4th& 6th semester

Even Semesters

College reopens after 08-01-18To 10-05-18(96 teaching

Semester Examination Monday Thursdaydays)

Total teaching days of Academic Term II= 96 days

BAC	HELOR	OF SC	IENCESe	ssion 201'	7-2018(Second Semester	January-May)
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof.	B.ScI	Paper-VII	January	II^{nd}	UNIT-I	UNIT-I (8 Hrs.)
	Sunny		Physical			Thermodynamics-I:	Thermodynamics-I:
			Chemistry-			Definition of	Definition of Thermodynamic Terms: System, surroundings etc. Types of systems, intensive
			В			Thermodynamic	and extensive properties. State and path functions and their differentials. Thermodynamic
						Terms: System,	process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of
						surroundings etc.	internal energy and enthalpy, Heat capacity, heat capacities at constant volume and pressure
						Types of systems,	and their relationship. Joule's Law-Joule-Thomson coefficient and inversion temperature.
						intensive and	Calculations of w, q, dU & dH for the expansion of ideal gases under isothermal and
						extensive	adiabatic conditions for reversible process.
						properties.	UNIT-II (7 Hrs.)
					III^{rd}	State and path	Thermochemistry:
						functions and their	Standard state, standard enthalpy of formation-Hess's Law of constant Heat Summation and
						differentials	its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of
						Thermodynamic	neutralization. Bond dissociation energy and its calculation from thermo-chemical data,
						process. Concept of	temperature dependence of enthalpy. Kirchoff's equation.
						heat and work.	UNIT-III (7 Hrs.)
						First Law of	Colloidal State:
						Thermodynamics:	Definition of colloids, classification of colloids. <i>Solids in liquids (sols):</i> Properties –kinetic,
						Statement, definition	optical and electrical; stability of colloids, protective action, Hardy-Schulze rules, gold
						of internal energy	number. Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifier. Liquids
						and enthalpy, Heat	in solids (gels): Classification, preparation and properties, inhibition, general applications of
						capacity, heat	colloids.
						capacities at constant	UNIT-IV (8 Hrs.)
						volume and pressure	Solutions, Dilute Solutions and Colligative Properties: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and
					IV th	and their relationship	activity coefficient. Dilute solution, colligative properties, Raoult's law, relative lowering of
					1 V	Joule's Law-Joule- Thomson coefficient	vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its
							measurement, determination of molecular weight from osmotic pressure. Elevation of boiling
						and inversion	point and depression of freezing point. Thermodynamic derivation of relation between
						temperature. Calculations of w, q,	molecular weight and elevation in boiling point and depression of freezing point.
						dU & dH for the	Experimental methods for determining various colligative properties. Abnormal molar mass,
						expansion of ideal	degree of dissociation and association of solutes.
						gases under	degree of disposition and apposition of polates.
						isothermal for	
						reversible process	
						reversible process	

			V^{th}	Joule's Law-Joule-		
				Thomson coefficient		
				and		
				inversion		
				temperature.		
				Calculations of w, q,		
				dU & dH for the		
				expansion of ideal		
				gases under adiabatic		
				conditions for		
				reversible process.		
		February	II^{nd}	UNIT-II		
		•		Thermochemistry:		
				Standard state,		
				standard enthalpy of		
				formation-Hess's		
				Law of constant Heat		
				Summation and its		
				applications.		
			$\mathrm{III}^{\mathrm{rd}}$	Heat of reaction at		
				constant pressure and		
				at constant volume.		
				Enthalpy of		
				neutralization. Bond		
				dissociation		
				energy		
			IV th	Bond dissociation		
				energy calculation		
				from thermo-		
				chemical data,		
				temperature		
				dependence of		
				enthalpy. Kirchoff's		
				equation.		
L	L	 l .		equation.		

		UNIT- III Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols): Properties — kinetic, optical and electrical.		
		Stability of colloids, protective action, Hardy-Schulze rules, gold number.		
	III rd	Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifier		
	IV th	Liquids in solids (gels): Classification, preparation and properties, inhibition, general applications of colloids.		
		UNIT-IV Solutions, Dilute Solutions and Colligative Properties:		
		Ideal and non-ideal solutions, methods of expressing concentrations of		
		solutions, activity and activity Coefficient.		

April I Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. II Dilute solution of somotic pressure and its measurement, determination of molecular weight from osmotic pressure IIII Delevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression of freezing point. IV Delevation of point and depression of freezing point. IV Depressio		ı	1	T		_ct	T =	
properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. IIII determination					April	Isi		
Iaw. relative lowering of vapour pressure, molecular weight determination. III ⁻³								
lowering of vapour pressure, molecular weight determination. III ^{al}								
pressure, molecular weight determination. Il comosis, law of commonity to the common pressure and its measurement, determination of molecular weight from cosmotic pressure Ill composition of pressure and its measurement, determination of molecular weight from cosmotic pressure Ill composition of the common point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression of freezing point. IV Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes. 2. Prof. B.Sc-I Paper-VI January II column.								
weight determination. II ^{rist} Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure III ^{rist} Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression of freezing point. IV ¹⁰ Experimental melhods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of sodues. 2. Prof. B.Sc-I Paper-VI January II ^{rist} UNIT-I UNIT-I (8 Hrs.)								
weight determination. II ^{rist} Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure III ^{rist} Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression of freezing point. IV ¹⁰ Experimental melhods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of sodues. 2. Prof. B.Sc-I Paper-VI January II ^{rist} UNIT-I UNIT-I (8 Hrs.)							pressure, molecular	
III nd							weight	
osmotic pressure and its measurement, determination of molecular weight from osmotic pressure IIIrd Elevation of boiling point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression of freezing point. IVth Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes. 2. Prof. B.Sc-l Paper-VI January IIrd UNIT-I UNIT-I GHrs.)							determination.	
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point and depression of freezing point. Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression of freezing point. IV^th						$\mathrm{III}^{\mathrm{rd}}$		
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dissociation and association of solutes. 2. Prof. B.Sc-I Paper-VI January II nd UNIT-I UNIT-I (8 Hrs.)								
association of solutes. 2. Prof. B.Sc-I Paper-VI January II nd UNIT-I UNIT-I (8 Hrs.)								
2. Prof. B.Sc-I Paper-VI January II nd UNIT-I UNIT-I (8 Hrs.)								
2. Prof. B.Sc-I Paper-VI January II nd UNIT-I UNIT-I (8 Hrs.)								
	2.	Prof.	B.Sc-I	Paper-VI	January	II^{nd}		UNIT-I (8 Hrs.)
		Ruchika					Alkenes,	Alkenes, Cycloalkenes:

	chemistry-			Cycloalkenes :
	В			Nomenclature of
				alkenes, methods of
				formation,
				mechanisms of
				dehydration of
				alcohols and
				dehydrohalogenation
				of alkyl halides,
				regioselectivity in
				alcohol dehydration
			III rd	The Saytzeff's Rule,
			111	Hofmann
				elimination, physical
				properties and
				relative stabilities of
				alkenes. Chemical
				reactions of alkenes –
				mechanisms involved
				in hydrogenation,
				electrophilic and free
				radical additions
			IV th	Markownikoff's rule,
			1 V	hydroboration –
				oxidation,
				oxymercuration-
				reduction.
				Epoxidation,
				ozonolysis,
				hydration,
				hydroxylation and oxidation with
		Cohmission	I st	KMnO4.
		February	1	Polymerization of
				alkenes. Substitution
				at the allylic and
				vinylic positions of
				alkenes. Industrial
				applications of

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. The Saytzeff's Rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes – mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration – oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO4. Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes. Industrial applications of ethylene and propene.

UNIT-II (7 Hrs.)

Dienes and Alkynes:

Methods of formation, conformation and chemical reactions of cycloalkenes. Nomenclature and classification of dienes: Isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions - 1,2 and 1,4 additions, Diels-Alder reaction. Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.

UNIT-III (8 Hrs.)

Arenes and Aromaticity:

Nomenclature of benzene derivatives. The aryl group, Aromatic nucleus and side chain, Structure of benzene, Molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. Aromaticity: The Huckel rule, aromatic ions. Aromatic electrophilic substitution—General pattern of the mechanism, role of σ and π complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Methods of formation and chemical reactions of alkylbenzenes, alkynyl benzenes and biphenyl.

UNIT-IV (7 Hrs.)

