

DEPARTMENT OF CHEMISTRY  
COURSE CURRICULUM

## PART-A: Introduction

Program: Bachelor in Science (Diploma/Degree/Honors)		Semester - III	Session: 2024-2025
1	Course Code	CHSC-03T	
2	Course Title	INORGANIC AND PHYSICAL CHEMISTRY-I	
3	Course Type	DSC	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>➤ Understand fundamental chemical concepts of transition elements and their applications.</li> <li>➤ Master the principles of coordination chemistry.</li> <li>➤ Grasp the core principles of thermodynamics and apply them to various phenomena.</li> <li>➤ Explore the world of electrochemistry and its applications.</li> </ul>	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max.Marks: 100	Min Passing Marks:40

### **PART -B: Content of the Course**

**Total No.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)**

Unit	Topics(Course contents)	No. of Periods
I	<p><b>Chemistry of d &amp; f-block elements</b></p> <p><b>A. d-block elements (5 hrs.)</b></p> <p>(i) Chemistry of elements of first transition series: Characteristic properties of the elements of first transition series with reference to their: Electronic configuration, Atomic and ionic radii, Ionization potential, Variable oxidation states, Magnetic properties, Color, Complex formation tendency and catalytic activity.</p> <p>(ii) Chemistry of elements of second and third transition series: Electronic configuration of 4d and 5d transition series. Comparative treatment with their 3d-analogous (Group Cr- Mo-W, Co-Rh-Ir) in respect of oxidation states and magnetic behavior.</p> <p><b>B. f-block elements (6 hrs.)</b></p> <p><b>Chemistry of Lanthanide &amp; Actinides:</b> Electronic structure, oxidation states, ionic radii, magnetic, and spectral properties. Lanthanide contraction and its consequences, complex formation, occurrence and isolation, Separation of lanthanides: solvent extraction and ion exchange method. General features and chemistry of actinides, Transuranic elements, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides.</p>	11
II	<p><b>Oxidation and reduction (5 hrs)</b></p> <p>Various definitions of oxidation and reduction, Balancing of redox reaction by ion-electron method, Latimer diagram of Chlorine and Oxygen, Frost diagram of Nitrogen and Oxygen, and Pourbaix diagrams of Iron. Predicting disproportionation and comproportionation phenomena.</p> <p><b>Coordination Chemistry (6 hrs)</b></p> <p><b>A. Coordination compounds:</b> Distinction among simple salts, double salts, and coordination compounds. Terminology and nomenclature of Coordination</p>	11

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*(Dr. A.K. Sharma)*



	<p>compounds. Types of ligands based on denticity. Werner's Coordination theory and its experimental verification. Sidgwick's electronic interpretation, EAN rule with examples. Electroneutrality principle, Valence Bond Theory of transition metal complexes. Determination of structures and magnetic properties of complexes based on VBT. Chelates: Classification and their application.</p> <p><b>B) Isomerism in coordination compounds:</b> Structural isomerism and Stereoisomerism (Geometrical and optical) in coordination compounds with four and six coordination numbers.</p>	
III	<p><b>Thermodynamics-I: (5 hrs)</b></p> <p><b>A. Basic concept of thermodynamics:</b> System, surrounding, types of system (closed, open &amp; isolated). Intensive &amp; extensive properties. Thermodynamic processes: isothermal, adiabatic, isobaric, isochoric, cyclic, reversible &amp; irreversible. State function &amp; path functions and their differentiation, concept of heat &amp; work. Zeroth law of thermodynamics, First law of thermodynamics. Definition of internal energy &amp; enthalpy. Concept of heat capacity, heat capacity at constant volume &amp; at constant pressure, and their relationship.</p> <p>Joule-Thomson experiment, Joule-Thomson coefficient (no derivation) &amp; inversion temperature. Calculations of <math>w</math>, <math>q</math>, <math>E</math> &amp; <math>H</math> for expansion of gases for isothermal &amp; adiabatic conditions for reversible process.</p> <p><b>B. Thermochemistry(2 hrs.)</b></p> <p>Standard states, Heat of reaction, enthalpy of formation, enthalpy of combustion, enthalpy of solution, enthalpy of neutralization, Hess's law of constant heat of summation &amp; its applications. Variation of enthalpy change of reaction with temperature (Kirchoff's equation).</p> <p><b>C. Thermodynamics II (4 hrs.)</b></p> <p><b>Second law of thermodynamics:</b> Limitations of first law and need for the second law. Statements of second law. Carnot cycle &amp; Efficiency of heat engine. Thermodynamic principle of working of a refrigerator (Carnot theorem). Concept of entropy: entropy change in a reversible and irreversible process; entropy change in isothermal reversible expansion of an ideal gas. Physical significance of entropy. Gibbs free energy, Gibbs-Helmholtz equation.</p> <p><b>D. Third law of thermodynamics (1 hr)</b></p> <p>Statement of third law, Nernst heat theorem, Absolute entropy of solids, liquids, and gases.</p>	12
IV	<p><b>Electrochemistry-1</b></p> <p>Electrolyte conductance: specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, Kohlrausch law, application of Kohlrausch law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titrations.</p> <p>Single electrode potential, standard electrode potential, electrochemical series and its applications. Concept of overvoltage.</p> <p>Theory of strong electrolyte: limitation of Ostwald's dilution law weak and strong electrolyte, Debye-Huckel-Onsager's (DHO) equation for strong electrolytes, relaxation, and electrophoretic effect.</p> <p>Migration of ions: Transport number-definition and determination by Hittorf method and moving boundary method.</p> <p>Electrochemical cells or Galvanic cells: reversible and irreversible cells, conventional Representation of electrochemical cells. EMF of a cell, effect of temperature on EMF of cell, Nernst equation calculation of <math>\Delta G</math>, <math>\Delta H</math> and <math>\Delta S</math> for cell reaction, polarization, Over potential and hydrogen overvoltage.</p>	11
Keywords	<p><i>D &amp; f-block elements, Coordination compounds, Werner's theory, VBT, Isomerism, Thermodynamics, Thermochemistry, Electrical/electrolytical conductance, Transport number.</i></p>	

