FOUR YEAR UNDERGRADUATE PROGRAM (2024 - 28)

Department of CHEMISTRY

Course Curriculum

FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)

Program: Bachelor in Science

DISCIPLINE-CHEMISTRY

Session-2024-28

| OSC- 01 to 08 | | DSE-01 to 12 | 2 | DGE-01 to | о 06 | |
|---------------|---------------------------------------|------------------------|---|-----------------|-------------------------------|--|
| Code | Title | Code | Title | Code | Title | |
| CHSC-01T | Fundamental Chemistry-I | CHSE-01T | , | CHGE-01T | Fundamental Chemistry-l | |
| CHSC-01P | Chemistry Lab. Course-I | CHSE-01P | Course | CHGE-01P | Chemistry Lab. Course-I | |
| CHSC-02T | Fundamental Chemistry-II | CHSE-02T | | CHGE-02T | Fundamental Chemistry-II | |
| CHSC-02P | Chemistry Lab. Course-II | CHSE-02P | Environmental Chemistry Lab. Course | CHGE-02P | Chemistry Lab. Course-II | |
| CHSC-03T | Inorganic and Physical Chemistry-I | CHSE-03T | Dyes & Polymer Chemistry | | | |
| CHSC-03P | Chemistry Lab. Course-III | CHSE-03P | Dyes & Polymer Chemistry Lab. Course | | | |
| CHSC-04T | Organic and Physical Chemistry-I | CHSE-04T | Heterocyclic Chemistry | | | |
| CHSC-04P | Chemistry Lab. Course-IV | CHSE-04P | Heterocyclic Chemistry Lab. Course | | | |
| CHSC-05T | Organic & Inorganic-I | CHSE-05T | Photochemistry & Pericyclic Reactions | | - | |
| CHSC-05P | Chemistry Lab. Course-V | CHSE-05P | Photochemistry & Pericyclic Reactions Lab. Course | | | |
| CHSC-06T | Organic and Physical Chemistry-II | CHSE-06T | Spectroscopy-I | | | |
| CHSC-06P | Chemistry Lab. Course-VI | CHSE-06P | Spectroscopy-I Lab. Course | | | |
| CHSC-07T | Inorganic & Physical Chemistry-II | CHSE-07T | Chemical Kinetics & Nuclear Chemistry | ; | | |
| CHSC-07P | Chemistry Lab. Course-VII | CHSE-07P | Chemical Kinetics & Nuclear Chemistry Lab. Course | | | |
| CHSC-08T | Organic & Inorganic-II | CHSE-08T | Electrochemistry & Surface Chemistry | | | |
| CHSC-08P | Chemistry Lab. Course-VIII | CHSE-08P | Electrochemistry & Surface Chemistry Lab. Course | | | |
| | | CHSE-09T | Spectroscopy-II | | | |
| | | CHSE-09P | Spectroscopy-II Lab. Course | | | |
| | | CHSE-10T | Nanotechnology & Solid State | SEC | | |
| | | CHSE-10P (VIII SEM) | Nanotechnology & Solid State Lab. Course | | | |
| | | CHSE-11T | Medicinal Chemistry & Natural Products | CHSEC- 01T&P | Chemical Analys Techniques | |
| | | CHSE-11P | Medicinal Chemistry & Natural Products Lab. Course | | | |
| | | CHSE-12T | Instrumental Methods of Analysis | VAC | | |
| | , | CHSE-12P | Instrumental Methods of Analysis Lab, Course | CHVAC- 01T | Chemistry in Dai | |

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Officer-In Charge (Apademic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.) Chairman

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FOUR YEAR UNDERGRADUATE PROGRAM(NEP-2020)

Program: Bachelor in Science

DISCIPLINE-CHEMISTRY Session-2024-28 PO & PSO

PROGRAMME OUTCOMES (PO)

PO-1: B.Sc. Chemistry curriculum is so designed to provide the students a comprehensive understanding about the fundamentals of chemistry covering all the principles and perspectives.

PO-2: The branches of Chemistry such as Organic Chemistry, Inorganic Chemistry, Physical Chemistry and Analytical Chemistry expose the diversified aspects of chemistry where the students experience a broader outlook of the subject.

