

EKLAVYA UNIVERSITY, DAMOH (M.P.)

Scheme of Examination B.Sc I Year

/For batch admitted in Academic Session 2020-21/

Subject wise distribution of marks and corresponding credits

S. No.	Subject Name	Subject Code	Paper Name	Maximum Marks Allotted													Total Marks	Contact Periods Per week			Total Credits			
				Theory Slot						Practical Slot		Quiz/ Assignment/ Attendance	End Sem	Lab Work/ Sessional	L	T		P						
				Final Yearly		Half Yearly				End Sem	Lab Work/ Sessional													
				P1	P2	P3	P4	P1	P2										P3	P4				
1	Common	BAECC20Y101	Environmental and Disaster Management (University Core Under Ability Enhancement Course (AEC-1))	60				30											100	2	0	0	2	
		BAECC20Y102	Communication Theory (University Core under Ability Enhancement Course (AEC-2))	60				30												100	4	0	0	4
		BYOGA20Y101	Yoga- I (University Core)	-	-	-												40		100	2	0	0	2
2	Chemistry	BCHEM20Y101	Physical Chemistry (Paper - I) (Core Course - 10A)	20				10												34	2	1	0	3
		BCHEM20Y102	Inorganic Chemistry (Paper - II) (Core Course - 10B)	20					10											33	2	1	0	3
		BCHEM20Y103	Organic Chemistry (Paper - III) (Core Course - 10C)				20			10										33	2	0	0	2
		BCHEM20Y104	Paper- I, Paper- II and Paper- III, Practical (Practical 10 A, 10B & 10C Core Course 10D)															20		50	0	0	2	2
		BCHEM20Y105	Industrial Aspects of Organic & Inorganic Chemistry Paper - IV (Core Course - 10E, for Honors)					30							15					50	3	1	0	4
		BCHEM20Y106	Paper-IV, Practical (Practical 10E for Honours, core course 10F)															30		50	0	0	1	1
3	Common	BASPR20Y101	Assignment Presentation for 3 Core Courses														50		50	0	3	0	3	

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

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Class		B.Sc. Chemistry	
Semester / year		I Year	
Subject & Subject Code		Chemistry - BCHEM20Y101	
Paper		Physical Chemistry (Paper - I)	
Max. Marks		20 (ETE) + 14 (IA) =34	
Credits		Total Credits	
L	T	P	3
2	1	0	

Course Objectives:

1. To understand the importance of the Periodic Table of the Elements, how it came to be, and its role in organizing chemical information.
2. To understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems.
3. To learn the laboratory skills needed to design, safely conduct and interpret chemical research.
4. Acquire a foundation of chemistry of sufficient breadth and depth to enable them to understand and critically interpret the primary chemical literature.
5. Develop the ability to effectively communicate scientific information and research results in written and oral formats.
6. To learn professionalism, including the ability to work in teams and apply basic ethical principles.

Course Outcome:

At the end of the course, learners will be able to:

1. Explain the postulates of kinetic theory of gases and derive the kinetic gas equation .
- 2 Describe Maxwell's distribution of molecular velocities .
- 3 Discuss the deviation of real gases from ideal behaviour, derive van der Waals' equation of state, and explain its significance .
- 4 Explain critical phenomena and determination of critical constants .
- 5 Introduce general properties of liquid state .
- 5 Describe in detail vapour pressure and surface tension and important applications .
- 6 Explain viscosity and its measurement and also discuss how molar refraction measurements are useful in the structural elucidation.

Student Learning Outcomes (SLO):

Students will:

1. Describe the ideal and real gases.
2. Use the Van Der Waals gas equation.
3. Use the real gas and Van Der Waals isotherms.
4. Describe the critical state, adapts critical state equation to the problems.
5. Explain the ideal solution and debate the chemical potential in ideal solution.
6. Be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
7. Be able to function as a member of an interdisciplinary problem solving team.