*Indira* *Pratibha* *Dr. K. Shree* *Dr. M. S. Ravi* *Dr. S. Ravi*  
*Dr. S. Ravi* *Dr. S. Ravi* *Dr. S. Ravi* *Dr. S. Ravi* *Dr. S. Ravi*  
*Dr. S. Ravi* *Dr. S. Ravi* *Dr. S. Ravi* *Dr. S. Ravi* *Dr. S. Ravi*



Signature of Convener & Members (CBoS) :

## PART-C: Learning Resources

### Text Books, Reference Books and Others

#### Text Books Recommended –

1. Jauhar, S. P. (2010). *Modern Approach to Inorganic Chemistry: A Textbook for B. Sc. I Students*. Modern publishers
2. Bajpai, D. N. (1992). *Advanced book of physical chemistry*. S Chand publishing.
3. Sharma, k. K. & Sharma, L. K. (2016). *A textbook of physical chemistry*. Vikas publishing.
4. Bhasin, K. K. (2018). *Pradeep's Inorganic Chemistry Vol.III*. Pradeep publications.
5. Puri, S., & Sharma, L. R. (2008). *Kalia "Principles of Inorganic Chemistry"*.

#### Reference Books recommended-

##### Inorganic Chemistry

1. Lee, J. D. (2008). *Concise inorganic chemistry*. John Wiley & Sons.
2. Cotton, F. A., Wilkinson, G., & Gaus, P. L. (1995). *Basic inorganic chemistry*. John Wiley & Sons.
3. Huheey, J. E., Keiter, E. A., Keiter, R. L., & Medhi, O. K. (2006). *Inorganic chemistry: principles of structure and reactivity*. Pearson Education India.
4. Douglas, B. E., McDaniel, D. H., & Alexander, J. J. (1994). *Concepts and models of inorganic chemistry*. John Wiley & Sons

##### Physical Chemistry

1. Puri, L. B., Sharma, L. R., & Pathania, M. S. (2013). *Principles of physical chemistry*. Vishal Publishing Co.
2. Atkins, P. W., De Paula, J., & Keeler, J. (2023). *Atkins' physical chemistry*. Oxford university press.
3. McQuarrie, D. A., & Simon, J. D. (2004). *Molecular Thermodynamics* Viva Books Pvt. Ltd.: New Delhi.

