

**Deccan Education Society's
Kirti M. Doongursee College of Arts,
Science and Commerce
(AUTONOMOUS)**



Affiliated to

UNIVERSITY OF MUMBAI

**Syllabus for
Program: Bachelor of Science
Course: F.Y.B.Sc (NEP 2024)
Subject: Chemistry**

**Choice Based Credit System (CBCS)
with effect from
Academic Year 2024-2025**

Deccan Education Society's
Kirti M. Doongursee College (Autonomous) Proposed
Curriculum as per NEP 2020 Year of implementation-
2024-25

Name of the Department: Chemistry

Semester	Course Code	Course Title	Vertical	Credit
I	K24USCHEMJ111	Fundamental Chemistry-I	Major	2
	K24USCHEMJP111	Practical-I	Major	2
	K24USCHEOE131	Chemical Technology and Society	Open Elective	2
	K24USCHEVC141	Good Laboratory Practices(GLP)	Vocational Skill Course	2
	K24USCHEESC151	Food Chemistry-I	Skill Enhancement Course	2
II	K24USCHEMJ211	Fundamental Chemistry-II	Major	2
	K24USCHEMJP211	Practical-II	Major	2
	K24USCHEVC241	Green Chemistry	Vocational Skill Course	2
	K24USCHEESC251	Food Chemistry-II	Skill Enhancement Course	2

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in Science Program will be able to	
PO1	Disciplinary Knowledge: Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate Programme. Execute strong theoretical and practical understanding generated from the specific graduate Programme in the area of work.
PO2	Critical Thinking and Problem solving: Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions
PO3	Social competence: Display the understanding, behavioral skills needed for successful social adaptation, work in groups, exhibits thoughts and ideas effectively in writing and orally.
PO4	Research-related skills and Scientific temper: Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research
PO5	Trans-disciplinary knowledge: Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	Personal and professional competence: Performing dependently and collaboratively as a part of team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	Effective Citizenship and Ethics: Demonstrate empathetic social concern and equity centered national development, and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	Environment and Sustainability: Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

SEM – I

Course Code	MAJOR Course	Credits	Lectures /Week
K23USCHEMJ111	Paper I FUNDAMENTAL CHEMISTRY-I	2	2
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <p>CO1: Recall the mathematical formulae related to concentration, fundamental concepts of atomic structure, long form of periodic table.</p> <p>CO2: <u>Comprehend</u> the concept of stoichiometry for chemical equations, various models of atomic structure, behavior of electrons in atomic structure, properties of periodicity of elements.</p> <p>CO3 : Apply the knowledge of mathematics in chemistry.</p> <p>CO4 : Compare the periodic properties of elements</p>			
Unit	Topics	No of Lectures	
I	1.1Chemical mathematics. Expressing concentration of solutions: Normality, molality, molarity, formality, mole fractions, ppm, ppb, millimoles, milliequivalents (Numerical expected).	03	
	1.2 Chemical Kinetics- Rate Laws: Rate laws, the relationship between the rate of a chemical reaction and the concentrations of reactants. Rate Determining Step, a reaction mechanism for the determination of the rate law. Rate Constants, coefficients in the rate laws, and quantitative information about the rate of reaction. Integrated Rate Laws Order of Reaction. (Numerical expected).	07	
II	Comparative chemistry of Main Group Elements:(06L) Comparative chemistry of oxides and hydroxides of group I and group II elements.(02L) oxides of carbon, oxides of Sulphur and Nitrogen with respect to environmental aspects like	06L	