Alkyl and Aryl Halides

Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides, SN2 and SN1 reactions with energy profile diagrams. Polyhalogen compounds: chloroform, carbon tetrachloride. Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative relativities of alkyl halides vs. allyl, vinyl and aryl halides.

		ethylene and	
		propene.	
	$\mathbf{II}^{\mathrm{nd}}$	UNIT-II	
		Dienes and Alkynes	
		:Methods of	
		formation,	
		conformation and	
		chemical reactions of	
		cycloalkenes.	
		Nomenclature and	
		classification of	
		dienes: Isolated,	
		conjugated and	
		cumulated dienes.	
	$\mathrm{III}^{\mathrm{rd}}$	Structure of allenes	
	111	and butadiene,	
		methods of	
		formation,	
		polymerization.	
		Chemical reactions –	
		1,2 and 1,4 additions,	
		Diels-Alder	
		reaction.	
	IV th	Nomenclature,	
	1 V	structure and	
		bonding in alkynes. Methods of	
		formation. Chemical	
		reactions of alkynes,	
3.5 1	I st	acidity of alkynes	
March	I"	Mechanism of	
		electrophilic and	
		nucleophilic addition	
		reactions,	
		hydroboration-	
		oxidation,	
		metal-ammonia	
		reductions, oxidation	

	and polymerization.	
$\Pi^{\rm nd}$	UNIT-III	
	Arenes and	
	Aromaticity:	
	Nomenclature of	
	benzene derivatives.	
	The aryl group,	
	Aromatic nucleus	
	and side chain,	
	Structure of benzene	
	: Molecular formula	
	and Kekule structure.	
III^{rd}	Stability and carbon-	
	carbon bond lengths	
	of benzene,	
	resonance	
	structure, MO	
	picture. Aromaticity:	
	The Huckel rule,	
	aromatic ions.	
IV th	Aromatic	
	electrophilic	
	substitution—	
	General pattern of	
	the mechanism, role	
	of σ and π	
	complexes.	
	Mechanism of	
	nitration,	
	halogenation,	
	sulphonation,	
	mercuration and	
	Friedel-Crafts	
	reaction. Energy	
41.	profile diagrams	
V^{th}	Activating and	
	deactivating	
	substituents,	

			orientation and	
			ortho/para ratio. Side	
			chain reactions of	
			benzene derivatives.	
			Methods of	
			formation and	
			chemical reactions of	
			alkylbenzenes,	
			alkynyl benzenes and	
			biphenyl.	
	April	I st	UNIT-IV	
			Alkyl and Aryl	
			Halides	
			Nomenclature and	
			classes of alkyl	
			halides, methods of	
			formation	
		\mathbf{H}^{nd}	Chemical reactions.	
			Mechanisms of	
			nucleophilic	
			substitution reactions	
			of alkyl halides, SN2	
			and SN1 reactions	
			with energy profile	
			diagrams.	
		III rd	Polyhalogen	
			compounds:	
			chloroform, carbon	
			tetrachloride.	
			Methods of	
			formation of aryl	
			halides, nuclear and	
		41-	side chain reactions.	
		IV th	The addition-	
			elimination and the	
			elimination-addition	
			mechanisms of	
			nucleophilic aromatic	

	ı		1		1	T	
						substitution	
						reactions. Relative	
						relativities of alkyl	
						halides vs. allyl,	
						vinyl and aryl	
					nd	halides.	
3.	Prof. Jyoti	B.ScI	Paper- V	January	II nd	UNIT-I	UNIT-I (7 Hrs.)
			Inorganic			Chemical Bonding-	Chemical Bonding-II
			Chemistry-			II Ionic Solids -	Ionic Solids – Concept of close packing, Ionic structures, (NaCl type, Zinc blende, Wurtzite,
			В			Concept of close	CaF ₂ and antifluorite), radius ratio rule and coordination number, limitation of radius ratio
						packing.	rule, lattice defects, semiconductors.
					III rd	Ionic structures,	UNIT-II (8 Hrs.)
						(NaCl type, Zinc	Chemical Bonding-III
						blende, Wurtzite,	Lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids,
						CaF ₂ and	polarizing power and polarisability of ions, Fajan's rule. Metallic bond-free electron, valence
						antifluorite)	bond and band theories. Weak Interactions – Hydrogen bonding, Van der Waals forces.
					IV th	Radius ratio rule and	UNIT-III (7 Hrs.)
						coordination number,	p-Block Elements-I
						limitation of radius	Comparative study (including diagonal relationship) of groups 13-14 elements, compounds
						ratio rule, lattice	like hydrides, oxides, oxyacids and halides of groups 13-14, hydrides of boron-diborane and
						defects,	higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons.
						semiconductors.	UNIT-IV (8 Hrs.)
					V th	UNIT-II	p-Block Elements-II
						Chemical Bonding-	Comparative study of groups 15-17 elements, compounds like hydrides, oxides, oxyacids and
						III Lattice energy	halides of groups 15-17, silicates (structural principle), tetrasulphur tetranitride, basic
						and Born-Haber	properties of halogens, interhalogens and polyhalides.
						cycle	
				February	II^{nd}	Solvation energy and	
				J == ==== J		solubility of ionic	
						solids, polarizing	
						power and	
						polarisability of ions,	
					III rd	Fajan's rule. Metallic	
					111	bond-free electron,	
						valence bond and	
						band theories.	
					IV th	Weak Interactions –	
					1 4	Hydrogen bonding,	
		L				Trydrogen bonding,	

				Van der Waals	
				forces.	
			V th	UNIT-III	
				p-Block Elements-I	
				Comparative study	
				(including diagonal	
				relationship) of	
				groups 13-14	
				elements compounds	
				like hydrides,	
				oxides, oxyacids	
		March	II^{nd}	Comparative study	
				(including diagonal	
				relationship) of	
				groups 13-14	
				elements compounds	
				like hydrides,	
				oxides, oxyacids	
			$\mathrm{III}^{\mathrm{rd}}$	Hydrides of boron-	
				diborane and higher	
				boranes, borazine,	
				borohydrides,	
			IV th	Fullerenes, carbides,	
			V th	Fluorocarbons	
	-	April	I st	UNIT-IV	
		P	-	p-Block Elements-II	
				Comparative study of	
				groups 15-17	
				elements, compounds	
				like hydrides, oxides,	
				oxyacids and halides	
				of groups 15-17	
			$\mathrm{II}^{\mathrm{nd}}$	Comparative study of	
			11	groups 15-17	
				elements, compounds	
				like hydrides, oxides,	
				oxyacids and halides	
				of groups 15-17	
				01 g10ups 13-17	

	$\mathbf{III}^{\mathrm{rd}}$	Halides of groups 15-
		17, silicates
		(structural principle
	IV^{th}	Tetrasulphur
		tetranitride basic
		properties of
		halogens,
		interhalogens and
		polyhalides.

BAC	HELOR	OF SC	IENCE	Session 2017-2018(Fourth Sem			ester January-May)
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof.	B.Sc	Paper-XV	January	II^{nd}	UNIT-I (8 Hrs.)	UNIT-I (8 Hrs.)
	Sunny	II	Physical			Phase equilibrium:	Phase equilibrium:
			Chemistry-			Statement and meaning	Statement and meaning of the terms – phase, component and degree of freedom,
			В			of the terms – phase,	derivation of Gibbs phase rule, phase equilibria of one component system—water, CO ₂
						component and degree	and S systems. Phase equilibria of two component system -solid -liquid equilibria,
						of freedom, derivation	simple eutectic - Bi-Cd system, desiliverisation of lead. Solid solutions—compound
						of Gibbs phase rule	formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-
					$\mathrm{III}^{\mathrm{rd}}$	Phase equilibria of one	
						component system—	water, trimethylamine - water, nicotine -water systems. Lower and upper consolute
						water, CO2 and S	temperature. Effect of impurity on consolute temperature, immiscible liquids, steam
						systems.	distillation. Nernst distribution law-thermodynamic derivation, applications.
					IV^{th}	Phase equilibria of two	UNIT-II (7 Hrs.)
						component system -	Electrochemistry –I:
						solid –liquid equilibria,	Electrical transport -Conduction in metals and in electrolyte solutions, specific
						simple eutectic – Bi-Cd	conductance and equivalent conductance, measurement of equivalent conductance,
						system,	variation of equivalent and specific conductance with dilution. Migration of ions and
						desiliverisation of lead.	Kohlrausch Law, Arrhennius theory of electrolyte dissociation and its limitations, weak

		V th	Solid solutions— compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H ₂ O) system.
	February	$\mathrm{II}^{\mathrm{nd}}$	Freezing mixtures, acetone-dry ice.
		III rd	Partially Miscible Liquids –Phenol-water, trimethylamine – water, nicotine –water systems.
		IV th	Lower and upper consolute temperature. Effect of impurity on consolute temperature, immiscible liquids, steam distillation.
		V th	Nernst distribution law- thermodynamic derivation, applications
	March	III rd	UNIT-II Electrochemistry –I: Electrical transport – Conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, Variation of equivalent and specific conductance with dilution. Migration of

and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.

