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

Academic Calendar for the session <u>2016-17</u> with Under Graduate & Post Graduate Chemistry Course having Semester System of examination:-

SummerVacation 25-05-16To

06-07-16

(43 days)

Wednesday

Wednesday

Academic Calendar

Colleges Open on and normal 07-07-16

Admission for on-going Classes **Thursday**

Admission Schedule

16

(9 days)

(13 days)

Monday

Monday

Commencement of Teaching

20-08-16(16 days)

Saturday

Academic Term -I (a)	11-07-16То	10-10-16	(75 teaching	
1 st & 3 rd & 5 th semester	Monday		Monday	days)
Autumn Break	11-10-16То	17-10-16	(07 days)	
	Tuesday		Monday	
Academic Term -I (b)	18-10-16То	02-12-16	(38 teaching	
	Tuesday		Friday	days)

Total teaching days of Academic Term I = 75 + 38 = 113 Days

BAC	HELOR (OF SC	IENCE	Session 2	2016-20	017(First Semest	er)
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Dr.GeetaJa	B.ScI	Paper-III	July	$\mathrm{III}^{\mathrm{rd}}$	UNIT-I	UNIT-I (8 Hrs.)
	llan		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.)
							Gaseous States:
					IV th	Differentiation and	Postulates of kinetic theory of gases, deviation from ideal behaviour, Van der Waal's
						integration of	equation of state.
						functions like ex, xn,	Critical Phenomena : PV isotherms of real gases, continuity of states, the isotherms of Van
						sin x, log x	der Waal's equation, relationship between critical constants and Van der Waal's constants,
				August	I st	Maxima and minima,	the law of corresponding states, reduced equation of state.
						partial differentiation	Molecular Velocities: Root mean square, average and most probable velocities. Qualitative
						and reciprocity	discussion of the Maxwell's distribution of molecular velocities, collision number, mean free
						relations	path and collision diameter.
					II^{nd}	Terms of mean and	Liquification of gases (based on Joule-Thomson effect).
						median, precision	UNIT-III (8 Hrs.)
						and accuracy in	Chemical Kinetics-I:
						chemical analysis,	Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction-
						determining accuracy	concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of
						of methods	rates, mathematical characteristics of simple chemical reactions – zero order, first order,
					$\mathrm{III}^{\mathrm{rd}}$	Improving accuracy	second order, pseudo order, half life and mean life. Determination of the order of reaction –
					111	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,
					1	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.
						cirois, stailuaru	

		deviation.	Catalysis and general characteristics of catalytic reactions, Homogeneous catalysis, acid-base catalysis and enzyme catalysis including their mechanisms, MichaelisMenten equation for enzyme catalysis and its mechanism.
	IV th	UNIT-II Gaseous States: Postulates of kinetic theory of gases, deviation from ideal behavior, Van der Waal's equation of state. Critical Phenomena: PV isotherms of real gases,	
		Continuity of states, the isotherms of Van der Waal's equation, relationship between critical constants and Vander Waal's constants	
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	
				:	
		1	. 1	Chemical kinetics	
		1	. 1	and its scope, rate of	
			. 1	a reaction, factors	
			. 1	influencing the rate	
			. 1	of a reaction-	
			!	concentration,	
	(October	\mathbf{I}^{st}	Temperature,	
		1	. 1	pressure, solvent,	
			. 1	light, catalyst.	
			. 1	Concentration	
		1	. 1	dependence of rates	
			. 1	mathematical	
		1	. 1	characteristics of	
			. 1	simple chemical	
			. 1	reactions – zero order	
			. 1	first order, pseudo	
		1	. 1	order, half life and	
				mean life.	
		Γ	II^{nd}	Determination of the	
			. 1	order of reaction -	
			. 1	differential method,	
		Γ	AUTUM	MN BREAK	
		Γ	$\mathrm{III}^{\mathrm{rd}}$	Method of	
				integration, method	
			. 1	of half	
			. 1	life period and	
			. 1	isolation method.	
			. 1	Radioactive decay as	
		1	. 1	a first order	

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	1	1	1	1	1	phenomenon.	1
	'	1	1	1	1	Chemical Kinetics-	[
		1	1	'	1	II:	1
	1	1	1	1	1	Theories of Chemical	
	'	1	1	1	1	Kinetics: Effect of	
	'	1	1	1	1	temperature on rate	
ŀ	1	1	1	1	1	of reaction,	
·	1	1	1	1	IVth	Arrhenius equation,	[
·	1	1	1	1	1	concept of	
·	1	1	1	1	1	activation energy.	[
	'	1	1	'	1	Simple collision	
·		1	1	1	1	theory based on hard	
·	'	1	1	1 '	1	sphere model,	
·		1	1	1	1	transition state theory	<u> </u>
'		1	1	1	1	(equilibrium	[
•	'	1	1	1	1	hypothesis).	1
,	'	1	1	November	Ist	Expression for the	1
•	'	1	1	1	1	rate constant based	
•	'	1	1	1	1	on equilibrium	
,	'	1	1	1 '	1	constant and	<u> </u>
'	1	1	1	'	1	thermodynamic	1
'	1	1	1	1	1	aspects. Catalysis	
,	'	1	1	1 '	1	and general	
,	'	1	1	1 '	1	characteristics of	
•	'	1	1	1	1	catalytic reactions,	
'	1	1	1	'	1	Homogeneous	
•	'	1	1	1	1'	catalysis,	
•	'	1	1	1	IInd	Acid-base catalysis	
•	'	1	1	1	1	and enzyme catalysis	
•	'	1	1	1	1	including their	
'	1	1	1	1	1	mechanisms,	
,	'	1	1	1 '	1	MichaelisMenten	
'	1	1	1	'	1	equation for enzyme	
'	1	1	1	1	1	catalysis and its	
		<u>L'</u>	<u> </u>	'	<u> </u>	mechanism	
2.	Dr.Arvinde	B.Sc-I	Paper-II	July	$\mathrm{III}^{\mathrm{rd}}$	UNIT-I	UNIT-I (8 Hrs.)
'	rKaur	'	Organic	1	1		Structure and Bonding:
'		'	chemistry-	'	'	Bonding	Hybridization, bond lengths and bond angles, bond energy, localized and delocalized
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1	1			<u> </u>
	A			:Hybridization, bond
				lengths and bond
				angles, bond energy,
				localized and
				delocalized chemical
				bond, Vander Waals
				interactions,
			IV th	Resonance,
				hyperconjugation,
				aromaticity,
				inductive and field
				effects, hydrogen
				bonding.
		August	I st	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.
			II^{nd}	Types of organic
				reactions. Energy
				considerations.
				Reactive
				intermediates—
				Carbocations,
				carbanions, free
				radicals, carbenes,
				arynes and nitrenes
				(with examples).
			III^{rd}	Assigning formal
				charges on
•	•	•	•	

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.)

Electromagnetic Spectrum: Absorption Spectra:

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.

UNIT-III (8 Hrs.)

Stereochemistry of Organic Compounds I:

Concept of isomerism, Types of isomerism. Optical isomerism – Elements of symmetry, molecular chirality, enantiomers, stereogeniccenter, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogeniccenters, diastereomers, threo and erythrodiastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

UNIT-IV (7 Hrs.)