PO-3: The syllabi of the B.Sc. Chemistry course are discretely classified to give stepwise advancement of the subject knowledge right through the four years of the term.

PO-4: The practical exercises done in the laboratories impart the students the knowledge about various chemical reagents and reactions. They are also trained about the adverse effects of the obnoxious chemicals and the first aid treatment.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO-1: The students will understand the existence of matter in the universe as solids, liquids, and gases which are composed of molecules, atoms and sub atomic particles.

PSO-2: Students will learn to estimate inorganic salt mixtures and organic compounds both qualitatively and quantitatively using the classical methods of analysis in practical classes.

PSO-3: Students will grasp the mechanisms of different types of reactions both organic and inorganic and will try to predict the products of unknown reactions.

PSO-4: Students will learn to synthesize the chemical compounds by maneuvering the addition

of reagents under optimum reaction conditions

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Officer-In-Charge (Academic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

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

| $\mathbf{p}_{\mathbf{r}}$ | ART-A: In | itroduction | n e | | |
|---------------------------|--|--|---|--|---------------|
| (C | ogram: Bachelor in | Science | Semester - | T 0 | II |
| 1 | ertificate / Diploma / Deg | gree/Honors) | Semester - | I Session: 2024-2 | 2025 |
| 2 | Course Code | CHSC-01T | | | |
| 3 | Course Title | FUN | DAMENTAL CH | EMISTRV-I | |
| 4 | Course Type | | DSC | 22011(1-1 | |
| 4 | Pre-requisite (if, any) | | As | per Program | |
| 5 | Course Learning. Outcomes (CLO) | > To exploi covalent intermole > To learn their stoi | the contributions of and periodic proper the concept of chibonding, hybridizations. about reaction mechionetry. | f ancient Indian scientists, stuerties. erties. emical bonding, including ion ion, molecular orbital theory of hanisms of inorganic reaction | ic and and |
| 6 | G 11.55 | > To under | stand basics princip | oles of organic chemistry. | |
| 7 | Credit Value | 3 Credits | <i>Credit</i> = 15 | Hours - learning & Observe | ation |
| | Total Marks | Max. Marks: | 100 | Min Passing Marks: | 40 |
| | ART-B: Conte | nt of the Co | ourse | | |
| | Total No. of Tea | ching-learning | Periods (01 Hr. pe | r period) - 45 Periods (45 H | óure) |
| U | nit | | pics (Course cor | | No. o |
| | I A. Chemistry in An | cient India: (a) | Chamical test | s in ancient India: General | Perio |
| | Introduction (b) Contribution of ancient Indian scientists in chemistry, e.g., metallurgy, dyes, pigments, cosmetics, Ayurveda, Charak Sanhita. Ancient Indian Chemist- Their Contribution and Books- Rishi Kanad, Aacharya Nagarjuna, Vagbhatta, Govindacharya, Yashodhar, Ramchandra, Somadava, Gopalbhatta etc. Indian Chemist of 19th century- Aacharya Prafulla Chandra Ray- His Contribution and work for Indian Chemistry. B. Atomic Structure and Periodic Properties: (i) Review of Bohr's theory and its limitations. Dual nature of particles and waves, de Broglie's equation, Heisenberg's Uncertainty principle and its significance. (ii) Quantum numbers and their significance. Rules for filling electrons in various orbitals, Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau principle and its limitations, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals. Anomalous electronic configurations. (iii)Effective nuclear charge (ENC), shielding or screening effect, Slater rules, Atomic and Ionic radii. Ionization energy and factors affecting ionization energy. Electron affinity, Electronegativity—Pauling's/Mulliken's electronegativity scales. Relation of electronegativity with hybridization. | | | | |
| | context of stability a Born-Haber Cycle | and solubility of i | id solvation energie: onic compounds. tions: Covalent char | acteristics of ionic bonding. s and their importance in the racter in ionic compounds, | |

Shaheed Nandkumar Patel
/ishwavidyalaya, Raigarh (C.G.)

of Studies Pad Nandkumar Patel Idyalaya, Raigarh (C.c.