UNIT-III (8 Hrs.)

Electrochemistry-II:

Types of reversible electrodes – gas metal – ion, metal –insoluble salt – anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode – reference electrodes – standard electrode potential, sign conventions, electrochemical series and its significance.

UNIT-IV (7 Hrs.)

Electrolytic and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells. E.M.F. of a cell and its measurements. Computation of cell E.M.F. Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), Polarization, over potential and hydrogen overvoltage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.

				Law, Arrhennius theory	
				of electrolyte	
				dissociation and its	
				limitations	
			IV^{th}	Weak and strong	
				electrolytes, Ostwald's	
				dilution law, its uses	
				and limitations. Debye-	
				Huckel-Onsager's	
				equation for strong	
				electrolytes (elementary	
				treatment only).	
			V th	Transport number,	
				definition and	
				determination by Hittorf	
				method and moving	
				boundary method.	
		April	I st	UNIT-III	
				Electrochemistry-II:	
				Types of reversible	
				electrodes – gas metal –	
				ion, metal –insoluble	
				salt - anion and redox	
				electrodes. Electrode	
				reactions	
			Π^{nd}	Nernst equation,	
				derivation of cell E.M.F.	
				and single electrode	
				potential, standard	
				hydrogen electrode –	
				reference electrodes -	
				standard electrode	
				potential, sign	
				conventions,	
				electrochemical series	
				and its	
				Significance.	
			$\mathrm{III}^{\mathrm{rd}}$	UNIT-IV (7 Hrs.)	
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						Electrolytic and	
						Galvanic cells -	
						reversible and	
						irreversible cells,	
						conventional	
						representation of	
						electrochemical	
						cells. E.M.F. of a cell	
						and its measurements.	
						Computation of cell	
						E.M.F.	
					IVth	Calculation of	
					1 7 111	thermodynamic	
						quantities of	
						cell reactions ($(\Delta G, \Delta H)$	
						and K), Polarization,	
						over potential and	
						hydrogen overvoltage.	
						Concentration cell with	
						and without transport,	
						liquid junction potential,	
						application of	
						concentration cells,	
						valency of ions,	
						solubility product and	
						activity coefficient,	
						potentiometric titrations.	
2.	Prof.	B.Sc-II	Paper-XIV	January	II^{nd}	UNIT-I	UNIT-II (7 Hrs.)
	Ruchika		Organic			Carboxylic Acid	Carboxylic Acid Derivatives: Structure and nomenclature of acid chlorides, esters,
			chemistry-			Derivatives: Structure	amides and acid anhydrides. Relative stability & reactivityof acyl derivatives. Physical
			В			and nomenclature of	properties, interconversion of acid derivatives by nucleophilic acyl
						acid chlorides, esters,	substitution. Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms
						amides and acid	of esterification and hydrolysis(acidic and basic).
						anhydrides.	UNIT-III (8 Hrs.)
					III rd	Relative stability &	Ethers, Epoxides Fats, Oils and Detergents:
						reactivityof acyl	Nomenclature of ether and methods of their formation, physical properties. Chemical
						derivatives. Physical	reaction-cleavage and autoxidation, Ziesel's method. Synthesis of epoxides. Acid and
						properties,	base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of
						interconversion of acid	Grignard and organolithium reagents with epoxides. Natural fats, edible and industrial
	L			l		interconversion or actu	Singular and organismum reagents with eposition. Trattara ratio, earlier and mutusurar

derivatives by nucleophilic acyl substitution IV th Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and hydrolysis(acidic and basic). February Ist UNIT-II Ethers, Epoxides Fats, Oils and Detergents: Nomenclature of ether and methods of their formation, physical properties. Chemical properties. Chemical reaction-cleavage and autoxidation, Ziesel's method. Ilnd Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxide ring opening, reactions of Grignard and organolithium reagents with peoxides. IIIIrd Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. IV th Saponification value, iodine value, acid value. Soaps, synthetic					
TVth					nucleophilic acyl
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				1 V	
Soaps, synthetic					
	l				Soups, symmetre

oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. Saponification value, iodine value, acid value. Soaps, synthetic detergents; alkyl and aryl sulphonates.

UNIT-IV (7 Hrs.)

Organic Compounds of Nitrogen:

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid. Structure and nomenclature of amines, physical properties. Stereochemistry of amines, Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase transfer catalysis. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction.

UNIT-IV

Electromagnetic Spectrum: Absorption Spectra –I: (7 Hrs.)

Ultraviolet (UV) absorption spectroscopy — Absorption laws (Beer — Lambert Law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones. Woodward Fieser Rules and their applications in calculating maximum values of conjugated alkenes (cyclic as well as acyclic) and conjugated carbonyl compounds.

			detergents; alkyl and	
1			aryl sulphonates.	
1	March	I st	UNIT-III	
			Organic Compounds	
			of Nitrogen:	
			Preparation of	
1			nitroalkanes and	
1			nitroarenes.	
1		II^{nd}	Chemical reactions of	ı
1			nitroalkanes.	ı
1			Mechanisms of	ı
1			nucleophilic substitution	ı
1			in nitroarenes and their	ı
1			reductions in acidic,	ı
1			neutral and alkaline	ı
1			media.	ı
1		III^{rd}	Picric acid. Structure	ı
1			and nomenclature of	ı
1			amines, physical	ı
1			properties.	ı
1			Stereochemistry of	ı
1			amines,	ı
1		IV^{th}	Separation of a mixture	ı
1			of primary, secondary	ı
1			and tertiary amines.	ı
1			Structural features	ı
1			effecting basicity of	ı
1			amines. Amine salts as	ı
1			phasetransfer catalysis.	ı
1		V th	Preparation of alkyl and	ı
1			aryl amines (reduction	ı
1			of nitro compounds,	ı
1			nitriles), reductive	ı
1			amination of aldehydic	ı
1			and ketonic compounds.	ı
1			Gabriel-phthalimide	ı
1			reaction, Hofmann	ı
	1		bromamide reaction.	

			I	April	I st	UNIT-IV	
				April	1	Electromagnetic	
						Spectrum: Absorption	
						Spectrum: Absorption Spectra –I:	
						Ultraviolet (UV)	
						` ,	
						absorption spectroscopy	
						- Absorption laws (Beer	
						– Lambert Law), molar	
						absorptivity,	
						presentation and	
						analysis of UV spectra,	
						types of electronic	
					nd	transitions	
					II^{nd}	Effect of conjugation.	
						Concept of	
						chromophore and	
						auxochrome.	
						Bathochromic,	
						hypsochromic,	
						hyperchromic and	
						hypochromic shifts.	
					$\mathrm{III}^{\mathrm{rd}}$	UV spectra of	
						conjugated enes and	
					.,	enones.	
					IV^{th}	Woodward Fieser Rules	
						and their applications in	
						calculating maximum	
						values of conjugated	
						alkenes (cyclic as well	
						as acyclic) and	
						conjugated carbonyl	
						compounds.	
3.	Prof.	B.Sc	Paper-XIII	January	Π^{nd}	UNIT-I	UNIT-I (8 Hrs.)
	Manpreet	II	Inorganic	-		Chemistry of	Chemistry of Lanthanide Elements:
	Kaur		Chemistry-			Lanthanide Elements:	Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex
			В			Electronic structure,	formation, occurrence and isolation, lanthanide compounds.
						oxidation states	Chemistry of Actinides:
					$\mathrm{III}^{\mathrm{rd}}$	Ionic radii and	General features and chemistry of actinides, chemistry of separation of Np, Pu and Am
	•	1			1		