Stereochemistry of Organic Compounds II:

Geometric isomerism: Determination of configuration of geometric isomers. E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism—Conformational analysis of ethane and n-butane; conformations of 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.

			intermediates and	
			other ionic species.	
			Methods of	
			determination of	
			reaction mechanism	
			(product analysis,	
			intermediates,	
			isotope effects,	
			kinetic and	
			stereochemical	
			studies).	
		IV th	UNIT –II	
			Electromagnetic	
			Spectrum:	
			Absorption Spectra	
			:	
			Ultraviolet (UV)	
			absorption	
			spectroscopy –	
			Absorption laws	
			(Beer – Lambert	
			Law), molar	
			absorptivity,	
			presentation and	
			analysis of UV	
			spectra	
	Septen	nber I st	Types of electronic	
			transitions, effect of	
			conjugation. Concept	
			of chromophore and	
			auxochrome.	
			Bathochromic,	
			hypsochromic,	
			hyperchromic and	
			hypochromic shifts.	
			UV spectra of	
			conjugated enes and	
		nd	enones.	
		Π^{nd}	Woodward	

	FiesherRules and	
	their applications in	
	calculating maximum	
	values of conjugated	
	alkenes (cyclic as	
	well as acyclic) and	
	conjugated carbonyl	
	compounds.	
$\mathrm{III}^{\mathrm{rd}}$	UNIT-III	
	Stereochemistry of	
	Organic	
	Compounds I:	
	Concept of	
	isomerism, Types of	
	isomerism.	
	Optical isomerism –	
	Elements of	
	symmetry, molecular	
	chirality,	
	enantiomers,	
- xx zth	stereogeniccenter,	
IV th	Optical activity,	
	properties of	
	enantiomers, chiral	
	and achiral	
	molecules with two	
	stereogeniccenters,	
	diastereomers, threo	
	and	
	erythrodiastereomers,	
	meso compounds,	
$V^{ ext{th}}$	Resolution of	
	enantiomers,	
	inversion, retention	
	and racemization.	
	Relative and absolute	
	configuration,	
	sequence rules, D &	
	L and R & S systems	

	1	1		1	1		
					,	of nomenclature.	
				October	II^{nd}	UNIT-IV	
						Stereochemistry of	
						Organic	
						Compounds II:	
						Geometric	
						isomerism:	
						Determination of	
						configuration of	
						geometric isomers. E	
						& Z system of	
						nomenclature	
					AUTUN	IN BREAK	
					III^{rd}	Geometric isomerism	
						in oximes and	
						alicyclic compounds.	
						Conformational	
						isomerism—	
						Conformational	
						analysis of ethane	
						and n-butane;	
					IVth	Conformations of	
						cyclohexane, axial	
						and equatorial bonds,	
						conformation of	
						mono and	
						disubstituted	
						cyclohexane	
						derivatives.	
				November	Ist	Newman projection	
						and Sawhorse	
						formulae, Fischer	
						and flying wedge	
						formulae.	
					IInd	Difference between	
						configuration and	
						conformation	
3.	Prof.Ruchi	B.ScI	Paper-I	July	III rd	UNIT-I	UNIT-I (8 Hrs.)
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ka	T	Inorganic			Atomic Structure :	Atomic Structure :
1144		Chemistry-			Idea of de Broglie	Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals,
	1	A			matter waves,	Schrodinger wave equation, significance of Ψ and Ψ^2 , quantum numbers, radial and angular
					Heisenberg	wave functions and probability distribution curves, shapes of s , p , d orbitals. Aufbau and
					uncertainty principle,	Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements
					atomic orbitals,	and ions.
					*	
					Schrodinger wave	UNIT-II (7 Hrs.)
					equation,	Periodic Properties:
					significance of Ψ and Ψ^2	Position of elements in the periodic table; effective nuclear charge and its calculations.
				th	1	Atomic and ionic radii, ionization energy, electron affinity and electronegativity—definition,
				IV th	Quantum numbers,	methods of determination or evaluation, trends in periodic table and applications in
					radial and angular	predicting and explaining the chemical behaviour.
					wave functions and	UNIT-III (7 Hrs.)
					probability	Chemistry of Noble Gases and s-Block Elements:
					distribution curves	Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon
			August	\mathbf{I}^{st}	Shapes of s, p,	compounds. Comparative study, diagonal relationships, salient features of hydrides, solvation
					dorbitals. Aufbau and	and complexation tendencies including their function in biosystems, an introduction to alkyls
					Pauli exclusion	and aryls.
					principles, Hund's	UNIT-IV (8 Hrs.)
					multiplicity rule.	Chemical Bonding-I:
					Electronic	Covalent Bond – Valence bond theory and its limitations, directional characteristics of
					configurations of the	covalent bond, various types of hybridization and shapes of simple inorganic molecules and
					elements and ions.	ions. BeF ₂ , BF ₃ , CH ₄ , PF ₅ , SF ₆ , IF ₇ ,SnCl ₂ , XeF ₄ , BF ₄ , PF ₆ , SnCl ² ₆ . Valence shell electron
				Π^{nd}	UNIT-II	pair repulsion (VSEPR) theory to NH ₃ , H ₃ O+, SF ₄ , ClF ₃ , ICl ⁻ ₂ and H ₂ O. MO theory,
					Periodic Properties	homonuclear (elements and ions of 1st and 2nd row), and heteronuclear (BO,
					:Position of elements	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	
					radii,	
				III rd	,	
				III	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			
			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.			
	September	II^{nd}	Comparative study,			
	1		diagonal			
			relationships, salient			
			features of hydrides,			
		III^{rd}	Solvation and			
			complexation			
			tendencies including			
			their function in			
			biosystems, an			
			introduction to alkyls			
			and aryls.			
		IV th	UNIT-IV			
			Chemical Bonding-I			
			: Covalent Bond -			
		1	Valence bond theory			
			and its limitations,			
		1	directional			
			characteristics of			
			covalent bond,			
		V th	Various types of			
		1	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	I st	Valence shell	
		electron pair	
		repulsion (VSEPR)	
		theory to NH ₃ , H ₃ O+,	
		SF ₄ , ClF ₃ , ICl ₂ and	
		H ₂ O	
	Π^{nd}	MO theory	
<u> </u>		IN BREAK	
H	III rd	Homonuclear	
	111	(elements and ions of	
		1st and 2nd row),	
		1st and 2nd fow),	
-	IVth	Hatamanualaan (BO	
	ı v uı	Heteronuclear (BO,	
		CN, CO ⁺ , NO ⁺ , CO,	
NT 1	т.,	CN ⁻)	
November	Ist	Diatomic molecules.	
		Percentage ionic	
		character from dipole	
		moment and	
		electronegativity	
		difference.	

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

	1			T	$\mathrm{III}^{\mathrm{rd}}$	Evaluation of	
					111	absolute entropy	
						from heat capacity	
						data. Gibbs and	
					TX 7.1	Helmholtz functions	
					IVth	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.	
					IInd	Variation of G and A	
						with P, V and T.	
2.	Dr.Arvinde	B.Sc-II	Paper-X	July	$\mathrm{III}^{\mathrm{rd}}$	Alkyl and Aryl	UNIT-I (7Hrs.)
	rKaur		Organic			Halides	Alkyl and Aryl Halides
			chemistry-			Nomenclature and	Nomenclature and classes of alkyl halides, methods of formation, chemical reactions.
			Α			classes of alkyl	Mechanisms of nucleophilic substitution reactions of alkyl halides, SN ₂ and SN ₁ reactions
						halides, methods of	with energy profile diagrams. Polyhalogencompounds: chloroform, carbon tetrachloride.
						formation, chemical	Methods of formation of aryl halides, nuclear and side chain reactions. The addition-
						reactions.	elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution
					IV th	Mechanisms of	reactions. Relative relativities of alkyl halides vs. allyl, vinyl and aryl halides.
					1	nucleophilic	UNIT-II (8 Hrs.)
						substitution reactions	Alcohols and Phenols:
						of alkyl halides, SN ₁	Classification and nomenclature. Monohydric alcohols-Nomenclature, methods of formation
						reactions with energy	by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic
						profile diagrams.	nature. Reactions of alcohols. Dihydric and Trihydric alcohols-
				August	I st	Mechanisms of	Nomenclature, methods of formation, chemical reactions of vicinal glycols and glycerol.
				August	1	nucleophilic	Preparation of phenols, physical properties and acidic character. Comparative acidic
						substitution reactions	strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of
						of alkyl halides, SN ₂	phenols-electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of
						with energy profile	Fries rearrangement, Claisen rearrangement, Gatterman synthesis, and Reimer-Tiemann
						diagrams.	reaction.
					II nd	Polyhalogen	UNIT-III (8 Hrs.)
		<u> </u>	L		11	rorynaiogen	C111-III (0 III 5.)