#### Online Resources–

- e-Resources / e-books and e-learning portals
- <https://www.geeksforgeeks.org/d-block-elements/>
- <https://www.vedantu.com/evs/lanthanides-vs-actinides>
- <https://www.livescience.com/50776-thermodynamics.html>
- <https://byjus.com/jee/electrochemistry/>

#### Online Resources–

- e-Resources / e-books and e-learning portals

## PART -D:Assessment andEvaluation

### Suggested Continuous Evaluation Methods:

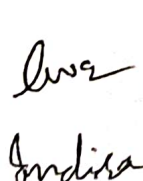
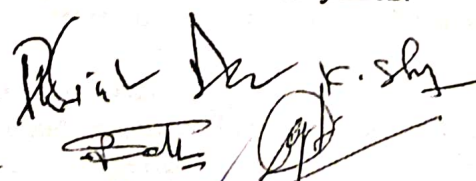
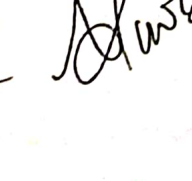

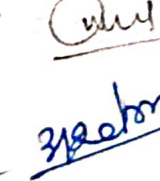


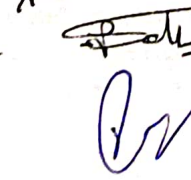
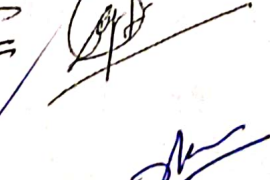

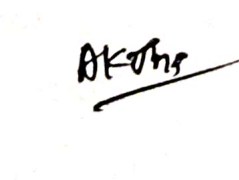



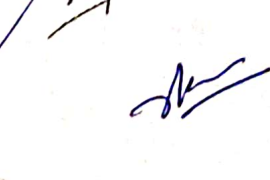

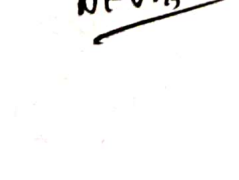

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA):30 Marks

EndSemester Exam(ESE): 70 Marks

<b>Continuous InternalAssessment (CIA):</b> (By Course Teacher)	Internal Test / Quiz-(2): 20 #20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
<b>End Semester Exam (ESE):</b>	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

Indira        
       
     

**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**  
**DEPARTMENT OF CHEMISTRY**  
**COURSE CURRICULUM**

**PART-A: Introduction**

Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - III	Session: 2024-2025
1	CourseCode	CHSC-03P	
2	CourseTitle	CHEMISTRY LAB. COURSE-III	
3	CourseType	DSC	
4	Pre-requisite(if,any)	-	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>➤ Understand the principle of determining transition temperature of hydrated or other allotropic salts.</li> <li>➤ Employ the principle of determination of solubility of a given salt at different temperatures.</li> <li>➤ Apply Born-Haber cycle to determine enthalpy and lattice energy.</li> <li>➤ Determine strength of an acid, ionization constant of weak acid and solubility product by conductometric or potentiometric titrations.</li> </ul>	
6	CreditValue	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	TotalMarks	Max.Marks:50	Min Passing Marks:20

**PART -B: Content of the Course**

Total No. of learning-Training/performancePeriods:30 Periods (30 Hours)

Module	Topics(Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	<p><b>Transition Temperature</b></p> <p>1) Transition temperature of a salt hydrate – determination of molecular weight.</p> <p>2) Determination of the transition temperature of the given substance by thermometric/dialometric method (e.g. <math>\text{SrBr}_2 \cdot 2\text{H}_2\text{O}</math> or <math>\text{MnCl}_2 \cdot 4\text{H}_2\text{O}</math>).</p> <p><b>Thermochemistry</b></p> <p><b>A. Determination of solubility:</b></p> <p>1) To determine the solubility of benzoic acid at different temperatures and to determine <math>\Delta H</math> of the dissolution processes.</p> <p><b>B. Calorimetry:</b></p> <p>1) To determine the enthalpy of neutralization of hydrochloric acid (strong acid) by sodium hydroxide (strong base) solution.</p> <p>2)</p> <p>(a) To determine the enthalpy of neutralization of a weak acid (acetic acid) versus strong base (sodium hydroxide) and determine enthalpy of ionization of weak acid.</p> <p>(b) To determine the enthalpy of neutralization of a weak base (ammonium hydroxide) versus strong acid (hydrochloric acid) and determine enthalpy of ionization of weak base.</p> <p>3) To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy.</p> <p><b>Conductometry</b></p> <p>1) Conductometry – Determination of limiting molar conductance of a strong Electrolyte (KCl).</p> <p>2) To determine the strength of the given acid (HCl or <math>\text{CH}_3\text{COOH}</math>) conductometrically</p>	30



**Signature of Convener & Members (CBoS) :**

### Text Books, Reference Books and Others

1. Vishwanathan, B. & Raghavan, P. S. (2017). *Practical Physical Chemistry*. Viva books originals publishing.
2. Yadav, J. B. (2006). *Advanced Practical Physical Chemistry*. Krishna Prakashan Media.
3. Sahu, D. P. & Bapat, K. N. (2022) *Unified practical chemistry*, Navbodh Prakashan.