| | Chemical Bonding - II A) MO theory: LCAO method-criteria of orbital overlapping, types of molecular orbitals-σ-, π- and, δ-MOs; formation of σ- and π-MOs and their, schematic illustration; qualitative MO energy level diagram of homo- (N ₂ & O ₂ (including peroxide, superoxide) and hetero-diatomic molecules (NO, CO), magnetic properties, bond order and stability of molecules and ions. B) Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions, ion-induced dipole interactions, dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment). | |
|--------|---|----|
| Ш | A. Chemical properties of s-block metals Reaction with water, air, and nitrogen, Anomalous behavior of Li and Be, Compounds of s-block metals: Oxides, hydroxides, peroxides, and superoxides (preparation and properties) Complexes of s-block metals, Complexes with crown ethers B. Chemistry of p-Block Elements Boron group: Hydrides (classification of boranes), Diborane (preparation, properties, and structure elucidation), Borazine (preparation and structure) Carbon group: Carbides (salt-like carbides, interstitial carbides, covalent carbides), Silicates (classification, three-dimensional silicates - properties and structures) Nitrogen group: Hydrides of Nitrogen (hydrazine, hydroxylamine, hydrazoic acid) Structure of oxides of nitrogen (N2O, NO, NO2, N2O4, and N2O5), Structure of oxyacids of nitrogen (HNO2, HNO3, H2N2O7,), Nitrides (classification, preparation, properties, and uses) Structure of Oxides and oxoacids of phosphorus: (P2O3, P2O5) H3PO2, H3PO3, H3PO4, H4P2O7 Halogen: Hydrides, Oxides and oxyacids of halogens (structure only) – Inter halogen compounds and pseudo halogens | 11 |
| IV | Electronic Effects in Organic Compounds Bond Cleavage: Homolytic and heterolytic cleavages, bond energy, bond length, and bond angle. Electron Displacement Effects: Inductive, inductomeric, electromeric, mesomeric (resonance), hyperconjugation, and steric effects. Tautomerism (keto-enol, amido-imidol, and nitro-acinitro forms). Reaction Intermediates: Formation and stability of carbocations, carbanions, free radicals, carbenes, nitrene and benzyne. B. Stereochemistry of Organic Compounds i) Optical Isomerism Elements of symmetry, chirality, enantiomers, and optical activity, Chiral and achiral molecules with two stereogenic centers (Tartaric acid as an example), Erythro & Threo, Diastereomers and meso compounds, Inversion, retention, and racemization, Relative configuration (D/L), and absolute configuration (R/S nomenclature: sequence rules). ii) Geometrical Isomerism Geometric isomerism (cis-trans isomerism) in alkenes with examples (maleic acid, fumaric acid, and 2-butene), E/Z system of nomenclature. | 11 |
| Keywor | Ancient Indian Chemistry, Atomic Structure, Periodic Properties, Chemical Bonding, s- &p-bloeded elements, Electronic effects, Stereochemistry | |

Signature of Convener & Members (CBoS):

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Officer-In-Charge (Academia)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

Studies Studies Seed Nandkumar Patel Idyalaya, Raigarh (C.G.)

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended – Text Books

- 1. Puri, B. R., Sharma, L. R., & Kalia, K. C. (2018). *Principles of Inorganic Chemistry*. Nagin Chand and Co., New Delhi.
- 2. Satyaprakash, G., Tuli, S. K., Basu, S. K., & Madan, R. D. (2017). Advanced Inorganic Chemistry (Vol. 1, 5th Ed.). S. Chand & Company.
- 3. Lee, J. D. (2010). Concise Inorganic Chemistry (5th Ed.). Blackwell Science.
- 4. Housecroft, C. E., & Sharpe, A. G. (2012). *Inorganic Chemistry* (4th Ed.). Pearson Education Limited.
- 5. Ray, Acharya Prafulla Charndra, *History of Chemistry in Ancient And Medieval India*, Chowkhamba Krishnadas Academy (Reprint 2004).

Reference Books

- 1. Cotton, F. A., Wilkinson, G., & Gaus, P. L. (2002). Basic Inorganic Chemistry (3rd Ed.). John Wiley & Sons.
- 2. Douglas, B. E., Mcdaniel, D. T., & Alexander, J. J. (1994). Concepts and Models Of Inorganic Chemistry (3rd Ed.). John Wiley & Sons.
- 3. Huheey, J. E., Keiter, E. A., & Keiter, R. L. (1993). *Inorganic Chemistry* (4th Ed.). Harpercollins College Publishers.
- 4. Shriver, D. F., Atkins, P. W., & Langford, C.-H. (2010). *Inorganic Chemistry* (5th Ed.). W. H. Freeman And Company.
- 5. Moeller, T. (1990). Inorganic Chemistry: A Modern Introduction. Wiley.