Al-	lanthanide contraction	from U, similarities between the later actinides and the later lanthanides.
IV th	Complex formation,	UNIT-II (7 Hrs.)
	occurrence and	Acids and Bases:
-	isolation,	Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids
V th	Lanthanide compounds	and bases.
February II nd	Chemistry of	UNIT-III (8 Hrs.)
	Actinides:	Oxidation and Reduction:
	General features and	Use of redox potential data – analysis of redox cycle, redox stability in water – Frost,
	chemistry of actinides	Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements. UNIT-IV (7 Hrs.)
$\mathrm{III}^{\mathrm{rd}}$	Chemistry of separation	Non-aqueous Solvents:
111	of Np, Pu and Am from	Physical properties of a solvent, types of solvents and their general characteristics,
	U,	reactions in non-aqueous solvents with reference to liquid NH ₃ and liquid SO ₂ .
IV^{th}	Similarities between the	
	later actinides and the	
	later lanthanides	
V^{th}	UNIT-II	
	Acids and Bases:	
	Arrhenius, Bronsted-	
	Lowry	
March II nd	The Lux-Flood, solvent	
	system	
$\mathrm{III}^{\mathrm{rd}}$	Lewis concepts of acids	
Al-	and bases.	
IV^{th}	UNIT-III	
	Oxidation and	
	Reduction:	
	Use of redox potential	
	data – analysis of redox	
th	cycle	
V^{th}	Redox stability in water	
	– Frost, Latimer and	
et	Pourbaix diagrams	
April I st	Principles involved in	
	the extraction of the	
nd	elements	
$\mathrm{II}^{\mathrm{nd}}$	UNIT-IV	
	Non-aqueous Solvents:	

		Physical properties of a	
		solvent, types of	
		solvents	
	III^{rd}	General characteristics	
		of solvent, reactions in	
		non-aqueous solvents	
		with reference to liquid	
		NH ₃	
	IV th	Reactions in non-	
		aqueous solvents with	
		reference to liquid SO ₂ .	

BAC	HELOR (OF SC	IENCE	Sessio	n 2017	-2018(Sixth Sem	nester January-May)
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof. Jyoti	B.Sc	Paper-XXI	January	II^{nd}	UNIT-I	UNIT-I (7 Hrs.)
		III	Inorganic			Silicones and	Silicones and Phosphazenes:
			Chemistry-			Phosphazenes:	Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in
			В			Silicones	triphosphazenes.
					III^{rd}	Phosphazenes	UNIT-II (8 Hrs.)
					IV th	Notice of honding in	Hard and Soft Acids and Bases (HSAB):
					1 V	Nature of bonding in	Classification of acids and bases as hard and soft Pearson's HSAB concept, acid-base
						triphosphazenes.	strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness,
					V^{th}	UNIT-II	electronegativity and hardness and softness.
						Hard and Soft	UNIT-III (8 Hrs.)
						Acids and Bases	Electronic Spectra of Transition Metal Complexes:
						(HSAB):	Types of electronic transitions, L - S coupling, selection rules for d-d transitions,
						Classification of	spectroscopic ground states, Orgel – energy level diagram for $d1$ and d^0 states, discussion of
						acids and bases	the electronic spectrum of $[Ti(H2O)_6]^{3+}$ complex ion.

	February	II nd	Pearson's HSAB	UNIT-IV (7 Hrs.)
	1 cordary	"	concept	Magnetic Properties of Transition Metal Complexes:
		III^{rd}	Acid-base strength	Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only
			and hardness and	formula. Correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments,
			softness.	application of magnetic moment data for 3d metal complexes.
		IV th		
		IV	Symbiosis, theoretical basis of	
			hardness and	
			softness,	
			electronegativity and	
			hardness and	
			softness.	
		V th	UNIT-III	
		*	Electronic Spectra	
			of Transition Metal	
			Complexes:	
			Types of electronic	
			transitions	
	March	II^{nd}	L - S coupling,	
			selection rules for d-	
			d transitions	
		III^{rd}	spectroscopic ground	
			states, Orgel -	
			energy level diagram	
		th	for d1 state	
		IV th	Orgel – energy level	
		th	diagram for d ⁰ state	
		V^{th}	Discussion of the	
			electronic spectrum	
			of $[Ti(H2O)_6]^{3+}$	
	A '1	I st	complex ion.	
	April	I"	UNIT-IV	
			Magnetic Properties of Transition Metal	
			Complexes:	
			Types of magnetic	
			behaviour,	
		$\Pi^{\rm nd}$	Methods of	
		п	iviculous 01	

					III rd	determining magnetic susceptibility, spinonly formula Correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, Application of magnetic moment data for $3d$ metal complexes.	
2.	Prof. Vishal Sharma	B.Sc- III	Paper- XXII Organic chemistry- B	February	III rd IV th Ist III rd	UNIT-I Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid- base behavior, isoelectric point and electrophoresis. Preparation and reactions of L- amino acids Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides Classical peptide	UNIT-I (8 Hrs.) Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid- base behavior, isoelectric point and electrophoresis. Preparation and reactions of L- amino acids. Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid – phase peptide synthesis. Structures of peptides and proteins. Levels of protein structure. Protein denaturation/renaturation. Nucleic Acids: Introduction. Constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical Structure of DNA. UNIT-II (7 Hrs.) Synthetic Polymers: Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler – Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers. UNIT-III (7 Hrs.) Organic Synthesis via Enolates: Acidity of á-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation and acylation of enamines. UNIT-IV (8 Hrs.) Organometallic Compounds: Organometallic Compounds: Formation and Chemical reactions. Organolithium Compounds: Formation and Chemical reactions.

		T	
		synthesis, solid -	
		phase peptide	
		synthesis. Structures	
		of peptides and	
		proteins	
	IV th	Levels of protein	
	1 v		
		structure. Protein	
		denaturation/renatura	
		tion. Nucleic Acids :	
		Introduction.	
		Constituents of	
		nucleic acids.	
		Ribonucleosides and	
		ribonucleotides. The	
		double helical	
		Structure of DNA.	
March	I st	UNIT-II	
111111111111111111111111111111111111111	1	Synthetic Polymers:	
		Addition or chain-	
		growth	
		polymerization. Free	
		radical vinyl	
		polymerization, ionic	
	nd nd	vinyl polymerization,	
	II nd	Ziegler – Natta	
		polymerization and	
		vinyl polymers.	
		Condensation or step	
		growth	
		polymerization.	
		Polyesters,	
		polyamides,	
	III rd	Phenol formaldehyde	
	111		
		formaldehyde resins, epoxy resins and	
.	1	Leboxy resins and L	
'			
	IV th	polyurethanes. Natural and synthetic	

rubbers.	
UNIT-III	
Organic Synthesis	
via Enolates:	
Acidity of ά-	
hydrogens,	
V th Alkylation of diethyl	· ·
malonate and ethyl	
acetoacetate.	
April I st Synthesis of ethyl	· ·
acetoacetate: the	· ·
Claisen	
condensation. Keto-	
enol tautomerism of	
ethyl acetoacetate.	
Alkylation and	
acylation of	
enamines.	
II nd UNIT-IV	
Organometallic	
Compounds:	
Organomagnesium	
Compounds: The	
Grignard reagents –	
Formation, structure	
and chemical	
reactions.	
III rd Organozinc	
Compounds:	
Formation and	
Chemical reactions.	
IV th Organolithium	
Compounds:	
Formation and	
Chemical reactions.	
3. Dr. Rishu B.Sc Paper- January II nd UNIT-I UNIT-I (7 Hrs.)	
Jain III XXIII Solid State-I: Solid State-I:	
Physical Definition of space Definition of space lattice, unit cell and	Miller Indices Laws of Crystallography – (i) Law of

	Chemistry-			lattice, unit cell and
	В			Miller Indices
			III^{rd}	Laws of
				Crystallography – (i)
				Law of Constancy of
				Interfacial Angles,
				(ii) Law of
				Rationality of
				Indices, (iii) Law of
			41-	Symmetry.
			IV th	Symmetry elements
			th	in crystals.
			V th	UNIT-II (8 Hrs.)
				Solid State-II:
				X-ray diffraction by
				crystals. Derivation
		Ealaman	II nd	of Bragg equation. Determination of
		February	111	Determination of crystal structure of
				NaCl, KCl and CsCl
				(Laue's method and
				powder method).
			III rd	Applications of
				Powder diffraction
				for structure
				determination
			IV th	Thermal and
				photochemical
				reaction in solid state
			V th	UNIT-III
				Spectroscopy:
				Introduction :
				Electromagnetic
				radiation, regions of
		36 1	nd	the spectrum,
		March	II^{nd}	Basic features of
				different
				spectrometers,

Constancy of Interfacial Angles, (ii) Law of Rationality of Indices, (iii) Law of Symmetry. Symmetry elements in crystals.

UNIT-II (8 Hrs.)

Solid State-II:

X-ray diffraction by crystals. Derivation of Bragg equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method). Applications of Powder diffraction for structure determination, Thermal and photochemical reaction in solid state

UNIT-III (8 Hrs.)