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Unit	Syllabus	Periods
UNIT - I	<p>A. Mathematical Concepts: Logarithmic relations, (rules and types) use of log table and antilog table in calculations, curves sketching straight line and linear graphs, calculation of slopes, Differentiation of functions like K^x, e^x, x^n, $\sin x$, $\log x$; multiplication and division in differentiation, maxima and minima, partial differentiation and reciprocity relations. Integration of some useful/relevant functions; Factorials, Probability.</p> <p>B. Gaseous States and Molecular Velocities : Critical phenomenon: PV isotherms of ideal gases, Andrew's experiment, continuity of states, the isotherms of van der Waals equations, relationship between critical constants and van der Waals constant. Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision numbers, mean free path and collision diameter.</p>	12
	<p>अ. गणितीय अवधारणाएँ – लघुगणकीय संबंध (लघुगणक के नियम तथा प्रकार), लघुगणक तालिका तथा प्रतिलघुगणक तालिका का गणना में अनुप्रयोग, वक्र आरेखन, सरल रेखा तथा रेखीय ग्राफ एवं ढाल की गणनाएं K^x, e^x, x^n, \sin^x, $\log x$, जैसे फलनों का अवकलन, दो फलनों का गुणनफल तथा भाग का अवकलन, उच्चतम एवं निम्नतम, आंशिक अवकलन एवं अन्योन्यता संबंध। कछ उपयोगी एवं संबंध फलनों का समाकलन, क्रमगुणित (फैक्टोरियल्स), प्रायिकता।</p> <p>ब. गैसीय अवस्था तथा आणविक गतियाँ – क्रांतिक परिघटनाएँ – वास्तविक गैसों के PV समतापीय वक्र, ऐन्ड्रूज का प्रयोग, अवस्था का सातत्य, वाण्डर वाल्स समीकरण के समतापी वक्र, वाण्डर वाल स्थिरांक एवं क्रांतिक स्थिरांक में संबंध। वर्गमाध्य मूल वेग, औसत वेग, प्रायिकतम वेग, आणविक वेगों के मैक्सवेल वितरण की गुणात्मक विवेचना, संघट्टन संख्या, माध्य मुक्त पथ, संघट्टन व्यास।</p>	12
UNIT - II	<p>A. Liquid State : Intermolecular forces, structure of Liquids (a qualitative description) Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.</p> <p>B. Solid State : Definition of space lattice, Unit cell, Laws of crystallography - (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry, symmetry elements in crystals. Ionic solid structure, radius ration, radius ratio effect and coordination number, limitations of radius rule, lattice defects.</p>	12
	<p>अ. द्रव अवस्था – अंतरा अणुक बल, द्रवों की संरचना (गुणात्मक विवरण) द्रव क्रिस्टल : द्रव क्रिस्टल, ठोस एवं द्रव में अंतर वर्गीकरण, नेमेटिक एवं कोलिस्ट्रिक प्रावस्थाओं की संरचना, उष्माग्राफी और सात खण्डीय सेल।</p> <p>अ. ठोस अवस्था – त्रिविम जालक तथा इकाई सेल की परिभाषा क्रिस्टलोग्राफी के नियम (i) अंतराफलक कोणों की स्थिरता का नियम (ii) परिमेय घातांक का नियम (iii) सममिति का नियम। क्रिस्टल में सममिति तत्व। आयनिक ठोस संरचना, त्रिज्या अनुपात, त्रिज्या अनुपात प्रभाव और उप सहसंयोजक संख्या। त्रिज्या अनुपात की कमियाँ और जालक दोष।</p>	
UNIT- III	<p>Chemical Kinetics : Chemical Kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction- concentration, temperature pressure, solvent, light and catalyst. Dependence of rate on concentration, mathematical Characteristics of simple chemical reactions-zero order. first order, second and pseudo order, half - life and mean life, Determination of the order of reaction. Differential method, Integration method and half life method. Study of chemical kinetics by polarimetry and spectrophotometry. Effect of temperature on rate of reaction, Arrhenius equation. concept of activation energy. simple collision theory, transition state theory (equilibrium hypothesis).</p>	12