Online Resources-

- https://bit.ly/3AyV3mZ
- https://nptel.ac.in/courses/104/104/104104101/
- https://nptel.ac.in/courses/104/103/104103019/
- > https://nptel.ac.in/courses/104/101/104101090/
- https://nptel.ac.in/courses/104/105/104105103/

Online Resources-

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

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks

Continuous Internal Assessment (CIA): 30 Marks
End Semester Exam (ESE): 70 Marks

Continuous Internal | Internal Test / Quiz-(2): 20 / 20 | Assessment (CIA): | Assignment / Seminar - 10 | Total Marks - 30

+ obtained marks in Assignment shall be considered against 30 Marks

End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 = 20 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

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Cifficer-In-Charge (Academic) Shaheed Nandkumar Patel Ashwavidyalaya, Raigarh (C.G.)

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

| | | | COURS | E CURRICULUM | | |
|------------------|---|--|--|--|--|------------------|
| PA | ART- | A: Ir | ntroductio | n | | |
| Pro (Ce | ogran ertificat | n: Bachelor in /c/Diploma/De | Science | Semester-I | Session: 2024-2 | 2025 |
| 1 | Cour | Course Code CHSC-01P | | | | |
| 2 | Cour | se Title | CH | EMISTRY LAB. COUR | SE-I | |
| 3 | Cour | se Type | | DSC | | |
| 4 | Pre-r | equisite (if, any) | | As per Program | | |
| 5 | Analyze mixtures for cations (NH₄+, Pb²⁺, etc.) & anions (CO₃²⁻, etc.) using H₂S or other methods. Perform titrimetric analysis (standardization, unknown conc. determination). Estimate the concentration of acetic acid in vinegar (using NaO alkali content in antacids (using HCl), and free alkali in soaps/detergents. Utilize complexometric titrations for calcium (Ca²⁺), water hards Fe²⁺/Fe³⁺, and Cu²⁺. | | | | OH), | |
| 6 | | lit Value | 1 Credits | | ratory or Field learning/I | Training |
| 7 | | l Marks | Max. Marks: | | Min Passing Marks: | 20 |
| PA | RT - | | nt of the C | | ÷1 | *1 |
| - | | Total No. o | of learning-Train | ning/performance Period | ds: 30 Periods (30 Hours) | |
| | odule | OYLLY YOU LINES | | opics (Course conten | | No. of Period |
| Tra Exp Co | o./Field aining/ eriment ntents Course | analysis contain H ₂ S (hydrogen sinsoluble salts) Cations and anion Cations: NH ₄ +, Sr ²⁺ , Ca ²⁺ , Na+ Anions: CO ₃ ²⁻ , (Spot tests may TITRIMETRIC Standardize sodi Determine the | ing up to four identified on that may be enough that may be used wherever that an analysis of the used wherever that may be used where the concentration | C MIXTURE ANALYS onic species (two cations ppropriate methods (Exclusionated include: Cd ²⁺ , Fe ²⁺ /Fe ³⁺ , Al ³⁺ , Co ²⁺ CH ₃ COO ⁻ , Cl ⁻ , Br ⁻ , I ⁻ , No r feasible.) lution using a standard ox of hydrochloric acid colution as an intermediate. | and two anions) using uded are interfering and, Ni ²⁺ , Mn ²⁺ , Zn ²⁺ , Ba ²⁺ , O ₂ -, SO ₃ ²⁻ alic acid solution. (HCl) solution using | 30 |
| Ke | ywords | Qualitative Analy. | sis (H ₂ S method, C | Cations (NH4 ⁺ , Pb ²⁺ , etc.), Ar lution), Concentration Dete | iions (CO32-, S2-, etc.), Titrii | metric |

Signature of Convener & Members (CBoS):

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Chairman

Vidyalaya, Raigarh (C.G.)