	compounds:	Aldehydes and Ketones I
	chloroform, carbon	Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with
	tetrachloride.	particular reference to the synthesis of aldehydes from acid chorides, synthesis of aldehydes
	Methods of	and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.
	formation of aryl	Physical properties.
	halides, nuclear and	UNIT-IV (7 Hrs.)
	side chain reactions	Aldehydes and Ketones-II
III ^r	Trd The addition-	Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin,
	elimination and the	aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its
	elimination-addition	derivatives. Wittig reaction, Mannich reaction. Use of acetals as protecting group. Oxidation
	mechanisms of	of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro
	nucleophilic aromatic	reaction, MPV, Clemmensen, Wolff-Kishner, LiAIH4 and NaBH4 reductions.
	substitution reactions	
IV ^t	Relative relativities	
	of alkyl halides vs.	
	allyl, vinyl and aryl	
	halides.	
	UNIT-II	
	Alcohols and	
	Phenols:	
	Classification and	
	nomenclature	
September I st	Monohydric	
	alcohols-	
	Nomenclature,	
	methods of formation	
	by reduction of	
	aldehydes, ketones,	
	carboxylic acids	
	and esters	
II ^{nc}	Hydrogen bonding.	
	Acidic nature.	
	Reactions of	
	alcohols. Dihydric	
	and Trihydric	
	alcohols-	
	1.	l l
	Nomenclature,	

	 •	•		
			formation, chemical	
			reactions of vicinal	
			glycols and glycerol.	
		$\mathrm{III}^{\mathrm{rd}}$	Preparation of	
			phenols, physical	
			properties and acidic	
			character.	
			Comparative acidic	
			strengths of alcohols	
			and	
			phenols, resonance	
			stabilization of	
			phenoxide ion	
		IV th	Reactions of	
			phenols-electrophilic	
			aromatic substitution,	
			acylation and	
			carboxylation.	
			Mechanisms of Fries	
			rearrangement	
		V^{th}	Claisen	
			rearrangement,	
			Gatterman synthesis,	
			and Reimer-Tiemann	
			reaction.	
	October	II^{nd}	UNIT-III	
			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,	

					AU	JTUMN BREAK	
					III rd	Synthesis of	
						aldehydes and	
						ketones using 1,3-	
						dithianes,	
						synthesis of ketones	
						from nitriles and	
						from carboxylic	
						acids, Physical	
						properties.	
					IVth	UNIT-IV	
						Aldehydes and	
						Ketones-II	
						Mechanism of	
						nucleophilic	
						additions to carbonyl	
						group with particular	
						emphasis on benzoin,	
						aldol, Perkin and	
						Knoevenagel condensations.	
				November	Ist	Condensation with	
				November	181	ammonia and its	
						derivatives. Wittig	
						reaction, Mannich	
						reaction. Use of	
						acetals as protecting	
						group	
					IInd	Oxidation of	
						aldehydes, Baeyer-	
						Villiger oxidation of	
						ketones, Cannizzaro	
						reaction, MPV,	
						Clemmensen, Wolff-	
						Kishner, LiAIH4 and	
						NaBH4 reductions.	
3.	Prof.Ruchi	B.Sc	Paper-IX	July	III rd	UNIT-I	UNIT-I (8 Hrs.)
	ka	II	Inorganic]		Chemistry of	Chemistry of Elements of First Transition Series:

	CI				
	Chemistry-			Elements of First	
	A			Transition Series:	series, their simple compounds and complexes, illustrating relative stability of their oxidation
				Characteristic	states, coordination number and geometry.
				properties of d-block	UNIT-II (7 Hrs.)
			41-	elements.	Chemistry of Elements of Second and Third Transition Series:
			IV th	Properties of the	General characteristics, comparative treatment with their 3d-analogues in respect of ionic
				elements of the first	radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.
				transition series, their	UNIT-III (8 Hrs.)
				simple compounds	Chemistry of Coordination Compounds-I
				and complexes,	Werner's coordination theory and its experimental verification, effective atomic number
				illustrating	concept, chelates, nomenclature of coordination compounds, isomerism in coordination
				relative stability of	compounds
				their oxidation states,	UNIT-IV (7 Hrs.)
				coordination number	Chemistry of Coordination Compounds-II
				and geometry.	Valence bond theory of transition metal complexes. Properties of Coordination compounds
		August	\mathbf{I}^{st}	Properties of the	i.e. magnetic properties, colours (Qualitative approach only), use of coordination
				elements of the first	compounds.
				transition series, their	
				simple compounds	
				and complexes,	
				illustrating	
				relative stability of	
				their oxidation states,	
				coordination number	
				and geometry.	
			Π^{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	
<u> </u>		I	1	Licinchia di Secolla	

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 stereochemistry. Vth Comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry. II nd UNIT-III Chemistry of Coordination Compounds-I Werner's coordination theory and its experimental verification III Effective atomic number concept, chelates, IVth Isomerism in coordination compounds Vth Isomerism in coordination compounds	ı	1		T	ı
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V th Isomerism in coordination compounds					
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				coordination	
October I st UNIT-IV				compounds	
		October	\mathbf{I}^{st}	UNIT-IV	

		Chemistry of	
		Coordination	
		Compounds-II	
		Valence bond theory	
		of transition metal	
		complexes	
	II^{nd}	Properties of	
		Coordination	
		compounds i.e.	
		magenetic	
		properties, colours (
		Qualitative approach	
		only),	
	ΔΙ	JTUMN BREAK	
	$\mathrm{III}^{\mathrm{rd}}$	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),	

BAC	HELOR	OF SC	IENCESe	ssion 2016	-2017(Fifth Semester)	
S.No.	Teacher	Class	Paper	Month	Week	Syllabus

1.	Dr.GeetaJa	B.Sc	Paper-	July	III^{rd}	UNIT-I	UNIT-I (8 Hrs.)
	llan	III	XVII			Metal – Ligand	Metal – Ligand Bonding in Transition Metal Complexes:
			Inorganic			Bonding in	Limitations of valence bond theory, an elementary idea of crystal – field theory, crystal field
			Chemistry-			Transition Metal	splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal –
			Α			Complexes:	field parameters, Spectro chemical Series.
						Limitations of	UNIT-II (7 Hrs.)
						valence bond theory,	Thermodynamic and Kinetic Aspects of Metal Complexes :
						an elementary idea of	A brief outline of thermodynamic and Kinetic stability of metal complexes and factors
						crystal – field theory	affecting the stability, substitution reactions of square planar complexes.
					IV th	Crystal field splitting	UNIT-III (8 Hrs.)
						in octahedral	Organometallic Chemistry:
						complexes	Definition, nomenclature and classification of organometallic compounds. Preparation,
				August	\mathbf{I}^{st}	Crystal field splitting	properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a brief
						in tetrahedral	account of metal – ethylenic complexes and homogeneous hydrogenation, mononuclear
					nd	complexes	carbonyls and the nature of bonding in metal carbonyls
					II nd	Crystal field splitting	UNIT-IV (7 Hrs.) Bioinorganic Chemistry:
						in square planar	Essential and trace elements in biological processes, metalloporphyrins with special reference
						complexes, factors	to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions.
						affecting the crystal – field parameters,	Nitrogen fixation.
						Spectro chemical	Tital ogen inkuloni
						Series.	