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UNIT- III	<p>रासायनिक बलगतिकी : रासायनिक बलगतिकी एवं इसका कार्यक्षेत्र, अभिक्रिया की दर, अभिक्रिया दर को प्रभावित करने वाले कारक – सान्द्रण ताप, दाब, विलायक प्रकाश एवं उत्प्रेरक, अभिक्रिया दर की सान्द्रण पर निर्भरता, सरल रासायनिक अभिक्रियाओं के गणितीय अभिलक्षण – शून्य कोटि, प्रथम कोटि, द्वितीय कोटि, तथा छद्म कोटि अर्द्ध – आयु काल एवं माध्य काल, अभिक्रिया की कोटि का निर्धारण अवकलन विधि, समाकलन विधि एवं अर्ध आयु काल विधि। रासायनिक बलगतिकी का पोलरीमीट्री तथा स्पेक्ट्रोफोटोमीट्री विधियों द्वारा अध्ययन, रासायनिक अभिक्रिया दर पर ताप का प्रभाव, आरहीनियस समीकरण, सक्रियण ऊर्जा की अन्वेषण, सरल संघटक सिद्धांत, संक्रमण अवस्था सिद्धांत (साम्य परिकल्पना)।</p>	12
UNIT- IV	<p>Radioactivity and Nuclear Chemistry : Natural and artificial radioactivity radioactive radiations, detection and measurement of radioactive radiations, theory of radioactivity, Group displacement law of soddy, radioactive disintegration, nuclear reactions, nuclear fission and nuclear fusion, half life period, isotopes, isobars and isomers. application of radiochemistry.</p> <p>रेडियोएक्टिवता एवं नाभिकीय रसायन : प्राकृतिक एवं कृत्रिम रेडियोएक्टिवता रेडियोएक्टिव विकिरण, रेडियोएक्टिवता का अभिज्ञान एवं मापन, रेडियोएक्टिवता का सिद्धांत, सोडी का समूह विस्थापन का नियम, रेडियोएक्टिव विखण्डन, नाभिकीय क्रियाएँ, नाभिकीय विखण्डन, नाभिकीय संलयन अर्ध आयुकाल, समस्थानिक, समभारिक एवं समवयी, रेडियोएक्टिवता का अनुप्रयोग।</p>	12
UNIT - V	<p>A. Chemical Equilibrium : Law of mass action, Equilibrium constant, Lechatelier's Principles.</p> <p>B. Colloidal Solutions : Classification, lyophilic and lyophobic colloids, properties, kinetic, optical and electrical, coagulation, Hardy - Schulze rule, gold number, emulsions, gels and sols, application of colliodals.</p> <p>अ. रासायनिक साम्य : द्रव अनुपाती क्रिया का नियम, साम्य स्थिरांक लीशेटेलिये का सिद्धांत।</p> <p>ब. कोलॉइडी विलयन : वर्गीकरण : द्रव – स्नेही तथा द्रव – विरोधी कोलॉइडी, कोलॉइडी विलयन के गुण – घर्ष, गतिक, प्रकाशिक एवं विद्युत, स्कंदन, हार्डी शुल्जे का नियम स्वर्णांक, पायस, जेल एवं सॉल, कोलाइडी विलयन के अनुप्रयोग।</p>	12

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Megha

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Class		B.Sc. Chemistry	
Semester / year		I Year	
Subject & Subject Code		Chemistry - BCHEM20Y102	
Paper		Inorganic Chemistry (Paper - II)	
Max. Marks		20 (ETE) + 13(IA) =33	
Credits		Total Credits	
L	T	P	3
2	1	0	

Course Objectives:

On completion of the course, students are able to:

1. Understand the importance of the Periodic Table of the Elements, how it came to be, and its role in organizing chemical information.
2. Understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems.
3. Learn the laboratory skills needed to design, safely conduct and interpret chemical research.
4. Acquire a foundation of chemistry of sufficient breadth and depth to enable them to understand and critically interpret the primary chemical literature.

Course Outcome:

At the end of the course, learners will be able to:

1. Learn systematic analysis of cations and anions .
2. Eliminate the interfering anions from the given mixture.
3. Discuss the concept of symmetry element, symmetry operation and point groups .
4. Classify & recognize the symmetry elements and their operations as required to specify molecular symmetry & possible point groups from symmetry elements & be able to find point group of molecule by systematic procedure .
5. Discuss the d-orbital splitting pattern in different geometries like octahedral, tetrahedral.
6. Calculate magnetic moment & crystal field stabilization energy of metal complexes.
7. Discuss HSAB rule chelation, macro cyclic, cryptate effect.

Student Learning Outcomes (SLO):

Students will:

1. Learn bonding fundamentals for both ionic and covalent compounds, including electronegativities, bond distances and bond energies using MO diagrams and thermodynamic data
2. Predict geometries of simple molecules
3. Comprehend the fundamentals of the chemistry of the main group elements, and important real world applications of many of these species
4. Comprehend the use of group theory to recognize and assign symmetry characteristics to molecules and objects, and to predict the appearance of a molecule's vibrational spectra as a function of symmetry
5. Comprehend the bonding models, structures, reactivities, and applications of coordination complexes, boron hydrides, metal carbonyls, and organometallics.