Officer-In-Charge (Maddumis)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

PART-C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended:

- 1. Gurtu, J. N., & Kapoor, R. (1987). Experimental Chemistry. S. Chand & Co.
- 2. Bajpai, D. N., Pandey, O. P., & Giri, S. (2013). Practical Chemistry. S. Chand & Co.
- 3. Ahluwalia, V. K., Dhingra, S., & Dhingram, S. (2005). College Practical Chemistry. Universities Press.
- 4. Kamboj, P. C. (2014). Advanced University Practical Chemistry (Part I). Vishal Publishing Co.
- 5. Fultariya, C., & Harsora, J. (2017). Volumetric Analysis: Concepts and Experiments.

Reference Books Recommended:

- 1. Mepherson, P. A. (2015). Practical Volumetric Analysis. Royal Society Of Chemistry.
- 2. Shobha, R., & Banani, M. (2017). Essentials of Analytical Chemistry. Pearson.
- 3. Venkateswaran, V., Veeraswamy, R., & Kulandaivelu, A. R. (2004). *Basic Principles Of Practical Chemistry* (2nd Ed.). S. Chand Publications.
- 4. Sundaram, S., & Raghavan, K. (1996). Practical Chemistry. S. Viswanathan Co. Pvt.
- 5. Svehla, G. (2011). Vogel's Textbook of Inorganic Qualitative Analysis (7th Ed.). Pearson Education

Online Resources-

- https://bit.ly/3B7tOQV
- https://bit.ly/30V85ze
- https://bit.ly/3B5WOIQ
- ➤ https://bit.ly/3C9PXPS
- https://bit.ly/30Ip9rZ
- ➤ https://bit.ly/3BPnwqc

Online Resources-

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

PART -D: Assessment and Evaluation Suggested Continuous Evaluation Methods: 50 Marks Maximum Marks: Continuous Internal Assessment (CIA): 15 Marks End Semester Exam (ESE): 35 Marks Internal Test / Quiz-(2): Better marks out of the two Test / Quiz 10 & 10 **Continuous Internal** Assignment/Seminar +Attendance - 05 + obtained marks in Assignment shall be Assessment (CIA): 15 Total Marks considered against 15 Marks (By Course Teacher) Laboratory / Field Skill Performance: On spot Assessment Managed by **End Semester** - 20 Marks | Course teacher A. Performed the Task based on lab. work Exam (ESE): as per lab. B. Spotting based on tools & technology (written) - 10 Marks C. Viva-voce (based on principle/technology) status

Name and Signature of Confener & Members of CBoS:

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ा**ficer-in-Charge (Asambandis)** Shaheed Nandkumar Patel Yishwavidyalaya, Raigarh (C.G.)

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

| | | Cours | E CURRICULUM | | |
|---|---|---|--|---|------------------|
| P | ART- A: | ntroductio | n | | |
| | ogram: Bachelor in ertificate / Diploma / De Course Code | | Semester - II | Session: 2024-2 | 2025 |
| 2 | Course Title | | TO A BATCH TO A CONTROL OF | | |
| 3 | Course Type | FUI | NDAMENTAL CHEMIS | STRY-II | |
| 4 | | | DSC | | |
| 5 | Pre-requisite (if, any) Course Learning. Outcomes (CLO) | > To under > To learn bonded c > To under | As per P estand different acid-base the preparation, bonding compounds estand the concept and ch | theories and solvent syst , and reactions of C-C σ - | & T- |
| 6 | Credit Value | > To learn the basic | the basic concepts of vari concepts of surface chen | iistry and chemical kineti | ics |
| | | 3 Credits | | rs - learning & Observa | tion |
| 7 | Total Marks | Max. Marks: | 100 | Min Passing Marks: | 40 |
| | I Acid, Base and Sol Theorics of acids a | vent System nd bases: Arrhen | pics (Course contents | ugate acids and bases. | No. of Period |
| | relative strengths of of acids and bases. HSAB concept: Cla Borderline, Soft). A Selectivity, Redox F Non-aqueous solven general characteristicomplex, formation application) | acids and bases, a assification of Aci pplications of HS Reactions ats: .Physical prop cs, Liquid ammor reactions. Solution | the Lux-flood, solvent system ds and Bases According to AB Theory in Inorganic Retries of a solvent, types on a sa a solvent. Acid-base on sof alkali and alkaline e | tem and Lewis concepts O HSAB Theory (Hard, Leactions - Solubility, of solvents and their concepts and | 11 |
| 1 | method). Reactions Cycloalkanes: Prepa hydrocarbons), Reac Stability of cycloalk Conformational struched CHEMISTRY OF Alkenes: Preparation Hoffmann and Saytz electrophilic and fre bromide, water, hydromes: 1,2- and 1,4 Alkynes: Preparation | in (Wurtz reaction (mechanisms): ha tration (Dieckman ctions (mechanisms) and series of ethane, C-C π-BONDIN methods (dehyd teff rules, cis and e radical addition roboration, ozono-additions, Diels-in (dehydrohaloger) | , reduction/hydrogenation logenation, free radical sum's ring closure, reduction as): substitution and ring-carain theory, Sachse and Mon-butane and cyclohexar G ration, dehydrohalogenation trans eliminations). React (hydrogen, halogen, hydrolysis, dihydroxylation wit | bstitution. of aromatic opening reactions. Mohr predictions, nc. on, dehydrogenation, ions (mechanisms): ogen halide, hydrogen h KMnO ₄). Reactions: Acidity, | 12 |