	<p>greenhouse effect, photochemical smog and acid rain.(04L)</p> <p>Acid Base Theories (4L) Arrhenius, Lowry- Bronsted, Lewis, Solvent – Solute concept of acids and bases,</p>	04L
III	<p><u>Classification and Nomenclature of Aliphatic Organic Compounds.</u></p> <p>Classification on the basis of functional groups: alkanes,alkenes,alkynes,haloalkanes,alcohols, ethers, aldehydes,ketones, carboxylic acids, carboxylic acid derivatives (acid halides,esters, anhydrides,amides),nitro compounds, nitriles and amines with at least two examples of each.</p> <p>Electronic effects : Inductive,electromeric, resonance, mesomeric effects and hyperconjugation .</p> <p>Basic terms and concepts: Homolytic and Heterolytic fission with suitable examples,electrophiles and nucleophiles ,Nucleophilicity and basicity ,Electrophilicity and acidity.</p> <p>Writing organic structures (Tartaric acid) in Fischer, Sawhorse, Newman's projections, and flying wedge-dash, zig-zag formula.</p>	(10L)
<p>References: Add Unit III references</p> <p><u>Unit I</u></p> <ol style="list-style-type: none"> 1. Atkins P.W. and Paula J.de, Atkin's Physical Chemistry, 10th Ed., Oxford University 12 Press (2014). 2. Ball D.W., Physical Chemistry, Thomson Press, India (2007). 3. Castellan G.W., Physical Chemistry, 4th Ed., Narosa (2004). 4. Mortimer R.G., Physical Chemistry, 3rd Ed., Elsevier: NOIDA, UP (2009). 5. Engel T. and Reid P., Physical Chemistry, 3rd Ed., Pearson (2013). 6. Peter A. and Paula J. de., Physical Chemistry, 10th Ed., Oxford University Press (2014). 		

7. McQuarrie D.A. and Simon J.D., Molecular Thermodynamics, Viva Books Pvt. Ltd., New Delhi (2004).
8. Levine I.N., Physical Chemistry, 6th Ed., Tata Mc Graw Hill (2010).
9. Metz C.R., 2000 Solved Problems in Chemistry, Schaum Series (2006).
10. Rice. Physical Chemistry, 2nd Ed., Oxford University Press: (2009).
11. Banwell C.N., Fundamentals of Molecular Spectroscopy, 4th Ed., Tata McGraw Hill (1994).
12. K.L. Kapoor, A Textbook of Physical Chemistry, Macmillan (2000).

Unit II

1. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning
6. India Edition, 2002.

Course Code	OPEN ELECTIVE SEM – I	Credits	Lectures/ Week
K23USCHEOE131	Paper-I CHEMICAL TECHNOLOGY AND SOCIETY	2	2
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <p>CO1 : Recollect - Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid-liquid extraction, separation by absorption and adsorption</p> <p>CO2 : Understand - Chemical and scientific literacy as a means to better understand topics like air and water (and the trace materials found in them that are referred to as pollutants)</p> <p>CO3: Apply Different - types of equipment needed in chemical technology</p> <p>CO4: Interconversions from simple examples like combustion to complex instances like genetic engineering and the manufacture of drugs</p>			
Unit	Topics	No of Lectures	
I	Basic Analytical Techniques: Purification of solids. Filtration, filtration under suction, crystallization, Fractional crystallization, Basic principles of distillation, Simple distillation, Fractional distillation, Distillation under reduced pressure, solvent extraction, solid-liquid leaching and liquid-liquid extraction, separation by absorption and adsorption.	15	
II	Exploration of societal and technological issues from a chemical perspective. Chemical and scientific literacy as a means to better understand topics like air and water (and the trace materials found in them that are referred to as pollutants); energy from natural sources (i.e. solar and renewable forms), from fossil fuels and from nuclear fission;	15	

References:

John W. Hill, Terry W. McCreary & Doris K. Kolb, Chemistry for changing times 13th Ed.

Course Code	SKILL ENHANCEMENT COURSE SEM – I	Credits	Lectures/ Week
K23USCHESC151	Paper-I FOOD CHEMISTRY-I	2	4
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <p>CO1 - To know about adulteration</p> <p>CO2 - To understand about adulterant</p> <p>CO3- To find out different examples of adulterant</p> <p>CO4 - Student get trained about finding to adulteration in day to day using edible materials</p>			
Uni	Topics		No of hours
I	<ol style="list-style-type: none"> 1. Detection of coloured adulterant in red chilli 2. Detection of sugar/dextrose from Honey 3. Identification of adulterant added in fruits and vegetables 4. Detection of artificial colors in Green pea 5. Detection of chalk powder/urea/washing soda from sugar. 6. Detection of adulterant in turmeric powder 7. Detection of adulterant in tea powder 8. Detection of adulterant in coffee 9. Visual identifications of adulterant in different food grains 10. Detection of sodium Bicarbonate in cooked food samples 11. Detection of adulterant in cooking oil 12. Detection of adulterant in pure ghee 		60
<p>References</p> <ol style="list-style-type: none"> 1. Food safety and standard authority of India (FSSAI) New Delhi 2. Manual of methods of analysis of foods: Milk and milk products D.G.H. Services (Ed.) 2005 3. Detection of adulterants in milk, A laboratory manual In N.D.R. Institute (Ed.) Karnal Haryana India 2012. 4. www.rjptonline.org. Research Journal of Pharm and Tech.Sept.2017. 5. Manual of methods of analysis of foods honey& other bee hive products (FSSAI) 6. Manual of methods of analysis of foods food safety and standards authority of India ministry of health and family welfare government of India new Delhi 2015 			