1. Moudgil, H. K. (2010). *Textbook of physical chemistry*. PHI Learning Pvt. Ltd.
2. Adamson, A. (2012). *A textbook of physical chemistry*. Elsevier.
3. Findlay, A. (1923). *Practical physical chemistry*. Longmans, Green.

- e-Resources / e-books and e-learning portals
- <https://tech.chemistrydocs.com/Books/Physical/Advanced-Physical-Chemistry-Experiments-by-J-N-Gurtu-&-Amit-Gurtu.pdf>
- <https://byjus.com/chemistry/conductometric-titration/>
- [https://chem.libretexts.org/Courses/University of California Davis/Chem 4B Lab%3A General Chemistry for Majors II/1%3A Thermochemistry \(Experiment\)](https://chem.libretexts.org/Courses/University_of_California_Davis/Chem_4B_Lab%3A_General_Chemistry_for_Majors_II/1%3A_Thermochemistry_(Experiment))
- [https://www.ulm.edu/chemistry/courses/manuals/chem1010/experiment\\_10.pdf](https://www.ulm.edu/chemistry/courses/manuals/chem1010/experiment_10.pdf)

➤ **e-Resources / e-books and e-learning portals**


**Suggested Continuous Evaluation Methods:**

**Maximum Marks: 50 Marks**

**Continuous Internal Assessment(CIA): 15 Marks**

**End Semester Exam(ESE):** 35 Marks

**Name and Signature of Convener & Members of CBoS:**

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**FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)**  
**DEPARTMENT OF CHEMISTRY**  
**COURSE CURRICULUM**

**PART-A: Introduction**

Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - III	Session: 2024-2025
1	Course Code	CHSE-01T	
2	Course Title	BASIC ANALYTICAL CHEMISTRY	
3	Course Type	DSE	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>➤ To understand the sampling, procedure and treatment of sample.</li> <li>➤ To understand the analytical techniques for analysis in different types of chemical reactions.</li> <li>➤ To understand the volumetric analysis technique.</li> <li>➤ To understand the gravimetric analysis technique.</li> </ul>	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max.Marks: 100	Min Passing Marks:40

**PART -B: Content of the Course**

Total No. of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics(Course contents)	No. of Period
I	<b>Qualitative and quantitative aspects of analysis</b> Classification of analytical Techniques, Qualitative and quantitative analysis. Classical and instrumental methods. Factors affecting choice of analytical method. Errors in chemical analysis. Types of errors: Systematic and random, Absolute and relative, Additive and proportional. Normal distribution of indeterminate errors. Statistical parameters for data evaluation: Mean, median, average deviation, standard deviation, coefficient of variation, relative standard deviation. Accuracy and precision of results. Comparison of data using F and t-test, rejection of data using Q test. Numerical problems.	12
II	<b>Sampling and sample treatment</b> Criteria for representative sample. Bulk, gross, incremental and analysis sample. Sampling statistics. Techniques of sampling of ambient air, water and soil samples. Methods of sample size reduction: Coning and quartering, rolling and quartering. Hazards in sampling. Sample dissolution methods for elemental analysis: Dry and wet ashing, acid digestion, fusion processes and dissolution of organic samples. Types of analysis: Macro, semi-micro, micro, sub-micro and ultramicro. Major, minor and trace constituents of a sample.	11
III	<b>Volumetric analysis</b> General principle. Criteria for reactions used in titrimetric analysis. Primary standards and secondary standards. Concepts of equivalent weight and molecular weight, normality, molarity and various methods of expressing concentrations. Internal and external indicators. Theories of indicators in acid-base, precipitation, redox and complexometric titrations. Calculations involving preparation of standard solutions. Stoichiometric calculations in various types of titrations.	11
IV	<b>Gravimetric analysis</b> General principles and conditions of precipitation. Concepts of solubility, solubility product and precipitation equilibrium. Numerical problems based on solubility and solubility product. Purity of precipitate: Co-precipitation and post-precipitation. Super saturation and peptization. Criteria of selection of wash liquids. Steps involved in gravimetric analysis of barium as barium sulphate.	11