					$\mathrm{III}^{\mathrm{rd}}$	UNIT-II	
						Thermodynamic	
						and Kinetic Aspects	
						of Metal Complexes : A brief outline of	
						thermodynamic and	
						Kinetic stability of	
						metal complexes	
					IV th	Factors affecting the	
					1 7	stability square	
						planar complexes	
					41-	1	
					V th	Factors affecting the	
						substitution reactions	
						of square planar	
						complexes	

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	September	II^{nd}	UNIT-III	
		1	Organometallic	
		'	Chemistry:	
		'	Definition,	
		'	nomenclature and	
		1	classification of	
		1	organometallic	
		rd	compounds.	
		$\mathrm{III}^{\mathrm{rd}}$	Preparation,	
		'	properties, bonding	
		1	and applications of	
		1	alkyls and aryls of	
			Li, Al	
		IV th	Preparation,	
		'	properties, bonding	
		1	and applications of	
		'	alkyls and aryls of	
1		-th	Hg, Sn and Ti,	
		V^{th}	A brief account of	
		'	metal – ethylenic	
		'	complexes and	
		'	homogeneous	
		-et	hydrogenation,	
	October	\mathbf{I}^{st}	Mononuclear	
		1	carbonyls and the	
		1	nature of bonding in	
			metal carbonyls	
		II^{nd}	UNIT-IV	
1		'	Bioinorganic	
		'	Chemistry:	
		'	Essential and trace	
		'	elements in	
		<u></u> '	biological processes	
			UTUMN BREAK	
		$\mathrm{III}^{\mathrm{rd}}$	Metalloporphyrins	
		'	with special	
1		'	reference to	
		<u> </u>	haemoglobin and	

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						myoglobin.
					IVth	Biological role of
						alkali and alkaline
						earth metal ions.
				November	Ist	Nitrogen fixation.
2.	Prof.Ruchi	B.Sc-	Paper-	July	III rd	UNIT-I
	ka	III	XVIII			Spectroscopy:
			Organic			Nuclear magnetic
			chemistry-			resonance (NMR)
			A			spectroscopy. Proton
						magnetic resonance
						(1H NMR)
						spectroscopy,
					IV th	Nuclear shielding
						and deshielding,
						chemical shift and
						molecular structure,
				August	\mathbf{I}^{st}	Spin-spin splitting
						and coupling
						constants, area of
						signals
					Π^{nd}	Interpretation of
						PMR spectra
					$\mathrm{III}^{\mathrm{rd}}$	Interpretation of
						ethyl bromide,
						ethanol,
						acetaldehyde, 1,1,2-
						tribromoethane, ethyl
						acetate, toluene and
						acetophenone.
					IV th	Applications of
						NMR
				September	\mathbf{I}^{st}	Electromagnetic
						Spectrum:
						Absorption Spectra:
						Infrared (IR)
						absorption
						spectroscopy –

UNIT-I (8 Hrs.)

Spectroscopy:

Nuclear magnetic resonance (NMR) spectroscopy. Proton magnetic resonance (1H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, area of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone. UNIT-II (7 Hrs.)

Electromagnetic Spectrum: Absorption Spectra:

Infrared (IR) absorption spectroscopy – Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques. UNIT-III (8 Hrs.)

Carbohydrates:

Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threodiastereomers. 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.

An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

UNIT-IV (7 Hrs.)

Heterocyclic Compounds:

Introduction: Molecular orbital picture and aromatic character of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed – five and six – membered heterocycles. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis. Skraup synthesis and Bischler— Napieralski synthesis. Mechanism of electrophilic substitution reactions of

Hooke's law, sclection rules III'ad Intensity and position of IR bands, measurement of IR spectrum, fingerprint region. III'd Characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds IV'a Problems pertaining to the structure clucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques. Vb'a UNIT-III Carbohydrates: Classification and nomenclature. Monosaccharides October II'ad Mechanism of organic org		1	Moloculos: bt	Lindala, avinalina and isogninalina
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interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides.	October	Π^{nd}		
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chain lengthening and chain shortening of aldoses. Configuration of monosaccharides.			glucose and fructose,	
and chain shortening of aldoses. Configuration of monosaccharides.			chain lengthening	
of aldoses. Configuration of monosaccharides.			and chain shortening	
monosaccharides.				
monosaccharides.			Configuration of	
Erythro and			monosaccharides.	
threodiastereomers			threodiastereomers	

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					TUMN BREAK	
]				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	
					disaccharides	
					(maltose, sucrose and	
					lactose) and	
					polysaccharides	
					(starch and cellulose)	
					without involving	
					structure	
					determination.	
					UNIT-IV	
					Heterocyclic	
					Compounds:	
					Introduction :	
					Molecular orbital	
					picture	
			November	I st	Aromatic character	
					of pyrrole, furan,	
					thiophene and	
					pyridine. Methods of	
					synthesis and	
					chemical reactions	
					with particular	
					emphasis on the	
					mechanism of	
					Illectianism of	

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						electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.	
3.	Dr.Rishu Jain	B.Sc	Paper-XIX Physical	July	III _{rq}		UNIT-I (8 Hrs.) Elementary Quantum Mechanics-I:
	Jain	111	Chemistry-A			Quantum Mechanics-I: Black-body radiation, Planck's radiation law, photoelectric effect,	Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect. De Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box. Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum

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			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
	A	ugust	\mathbf{I}^{st}	The Heisenberg's	characteristics. Hybrid orbitals – sp, sp ² , sp ³ ; calculation of coefficients of A.O.'s used in
				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,	Interaction of radiation with matter, difference between thermal and photochemical
				Schrodinger wave	processes. Laws of Photochemistry: Grothus – Drapper law, Stark – Einstein law, Jablonski
				equation and its	diagram depicting various processes occurring in the excited state.
				importance,	UNIT-IV (7 Hrs.)
			II nd	Physical	Photochemistry-II:
				interpretation of the	Qualitative description of fluorescence, phosphorescence, non-radiative processes (internal
				wave function,	conversion, intersystem crossing), quantum yield, photosensitized reactions – energy transfer
				postulates of	processes (simple examples). Photochemistry of carbonyl compounds and alkenes.
				quantum mechanics,	F
				particle in a one	
				dimensional box.	
			III^{rd}	Schrodinger wave	
			111	equation for H-atom,	
				separation into three	
				equations (without	
				derivation), quantum	
				numbers and their	
		-	IV th	importance,	
			1 V	Hydrogen like wave	
				functions, radial	
				wave functions,	
				angular wave	
		<u> </u>	x zth	functions.	
			V^{th}	UNIT-II	
				Elementary	
				Quantum	

<u> </u>	, — I	1 '	<u>'</u>	<u> </u>	Mechanics-II:	
1	1	1	1	1	Molecular orbital	
1	1	1	1	1	theory, basic ideas -	
1	, 1	1	1	1	criteria for forming	
	1	1	1	1	M.O. from A.O.,	
1	1	1	September	II^{nd}	Construction of	
'	, 1	1	'	1	M.O.'s by LCAO –	
1	, 1	1	1	1	H ₂ ⁺ ion. Calculation	
'	, 1	1	1	1	of energy levels from	
1	1	1	1	1	wave functions,	
1	1	1	1	1	physical picture of	
1	, 1	1	1	1	bonding and	
	1	1	1	1	antibonding wave	
'	, 1	1	1	1	functions,	
'	, 1	1	1	III^{rd}	Concept of σ , σ^* , π ,	
]	1	1	1	'	π^* orbitals and their	
] '	1	1	1	1	characteristics.	
1	1	1	1	1		
1	1	1	1	1	Hybrid orbitals – sp, sp ² , sp ³ ; calculation	
1	1	1	1	1	of coefficients of	
1	1	1	1	1	A.O.'s used in these	
1	1	1	1	1	hybrid orbitals.	
1	1	1	1	IV th	Introduction to	
1	1	1	1	• '	valence bond model	
1	1	1	1	1	of H ₂ , comparison of	
'	, 1	1	1	1	M.O. and V.B.	
] '	1	1	1	1	models.	
]	1	1	1	1	UNIT-III	
] '	1	1	1	1	Photochemistry-I:	
]	1	1	1	1	Interaction of	
1	1	1	1	1	radiation with matter	
1	1	1	1	V th	Difference between	
1	1	1	1	' '	thermal and	
1	1	1	1	1	photochemical	
1	1	1	1	1	processes. Laws of	
1	1	1	1	1	Photochemistry:	
'	, 1	1	1	1	Grothus – Drapper	
] '	1	1	1	1	law, Stark – Einstein	
L'	 	<u> </u>		'	law, black Linden	

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		0 1	- ct	law,
		October	\mathbf{I}^{st}	Jablonski diagram
				depicting various
				processes occurring
				in the excited state.
			II^{nd}	UNIT-IV
				Photochemistry-II:
				Qualitative
				description of
				fluorescence,
				phosphorescence,
				non-radiative
				processes (internal
				conversion,
				intersystem crossing)
			A T	JTUMN BREAK
			III^{rd}	Quantum yield,
				photosensitized
				reactions - energy
				transfer processes
				(simple examples).
			IV^{th}	Photochemistry of
				carbonyl compounds
				and alkenes.