7. Food Adulteration Testing Manual (14th Revised Edition) –Consumer Guidance
Society of India (CGSI) Mumbai-2019

Course Code	VOCATIONAL SKILL COURSE SEM – I	Credits	Practical s/Week
K23USCHEVC141	Good Laboratory Practices (GLP)	2	4hrs
<p>Course Outcomes:</p> <p>After completing this course, the learner will be able to:</p> <p>CO1 Apply practical skills in science courses with the understanding of general laboratory practices</p> <p>CO2 Use various techniques in Chemistry</p> <p>CO3 Apply various techniques to study chemical compounds and basic concepts in Chemistry.</p> <p>CO4 Explore various research issues in chemistry and their solutions</p> <p>Introduction:</p> <p>Concept of molarity, molality, normality and percentage. Introduction of primary and secondary standards.</p> <p>Techniques of handling analytical balance, micropipettes, pH meter, Conductivity Meter, Potentiometer, Colorimeter etc.</p> <p>Introduction to Chromatographic Techniques</p>			
Experiments			No of hours
<p>1. Preparation of solutions of different strengths (Molar, molal, normal and percentage solutions) and its standardization.(4-5 Experiments)</p> <p>2. Use of burettes, pipettes (micropipettes), analytical balance etc.(2-3 experiments)</p> <p>3. Use of pH meter, Conductivity Meter, Potentiometer, Colorimeter(4 experiments)</p> <p>4. Chromatographic techniques (Paper & TLC) (4 experiments)</p> <p>a) Paper chromatographic separation of Co(II) & Ni(II)</p>			60

b) Paper chromatographic separation of Fe(III) and Al(III)

c) Separation of a mixture of two amino acids by paper chromatography

References:

1. Mendham, J., A.I.Vogel's Quantitative Analysis 6th Ed., Pearson, 2009 CBCS: B. Sc. (Honours) with CHEMISTRY
2. Garner, W.Y., Barge M.S., Ussary. P.J. (1992). Good Laboratory Practice Standards: Application for field and Laboratory studies. Wiley VCH.
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

Course Code	MAJOR	Credits	Lectures/Week
K23USCH EMJ211	Paper I FUNDAMENTAL CHEMISTRY - II	2	2
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to-</p> <p>CO1 : Define the terms and laws involved in chemical thermodynamics, acid base theory, Qualitative Analysis</p> <p>CO2: Understand the concepts of thermodynamic parameters.</p> <p>CO3 : Derivation of Kirchhoff's equation, Applications of Qualitative Analysis and acid base theory in organic reactions..</p> <p>CO4 :Volumetric analysis of strong acid and strong base.</p>			
Unit	Topics	No of Lectures	
I	<p>Chemical thermodynamics</p> <p>1.1 Thermodynamic terms: System, surrounding, boundaries, open, closed and isolated system, intensive and extensive properties, state functions and path functions,</p> <p>1.2 Laws of thermodynamics: zeroth, First and second law of thermodynamics: Concept of heat (q), work (w), internal energy (U), statement of the first law, enthalpy, the relation between heat capacities, sign conventions, calculations of heat (q), work (w), internal energy (U), and enthalpy (H) (Numerical expected) Thermochemistry: Heats of reactions, standard states, enthalpy of formation of molecules, enthalpy of combustion and its applications, calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, Kirchhoff's equation (Numerical expected)</p>	03	07
II	<p>Chemical Bond and Reactivity:(06 L)</p> <p>Types of chemical bond, comparison between ionic and covalent bonds, polarizability (Fajan's Rule), shapes of molecules, Lewis dot structure, Sidgwick Powell Theory,</p>	06	