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 2/2/24  
 (Dr. Akshama)



Keywords	Qualitative and quantitative analysis; errors; Accuracy; Sampling; titrimetric analysis; indicators; Gravimetric analysis
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*Qualitative and quantitative analysis; errors; Accuracy; Sampling; titrimetric analysis; indicators; Gravimetric analysis*

## PART-C: Learning Resources

***Text Books Recommended:***

**Reference books Recommended:**

### Online Resources:

## **PART-D:Assessment andEvaluation**

**Maximum Marks: 100 Marks**

**EndSemesterExam(ESE): 70 Marks**

<b>Continuous Internal Assessment (CIA):</b> (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment/Seminar- 10 Total Marks -30	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against 30 Marks
<b>End Semester Exam (ESE):</b>	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit- 4x10=40Marks	

Name and Signature of Convener & Members of CBoS:

Dr. Pinka D. K. S. Datta

Indira

Sh. (M)

Asst. M. S. S.

Sp. S. S.

# FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

## DEPARTMENT OF CHEMISTRY

### COURSE CURRICULUM

<b>PART-A: Introduction</b>			
Program: Bachelor in Science (Diploma / Degree/Honors)		Semester- III	Session: 2024-2025
1	Course Code	CHSE-01P	
2	Course Title	BASIC ANALYTICAL CHEMISTRY LAB. COURSE	
3	Course Type	DSE	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>➤ To make the student aware of Common analytical method.</li> <li>➤ To demonstrate the volumetric titration.</li> <li>➤ To demonstrate the students about gravimetric analysis.</li> <li>➤ To learn the testing of solubility, pH of soil and water.</li> </ul>	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max.Marks:50	Min Passing Marks:20
<b>PART -B: Content of the Course</b>			
Total No. of learning-Training/performance Periods:30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ol style="list-style-type: none"> <li>1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration.</li> <li>2. Estimation of oxalic acid by titrating it with <math>\text{KMnO}_4</math> (potassium permanganate) by volumetric titration.</li> <li>3. Estimation of water of crystallization in Mohr's salt by titrating with <math>\text{KMnO}_4</math> (potassium permanganate).</li> <li>4. Estimation of <math>\text{Fe(II)}</math> ions by titrating it with <math>\text{K}_2\text{Cr}_2\text{O}_7</math> (potassium dichromate) using an internal indicator.</li> <li>5. Estimation of <math>\text{Cu(II)}</math> ions iodometrically using <math>\text{Na}_2\text{S}_2\text{O}_3</math> (sodium thiosulfate).</li> <li>6. Determination of heat capacity of a calorimeter for different volumes.</li> <li>7. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.</li> <li>8. Determination of ionization of acetic acid.</li> <li>9. Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization.</li> <li>10. Analysis of soil:               <ol style="list-style-type: none"> <li>(a) Determination of pH of soil.</li> <li>(b) Determination of total soluble salts.</li> <li>(c) Determination of carbonate and bicarbonate.</li> <li>(d) Determination of calcium, magnesium, and iron.</li> </ol> </li> </ol>		30
Keywords	Volumetric analysis, gravimetric analysis, water testing, soil testing.		