Mehar  Mehta  Shama

Unit	Syllabus	Periods
UNIT - I	<p>A. Atomic Structure : Dual Nature of matter idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ and ψ^2, 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 configuration of the elements, effective nuclear charge.</p> <p>B. Periodic Properties : 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.</p>	12
	<p>अ. परमाणु संरचना : पदार्थ की दोहरी प्रकृति, तरंगीय गति के अभिलक्षण, डी - ब्रॉग्ली संबंध, अनिश्चितता का सिद्धांत, श्रोडिंगर तरंग समीकरण ψ तथा ψ^2 का भौतिक महत्व, ऑर्बिटल तरंग - फलन तथा प्राथिकता वितरण परमाण्वीय ऑर्बिटलों की आकृति, क्वाण्टम संख्याएँ हुण्ड का अधिकतम बहुलता का नियम, किसी इलेक्ट्रॉन निकाय की क्वाण्टम संख्याओं का निर्धारण, बहु इलेक्ट्रॉनीय परमाणुओं का ऊर्जा स्तर आरेख, ऑर्बिटलों एवं उपकोशों में इलेक्ट्रॉन क पूरण के नियम, तत्वों का इलेक्ट्रॉनिक विन्यास, पाउली का अपवर्जन नियम।</p> <p>ब. आवर्ती गुण : तत्वों के गुणों में आवर्तिता, परमाणु त्रिज्या, आयनिक त्रिज्या, आयनन ऊर्जा या आयनन विभव, इलेक्ट्रॉन बंधुता, इलेक्ट्रॉन बन्धुता पर प्रभाव डालने वाले कारक, विद्युत ऋणात्मकता।</p>	12
UNIT - II	<p>Chemical Bonding - Part I (A) Covalent Bond - Valence bond theory and its limitations. Directional characteristics of covalent bond. Various types of hybridization and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_2O, ClF_3, and H_2O, MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy.</p>	12
	<p>अ. रासायनिक आबंधन : I सह संयोजक बंध संयोजकता बंध की दिशात्मक विशेषताएं संकरण के प्रकार, सरल अर्काबनिक अणुओं एवं आयनों का आकार संयोजकता को इलेक्ट्रॉन युग्म सिद्धांत NH_3, H_2O, ClF_3, and H_2O, MO सिद्धांत समनाभिकीय एवं विषम नाभिकीय अणुओं में बंधन, इलेक्ट्रॉन, इलेक्ट्रॉन न्यून यौगिकों में बहु केन्द्रीय बंधन, बंध सामर्थ्य एवं बंध ऊर्जा, सहसंयोजक बंध का प्रतिशत आयनिक गुण।</p>	
UNIT - III	<p>1. Chemical Bonding - Part II (A) Ionic Solids - Ionic Structure, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born- Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ionic. Fajan's rule. Metallic bond - free electron, valence bond and band theories. (B) Weak Interactions - Hydrogen bonding, Van der waals forces.</p> <p>2. Chemistry of Noble Gases Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.</p>	12