	<p>basic VSEPR theory for AB_n type molecules with and without lone pair of electrons, isoelectronic principles, applications and limitations of VSEPR theory.</p> <p>Concept of Qualitative Analysis (4L) Precipitation equilibria:- solubility product , effect of common ions, uncommon ions, oxidation states, buffer action, complexing agents on precipitation of ionic compounds (Balanced chemical equations and numerical problems expected)</p>	04
UNIT III	<p>CHEMISTRY OF ALIPHATIC HYDROCARBONS</p> <p>Chemistry of Alkanes : Formation of alkanes, Wurtz reaction, Wurtz-Fittig reaction, free radical substitution (chlorination of methane with mechanism)</p> <p>Chemistry of Alkenes and Alkynes: Formation of alkenes and alkynes by elimination reactions, Saytzeff and Hofmann eliminations.</p> <p>Reactions of alkenes: Electrophilic additions and their mechanisms (Markownikoff/AntiMarkownikoff addition), Ozonolysis, Diel's-Alder reaction, Allylic and Benzylic bromination using NBS, e.g. propene, 1-butene, ethylbenzene.</p> <p>Reaction of alkynes : acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, alkylation of terminal alkynes.</p>	10

References:

Unit I

1. Atkins P.W. and Paula J.de, Atkin's Physical Chemistry, 10th Ed., Oxford University 12 Press (2014).
2. Ball D.W., Physical Chemistry, Thomson Press, India (2007).
3. Castellan G.W., Physical Chemistry, 4th Ed., Narosa (2004).
4. Mortimer R.G., Physical Chemistry, 3rd Ed., Elsevier: NOIDA, UP (2009).
5. Engel T. and Reid P., Physical Chemistry, 3rd Ed., Pearson (2013).
6. Peter A. and Paula J. de., Physical Chemistry, 10th Ed., Oxford University Press (2014).
7. McQuarrie D.A. and Simon J.D., Molecular Thermodynamics, Viva Books Pvt. Ltd., New Delhi (2004).
8. Levine I.N., Physical Chemistry, 6th Ed., Tata Mc Graw Hill (2010).
9. Metz C.R., 2000 Solved Problems in Chemistry, Schaum Series (2006).
10. Rice. Physical Chemistry, 2nd Ed., Oxford University Press: (2009).

11. Banwell C.N., Fundamentals of Molecular Spectroscopy, 4th Ed., Tata McGraw Hill (1994).
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Unit II

1. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
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4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.

References:

Unit-I

1. Morrison, R. T. and Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt Ltd. (Pearson Education).2012
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt Ltd. (Pearson Education).
4. Eliel, E. L. and Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.
5. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.

Unit II

References:

1. Instrumental Analysis by Douglas A. Skoog, F. James Holler, Stanley R. Crou
2. Instrumental methods of analysis by Willard, H.H.; Merritt, L.L. Jr.; Dean, J.A.; Settle, 7th Edition
3. Fundamental of Analytical Chemistry by Douglas A. Skoog, West, F. James Holler, S.R. Crouch
4. Day and Underwood, "Quantitative analysis" prentice hall 1991, chapter 3
5. Modern Analytical Chemistry by David Harvey, McGraw-Hill Higher Education
6. Skoog et al. "Fundamentals of Analytical chemistry" Cengage Learning, Eight Edition, chapter 13, 14 and 15
7. Day and Underwood, "Quantitative analysis" prentice hall 1991, chapter 3
8. S.M. Khopkar, "Basic Concepts of Analytical Chemistry", II Ind Edition NewAge International Publisher
9. Gary D. Christian, "Analytical Chemistry", VIth Edition, Wiley Students Edition, Chapter No 8,9,10
10. Fundamental of Analytical Chemistry by Douglas A. Skoog, West, F. James Holler, S.
11. R. Crouch 6) Modern Analytical Chemistry , David Harvey (page numbers 232 -265)
12. Instrumental Methods of Chemical Analysis by Gurdeep R. Chatwal , Sham K.Anand pp 2.107-2.148
13. Principles of Instrumental Analysis by Skoog, Holler, Nieman, 5th Edition pp 143-172.
14. Instrumental Methods of Analysis by Willard, Merritt, Dean, Settle 7th Edition pp 118-181.