Officer-In-Charge (No. 1977)
Shaheed Nandkufnak Patel
Vishwavidyalaya, Patekik (C.G.)

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| | ozonolysis, hydroboration/oxidation. | |
|---------|--|------|
| | Aromatic Hydrocarbons | |
| | Aromatic hydrocarbons: Aromaticity: Hückel's rule, aromatic character of | 1 |
| | | |
| | | 1 |
| | nitration, sulphonation and Friedel-Craft's alkylation/acylation with their | İ |
| | mechanism. Directive effects of the groups. | ł |
| III | Behaviour of ideal gasses Vinetical | |
| | Behaviour of ideal gases: Kinetic theory of gases – postulates and derivation of the equation, PV = 1/3 mnc ² and derivation of the | |
| | equation, PV = 1/3 mnc ² and derivation of the gas laws- Maxwell's distribution of molecular velocities-effect of temperature types of molecular velocities and derivation of | |
| | molecular velocities-effect of temperature-types of molecular velocities-degrees of freedom-Principle of equipartition of approximately processes and the second se | |
| | | |
| | Behaviour of Real gases: Deviation from ideal behaviour, derivation of van der Waals, equation of state and critical constants | |
| | equation of state and critical constants. | |
| | Liquid state chemistry: structure of liquids(Eyring Theory), Properties of liquids, viscosity and surface tension. | 11 |
| | | |
| | Solid state chemistry: Nature of the solid state, law of constancy of interfacial angles, law of rational indices. Miller indices, elementary ideas of | |
| | | |
| | operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, Crystal defects. | |
| IV | | |
| 1 1 | A. Colloids and surface chemistry: Classification, Optical, Kinetic and Electrical | |
| } | repetites of colloids, Coagulation, Hardy Schulze law, flocoulation value, Day, it | |
| 1 | The first of the state of the s | |
| | ausorption, enemisorption. | 1 |
| | B. Chemical kinetics: Rate of reaction, Factors influencing rate of reaction, rate law, | |
| | rate constant, Order and molecularity of reactions, rate determining step. Zoro, First and | |
| - | become order reactions, Kate and Kate Law methods of determining order of reaction | 11— |
| | Chain reactions. Temperature dependence of reaction rate. Arrhenius theory, Physical | 11 |
| | significance of Activation energy, collision theory, demerits of collision theory, non | |
| | mathematical concept of transition state theory. | |
| ł | C. Catalysis: Homogeneous and Heterogeneous Catalysis types of catalyst | 4 |
| 1 | characteristics of catalyst, Enzyme catalyzed reactions, Industrial applications of | |
| | catalysis. | - |
| | Acid & Rases Alkanes Cycloglianes Alkanes Diana All | |
| Keyword | Acid & Bases, Alkanes, Cycloalkanes, Alkenes, Dienes, Alkynes, Aromatic Hydrocarbons, Kine | etic |
| | theory of gases, Real gases, Intermolecular forces, Crystal structure, Chemical kinetics | |

Signature of Convener & Members (CBoS):

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Chairman

od Nandkumar Patel idyalaya, Raigarh (C.G

Officer-In-Charge (Authorities)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