Mehru
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UNIT- III	<p>1. रासायनिक आबन्धन – II अ. आयनिक ठोस कुछ प्रारूपिक आयनिक संरचनाएँ, जालक त्रुटियाँ, अर्धचालक, जालक ऊर्जा, सोडियम क्लोराइड के निर्माण की और्जिकी तथा बॉर्न – हैबर चक्र, आयनिक ठोसों की विलेयता एवं विलायकन ऊर्जा, ध्रुवण क्षमता, आयनों की ध्रुवणीयता एवं फायान्स के नियम, धात्विक बंध, स्वतंत्र इलेक्ट्रॉन सिद्धांत या इलेक्ट्रॉन समुद्र मॉडल, संयोजकता बंधन मॉडल, बैंड मॉडल। ब. दुर्बल अन्वोन्य क्रियाएँ हाइड्रोजन बंध, हाइड्रोजन आबंधों के प्रकार, हाइड्रोजन बन्धन के सिद्धांत वान्डर वाल्स बल। 2. उत्कृष्ट गैसों का रसायन उत्कृष्ट गैसों का रसायन, उत्कृष्ट गैसों के यौगिक, जीनों के प्रमुख यौगिक।</p>	12
UNIT- IV	<p>1. s- Block Elements : Comparative study Li and Mg, diagonal relationships, salient features of hydrides. Solvation and complexation tendencies including their function in biosystems an introduction to alkyls and aryls. 2. p - Block Elements Part - I Comparative study Be and Al (including diagonal relationship) of group 13-17 elements. compounds like hydrides. oxides. oxyacids and halides of groups 13-16.</p> <p>अ. s – ब्लॉक के तत्व समूह 1 के तत्व : क्षार धातुएँ, भौतिक गुणों में समानता तथा क्रमिक परिवर्तन, रासायनिक गुणों में समानता तथा क्रमण, लीथियम का असंगत व्यवहार, लीथियम व मैग्नीशियम में विकर्ण संबंध, जैव तंत्रों में क्षार धातुओं के कार्य, समूह 2 के तत्वों का सामान्य अध्ययन: क्षारीय मृदा धातुएँ, भौतिक गुणों में समानता तथा क्रमण, रासायनिक गुणों में समानता तथा क्रमण, क्षारीय मृदा धातुओं के ऐल्कल और ऐरिल व्युत्पन्न, बेरीलियम का असंगत व्यवहार, बेरीलियम व ऐलुमिनियम में विकर्ण संबंध समूह 1 व समूह 2 तत्वों में तुलना।</p> <p>ब. p खण्ड के तत्व, भाग – 1 समूह 13 के तत्वों का सामान्य अध्ययन, भौतिक गुणों में समानता एवं क्रमिकता, रासायनिक गुणों में समानता तथा क्रमिकता, बोरॉन तथा सिलिकॉन के मध्य विकर्ण संबंध बोरॉन और ऐलुमिनियम में तुलना, बोरॉन तथा कार्बन की तुलना, बोरॉन का असंगत व्यवहार, बोरॉन और ऐलुमिनियम के हैलाइड, चौदहवे समूह के तत्व : कार्बन परिवार, भौतिक गुणों में समानता तथा क्रमण, कार्बन का असंगत व्यवहार, पंद्रहवे समूह के तत्व नाइट्रोजन परिवार, सोलहवे समूह के तत्व : ऑक्सीजन परिवार, सत्रहवें समूह के तत्व: हैलोजन परिवार।</p>	12
UNIT - V	<p>p- Block Elements Part - II Hydrides of boron - diborane and higher boranes, borazine, boroydrides, Fullerenes, fluocarbons, silicates (Structural principle) tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.</p> <p>p - खण्ड के तत्व, भाग – 2 बोरॉन के हाइड्राइड, डाइबोरॉन या बोरॉन, बोरजिन, बोराहाइड्राइड, फुलेरीन, कार्बाइड, फ्लुओरोकार्बन, सिलिकेट, टेट्रासल्फर टेट्रानाइट्राइड, हैलोजनों के क्षारकीय गुण, अंतरा – हैलोजन यौगिक, पॉलीहैलाइड।</p>	12

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Class		B.Sc. Chemistry	
Semester / year		I Year	
Subject & Subject Code		Chemistry - BCHEM20Y103	
Paper		Organic Chemistry (Paper - III)	
Max. Marks		20 (ETE) + 13(IA) =33	
Credits		Total Credits	
L	T	P	2
2	0	0	

Course Objectives:

On completion of the course, students are able to:

1. Understand the importance of the Periodic Table of the Elements, how it came to be, and its role in organizing chemical information.
2. Understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems.
3. Learn the laboratory skills needed to design, safely conduct and interpret chemical research.

Course Outcome:

At the end of the course, learners will be able to:

- 1 Identify the symmetry elements and symmetry operations in molecules.
- 2 Explain the criteria for chirality and discuss axial, planar and helical chirality.
- 3 Discuss the methods of determination of relative and absolute configuration.
- 4 Discuss Racemization and Resolution techniques.
- 5 Determine the configuration in E and Z isomers.
- 6 Explain the mechanism of electrophilic addition to carbon carbon double bond and elimination reactions.
- 7 Discuss the various methods of determination of reaction mechanism.
- 8 Discuss the conformations in saturated and unsaturated acyclic compounds and the factors affecting the stability and reactivity of conformations.

Student Learning Outcomes (SLO):

Students will:

1. Identify, classify, organize, analyze, and draw structures of organic molecules.
2. Apply the basic rules of organic nomenclature to convert between structures and names.
3. Recall reagents and predict products for a defined set of organic reactions.
4. Draw organic structures consistent with the results of specific chemical tests.
5. Predict the physical properties of organic chemicals based on their structures (e.g. relative boiling point, melting point, and solubility.)
6. Analyze the influence of structure and physical properties of organic molecules on their biological properties (e.g. drug action, membrane fluidity, energy storage, cell signaling.)