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures/ Week
K23USCHEVC241	Paper I GREEN CHEMISTRY	2	4
<p>CO1: Recollect - Natural and Synthetic Pesticides CO2: Understand - benefits and adverse effects, changing concepts of pesticides, structure activity relationship CO3: synthesis and technical manufacture and uses of representative pesticides Preparation of simple organophosphates, phosphonates and thiophosphates</p> <p>CO4: Analyze - To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications</p>			
1	To prepare 1,4-dihydroquinoxaline-2,3-dione- Green synthesis (Mortar and pestle)		
2	Synthesis of copper nanoparticles by green method.		
3	Preparation of Biodegradable Plastic from Starch.		
4	Extraction of Essential Oils from Citrus Peels using Dry Ice.		
5	To synthesize Aspirin from Salicylic Acid by greener method		
6	Synthesis of Iron Oxide Nanoparticles using green chemistry principles		
7	Green Synthesis of Zinc Oxide Nanoparticles.		
8	Extraction of Lycopene from Tomatoes using a greener method.		
9	To extract Curcumin from Turmeric.		
10	To use and know about Natural pH Indicators from Plants.		
11	Water Purification Using Activated Charcoal.		
12	To prepare Choline Chloride Based Deep Eutectic Solvent. (Maximum three experiments can be done)		
13	To Extract the Natural Dye from Beetroot and Fabric Dyeing using the extract. (Two Day experiment i.e. eight hours)		

14	Synthesis of chalcone using mortar and pestle as green method.
15	Preparation of Biodiesel from Waste Cooking Oil.

The students are expected to learn conventional methods for the given experiment and compare it with green procedures. At least twelve experiments to be performed.

Reference Book:

1. Basics and properties of deep eutectic solvents: a review Published: 20 April 2021, Volume 19, pages 3397–3408, (2021)
2. A mini review on synthesis, properties and applications of deep eutectic solvents, Journal of the Indian Chemical Society Volume 98, Issue 11, November 2021, 100210.
3. Deep Eutectic Solvents: A Review of Fundamentals and Applications, Chem. Rev. 2021, 121, 3, 1232–1285.

Course Code	SKILL ENHANCEMENT COURSE SEM – II	Credits	Lectures /Week
K23USCHESC251	Paper I FOOD CHEMISTRY-II	2	2
<p>Course Outcomes:</p> <p>CO1 : Recollect - Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate</p> <p>CO2 : Understand - Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, etc properties of elements in alloys. Manufacture of Steel</p> <p>CO3 : Applied for determining be composition of fertilizer and alloy</p> <p>CO4 : 1. Determination of free acidity in ammonium sulphate fertilizer. 2. Estimation of calcium in calcium ammonium nitrate fertilizer. 3. Estimation of phosphoric acid in superphosphate fertilizer. 4. Determination of composition of dolomite (by complexometric titration).</p>			
Experiment No	Topics		
1	Water Adulteration Detection in milk by calculating the specific gravity of pure milk (usually around 1.032) and comparing it with the sample.		
2	To detect urea adulteration in milk samples and comparing it with pure milk.		
3	To detect Ammonium sulfate in the milk sample as adulterant.		
4	To determine the presence of Nitrates in milk samples.		
5	To detect Starch adulteration in milk samples and comparing it with pure milk.		
6	To detect sugar adulteration in milk samples and comparing it with pure milk.		
7	To detect Hydrogen peroxide in the milk sample as adulterant.		

8	To detect Formalin in the milk sample as adulterant.
9	To determine the presence of Nitrates in the milk samples.
10	To determine the presence of organic acids like benzoic acid and salicylic acid in the milk samples.
11	To detect Borax and Boric acid in the milk sample as adulterants.
12	To detect the presence of Detergent in milk samples.
13	To detect pulverized Soap in the milk sample as adulterants.
14	To detect the coloring matter in milk samples.
15	To detect Alkali adulterants in the milk sample.
16	To determine Fat Content of milk.
17	To analyze the Protein Content of milk samples.
18	To perform the Sensory Evaluation of milk samples.