Spectroscopy:

Introduction: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Rotational Spectrum:

Diatomic molecules. Energy levels of a rigid rotor (semi – classical principles), selection rules, spectral intensity, determination of bond length, qualitative description of non-rigid rotor, isotope effect.

UNIT-IV (7 Hrs.)

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.

Electronic Spectrum:

Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck- Condon principle. Qualitative description of σ , π and n M.O., their energy levels and the respective transitions.

				statement of the		
				Born-Oppenheimer		
				approximation,		
				degrees of freedom.		
			III rd	Rotational		
				Spectrum:		
				Diatomic molecules.		
				Energy levels of a		
				rigid rotor (semi –		
				classical principles),		
				selection rules,		
				spectral intensity,		
			IV th	Determination of		
			1 4	bond length,		
				qualitative		
				description of non-		
				rigid rotor, isotope		
				effect.		
			V th	UNIT-IV		
			l v	Vibrational		
				Spectrum:		
				Infrared Spectrum :		
				Energy levels of		
				oscillator, selection		
				rules, pure		
				vibrational spectrum		
				intensity,		
				determination of		
				force constant and		
				qualitative relation of		
				force constant and		
			-et	bond energies,		
		April	I st	Effect of anharmonic		
				motion and isotope		
				on the spectrum, idea		
				of vibrational		
	1			frequencies of		

	different functional		
	groups.		
II^{nd}	Raman Spectrum :		
	Concept of		
	polarizability, pure		
	rotational and pure		
	vibrational, Raman		
	spectra of diatomic		
	molecules, selection		
	rule		
$\mathrm{III}^{\mathrm{rd}}$	Electronic		
	Spectrum: Concept		
	of potential energy		
	curves for bonding		
	and antibonding		
	molecular orbitals,		
	qualitative		
	description of		
	selection rules and		
	Franck- Condon		
	principle.		
IV^{th}	Qualitative		
	description of s, p -		
	and n M.O., their		
	energy levels and the		
	respective		
	transitions.		

MAS'	TER OF S	CIENC	E Ses	sion 2017-2	2018(S	econd Semester)	
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Dr. Geeta	M.ScI	CH-421-	January	II^{nd}	UNIT 1	UNIT 1
	Jallan		Inorganic			Electronic Spectra and	Electronic Spectra and Magnetic Properties Of Transition Metal
			chemistry			Magnetic Properties Of	Complexes-I (15 Hrs.)
						Transition Metal Complexes-	Spectroscopic ground states, correlation, Orgel and Tanabe-Sugano
						Spectroscopic ground states,	diagrams for transition metal complexes (d1-d9 states), calculations of Dq,
						correlation, Orgel and Tanabe-	B and β parameters, charge transfer spectra and Heteropoly Acids And
						Sugano diagrams	Salts
					III rd	For transition metal complexes	UNIT 2
						(d1-d9 states), calculations of	Electronic Spectra and Magnetic Properties Of Transition Metal
						Dq, B and β parameters,	Complexes-II (15 Hrs.)
					IV th	Charge transfer spectra and	Spectroscopic method of assignment of absolute configuration in optically
						Heteropoly Acids And Salts	active metal chelates and their stereo chemical information, anomalous
						UNIT 2	magnetic moments, magnetic exchange coupling and spin crossover.
						Electronic Spectra and	UNIT 3
						Magnetic Properties Of	Metal Π–Complexes (15 Hrs.)
						Transition Metal Complexes-II	Metal carbonyls, structure and bonding, vibrational spectra of metal
						Spectroscopic method of	carbonyls for bonding and structure elucidation, important reaction of metal
						assignment of absolute	carbonyls. Preparation, bonding structure and important reactions of
						configuration in optically active	transition metal nitrosyl, dinitrogen and dioxygen complexes, tertiary phosphine as ligand.
					V th	metal chelates	UNIT 4
					V	Their stereo chemical information, Anomalous	Metal Cluster (15 Hrs.)
						The state of the s	Higher boranes, carboranes, metallobranes and metallocarboranes, metal
				February	I st	magnetic moments, Magnetic exchange coupling and	carbonyl and halide clusters, compounds with metal-metal multiple bonds.
				rebruary	1	spin crossover.	
						UNIT 3	
						Metal II–Complexes	
						Metal Carbonyls, structure and	
						bonding	
					II nd	Vibrational spectra of metal	
					11	carbonyls for bonding and	
						structure elucidation,	
			<u> </u>			structure enucluation,	

				1	TTTI	T	
					III rd	Important reaction of metal	
						carbonyls. Preparation, bonding,	
						structure of transition metal	
						nitrosyl,	
					IV th	Preparation, bonding, structure	
						of transition metal dinitrogen	
						and dioxygen complexes,	
						tertiary phosphine as ligand.	
				March	I st	Important reactions of transition	
						metal nitrosyl, dinitrogen and	
						dioxygen complexes	
					II nd	Important reactions of transition	
						metal tertiary phosphine as	
						ligand.	
					$\mathrm{III}^{\mathrm{rd}}$	UNIT 4	
						Metal Cluster	
						Higher boranes, carboranes,	
						metallobranes	
					IV^{th}	Metallocarboranes, metal	
						carbonyl and halide clusters,	
				April	I st	Compounds with metal-metal	
						multiple bonds.	
2.	Dr.	M.Sc-I	CH-422	January	II nd	UNIT 3	UNIT 3
	Arvinder		Organic			Free Radical Reactions	Free Radical Reactions (8 Hrs.)
	Kaur		Chemistry-II			Type of free radical reactions,	Type of free radical reactions, free radical substitution mechanism at an
						free radical substitution	aromatic substrate, neighbouring group assistance. Reactivity for aliphatic
						mechanism at an aromatic	and aromatic substrates at a bridgehead. Reactivity in the attacking radicals.
						substrate	The effect of solvents on reactivity. Allylic halogenation (NBS), oxidation
					$\mathrm{III}^{\mathrm{rd}}$	Neighbouring group assistance.	of aldehydes to carboxylic acids, auto-oxidation. Coupling of alkynes and
						Reactivity for aliphatic and	arylation of aromatic compounds by diazonium salts. Sandmeyer reaction.
						aromatic substrates at a	Free Radical Rearrangement. Hunsdiecker reaction.
						bridgehead.	Elimination Reaction (7 Hrs.)
					IV th	Reactivity in the attacking	The E2, E1 and E1cB mechanisms and their spectrum, Orientation of the
						radicals. The effect of solvents	double bond. Reactivity effects of substrate structure, attacking base, the
						on reactivity. Allylic	leaving group and the medium.
						halogenation (NBS)	Mechanism and orientation in pyrolytic elimination.
		-				<u> </u>	

		V th	Oxidation of aldehydes to carboxylic acids, auto-oxidation.	UNIT 4 Pericyclic Reactions
	February	I st	Coupling of alkynes and arylation of aromatic compounds by diazonium salts. Sandmeyer reaction. Free Radical Rearrangement. Hunsdiecker reaction.	Molecular orbital symmetry, frontier orbital symmetry, frontier orbital system. Class Woodward-Hoffmann correlation diagratelectrocyclic reactions conrotatory and callyl system. Cycloadditions-antarafacia 4n+2 systems, 2+2 addition of ketenes cheleotropic reactions. Sigmatropic
		$\mathbf{II}^{\mathrm{nd}}$	Elimination Reaction The E2, E1 and E1cB mechanisms and their spectrum,	antarafacial shifts of H. Sigmatropic shi 3]-and [5, 5]- sigmatropic rearrangement rearrangement. Fluxional tautomerism. En
		$\mathrm{III}^{\mathrm{rd}}$	Orientation of the double bond. Reactivity effects of substrate structure, attacking base,	rearrangement. I ruxionar tautomensin. Er
		IV th	The leaving group and the medium. Mechanism and orientation in pyrolytic elimination.	
	March	I st	Pericyclic Reactions Molecular orbital symmetry, frontier orbitals of ethylene, 1,3- butadiene	
		II nd	1, 3, 5-hexatriene and allyl system. Classification of pericyclic reactions. Woodward-Hoffmann correlation diagrams.	
		III rd	FMO and PMO approach. Electrocyclic reactions conrotatory and disrotatory motions 4n, 4n +2 and allyl	
		IV th	system. Cycloadditions-antarafacial suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketenes, 1, 3-dipolar cycloadditions	

(15Hrs.)

rbitals of ethylene, 1,3-butadiene, 1, assification of pericyclic reactions. grams. FMO and PMO approach. disrotatory motions 4n, 4n +2 and cial suprafacial additions, 4n and es, 1, 3-dipolar cycloadditions and rearrangements-Suprafacial and hifts involving carbon moieties, [3, nents. Claisen, Cope and aza-Cope Ene reaction.