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Unit	Syllabus	Periods
UNIT - I	<p>Structure and Bonding Hybridization, bond length and bond angles, bond energy, localized and delocalized chemical bond inclusion compounds, clathrates, charge transfer complexes, resonance, hyperconjugation, inductive, electromeric, mesomeric and steric effect.</p> <p>Mechanism of Organic Reactions Homolytic and heterolytic bond fission, Types of reagents-electrophiles and nucleophiles. Types of reaction, energy consideration. Reactive intermediates (carbocations, carbanions, free radicals, carbenes, arynes and nitrene with examples). Methods of determination of reaction mechanism (active intermediate products) isotope effects, kinetic and stereo chemical studies.</p>	12
	<p>संरचना एवं आबन्धन संकरण, आबन्ध लम्बाइ, आबन्ध कोण, आबन्ध उर्जा, स्थानित रासायनिक आबन्ध तथा अस्थापित रासायनिक आबन्ध, समावेशन यौगिक, क्लैथ्रेट, आवेश स्थानांतरण संकुल, अनुनाद, अति-संयुगमन, प्रेरणिक प्रभाव, इलेक्ट्रोमेरिक, मेसोमेरिक प्रभाव एवं त्रिविम प्रभाव। कार्बनिक अभिक्रियाओं की क्रियाविधि समांश एवं विषमांश बन्ध विदलन, अभिकर्मकों के प्रकार, कार्बनिक अभिक्रियाओं के प्रकार, कार्बनिक अभिक्रियाओं में उर्जा विचार, अभिक्रियाशील मध्यवर्ती-कार्बोकेटायन, कार्बोनियन, मुक्त मूलक, कार्बिन, ऐरीन तथा नाइट्रीन, अभिक्रियाओं की क्रियाविधि निर्धारण की विधियां, सक्रिय मध्यवर्ती, गतिक एवं त्रिविम रासायनिक अध्ययन।</p>	12
UNIT - II	<p>Alkanes and Cycloalkanes IUPAC nomenclature of branched and unbranched alkanes, classification of alkanes. Isomerism in alkanes, 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, conformation of alkanes, mechanism of free radicals halogenation of alkanes, Cycloalkanes- nomenclature, methods of formation, chemical reaction, Baeyer strain Theory and its limitations, Theory of strainless rings. The case of cyclopropane ring: Banana bonds, conformation of cycloalkanes.</p>	12
	<p>आईयूपीएसी नामकरण-शाखायुक्त एवं शाखाविहिन एल्केन, एल्केन का वर्गीकरण, एल्केन में समावयवता, बनाने की विधियां, बर्टज अभिक्रिया, कोल्बे अभिक्रिया, कोरे हाउस अभिक्रिया, कार्बोक्लीकरण अम्लों का विकारोक्लीकरण, एल्केनो के भौतिक एवं रासायनिक गुणधर्म, एल्केनो में संरूपण, एल्केनो में मुक्त मूलक हैलोजेनीकरण की क्रियाविधि, साइक्लोएल्केन नामकरण, बनाने की विधियां, रासायनिक अभिक्रिया, बेयर का तनाव सिद्धांत एवं उसकी सीमाएं, तनावरहित वलयों का सिद्धांत साइक्लोप्रोपेन का उदाहरण: केला आबन्ध, साक्लोएल्कोनो में संरूपण।</p>	

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UNIT- III	<p>Alkenes, Cycloalkenes, Dienes Nomenclature of alkenes, methods of formation-mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. The Saytzeff rule. Hofmann elimination, physical properties and relative stabilities of alkenes.</p> <p>Chemical reactions of alkenes-mechanism involved in hydrogenation, electrophilic and free radical addition, Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction, Epoxidation, ozonolysis. Polymerization of alkenes. Substitution at the allylic and vinylic positions, Industrial application of ethylene and propene. Methods of formation, conformation and chemical reactions of cycloalkenes. nomenclature and classification of dienes: Isolated, conjugated and cumulated dienes. Structure of alkenes and butadienes, methods of formation, polymerisation, Chemical reaction-1,2 and 1,4 addition,</p>	12
UNIT- IV	<p>Alkynes and alkyl Halides Nomenclature, structure and bonding in alkynes, Methods of formation. Chemical reactions, acidity of alkynes, Mechanism of electrophilic and nucleophilic addition reaction, hydroboration oxidation, metal-ammonia reduction, oxidation and polymerisation.</p> <p>Nomenclature and classification of alkyl halides, methods of formation; chemical reactions. Mechanisms of nucleophilic substitution reaction of alkyl halides, SN^1 and SN^2 reaction with energy profile diagram, Elimination reaction, Polyhalogen compounds: methods of preparation and properties of chloroform and carbon tetrachloride</p>	12
UNIT - V	<p>Stereochemistry of Organic compounds Concept of isomerism, types of isomerism. Optical isomerism element of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.</p> <p>Relative and absolute and absolute configuration, sequence rule, D & L and R & S system of nomenclature. Geometrical isomerism- determination of configuration of geometric isomerism in oximes and alicyclic compounds.</p>	12