End Semester 03-12-16To 28-12-16 (22 days including

Examinations Saturday Wednesday Saturday)

Semester Vacation 29-12-16 To 10-01-17 (13 days)

(Winter Break) Thursday Tuesday

Academic Term -II

2nd& 4th&6th semester

Even Semesters

College reopens after 11-01-17To 05-05-17 (94 teaching

Semester Examination Wednesday Friday days)

Total teaching days of Academic Term II = 94 days

BAC	CHELOR	OF SC	IENCESe	ssion 2016	-2017(Second Semester	January-May)
S.No.	Teacher	Class	Paper	Month	Week	Syllabus

1.	Dr.GeetaJa	B.ScI	Paper-VII	January	Π^{nd}	UNIT-I	UNIT-I (8 Hrs.)
	llan		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 adiabatic
						extensive	conditions for reversible process.
						properties.	UNIT-II (7 Hrs.)
					$\mathrm{III}^{\mathrm{rd}}$	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. Solids in liquids (sols): 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:
					th	and their relationship	Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and
					IV^{th}	Joule's Law-Joule-	activity coefficient. Dilute solution, colligative properties, Raoult's law, relative lowering of
						Thomson coefficient	vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its
						and	measurement, determination of molecular weight from osmotic pressure. Elevation of boiling
						inversion	point and depression of freezing point. Thermodynamic derivation of relation between
						temperature.	molecular weight and elevation in boiling point and depression of freezing point.
						Calculations of w, q,	Experimental methods for determining various colligative properties.
						dU&dH for the	Abnormal molar mass, degree of dissociation and association of solutes.
						expansion of ideal	
						gases under	
						isothermal	
						for 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
	Ī	IV^{th}	Bond dissociation
			energy calculation
			from thermo-
			chemical data,
			temperature
			dependence of
			enthalpy. Kirchoff's
			equation.

		V th	UNIT- III Colloidal State: Definition of colloids, classification of colloids. Solids in liquids (sols): Properties — kinetic, optical and electrical.	
	March	II nd	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.	
		V th	UNIT-IV Solutions, Dilute Solutions and Colligative	
			Properties: Ideal and non-ideal solutions, methods of expressing concentrations of	
			solutions, activity and activity Coefficient.	

	1		1	T	-et		
				April	\mathbf{I}^{st}	Dilute solution,	
						colligative	
						properties, Raoult's	
						law, relative	
						lowering of vapour	
						pressure, molecular	
						weight	
						determination.	
					$\mathrm{II}^{\mathrm{nd}}$	Osmosis, law of	
						osmotic pressure and	
						its measurement,	
						determination of	
						molecular weight	
						from	
						osmotic pressure	
					III^{rd}	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.	Dr.Arvinde	B.Sc-I	Paper-VI	January	II^{nd}	UNIT-I	UNIT-I (7 Hrs.)
	rKaur		Organic			Alkanes and	Alkanes and Cycloalkanes :

	chemistry-			Cycloalkanes :	Ι
	В			Isomerism in	
	Б			alkanes, sources,	
				methods of formation	
				(with special	
				reference to Wurtz	
				reaction, Kolbe	
				reaction, Corey-	
				House reaction and	
				decarboxylation of	
				carboxylic acids),	
			III rd		
			111	Physical properties and chemical	
				reactions of alkanes.	
				Mechanism of free	
				radical halogenation	
				of alkanes :	
				Orientation,	
				reactivity and	
			IV th	selectivity.	
			1 V	Cycloalkanes—	
				nomenclature, methods of	
					'
				formation, chemical	
				reactions, Baeyer's strain theory and its	
				limitations.	
		Ealaman	I st		-
		February	1	Ring strain in small	
				rings (cyclopropane and cyclobutane),	1
				theory of stainless	1
				rings. The case	
				ofcyclopropane ring:	
				banana bonds.	
			\mathbf{H}^{nd}	UNIT-II	-
			11		
				Alkenes,	1
				Cycloalkenes: Nomenclature of	
				riomenciature of	L

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 limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of stainless rings. The case of cyclopropanering: banana bonds.

UNIT-II (8 Hrs.)

Alkenes, Cycloalkenes:

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-III (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-IV (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.

'					alkenes, methods of	
'					formation,	
'					mechanisms of	
'					dehydration of	
'					alcohols and	
'					dehydrohalogenation	
'					of alkyl halides,	
'					regioselectivity in	
'					alcohol dehydration	
'				$\mathrm{III}^{\mathrm{rd}}$	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	
ļ				th	radical additions	
				IV^{th}	Markownikoff's rule,	
					hydroboration –	
'					oxidation,	
'					oxymercuration-	
'					reduction.	
'					Epoxidation,	
'					ozonolysis,	
'					hydration,	
'					hydroxylation and	
'					oxidation with	
'					KMnO4.	
'		Ī	March	I st	Polymerization of	
'					alkenes. Substitution	
'					at the allylic and	
'					vinylic positions of	
'					alkenes. Industrial	
'					applications of	
ļ					ethylene and	
					propene.	
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1,2 and 1,4 additions, Diels-Alder reaction. IV th Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes V th Mechanism of electrophilic and nucleophilic addition reactions, hydroboration- oxidation, metal-ammonia reductions, oxidation and polymerization.		'				
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IV th Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes V th Mechanism of electrophilic and nucleophilic addition reactions, hydroboration- oxidation, metal-ammonia reductions, oxidation and polymerization.		'		ļ		
structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes Vth Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'			reaction.	
bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes V th Mechanism of electrophilic and nucleophilic addition reactions, hydroboration- oxidation, metal-ammonia reductions, oxidation and polymerization.		'		IV th	Nomenclature,	
Methods of formation. Chemical reactions of alkynes, acidity of alkynes V th Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'		ļ		
Methods of formation. Chemical reactions of alkynes, acidity of alkynes V th Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'			bonding in alkynes.	
reactions of alkynes, acidity of alkynes Vth Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'			Methods of	
reactions of alkynes, acidity of alkynes Vth Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'			formation. Chemical	
acidity of alkynes V th Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'		ļ		
V th Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'			acidity of alkynes	
electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.		'		V th	Mechanism of	
nucleophilic addition reactions, hydroboration- oxidation, metal-ammonia reductions, oxidation and polymerization.		'		!	electrophilic and	
reactions, hydroboration- oxidation, metal-ammonia reductions, oxidation and polymerization.		'		!	nucleophilic addition	
hydroboration- oxidation, metal-ammonia reductions, oxidation and polymerization.		'		!	reactions,	
oxidation, metal-ammonia reductions, oxidation and polymerization.		'		!		
metal-ammonia reductions, oxidation and polymerization.		'		!		
reductions, oxidation and polymerization.		'			metal-ammonia	
and polymerization.		'			reductions, oxidation	
		'			and polymerization.	
		'	April	I st		

		Arenes and	
		Aromaticity:	
		Nomenclature of	
		benzene derivatives.	
		The aryl group,	
		Aromatic nucleus	
		and side chain,	
		Structure of benzene	
		: Molecular formula	
		and Kekule structure.	
	II nd		
	11	Stability and carbon-	
		carbon bond lengths	
		of benzene,	
		resonance	
		structure, MO	
		picture. Aromaticity:	
		The Huckel rule,	
		aromatic ions.	
	III^{rd}	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	
	TX 7th	profile diagrams	
	IV th	Activating and	
		deactivating	
		substituents,	
		orientation and	
		ortho/para ratio. Side	
		chain reactions of	