PART-C: **Learning Resources**

Text Books, Reference Books and Others

Textbooks Recommended:

- 1. Bahl, A., & Bahl, B. S. (2014). Organic Chemistry (22nd Ed.). S. Chand & Sons.
- 2. Ahluwalia, V. K., & Goyal, M. (2001). A Textbook of Organic Chemistry. Narosa Publishing
- 3. Jain, M. K., & Sharma, S. C. (2017). Modern Organic Chemistry. Vishal Publishing Company.
- 4. Puri, B. R., Sharma, L. R., & Pathania, M. S. (2013). Principles of Physical Chemistry (46th Ed.). Shoban Lal Nagin Chand And Co.
- 5. Bahl, B. S. A., & Tuli, G. D. (2009). Essentials of Physical Chemistry (Multicolour Ed.). S. Chand & Company Pvt Ltd.
- 6. Puri, B. R., Sharma, L. R., & Kalia, K. C. (2018). Principles of Inorganic Chemistry. Nagin Chand and Co., New Delhi.

Reference Books Recommended:

- I. Paula, B. Y. (2014). Organic Chemistry (7th Ed.). Pearson Education, Inc. (Singapore).
- 2. Solomons, T. W. G. (2017). Organic Chemistry (Global Ed.). John Wiley & Sons.
- 3. Morrison, R. T., & Boyd, R. N. (2010). Organic Chemistry (7th Ed.). Prentice-Hall Of India
- 4. Laidler, K. J., &-Meiser, J. H. (2006). Physical Chemistry (2nd Indian Ed.). CBS-Publishers.
- 5. Atkins, P. W., & De Paula, J. (2006). Physical Chemistry (8th Ed.). Oxford University Press.
- 6. Dogra, S., & Dogra, S. (2006). Physical Chemistry through Problems (2nd Ed.). New Age International.
- 7. Sangaranarayanan, M. V., & Mahadevan, V. (2011). Textbook of Physical Chemistry. University Press.

Online Resources-

- https://bit.ly/3Gb99iy
- https://www.organic-chemistry.org/
- https://bit.ly/3GduvMi
- https://bit.ly/30TXm8d
- https://application.wiley-vch.de/books/sample/3527316728 c01.pdf
- https://www.ncbi.nlm.nih.gov/books/NBK547716/

Online Resources-

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

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:

100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE):

70 Marks

Assessment (CIA):

(By Course Teacher)

Continuous Internal Internal Test / Quiz-(2): 20 x 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

Chairman

Sidklimar Patel idyalaya, Raigarh (C.G

Officer-In-Charge (Additional) Shaheed Nandkumar Patel //shwavidyalaya, Raigarh (C.G.) End Semester Exam (ESE):

Two section - A & B

Section A: Q1. Objective -10 x1 = 10 Mark; Q2. Short answer type- 5x4 = 20 MarksSection B: Descriptive answer type qts.,1out of 2 from each unit-4x10 = 40 Marks

Name and Signature of Convener & Members of CBoS:

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Chairman I Studio Ised Nandkumar Patel Idyalaya, Raigarh (C,G

Officer-In-Charge (Apple 1995)
Shaheed Nandkumar Patel
Ishwavidyalaya, Raigarh (C.G.)