Sharma

Sinha

Nigam

Joshi

Mishra

कार्बनिक यौगिकों का त्रिविम रसायन

समावयवता की अवधारणा, समावयवता के प्रकार, प्रकाशिक समावयवता सममिति के तत्व, आणविक किरैलता प्रतिबिम्ब रूप, स्टीरियोजेनिक केन्द्र, प्रकाशित सक्रियता प्रतिबिम्बों के गुणधर्म, दो स्टीरियोनजेनिक केन्द्रयुक्त किरैल व अकिरैल अणु, शिथिल एवं एस्थो द्विक त्रिविम समावयवी, मिजो यौगिक, प्रतिबिम्ब रूपों का वियोजन, प्रतिलोमन, धारण एवं रेसिमीकरण आपेक्षिक एवं निरपेक्ष विन्यास, अनुक्रम नियम, नामकरण की पद्धति, ज्यामितीय, समावयवता, ज्यामितीय समावयवियों के विन्यास का निर्धारण, नामकरण की पद्धति, आक्साइडों एवं ऐलिसाइक्लिक यौगिकों में ज्यामितीय समावयवता।

Text Books:-

1. D.F. Shriver, P.W Atkins and C.H. Langford (2001) inorganic chemistry, 3rd Ed. Oxford University Press London.
2. B. Douglas D. Mc Daniel, and J. Alexander. (1994) Concepts and Models of Inorganic chemistry, 3rd ed. John Wiley.
3. R.T. Morrison and R.N. Boyd, (1994) organic chemistry, 6th edition. Prentice-Hall of India Ltd. New Delhi.
4. T.w. Graham Solomons, (1996) organic chemistry, 6th edition, John wiley and sons, New York.

Reference Books:-

1. Atkins, P.W. and Paula, J. De Atkins, (2014) , Physical chemistry. 10th, edition., Oxford University Press.
2. Puri, B.R., Sharma, L.R. and Pathania, M.S. (2016) Principles of Physical chemistry, vishal Publishing Co., 47th Ed.
3. Paula Y. Bruice, (1998) Organic Chemistry; 2nd Edition, Prentice-Hall, International Edition.
4. Kalsi, P.S. (2005) Stereochemistry Conformation and mechanism, New Age International.
5. Lee, J.D. (1991) Inorganic chemistry, John wiley .
6. Day, M.C. and Selbin, J. (1962) Theoretical Inorganic chemistry, ACS Publications.

Shama

Shama

Megha

Shama

Neha

Class	B.Sc. Chemistry
Semester / year	I Year
Subject & Subject Code	Practical Chemistry - BCHEM20Y104
Paper	Paper- I, Paper- II and Paper- III, Practical
Max. Marks	30 (ETE) + 20 (IA) =50
L	2
T	
P	
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0	
2	

Physical Chemistry

(A) Any One Experiment

- 1 Calibration of thermometer
- 2 Determination of melting point
- 3 Determination of boiling point
- 4 Preparation of Solutions of Various concentration NaOH, HCl, H₂SO₄

(B) Any One Experiment

- 1 Determination of Surface tension / Percentage Composition of given Organic mixture using surface tension Method.
- 2 Determination of viscosity /percentage composition of given organic mixture using viscosity method.

Organic Chemistry

- 1 Distillation
- 2 Crystallization
- 3 Decolourisation and crystallization using charcol
- 4 Sublimation
- 5 Detection of elements and functional groups
- 6 Organic Molecules through models with special refernce to oprical geometrical isomerism

Mahar
Shama
Megha
Anil

Class		B.Sc. Chemistry (Honours)	
Semester/Year		I Year	
Subject		Chemistry Honours BCHEM20Y105	
Paper		Industrial Aspects of Organic & Inorganic Chemistry Paper - IV	
Max. Marks		30 (ETE) + 20 (IA) =50	
Credit		Total Credits	
L	T	P	4
3	1	0	

Course Objectives:

Bachelor course in Chemistry offers the synergism of basic concepts of Chemistry with Industrial applications. The main objective of this degree course is to produce graduates with enhanced skills, knowledge and research aptitude to carry out higher studies or research and development in the various industrial areas. This degree course of Industrial Chemistry prepares the students for immediate entry to the workplace with sound theoretical, experimental knowledge in the area of fuels and energy, environment, health, foods, cosmetics, polymers and related multidisciplinary fields. Overall, the course offers basic foundation in chemistry, physics and maths which enables the students to understand the concepts in chemical processing, engineering and industrial development.