Sigmatropic rearrangements Suprafacial and antarafacia shifts of H. Sigmatropic rearrangements. III ^{nul} [3,3]-and [5,5]- sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangement. Fluxional tautomerism. Ene reaction. UNIT 1 Reaction Mechanism, Structure and Reactivity Types of mechanism, types of reactions, thermodynamics and kinetic requirement. IIII ^{nul} Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. Vib. Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. Vib. Addition to Carbon-Carbon Multiple Bonds Mechanistic and stereochemical aspects of addition reaction involving electrophiles, nucleophiles and frer radicals, regio and demonsteric addition reaction involving electrophiles, nucleophiles electrophiles, nucleophiles electrophiles, nucleophiles early provided reduction of saturated and unsaturated carbonyl compounds, esters and nitriles. Addition Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mamnich. Beaction Mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (8 Hrs.) Types of mechanism, Structure and Reactivity (9 Hrs.) Types of mechanism, Structure and Reactivity (9 Hrs.) Types of mechanism, Structure and Reactivity (9					April	I st	Cheleotropic reactions.	
Suprafacial and antarafacial shifts of H. Sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangements. Fluxional tautomerism. Ene reaction. 3. Dr. Rishu Jain Dr. Rishu Jain Dr. Rishu Jain Dr. Rishu Jain Jain January Organic chemistry-II Dr. Rishu Jain Jain January Janua					Apin	1		
shifts of H. Sigmatropic shifts involving carbon moieties								
Indicate Indicate								
3. Dr. Rishu Jain M.Sc1 CH-42 Organic chemistry-II Draw								
3. Dr. Rishu Jain 3. Dr. Rishu Jain 3. Dr. Rishu Jain 3. Dr. Rishu Jain 4. Dr. Rishu Jain 5. CH-42 Organic chemistry-II 6. Dr. Rishu Jain 6. Dr. Rishu Jain 6. Dr. Rishu Jain 7. Dr. Rishu Jain 8. Dr. Rishu Jain 9. Dr. Reaction Mechanism, Structure and Reactivity (8 Hrs.) 7. Types of mechanism, types of reations, thermodynamics and kinetic requirement. Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hamment Principle, Potential energy diagrams, transition and stereochemical aspects of addition to Carbon-Carbon Multiple Bonds (7 Hrs.) 9. Mechanistic and stereochemical aspects of addition to Carbon-Carbon Multiple Bonds (15 Hrs.) 9. Mchanism of metal hydride reduction of saturated arbonyl compounds. Wittig reaction. Mechanism of condensation reaction involving electrophiles, nucleophiles 9. Addition to Carbon-Heteroatom Multiple Bonds (15 Hrs.) 9. Addition to Carbon-Carbon Machanism, structure and Reactivity (9 Hrs.) 9.						TTnd		
3. Dr. Rishu Jain Dr. Reaction Mechanism, Structure and Reactivity (8 Hrs.) Types of reactions, thermodynamics and kinetic requirement. Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. Addition to Carbon-Carbon Multiple Bonds (7 Hrs.) Mechanistic and stereochemical aspects of addition to exciton. Sharpless asymmetric epoxidation. UNIT 2 Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanism of metal hydride reduction of saturated and unsaturated and organolithium reagents to carbonyl and unsaturated arbonyl compounds, esters and nitriles. Addition of grignard reagents, organozine and organolithium reagents to carbonyl audunsaturated arbonyl compounds. Wiltig reactions. Hydrobyasi of este						111		
3. Dr. Rishu Jain M.ScI Organic chemistry-II III Reaction Mechanism, Structure and Reactivity Types of mechanism, types of reactions, thermodynamics and kinetic requirement. IIII Addition to Carbon-Carbon Multiple Bonds (15 Hrs.) IVIN Addition to Carbon-Carbon Multiple Bonds (15 Hrs.) Viii Addition to Carbon-Carbon Multiple Bonds (15 Hrs.) Viii Addition reaction involving electrophiles, nucleophiles February Is Free radicals, regio and Flexion involving electrophiles and greactions. Hydrolysis of esters and mineters and min								
The control of the								
January Jain Dr. Rishu Jain M.ScI CH-42 Organic chemistry-II A limit limit limits								
Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. Vih Addition to Carbon-Carbon Multiple Bonds Mechanistic and stereochemical aspects and stereochemical aspects of addition reaction involving electrophiles, nucleophiles and stereochemical aspects of addition reaction involving electrophiles, nucleophiles and organozinc and organozinc and organozinc and organozinc and organozinc and otherwise of esters and animals.	2	D D' 1	MCI	CII 40	T	TTNd		TINTED 4
chemistry-II Structure and Reactivity Types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of mechanism, types of reactions, thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. III rd Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. IV th Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. V th Addition to Carbon-Carbon Multiple Bonds (7 Hrs.)	3.		M.Sc1		January	11		
of mechanism, types of reactions, thermodynamics and kinetic requirement. IIIIrd Kinetic and thermodynamics and kinetic requirement. IIIIrd Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, Potential energy diagrams, intermediates, postulate, Curtin-Hammett Principle, Potential energy diagrams, transition states and intermediates, method of determining and intermediates, method of determining mechanisms, isotope effects. Vin Addition to Carbon-Carbon Multiple Bonds (7 Hrs.) Mechanistic and stereochemical aspects of addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic ring. Hydrogenation. UNIT 2 Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, esters and nitriles. Addition of grignard reagents, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enclates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,		Jain						
reactions, thermodynamics and kinetic requirement. III rd Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, Potential energy diagrams, transition of the curtin-Hammett Principle, electrophiles, nucleophiles and free radicals, regio and intermediates, method of determining mechanisms, isotope effects. Vih Addition to Carbon-Carbon Multiple Bonds (15 Hrs.) February I rd Free radicals, regio and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic ring. Hydroboration. UNIT 2 Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, esters and nitriles. Addition of grignard reagents, organozine and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,				cnemistry-II				
kinetic requirement. IIII rd Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, IV th Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. V th Addition to Carbon-Carbon Multiple Bonds (7 Hrs.) Mechanistic and stereochemical aspects of addition reaction involving electrophiles, nucleophiles and free radicals, regio and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic ring. Hydrogenation. Michael reaction. Sharpless asymmetric epoxidation. UNIT 2 Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanistic and stereochemical aspects of addition reactioning mechanisms, isotope effects. Addition to Carbon-Carbon Multiple Bonds (7 Hrs.) Mechanistic and stereochemical aspects of addition reaction. Sharpless asymmetric epoxidation. UNIT 2 Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, esters and nitriles. Addition of grignard reagents, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,								
III rd Kinetic and thermodynamics control, Hammond's postulate, Curtin-Hammett Principle, IV th Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. V th Addition to Carbon-Carbon Multiple Bonds (7 Hrs.)								
control, Hammond's postulate, Curtin-Hammett Principle, IV th Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. V th Addition to Carbon-Carbon Multiple Bonds Mechanistic and stereochemical aspects of addition reaction involving electrophiles, nucleophiles and free radicals, regio and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydroboration. Michael reaction. Sharpless asymmetric epoxidation. UNIT 2 Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, esters and nitriles. Addition of grignard reagents, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,						rd		
Curtin-Hammett Principle, IV th Potential energy diagrams, transition states and intermediates, method of determining mechanisms, isotope effects. V th Addition to Carbon-Carbon Multiple Bonds Mechanistic and stereochemical aspects of addition reaction involving electrophiles, nucleophiles February I ^{SI} Free radicals, regio and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic ring. Hydroboration. Michael reaction. Sharpless asymmetric epoxidation. UNIT 2 Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, esters and nitriles. Addition of grignard reagents, organozine and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,						III''		
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isotope effects. Vth Addition to Carbon-Carbon Multiple Bonds (15 Hrs.) Multiple Bonds Mechanistic and stereochemical aspects of addition reaction involving electrophiles, nucleophiles February Ist Free radicals, regio and Addition To Carbon-Heteroatom Multiple Bonds (15 Hrs.) Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, esters and nitriles. Addition of grignard reagents, organozine and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,							•	
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Multiple Bonds Mechanistic and stereochemical aspects of addition reaction involving electrophiles, nucleophiles February Multiple Bonds Mechanistic carbonyl compounds, esters and nitriles. Addition of grignard reagents, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,								
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February I st Free radicals, regio and Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides,								
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chemoselectivity, orientation and ammonolysis of esters.					February	I st		
	ļ						chemoselectivity, orientation and	ammonolysis of esters.
reactivity.							reactivity.	
II nd Addition to cyclopropane ring.						$\overline{\mathrm{II}^{\mathrm{nd}}}$	Addition to cyclopropane ring.	
Hydrogenation of double and	ļ						Hydrogenation of double and	
triple bonds,							triple bonds,	
III rd Hydrogenation of aromatic ring.						$\mathrm{III}^{\mathrm{rd}}$	Hydrogenation of aromatic ring.	
Hydroboration. Michael							Hydroboration. Michael	
reaction. Sharpless asymmetric	1						reaction. Sharpless asymmetric	