					1	T	
						benzene derivatives.	
						Methods of	
						formation and	
						chemical reactions of	
						alkylbenzenes,	
						alkynyl benzenes and	
						biphenyl.	
3.	Prof.Ruchi	B.ScI	Paper- V	January	II nd	UNIT-I	UNIT-I (7 Hrs.)
J.	ka	D.50. 1	Inorganic	January	11	Chemical Bonding-	Chemical Bonding-II
	Ka		Chemistry-			II Ionic Solids –	Ionic Solids – Concept of close packing., Ionic structures, (NaCl type, Zinc blende, Wurtzite,
			B			Concept of close	CaF ₂ and antifluorite), radius ratio rule and coordination number, limitation of radius ratio
			B			<u> </u>	
					rd	packing.	rule, lattice defects, semiconductors.
					$\mathrm{III}^{\mathrm{rd}}$	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), tetrasulphurtetranitride, basic
							properties of halogens, interhalogens and polyhalides.
						and Born-Haber	properties of harogens, internatogens and polynandes.
					-nd	cycle	
				February	II^{nd}	Solvation energy and	
						solubility of ionic	
						solids, polarizing	
						power and	
						polarisability of ions,	
					III^{rd}	Fajan's rule. Metallic	
						bond-free electron,	
						valence bond and	
						band theories.	
					IV th	Weak Interactions –	
					1 V	weak interactions -	

		Hydrogen 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,	
	th	borohydrides,	
	IV th	Fullerenes, carbides,	
	V th	Fluorocarbons	
April	I st	UNIT-IV	
		p-Block Elements-II	
		Comparative study of	
		groups 15-17	
		elements, compounds	
		like hydrides, oxides,	
		oxyacids and halides	
	nd	of groups 15-17	
	II^{nd}	Comparative study of	
		groups 15-17	
		elements, compounds	
		like hydrides, oxides,	
		oxyacids and halides	

		of groups 15-17		
	III^{rd}	Halides of groups 15-		
		17, silicates		
		(structural principle		
	IV^{th}	Tetrasulphurtetranitri		
		de basic properties of		
		halogens,		
		interhalogens and		
		polyhalides.		

BAC	BACHELOR OF SCIENCESession 2016-2017(Fourth Semester January-May)										
S.No.	Teacher	Class	Paper	Month	Week		Syllabus				
1.	Dr.Rishu	B.Sc	Paper-XV	January	II^{nd}	UNIT-I	UNIT-I (8 Hrs.)				
	Jain	II	Physical			Phase equilibrium:	Phase equilibrium:				
			Chemistry-			Statement and	Statement and meaning of the terms – phase, component and degree of freedom, derivation				
			В			meaning of the terms	of Gibbs phase rule, phase equilibria of one component system—water, CO ₂ and S systems.				
						- phase, component	Phase equilibria of two component system –solid –liquid equilibria, simple eutectic – Bi-Cd				
						and degree of	system, desiliverisation of lead. Solid solutions—compound formation with congruent				
						freedom, derivation	melting point (Mg-Zn) and incongruent melting point, (NaCl-H ₂ O) system. Freezing				
						of Gibbs phase rule	mixtures, acetone-dry ice. Partially Miscible Liquids –Phenol-water, trimethylamine – water,				
					III^{rd}	Phase equilibria of	nicotine -water systems. Lower and upper consolute temperature. Effect of impurity on				
						one component	consolute temperature, immiscible liquids, steam distillation. Nernst distribution law-				
						system—water, CO ₂	thermodynamic derivation, applications.				
						and S systems.	UNIT-II (7 Hrs.)				
					IV^{th}	Phase equilibria of	Electrochemistry –I:				
						two component	Electrical transport –Conduction in metals and in electrolyte solutions, specific conductance				
						system –solid –liquid and equivalent conductance, measurement of equivalent conductance, variation of equivalent					
i						equilibria, simple	and specific conductance with dilution. Migration of ions and Kohlrausch Law, Arrhennius				

					
'				system,	dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong
'				desiliverisation of	electrolytes (elementary treatment only). Transport number, definition and determination by
'				lead.	Hittorf method and moving boundary method.
'			V th	Solid solutions—	UNIT-III (8 Hrs.)
'				compound formation	Electrochemistry-II:
'				with congruent	Types of reversible electrodes – gas metal – ion, metal –insoluble salt – anion and redox
'				melting point (Mg-	electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single
1				Zn) and incongruent	electrode potential, standard hydrogen electrode – reference electrodes – standard electrode
1				melting point,	potential, sign conventions, electrochemical series and its significance.
'				(NaCl-H ₂ O) system.	UNIT-IV (7 Hrs.)
'		February	/ II nd	Freezing mixtures,	Electrolytic and Galvanic cells – reversible and irreversible cells, conventional representation
'				acetone-dry ice.	of electrochemical cells. E.M.F. of a cell and its measurements. Computation of cell E.M.F.
'				decione dry 100.	Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), Polarization, over
'					potential and hydrogen overvoltage.
'			$\mathrm{III}^{\mathrm{rd}}$	Partially Miscible	Concentration cell with and without transport, liquid junction potential, application of
'			111	Liquids —Phenol-	concentration cells, valency of ions, solubility product and activity coefficient, potentiometric
'				water,	titrations.
				trimethylamine –	duadons.
					Į į
'				· ·	1
'				water systems.	
			IV th	Lower and upper	<u> </u>
				consolute	
'				temperature. Effect	
'				of impurity on	
'				consolute	
'				temperature,	
				immiscible liquids,	
				steam distillation.	
'			V th	Nernst distribution	
'] '	law-thermodynamic	
'				derivation,	
				applications	
		March	Π^{nd}	UNIT-II	1
		Iviaich	11	Electrochemistry –	
'				I:	
				Electrical transport –	
'					
'				Conduction in metals	1

		and in electrolyte	
		solutions, specific	
		conductance and	
		equivalent	
		conductance,	
		measurement of	
		equivalent	
		conductance,	
	$\mathrm{III}^{\mathrm{rd}}$	Variation of	
		equivalent and	
		specific conductance	
		with dilution.	
		Migration of ions and	
		Kohlrausch 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	

	ectrodes – gas	
	etal – ion, metal –	
	soluble salt – anion	
	nd redox electrodes.	
	lectrode reactions	
Π^{nd}	ernst equation,	
	erivation of cell	
	.M.F. and single	
	ectrode potential,	
	andard hydrogen	
	ectrode – reference	
	ectrodes – standard	
	ectrode potential,	
	gn conventions,	
	ectrochemical	
	eries and its	
	ignificance.	
$\mathrm{III}^{\mathrm{rd}}$	NIT-IV	
111	lectrolytic and	
	*	
	alvanic cells – eversible and	
	reversible cells,	
	onventional	
	epresentation of	
	ectrochemical	
	ells. E.M.F. of a cell	
	nd its	
	easurements.	
	omputation of cell	
	.M.F.	
IVth	alculation of	
	ermodynamic	
	uantities of	
	ell reactions (ΔG,	
	H and K),	
	olarization, over	
	otential and	
	ydrogen	
	vervoltage.	

						Concentration cell	[
					1	with and without	
					1	transport, liquid	
					1	junction potential,	
					1	application of	
					1	concentration cells,	
					1	valency of ions,	
					1	solubility product	
					1	and activity	
					1	coefficient,	
					1	potentiometric	
					1	titrations.	
2.	Dr.Arvinde	B.Sc-II	Paper-XIV	January	II nd	UNIT-I	UNIT-I (8 Hrs.)
۷٠	rKaur	D.5C-11	Organic	Januar y	11	Carboxylic Acids:	Carboxylic Acids:
	TXaui		chemistry-		1	Nomenclature,	Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects
			B		1	structure and	of substitutions on acid strength. Preparations of carboxylic acids. Reactions of carboxylic
			1		1	bonding, physical	acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides,
					1	properties, acidity of	Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and
					1	carboxylic acids,	chemical reactions of halo acids. Hydroxyl acids: Malic, tartaric and citric acid (structural
					1	effects of	features only). Method of formation and chemical reactions of unsaturated monocarboxylic
					1	substitutions on acid	acids. Dicarboxylic Acids: Methods of formation and effect of heat and hydrating agents.
					1	strength.	UNIT-II (7 Hrs.)
					$\mathrm{III}^{\mathrm{rd}}$	C	Carboxylic Acid Derivatives: Structure and nomenclature of acid chlorides, esters, amides
					1111	1	and acid anhydrides. Relative stability & reactivity of acyl derivatives. Physical properties,
					1	carboxylic acids.	
					1	Reactions of	interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of
					1	carboxylic acids.	carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and
					1	Hell-Volhard-	hydrolysis(acidic and basic).
					TX zth	Zelinsky reaction.	UNIT-III (8 Hrs.)
					IV^{th}	Synthesis of acid	Ethers, Epoxides Fats, Oils and Detergents:
					1	chlorides, esters and	Nomenclature of ether and methods of their formation, physical properties. Chemical
					1	amides, Reduction of	reaction-cleavage and autoxidation, Ziesel's method. Synthesis of epoxides. Acid and base-
					1	carboxylic acids.	catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of
					1	Mechanism of	Grignard and organolithium reagents with epoxides. Natural fats, edible and industrial oils of
					1	decarboxylation.	vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils.
					1	Methods of	Saponification value, iodine value, acid value. Soaps, synthetic detergents; alkyl and aryl
					1	formation and	sulphonates.
					1	chemical reactions of	UNIT-IV (7 Hrs.)
					'	halo acids	Organic Compounds of Nitrogen:

nes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms
ion in nitroarenes and their reductions in acidic, neutral and alkaline
Structure and nomenclature of amines, physical properties.
nes, Separation of a mixture of primary, secondary and tertiary
ires effecting basicity of amines. Amine salts as phase transfer
f alkyl and aryl amines (reduction of nitro compounds, nitriles),
aldehydic and ketonic compounds. Gabriel-phthalimide reaction,
action.
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		March	\mathbf{I}^{st}	UNIT-III	
				Ethers , Epoxides	
				Fats, Oils and	
				Detergents:	
				Nomenclature of	
				ether and methods of	
				their formation,	
				physical properties.	
				Chemical reaction-	
				cleavage and	
				autoxidation, Ziesel's	
				method.	
			Π^{nd}	Synthesis of	
				epoxides. Acid and	
				base-catalyzed ring	
				opening of epoxides,	
				orientation of	
				epoxide ring	
				opening,	
				reactions of Grignard	
				and organolithium	
				reagents with	
			rd	epoxides.	
			III rd	Natural fats, edible	
				and industrial oils of	
				vegetable origin,	
				common fatty acids,	
				glycerides,	
				hydrogenation of	
			th	unsaturated oils.	
			IV^{th}	Saponification value,	
				iodine value, acid	
				value. Soaps,	
				synthetic detergents;	
				alkyl and aryl	
			V th	sulphonates.	
			V	UNIT-IV	
				Organic	

 	.			
			Compounds of	
			Nitrogen:	
			Preparation of	
			nitroalkanes and	
			nitroarenes.	
	April	\mathbf{I}^{st}	Chemical reactions	
			of nitroalkanes.	
			Mechanisms of	
			nucleophilic	
			substitution in	
			nitroarenes and their	
			reductions in acidic,	
			neutral and alkaline	
			media.	
		II^{nd}	Picric acid. Structure	
			and nomenclature of	
			amines, physical	
			properties.	
			Stereochemistry of	
			amines,	
		III rd	Separation of a	
		1111	mixture of primary,	
			secondary and	
			tertiary amines.	
			Structural features	
			effecting basicity of	
			amines. Amine salts	
			as phasetransfer	
			catalysis.	
		IV th	Preparation of alkyl	
		1 4	and aryl amines	
			(reduction of nitro	
			compounds, nitriles),	
			reductive amination	
			of aldehydic and	
			ketonic compounds.	
			Gabriel-phthalimide	
			reaction, Hofmann	
			reaction, monnain	

	l J					bromamide reaction.	
3.	Prof.Ruchi	B.Sc	Paper-XIII	January	II nd	UNIT-I	UNIT-I (8 Hrs.)
٥.	ka	II	Inorganic	Januar y	111	Chemistry of	Chemistry of Lanthanide Elements:
	ка	11	Chemistry-			Lanthanide	Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex
			B			Elements:	formation, occurrence and isolation, lanthanide compounds.
			D				
						Electronic structure,	Chemistry of Actinides:
					III rd	oxidation states	General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from
					III	Ionic radii and	U, similarities between the later actinides and the later lanthanides.
						lanthanide	UNIT-II (7 Hrs.) Acids and Bases:
					TX 7 th	contraction	
					IV th	Complex formation,	Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and
						occurrence and	bases.
					w rth	isolation,	UNIT-III (8 Hrs.)
					V th	Lanthanide	Oxidation and Reduction:
					nd	compounds	Use of redox potential data – analysis of redox cycle, redox stability in water – Frost, Latimer
				February	$\mathrm{II}^{\mathrm{nd}}$	Chemistry of	and Pourbaix diagrams. Principles involved in the extraction of the elements.
						Actinides:	UNIT-IV (7 Hrs.)
						General features and	Non-aqueous Solvents:
						chemistry of	Physical properties of a solvent, types of solvents and their general characteristics, reactions
						actinides	in non-aqueous solvents with reference to liquid NH ₃ and liquid SO ₂ .
					$\mathrm{III}^{\mathrm{rd}}$	Chemistry of	
						separation of Np, Pu	
					4	and Am from U,	
					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	
					III^{rd}	Lewis concepts of	
						acids and bases.	
					IV th	UNIT-III	
						Oxidation and	
1						Reduction:	

			Use of redox	
			potential data -	
			analysis of redox	
			cycle	
		V th	Redox stability in	
			water – Frost,	
			Latimer and	
			Pourbaix diagrams	
	April	I^{st}	Principles involved	
	-		in the extraction of	
			the elements	
		Π^{nd}	UNIT-IV	
			Non-aqueous	
			Solvents:	
			Physical properties	
			of a solvent, types of	
			solvents	
		$\mathrm{III}^{\mathrm{rd}}$	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	IENCESe	ssion 201	6-2017(Sixth Semester	January-May)
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Dr.GeetaJa llan	B.Sc III	Paper-XXI Inorganic Chemistry-B	January	III nd	UNIT-I Silicones and Phosphazenes: Silicones Phosphazenes	UNIT-I (7 Hrs.) Silicones and Phosphazenes: Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes. UNIT-II (8 Hrs.)
					IV th	Nature of bonding in triphosphazenes.	Hard and Soft Acids and Bases (HSAB): Classification of acids and bases as hard and soft Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.
					V th	UNIT-II Hard and Soft Acids and Bases (HSAB): Classification of acids and bases	UNIT-III (8 Hrs.) Electronic Spectra of Transition Metal Complexes: Types of electronic transitions, $L - S$ coupling, selection rules for d - d transitions, spectroscopic ground states, Orgel – energy level diagram for d 1 and d 0 states, discussion of the electronic spectrum of $[Ti(H2O)_6]^{3+}$ complex ion. UNIT-IV (7 Hrs.)
				February	II nd	Pearson's HSAB concept	Magnetic Properties of Transition Metal Complexes: Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only
					${ m III}_{ m rd}$	Acid-base strength and hardness and softness.	formula. Correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for $3d$ metal complexes.
					IV th	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 <i>d</i> -	