***Name and Signature of Convener & Members of CBoS:***



**FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)**  
**DEPARTMENT OF CHEMISTRY**  
**COURSE CURRICULUM**

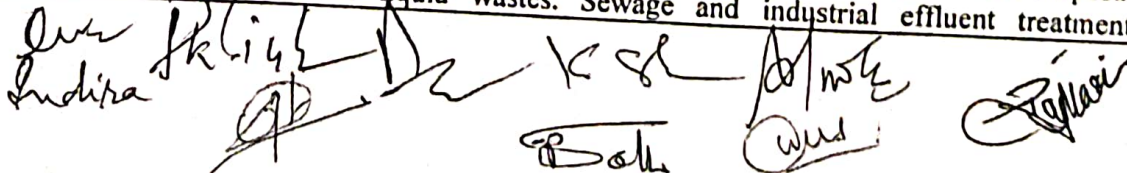
**PART-A: Introduction**

Program: Bachelor in Science (Certificate / Diploma / Degree/Honors)		Semester-I/III/V	Session: 2024-2025
1	Course Code	CHVAC	
2	Course Title	Chemistry in Daily Life	
3	Course Type	Value Added Course(VAC)	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>➤ To introduce the student about dairy product, beverages food additives, artificial sweeteners, flavors, food colorants, paints, pigments, dyes etc.</li> <li>➤ To make aware the students about air pollution, hydrological cycle, composition of soil, fertilizers etc.</li> <li>➤ To introduce the students about carbohydrate, vitamins, drugs.</li> <li>➤ To introduce students about concept of thermodynamics used in day to day life.</li> </ul>	
6	Credit Value	2 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max.Marks:50	Min Passing Marks:20

**PART -B: Content of the Course**

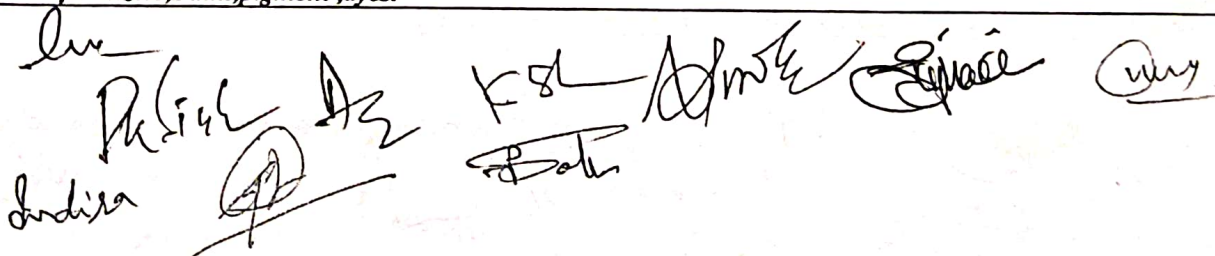
Total No. of Teaching-learning Periods (01 Hr. per period) - 30 Periods (30 Hours)

Unit	Topics(Course contents)	No. of Period
I	<p><b>Dairy Products:</b> Composition of milk and milk products. Analysis of fat content, minerals in milk and butter. Estimation of added water in milk.</p> <p><b>Beverages:</b> Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, estimation of methyl alcohol in alcoholic beverages.</p> <p><b>Food additives, adulterants and contaminants:</b> Food preservatives like benzoates, propionates, sorbates, disulphites.</p> <p><b>Artificial sweeteners:</b> spartame, saccharin, dulcin, sucralose and sodium cyclamate.</p> <p><b>Flavors:</b> Vanillin, alkyl esters (fruit flavours) and monosodium glutamate. Artificial food colorants: Coal tar dyes and non-permitted colours and metallic salts. Analysis of pesticide residues in food.</p> <p><b>Paints &amp; Pigments:</b> White pigments (white lead, ZnO, lithopone, TiO<sub>2</sub>). Blue, red, yellow and green pigments. Paints and distempers: Requirement of a good paint. Emulsion, latex; luminescent paints. Fire retardant paints and enamels, lacquers. Solvents and thinners for paints.</p> <p><b>Dyes:</b> Colour and constitution (electronic concept). Classification of dyes. Methods of applying dyes to the fabrics. A general study of azo dyes, Mordant brown, Congo red and methyl orange.</p>	08
II	<p><b>Air Pollution:</b> Air pollutants, prevention and control, Greenhouse gases and acid rain. Ozone hole and CFC's. Photochemical smog and PAN. Catalytic converters for mobile sources. Bhopal gas tragedy.</p> <p><b>Hydrologic cycle, sources, criteria and standards of water quality - safe drinking water.</b></p> <p><b>Public health significance and measurement of water quality parameters - (Colour, turbidity, total solids, acidity, alkalinity, hardness, sulphate, fluoride, phosphate, nitrite, nitrate, BOD and COD).</b></p> <p><b>Water purification for drinking and industrial purposes. Toxic chemicals in the environment. Detergents - pollution aspects, eutrophication. Pesticides and insecticides - pollution aspects. Heavy metal pollution. Solid pollutants - treatment and disposal. Treatment of industrial liquid wastes. Sewage and industrial effluent treatment.</b></p>	07