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	l I	1	'		41-	epoxidation.]
	1	1	'		IV th	UNIT 2	
	l I	1	'		'	Addition To Carbon-	
	1	1	'		'	Heteroatom Multiple Bonds	!
	l I	1	'		'	Mechanism of metal hydride	!
	l I	1	'		'	reduction of saturated and	!
	 	1	'		'	unsaturated carbonyl compounds	
	ı l	1	'	March	I st	Esters and nitriles. Addition of	
	 	1	'		'	grignard reagents, organozinc	
	1	1	'		'	and organolithium reagents	
	1	1	'		II^{nd}	To carbonyl and unsaturated	
	 	1	'		'	carbonyl compounds. Wittig	
	 	1	'		'	reaction. Mechanism of	
		1	'		'	condensation reactions	
	 	1	'		III^{rd}	Involving enolates-Aldol,	
	 	1	'		'	Knoevenagel, Claisen, Mannich,	
	1	1	'		'	Benzoin,	
	l I	1	'		IV th	Perkin and Stobbe reactions.	1
	ı l	1	'		'	,	ļ ,
	l I	1	'	April	I st	Hydrolysis of esters and amides,	
	l I	1	'		'	ammonolysis of esters.	
4.	Prof. Sunny	M.Sc-I	CH-424	January	II^{nd}	UNIT 1	UNIT 1
	1	1	Group		1	Symmetry And Group Theory	Symmetry And Group Theory In Chemistry: (15 Hrs.)
	1	1	Theory,	1	1	In Chemistry: Symmetry	Symmetry elements & symmetry operation, definitions of group, subgroup,
	1	1	Spectroscopy	1	1	elements & symmetry operation,	relation between orders of a finite group & its sub groups. Point group
	1	1	and		1	definitions of group, subgroup,	symmetry. Representations of groups by matrices (representation for the
	1	1	Diffraction		$\mathrm{III}^{\mathrm{rd}}$	Relation between orders of a	Cn, Cnv, Cnn, Dnn etc. group) character of a representation. The great
	 	1	Methods-IV			finite group & its sub groups.	orthogonality theorem and its importance character tables and there use-in
	1	1	1,10,110		1	Point group symmetry.	spectroscopy.
	1	1	'		IV th	Representations of groups by	UNIT 2
	1	1	'	1	1,	matrices (representation for the	Microwave Spectroscopy: (15 Hrs.)
	1	1	'		1	Cn, Cnv, Cnn, Dnn etc. group)	Classification of molecules rigid rotor model, effect of isotopes; non rigid
	1	1	'		1	character of a representation.	rotor Stark effect, nuclear and electron spin interaction & effect of external
	1	1	'		V th	The great orthogonality theorem	field.
	1	1	'		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	and its importance character	Vibrational Spectroscopy:
	1	1	'		1	tables and there use-in	Infrared Spectroscopy: Linear Harmonic Oscillator, Vibrational energy of
	1	1	'	1	1		diatomic molecule zero point energy, force constants & bond lengths
	1	1	'	February	Tst	spectroscopy. UNIT 2	anharmonicity, morse potential energy diagram. Vibrational rotational
			'	rebruary	11	UNII 2	annatmomenty, morse potential energy diagram. Violational Totallonal

	1		T	\top	T	Thr:	27 attack and D. O. D. bronch as Collection rules Normal modes of vibration
	ı l	1	1			Microwave Spectroscopy:	spectroscopy, P, Q, R, branches. Selection rules Normal modes of vibration,
	, ,	,	1			Classification of molecules rigid	group frequencies, overtones, hot bands, Raman Vibrational:- Classical &
	1	1 '	1		nd	rotor model, effect of isotopes;	quantum theories of Raman effect pure rotational, and vibrational.
	, ,	,	1		$\mathrm{II}^{\mathrm{nd}}$	Non rigid rotor Stark effect,	Rotational Raman spectroscopy. Coherent anti stokes Raman spectroscopy.
	, ,	1 '	1			nuclear and electron spin	
		'	1			interaction	_
		'	1		$\mathrm{III}^{\mathrm{rd}}$	Effect of external field.	
	1	1 '	1			Vibrational Spectroscopy:	
		'	1			Infrared Spectroscopy:- Linear	
		'	1			Harmonic Oscillator,	_
	1	1 '	1		IV^{th}	Vibrational energy of diatomic	
		'	1			molecule zero point energy,	
	1	1 '	1			force constants & bond lengths	
		'	1			anharmonicity, morse potential	
	1	1 '	1		<u> </u>	energy diagram.	
	1	1 '	1	March	I st	Vibrational rotational	
	1	1 '	1			spectroscopy, P, Q, R, branches.	
		'	1			Selection rules Normal modes of	
	1	1 '	1			vibration	
	, J	1	1		II^{nd}	Group frequencies, overtones,	
	1	1 '	1			hot bands,	
	, J	1	1		$\mathrm{III}^{\mathrm{rd}}$	Raman Vibrational:- Classical &	
		'	1			quantum theories of Raman	
	1	1 '	1			effect pure rotational,	
	, J	1	1		IV^{th}	Vibrational Rotational Raman	
	1	1 '	1			spectroscopy. Coherent anti	
	, ,	1	1			stokes Raman spectroscopy.	
5.	Prof. Vishal	M.Sc-I	CH-424	January	II^{nd}	UNIT 3	UNIT 3
	Sharma	1	Group	-		Molecular Spectroscopy:	Molecular Spectroscopy: (15 Hrs.)
	1	1 '	Theory,			Energy levels, molecular orbital,	Energy levels, molecular orbital, Frank Condon's Principles, electronic
		'	Spectroscopy			Frank Condon's Principles,	spectra of polyatomic molecules emission spectra; radiative & non radiative
	1	1 '	and		$\mathrm{III}^{\mathrm{rd}}$	Electronic spectra of polyatomic	decay. Spectra of transition metal
	1	1 '	Diffraction			molecules emission spectra;	complexes; change transfer spectra.
		'	Methods-IV			radiative & non radiative decay	Basic Principles Photoelectric Effect, Ionization Process:
	ı l	1	1		IV th	Spectra of transition metal	Koopman's theorem, photoelectron spectra of simple molecule. Auger
		'	1			complexes; change transfer	electron spectroscopy.
	1	1 '	1			spectra.	Diffraction:
			'			Special.	,

		V th	Basic Principles Photoelectric	Bragg's condition, Miller indices. Debye-Scherrer method for structure
		\ \ \	Effect, Ionization Process:	analysis. Principal and applications of neutron diffraction and electron
			Koopman's theorem,	diffraction
			photoelectron spectra of simple	UNIT 4
		1	molecule.	Magnetic Resonance Spectroscopy: (15 Hrs.)
	Folom: 2	I st		Nuclear Magnetic Resonance Spectroscopy: (15 Hrs.)
	February	1	Auger electron spectroscopy.	
			Diffraction:	Nuclear spin, Nuclear resonance, shielding of magnetic nuclei, chemical shifts deshielding, spin spin interactions, (ABX, AMX, ABC, A2 B2) spin
			Bragg's condition, Miller indices.	decoupling. Electron Spin resonance spectroscopy:-Basic values factors
		II nd	Debye-Scherrer method for	affecting 'g' value. Measurements, techniques, applications. Nuclear
		11	structure analysis. Principal and	Quadrupole Resonance spectroscopy:- Quadrupole Nuclear moments,
			applications of neutron	electic field gradient complex constants applications.
			diffraction and electron	
			diffraction	
		III rd	UNIT 4	
			Magnetic Resonance	
			Spectroscopy: (15 Hrs.)	
			Nuclear Magnetic Resonance	
			Spectroscopy:-	
			Nuclear spin, Nuclear resonance,	
			shielding of magnetic nuclei,	
		IV th	Chemical shifts deshielding, spin	
			spin interactions, (ABX, AMX,	
			ABC, A2 B2) spin decoupling.	
	March	I st	Electron Spin resonance	
			spectroscopy:-Basic values	
			factors affecting 'g' value.	
		II^{nd}	Measurements, techniques,	
			applications	
		$\mathrm{III}^{\mathrm{rd}}$	Nuclear Quadrupole Resonance	
		1	spectroscopy:- Quadrupole	
			Nuclear moments,	
		IV th	Electic field gradient complex	
			constants applications.	