			Т	T	$\overline{}$	1	
'	1	1	· I	1	!	d transitions	4
'	1	1	ı ı	1	$\mathrm{III}^{\mathrm{rd}}$	Spectroscopic ground	1
'	1	1	ı ı	1	'	states, Orgel –	ı
'	1	1	ı ı	1	'	energy level diagram	ı
'	1	1	1	1	<u> </u>	for d1 state	J I
'	1	1	1	1	IV th	Orgel – energy level	ı
'	1	1 '	'	1	<u> </u>	diagram for d^0 state	<u> </u>
'	1	1	1	1	V th	Discussion of the	
'	1	1 '	'	1	'	electronic spectrum	ı
'	1	1	'	1	'	of $[Ti(H2O)_6]^{3+}$	
'	1	1	1		'	complex ion.	<u>J</u>
'	1	1	1	April	\mathbf{I}^{st}	UNIT-IV	
	1	1	1	1	'	Magnetic Properties	
'	1	1	'	1	'	of Transition Metal	l
'	1	1	1	1	'	Complexes:	l l
'	1	1	1	1	'	Types of magnetic	
'	1	1 '	1	1	'	behaviour,	1
'	1	1 '	'	1	Π^{nd}	Methods of	<u> </u>
	1	1	1	1	'	determining	ı
'	1	1 '	'	1	'	magnetic	ı
'	1	1	1	1	'	susceptibility, spin-	ı
'	1	1 '	'	1	<u> </u>	only formula	1
'	1	1 '	1	1	$\mathrm{III}^{\mathrm{rd}}$	Correlation of μ_s and	1
'	1	1 '	'	1	'	μ_{eff} values, orbital	1
'	1	1 '	'	1	'	contribution to	1
'	1	1 '	'	1	<u> </u>	magnetic moments,	1
'	1	1 '	'	1	IVth	Application of	1
'	1	1 '	'	1	'	magnetic moment	1
'	1	1 '	'	1	'	data for 3d metal	1
<u> </u>	<u> </u>	 '	<u> </u> '		nd	complexes.	
2.	Prof.Ruchi	B.Sc-	Paper-	January	II nd	UNIT-I	UNIT-I (8 Hrs.)
'	ka	III	XXII	1	'	Amino Acids,	Amino Acids, Peptides, Proteins and Nucleic Acids:
'	1	1 '	Organic	1	'	Peptides, Proteins	Classification, structure and stereochemistry of amino acids. Acid- base behavior, isoelectric
'	1	1 '	chemistry-	1	'	and Nucleic Acids:	point and electrophoresis. Preparation and reactions of L- amino acids.
'	1	1 '	В	1	'	Classification,	Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide
'	1	1 '	'	1	'		structure determination, end group analysis, selective hydrolysis of peptides. Classical
	1	1	'	1	'	stereochemistry of	peptide synthesis, solid – phase peptide synthesis. Structures of peptides and proteins. Levels
<u> </u>	'	'	<u> </u>		'	amino acids. Acid-	of protein structure. Protein denaturation/renaturation.

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				base behavior,	Nucleic Acids: Introduction. Constituents of nucleic acids. Ribonucleosides and
				isoelectric point and	ribonucleotides. The double helical Structure of DNA.
				electrophoresis.	UNIT-II (7 Hrs.)
			$\mathrm{III}^{\mathrm{rd}}$	Preparation and	Synthetic Polymers:
				reactions of L- amino	Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl
				acids	polymerization, Ziegler – Natta polymerization and vinyl polymers. Condensation or step
			IV th	Structure and	growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea
			1 1	nomenclature of	formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.
				peptides and	UNIT-III (7 Hrs.)
				proteins.	Organic Synthesis via Enolates:
				Classification of	Acidity of ά-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of
					ethyl acetoacetate: the Claisen condensation. Keto-enoltautomerism of ethyl acetoacetate.
		E-lama :	⊤st	proteins.	Alkylation and acylation of enamines.
		February	\mathbf{I}^{st}	Peptide structure	UNIT-IV (8 Hrs.)
				determination, end	Organometallic Compounds:
			nd	group analysis,	Organomagnesium Compounds: The Grignard reagents – Formation, structure and chemical
			II nd	Selective hydrolysis	reactions. Organozinc Compounds: Formation and Chemical reactions.
			ed	of peptides	Organolithium Compounds: Formation and Chemical reactions.
			$\mathrm{III}^{\mathrm{rd}}$	Classical peptide	organonunum compounds. Formation and chemical reactions.
				synthesis, solid -	
				phase peptide	
				synthesis. Structures	
				of peptides and	
				proteins	
			IV th	Levels of protein	
				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	
		17101011	1	Synthetic Polymers:	
				Addition or chain-	
				growth	
		1	l	810WIII	

				polymerization. Free	
				radical vinyl	
				polymerization, ionic	
				vinyl polymerization,	
			II^{nd}	Ziegler – Natta	
				polymerization and	
				vinyl polymers.	
				Condensation or step	
				growth	
				polymerization.	
				Polyesters,	
				polyamides,	
			III^{rd}	Phenol formaldehyde	
				resins, urea	
				formaldehyde resins,	
				epoxy resins and	
				polyurethanes.	
			IV th	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-	
				enoltautomerism of	
				ethyl acetoacetate.	
				Alkylation and	
				acylation of	
				enamines.	

II nd UNIT-IV Organometallic Compounds: Organomagnesium Compounds: The	
Compounds: Organomagnesium Compounds: The	
Organomagnesium Compounds: The	
Compounds: The	
L'examped reagants	
Grignard reagents – Formation, structure	
and chemical	
reactions.	
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 Lav	
Chemistry- lattice, unit cell and Constancy of Interfacial Angles, (ii) Law of Rationality of Constance of Co	of indices, (iii) Law of Symmetry.
B Miller Indices Symmetry elements in crystals.	
III rd Laws of UNIT-II (8 Hrs.)	
Crystallography – (i) Solid State-II:	
Law of Constancy of X-ray diffraction by crystals. Derivation of Bragg eq	uation. Determination of crystal
Interfacial Angles, structure of NaCl, KCl and CsCl (Laue's method and page)	
(ii) Law of Powder diffraction for structure determination, Thermal ar	nd photochemical reaction in solid
Rationality of state	
Indices, (iii) Law of UNIT-III (8 Hrs.)	
Symmetry. Spectroscopy:	1 1 6 1 6 1 6 1 6
IV th Symmetry elements Introduction: Electromagnetic radiation, regions of the sp	
in crystals. spectrometers, statement of the Born-Oppenheimer approxi	imation, degrees of freedom.
V th UNIT-II Rotational Spectrum:	. , . ,
Solid State-II: Diatomic molecules. Energy levels of a rigid rotor (semi	
X-ray diffraction by rules, spectral intensity, determination of bond length, qu	ualitative description of non-rigid
crystals. Derivation rotor, isotope effect.	
of Bragg equation. UNIT-IV (7 Hrs.)	
February II nd Determination of Vibrational Spectrum :	

				crystal structure of	Infrared Spectrum: En
				NaCl, KCl and CsCl	vibrational spectrum into
				(Laue's method and	force constant and bond
				powder method).	idea of vibrational freque
			$\mathrm{III}^{\mathrm{rd}}$	Applications of	polarizability, pure rotat
				Powder diffraction	selection rules.
				for structure	Electronic Spectrum:
				determination	Concept of potential e
			IV^{th}	Thermal and	qualitative description
				photochemical	description of σ , π and n
				reaction in solid state	
			V th	UNIT-III	
				Spectroscopy :	
				Introduction :	
				Electromagnetic	
				radiation, regions of	
				the spectrum,	
		March	II^{nd}	Basic features of	
				different	
				spectrometers,	
				statement of the	
				Born-Oppenheimer	
				approximation,	
				degrees of freedom.	
			III rd	Rotational	
			111	Spectrum:	
				Diatomic molecules.	
				Energy levels of a	
				rigid rotor (semi –	
				classical principles),	
				selection rules,	
				spectral intensity,	
			IV th		
			1 V	Determination of	
				bond length,	
				qualitative	
				description of non-	
				rigid rotor, isotope	
				effect.	

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, dea of vibrational frequencies of different functional groups. Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational, Raman spectra of diatomic molecules, selection rules.

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.

	41-		
	V th	UNIT-IV	
		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,	
April	\mathbf{I}^{st}	Effect of anharmonic	
		motion and isotope	
		on the spectrum, idea	
		of vibrational	
		frequencies of	
		different functional	
		groups.	
	II^{nd}	Raman Spectrum :	
		Concept of	
		polarizability, pure	
		rotational and pure	
		vibrational, Raman	
		spectra of diatomic	
		molecules, selection	
		rule	
	III^{rd}	Electronic	
		Spectrum:	
		Concept of potential	
		energy curves for	
		bonding and	
		antibonding	
		molecular orbitals,	
		qualitative	
		description of	

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End Semester 06-05-17To31-05-17 (22 days including

Examinations Saturday Wednesday Saturday)

Semester Vacation 01-06-17To08-07-17 (39 days)

(Tentative) Thursday Saturday

Total teaching days of Academic Term II =113 + 94 = 207 days