	Composition of soil – inorganic and organic components in soil - micro and macronutrients. <b>Fertilizers:</b> Classification of fertilizers - Straight Fertilizers, Compound/Complex Fertilizers, Fertilizer Mixtures. Manufacture and general properties of fertilizer products - Urea and DAP.	
III	<b>Carbohydrates:</b> Structure, function and Chemistry of some important mono and disaccharides. <b>Vitamins:</b> Classification and Nomenclature. Sources, deficiency diseases and structures of Vitamin A <sub>1</sub> , Vitamin B <sub>1</sub> , Vitamin C, Vitamin D, Vitamin E & Vitamin K <sub>1</sub> . <b>Drugs:</b> Classification and nomenclature. Structure and function of: <i>Analgesics</i> – aspirin, paracetamol. <i>Anthelmintic drug:</i> mebendazole. <i>Antiallergic drug:</i> Chlorpheniramine maleate. <i>Antibiotics:</i> Penicillin V, Chloromycetin, Streptomycin. <i>Anti-inflammatory agent:</i> Oxypheno-butazone. <i>Antimalarials:</i> Primazquine phosphate & Chloroquine. <b>Oils and fats:</b> Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like argemone oil and mineral oils. <b>Soaps &amp; Detergents:</b> Structures and methods of use of soaps and detergents.	08
IV	<b>Chemical Thermodynamics:</b> Concept of fugacity and free energy, Activity and activity coefficient, spontaneity of processes-entropy and free energy changes. Partial molar quantities, colligative properties, Le-Chatelier principle, phase equilibrium. Enzyme catalyzed reactions. <b>Principles of Reactivity:</b> Basis kinetic concepts, rates of simple and complex chemical reactions, empirical rate equations. Temperature dependence of rates and activation parameters. Branched chain reactions – explosion limits. Oscillatory reactions. <b>Chemical energy system</b> and limitations, principles and applications of primary & secondary batteries and fuel cell. Basics of solar energy, future energy storer. aerospace materials. Problems of plastic waste management. Strategies for the development of environment friendly polymers.	08
Keywords	Air pollution, carbohydrate, vitamins, LeChatteliar's law, Dairy product, artificial sweeteners. fertilizers, Paint, pigment, dyes.	


 A collection of handwritten signatures and initials in black ink, including names like 'Indira', 'Rishi', 'A2', 'KSL', 'Anshu', 'Srinath', and 'Anurag'.



Signature of Convener & Members (CBoS):

## PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Sharma, B. K. (1998). *Introduction to Industrial Chemistry*. Meerut: Goel Publishing.
2. Mary, N. S., & Swamy, S. (1998). *Foods: Facts and Principles* (4th ed.). New Age International.
3. Kar, A. (2022). *Medicinal Chemistry*. NEW AGE International Pvt Ltd

Reference books Recommended:

1. *Drugs and Pharmaceutical Sciences Series*. (Year). Marcel Dekker, Vol. II. New York: INC.
2. Atkins, P., & de Paula, J. (2002). *Physical Chemistry* (7th ed.). Oxford University Press.
3. Swaminathan, & Goswamy. (2001). *Handbook on Fertilizer Technology* (6th ed.). FAI.
4. Finar, I. L. (Year). *Organic Chemistry* (Vol. 1&2).
5. Fired, J. R. (Year). *Polymer Science and Technology*. Prentice Hall.

Online Resources:

[https://onlinecourses.swavam2.ac.in/nos22\\_sc23/preview](https://onlinecourses.swavam2.ac.in/nos22_sc23/preview)

[https://www.researchgate.net/publication/343585969\\_Chemistry\\_in\\_Everyday\\_Life](https://www.researchgate.net/publication/343585969_Chemistry_in_Everyday_Life)

<https://www.youtube.com/watch?v=P3p1C87gc0U>

<https://www.slideshare.net/sanjaijosephManesh/food-chemistry-51688453>

## PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

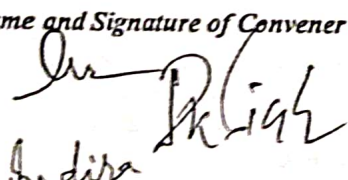
Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

End Semester Exam(ESE):35Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar + Attendance- 05 Total Marks -15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 05 x 1 = 05 Mark; Q2. Short answer type- 5 x 2 = 10 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit- 4 x 05 = 20 Marks	

Name and Signature of Convener & Members of CBoS:

Indira  K. S. 