6.	Dr. Geeta Jallan	M.ScI	CH-423 Physical	January	II^{nd}	UNIT 1 Chemical Dynamics: Methods	1
	Janan		Chemistry-III			of determining rate laws, ionic	
						reactions*, kinetic salt effects,	
						steady state kinetics	i
					$\mathrm{III}^{\mathrm{rd}}$	Kinetic & thermodynamic	١,
						control of reactions, treatments	(
						of unimolecular reactions,	
						Dynamic chain (pyrolysis of acetaldehyde	
						composition of ethane),	
					IV th	Photochemical (H ₂ -Cl ₂)	ŀ
						reactions & oscillatory reactions	
						(Belousov-Zhabotinsky	1
						reaction), homogeneous	1
						catalysis, kinetics of enzyme	
					V th	reactions,	۱,
					V···	General features of fast reactions, study of fast reactions	'
						by flow method, relaxation]
						method, flash photolysis, and]
						NMR method,	1
				February	\mathbf{I}^{st}	Dynamics of molecular motion,	١.
						probing the transition state,	
						dynamics of barrierless chemical	
					**nd	reactions in solution,	١,
					II^{nd}	Dynamics of unimolecular reaction (Lindemann-	١,
						Hinshelwood and Rice-	
						Ramsperger-Kassel-Marcus	
						Theories of unimolecular	
						reactions)	
					$\mathrm{III}^{\mathrm{rd}}$	UNIT 2	1
						Non-equilibrium	
						Thermodynamics:	
						Thermodynamic criteria for non	
						eqbm states, entropy production	
						and entropy flow,	L

UNIT 1

Chemical Dynamics:

(15 Hrs.)

Methods of determining rate laws, ionic reactions*, kinetic salt effects, steady state kinetics, kinetic & thermodynamic control of reactions, treatments of unimolecular reactions, Dynamic

chain (pyrolysis of acetaldehyde composition of ethane), photochemical ($H_2\text{-}Cl_2$) reactions & oscillatory reactions (Belousov-Zhabotinsky reaction), homogeneous catalysis, kinetics of enzyme reactions, general features of fast reactions, study of fast reactions by flow method, relaxation method, flash photolysis, and NMR method, dynamics of molecular motion, probing the transition state, dynamics of barrierless chemical reactions in solution, dynamics of unimolecular reaction (Lindemann-Hinshelwood and Rice-Ramsperger-Kassel-Marcus Theories of unimolecular reactions)

UNIT 2

Non-equilibrium Thermodynamics:

(15Hrs.)

Thermodynamic criteria for non eqbm states, entropy production and entropy flow, entropy balance eqns for different irreversible processes (eg. heat flow, chemical reaction etc.), transformation of generalized fluxes and forces, noneqbm stationary states, phenomenological equators, microscopic reversibility and onsager's reciprocity relations, electro kinetic phenomenon, diffusion, electrical conduction, irreversible thermodynamics for biological system, coupled reactions.

Macromolecules:

Electrically conducting, fire resistant, liquid crystal polymers, Kinetics of polymerization, mechanism of polymerization, mol.mass determination (osmometry, viscometry, diffusion & light scattering methods), sedimentation, chain config. of macromolecules, calculation of average dimensions.

					IV th	Entropy balance eqns for different irreversible processes (eg. heat flow, chemical reaction etc.), transformation of generalized fluxes and forces,	
				March	I st	Noneqbm stationary states, phenomenological equators, microscopic reversibility and onsager's reciprocity relations,	
					II^{nd}	Electro kinetic phenomenon, diffusion, electrical conduction,	
					$\mathrm{III}^{\mathrm{rd}}$	Irreversible thermodynamics for biological system, coupled reactions.	
					IV th	Macromolecules: Electrically conducting, fire resistant, liquid crystal polymers, Kinetics of polymerization,	
				April	I st	Mechanism of polymerization, mol.mass determination (osmometry, viscometry, diffusion & light scattering methods),	
					Π^{nd}	Sedimentation, chain config. of macromolecules, calculation of average dimensions.	
7.	Prof. Vishal	M.Sc-I	CH-423 Physical Chemistry-III	January	II nd	UNIT 3 Surface Chemistry Adsorption: Surface tension, capillary action, pressure difference across curved surface (Laplace eqn), vapour pressure of droplets	UNIT 3 Surface Chemistry Adsorption: Surface tension, capillary action, pressure difference across curved surface (Laplace eqn), vapour pressure of droplets, (Kelvin eqn), Gibb's adsorption isotherm, estimation of surface area (BET eqn), surface films on liquids (electro kinetic phenomenon), catalytic activity at surfaces. Micelles: Surface active agents, classification of surface active agents,

 <u> </u>	1	1	rd	Tora to the control of the control o	
			III rd	(Kelvin eqn), Gibb's adsorption isotherm, estimation of surface area (BET eqn), surface films on liquids (electro kinetic phenomenon),	micellisation, hydrophobic interactions, critical micellar concentration, factors affecting CMC of surfactants, counter ions binding to micelles, thermodynamics of micellization-phase separation & mass action models, solubilization, microemulsion, reverse micelles. UNIT 4 Electrochemistry: (15 Hrs.)
			IV th	Catalytic activity at surfaces. Micelles: Surface active agents, classification of surface active agents, micellisation, hydrophobic interactions,	Electrochemistry: Electrochemistry of solutions, Debye-Huckel treatment, and its extension, ion solvent interaction, Debye-Huckel-Jerrum model, Thermodynamics of electrified interface equations, derivation of electrocapillarity, Lippmann equations (surface excess), Methods of determining structures of electrified interfaces, Guoy-Chapman, Stern. Over potentials, exchange current
			V th	Critical micellar concentration, factors affecting CMC of surfactants, counter ions binding to micelles, thermodynamics of micellization-phase separation	density, derivation of Butler-volmer equation. Tafel plots. Quantum aspects of charge transfer at electrode solution interfaces, quantization of charge transfer, tunnelling Semiconductor interfaces- theory of double layer interfaces, effects of light at semiconductor solution interface.
		February	I st	Mass action models, solubilization, microemulsion, reverse micelles.	Electrocatalysis: Influence of various parameters, H-electrode, polarography, theory Ilkovic eqn, (excluding derivation), Half wave potential & its significance,
			Π^{nd}	UNIT 4 Electrochemistry: Electrochemistry of solutions, Debye-Huckel treatment, and its extension, ion solvent interaction, Debye-Huckel- Jerrum model,	electrocardiography, introduction to corrosion, homogeneous, theory, forms of corrosion, corrosion monitoring.
			III rd	Thermodynamics of electrified interface equations, derivation of electrocapillarity, Lippmann equations (surface excess), Methods of determining structures of electrified interfaces,	
			IV th	Guoy-Chapman, Stern. Over potentials, exchange current density, derivation of Butler-volmer equation. Tafel plots.	

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		March	I st	Quantum aspects of charge transfer at electrode solution	
				interfaces, quantization of	
				charge transfer, tunnelling	
				•	
			II^{nd}	Semiconductor interfaces-	
				theory of double layer interfaces,	
				effects of light at semiconductor	
				solution interface.	
			III rd	Electrocatalysis :	
				Influence of various parameters,	
				H-electrode, polarography,	
				theory Ilkovic eqn, (excluding	
				derivation),	
			IV^{th}	Half wave potential & its	
				significance,	
				electrocardiography,	
		April	\mathbf{I}^{st}	Introduction to corrosion,	
				homogeneous, theory, forms of	
				corrosion,	
			II^{nd}	Corrosion monitoring.	

End Semester	11-05-18То	01-06-18	(19 days including	
Examinations	Friday		Friday	Saturday)
Semester Vacation	02-06-18To	08-07-18	(37days)	
(Tentative)	Saturday	Sunday		

Total teaching days of Academic Term II = 99 + 96 = 195 days