At least twelve experiments to be performed. Students are expected to know common adulterants in milk and simple techniques to detect such adulterations.

Reference Books:

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
2. R. M. Felder, R. W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
3. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: *Introduction to Ceramics*, Wiley Publishers, New Delhi.
4. J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
5. P. C. Jain & M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
6. R. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering Chemistry*, Vikas Publications, New Delhi.
7. B. K. Sharma: *Engineering Chemistry*, Goel Publishing House, Meerut

Course Code	SEM I - Chemistry Practicals	Credits	Lectures/Week
KUSCHEM23P1	Practical 1	2	4
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • Various ways in which concentration is expressed and functional groups of organic compounds • How to prepare standard solutions and procedure to find out the functional groups of organic compounds • Determination of the concentration and identification of organic compounds- • Estimate the concentration of various elements and find out the organic compounds` 			
1	To prepare 0.1N succinic acid solution and standardize the supplied NaOH solution volumetrically.		
2	To prepare 0.1N oxalic acid solution and standardize the supplied NaOH solution volumetrically.		
3	To determine the percentage purity of samples of BaSO ₄ containing NH ₄ Cl gravimetrically.		
4	Chemical kinetics: To determine the rate constant K, of the reaction, hydrolysis of methyl acetate by using 1st order rate equation.		
5	Chemical kinetics: To determine the rate constant K, of the reaction between KI and K ₂ Cr ₂ O ₇ in acidic medium using second order rate equation.		
6	To determine the percentage purity of a sample of ZnO containing ZnCO ₃ gravimetrically.		
7	To crystallize the given organic compound and find the weight and purity of crystals by melting point.(minimum three)		
8	To prepare p-nitroacetanilide from acetanilide (nitration)		

9	To prepare p-nitroaniline from p-nitroacetanilide (hydrolysis)
10	To prepare solutions of different concentrations by using a given standard solution.
11	To Determine the strength of a commercial sample of hydrochloric acid by titrimetry.
12	To Determine the strength of commercial sample of acetic acid - by titrimetric method

References for Practicals

1. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis- V.K. Ahluwalia and Renu Aggarwal, Universities Press India Ltd., 2000
2. Advanced Practical Organic Chemistry – N. K. Vishnoi,
3. Third Addition, Vikas Publishing House PVT Ltd
4. Systematic Laboratory Experiments in Organic Synthesis- A. Sethi, New Age International Publications

Systematic Identification of Organic compounds, 6th edition, R. L. Shriner, R. C. Fuson and D.Y. Curtin Wiley, New York

Course Code	SEM II - Chemistry Practicals	Credits	Lectures/Week
KUSSCH E M23P212	Practical 2	2	4
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • Enthalpy of a salt, crystallization, pH of a buffer solution • Enthalpy change, strength of an acid, preparation of derivatives, cations and anions in a qualitative mixture) • Determination of Enthalpy of salt, crystallize a compound, Preparation of derivatives of organic compounds • Weight and purity of organic compounds, analyze the positive and negative ions in a salt 			
1	To determine enthalpy of dissolution of salt (like KNO ₃)		
2	To study change in strength of acid solution by pH-metry		
3	Semi-micro inorganic qualitative analysis of a sample containing two cations and two anions. (minimum five mixtures)		
4	To determine enthalpy of dissolution of salt (like KNO ₃)		
5	Characterization of organic compound containing C, H, (O), N, S, X elements (minimum six compounds) Benzoic acid, *Salicylic acid, * β-naphthol, * p-nitroaniline, * Naphthalene, * Acetanilide. (At least six experiments are expected)		

Evaluation Scheme for First Year (UG) under NEP (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

- 1) Continuous Internal Assessment(CIA1) Assignment – 10 marks
- 2) Continuous Internal Assessment(CIA 2) ONLINE Unit Test – 10 marks

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hours

Theory question paper pattern: All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	10
Q2	Unit-II	10
Q.3	Unit II	10

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination

- Each core subject carries 50 Marks.
- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam

NOTE: To pass the examination, attendance is compulsory in both Internal & External (Theory + Practical) Examinations.