Course Outcome:

At the end of the course, learners will be able to:

1. Describe the chemical industry and identify the distinguishing features of its component.
2. Explain the importance and roles of process optimization in chemical processing.
3. Describe the industrial production of a number of important organic and inorganic.
4. Evaluate environmental issues pertaining to the chemical industry.
5. Use modern instrumentation techniques for chemical analysis and separation.
6. Communicate the results of their work to chemists and non-chemists.
7. Gain comprehensive knowledge of cutting-edge developments in a field of science by discussion and exchange of experiences and knowledge.
8. Understand fundamental and applied aspects of organic, inorganic, physical and analytical chemistry as well as key major concepts, theoretical principles and experimental findings in industrial chemistry will be covered.
9. Develop proficiency in application of current aspects of industrial chemistry.

Mehar *Sharma* *Megha* *Sharma*
Shama

Student Learning Outcomes (SLO):

Students will:

1. Use chemical techniques relevant to academia and industry, generic skills and global competencies including knowledge and skills that enable the students to undertake further studies in the field of industrial chemistry or a related field, and work in chemical and non chemical sector.
2. Undertake hands on lab work and practical activities and develop problem solving abilities required for successful career in pharmaceuticals, chemical industries, teaching research, environmental monitoring, product quality, food products, cosmetic industries, oils and lubricants industries, fuels, petrochemicals and energy sector, etc.
3. Interact with peers from diverse backgrounds with developed confidence to lead a team. Identify appropriate resources required for an assigned task/project to accomplish it.
4. Identify the ethical and environmental dimensions of problems and issues facing chemists. Use modern library searching and retrieval methods to obtain information on a topic, relating to Industrial chemistry.
5. Gain knowledge about raw materials, agents and reaction conditions required for carry out the specific unit process.
6. Understand the chemical composition of natural gas and crude petroleum and learns the common

Unit	Syllabus	Periods
UNIT - I	Nomenclature Generic names, Rade names. Raw Materials for Organic compounds :- Petroleum, natural gas, Fractionation of Crude oil.	12
UNIT - II	Petrolutri :- Cracking, reforming Hydroforming isomerisaton. Coal :- Types Structure properties distillation of coal chemicals derived there from.	12
UNIT - III	Renewable natural resources :- Cellulose, starch, properties, modification, important ind. Chemicals derived from them, Alcohol and alcohol based chemicals, Oxalic acid, Furfural. - Pulverisation, calcination, Roasting, refining.	12
UNIT - IV	Physico chemical principles of extraction of, :- Iron, Copper, Lead, Silver, Sodium, Aluminium, Magnesium, Zinc, Chromium.	12
UNIT - V	Inorganic materials of Industrial Importance :- Their availability, forms, structure arid modification. Alumina, Silica, Silicates, Clays, Mica, Carbon, Zeolites.	12

Reference Books -

- 1 Coal Conversion, E.J. Hoggman, The Energon Co., Lavamic Wyomnig, U.S.A
- 2 Introduction of Petroleum Chemicals, H. Steiner, Pergamen Press.
- 3 From Agrocarbon to Petrochemicals, L.F. Hatch & S. Matarm, Gulf Publishing Co., Houston.
- 4 Colten Cellulose : Its Chemistry & Technology, Hall A.G.
- 5 Methods in Carbohydrate Chemistry, Vol. 3 - Cellulose, Whistler, R.L.
- 6 Chemistry of Cellulose, Heuser, E.
- 7 Chemistry & Industry of Starch, Kerr, R.W.

Shams

Neha

Ravi

Megha

Ant

Class		B.Sc. Chemistry (Honours)	
Semester/Year		I Year	
Subject		Practical Chemistry Honours- BCHEM20Y106	
Paper		Paper-IV, Practical	
Max. Marks		30 (ETE) + 20 (IA) =50	
Credit		Total Credits	
L	T	P	1
0	0	1	

PRACTICALS

- 1 Simple laboratory techniques crystallisation, Fraction Crystallisation, Distillation, Fractional distillation Boiling Point.Diagram.
- 2 Preparation of standard solutions- Primary and secondary standards, Determination of- and H_3PO_4 in a mixture.
- 3 Calibration of Thermometres.
- 4 Acquaintance with safety measures in a laboratory Hazards of Chemicals.
- 5 Depression and elevation in.b.p./m.p. of solids and liquids.
- 6 Ore analysis dolomite, limestone, -calcite, Analysis of alloys such as cupronickel.
- 7 Determination of Physical Constants Refractive -index, surface tension, Effect of surfactants, on surface tension, viscosity- Fluids, Polymer solutions effect of additives on viscosity, optical rotation.

S. Lang

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