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

| p | ART | Α | | E CURRICULUM | fi T | |
|--------------------|-------------------------------------|--|--|---|--|------------------|
| | | | ntroductio | n | | j + 1, |
| C | ograi | n: Bachelor ir | Science | Semester- II | G 1 2001 | |
| 1 | Com | <i>ite / Diploma / De</i> rse Code | | Schlester- II | Session: 2024-2 | 2025 |
| 2 | | | CHSC-02P | | | |
| 3 | | rse Title | CH | EMISTRY LAB. COURS | SE-II | ly = 1 In |
| 4 | | rse Type | | DSC | | |
| - | Pre- | requisite (if, any) | | As per Program | | |
| 5 | Cou Out | rse Learning. comes (CLO) | > Studying the > Determining distillation an | functional group analysis melting points to assess c ad sublimation techniques th essential skills in meas | organic compounds ompound purity and em | . 4 |
| 6 | Cred | lit Value | 1 Credits | Credit =30 Hours Labor | atory or Field learning | r |
| 7 | | l Marks | Max. Marks: | 50 | Min Passing Marks: | 20 |
| PA | RT - | | nt of the Co | ourse | | |
| | | Total No. o | f learning-Train | ing/performance Period | s: 30 Periods (30 Hours) | |
| | dule /Field | ' = | To | opics (Course content | | No. of Period |
| Tra Expe Con | ining/ riment itents ourse | 133°C (Urea), 10 Functional grou S, and halogens) Physical chemis Surface tension n (ii) drop weight mixture. Viscosity measur of aqueous soluti Study of the vari | f Laboratory Glast 0-82°C (Naphtha 00°C (Distilled V p Analysis of On and functional gratry measurements: D method. Surface rement using Ostions of (i) sugar (ation of viscosity) | rganic Compounds Detec | etanilide), 132.5°C - etion of elements (N, ion by (i) drop number rve for a binary liquid mination of viscosity rature. | 20 |
| Keyı | words | Basic laboratory te Physical chemistry, | chniques, Equipm | tents. Calibration Melting n | cture oints, Qualitative analysis, | |

Signature of Convener & Members (CBoS):

Boli

hairman

Andkumar Patel Li, alaya, Raigarh (C.G.

Officer-In-Charge (A. Sanda) Shaheed Nandkumar Patel Shwavidyalaya, Raigarh (C.G.)

PART-C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended:

- 1. Ahluwalia, V. K., Dhingra, S., & Gulati, A. (N.D.). College Practical Chemistry. University Press.
- 2. Khosla, B. D., Garg, V. C., & Gulati, A. (2011). Senior Practical Physical Chemistry. S. Chand & Co.

Reference Books Recommended:

- 3. Garland, C. W., Nibler, J. W., & Shoemaker, D. P. (2003). Experiments in Physical Chemistry (8th Ed.). Mcgraw-Hill.
- 4. Mendham, J. (2009). Vogel's Quantitative Chemical Analysis (6th Ed.). Pearson Education.
- 5. Mann, F. G., & Saunders, B. C. (2009). Practical Organic Chemistry. Pearson Education.
- 6. Furniss, B. S., Hannaford, A. J., Smith, P. W. G., & Tatchell, A. R. (2012). Practical Organic Chemistry (5th Ed.). Pearson Education.

Online Resources-

- http://heecontent.upsdc.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- http://heecontent.upsdc.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtml/introl.htm
- https://nptel.ac.in/courses/104/103/104103071/W

Online Resources-

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

| PART -D: Assessment and Evaluation | | | | | | |
|------------------------------------|--------------------------------------|---------------------------|------------------|--|--|--|
| Suggested Continuous | Evaluation Methods: | | | | | |
| Maximum Marks: | 50 Marks | | | | | |
| Continuous Internal A | ssessment (CIA): 15 Marks | | | | | |
| End Semester Exam (E | SE): 35 Marks | | | | | |
| Continuous Internal | Internal Test / Quiz-(2): 10 & 10 | Better marks out of the t | wo Test / Quiz | | | |
| Assessment (CIA): | Assignment/Seminar +Attendance - 05 | + obtained marks in Assi | ignment shall be | | | |
| (By Course Teacher) | Total Marks - 15 | considered against | 15 Marks | | | |
| End Semester | Laboratory / Field Skill Performan | | Managed by | | | |
| Exam (ESE): | D. Performed the Task based on lat | | Course teacher | | | |
| Exam (ESE). | E. Spotting based on tools & techno | | as per lab. | | | |
| | F. Viva-voce (based on principle/tec | chnology) - 05 Marks | status | | | |

Name and Signature of Convener & Members of CBoS:

Indisa

Jones

Fale

Chairman Julyan Jakumar Patel alaya, Raigarh (C.G

Officer-In-Charge Shaheed Nandkumar Patel (Shaheed Nandkumar Patel (Shahwavidyalaya, Raigarh (C.G.)

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

| D/ | יפו | - A: In | Cours | E CURRICULUM | | |
|---|--------|---|---|--|--|-----------|
| | - | 4.0 | troduction | 7 | | |
| r | gra | m: Bachelor in | Science | | | _ |
| Ce | rtific | ate / Diploma / Des | gree/Honors) | Semester - I | Session: 2024-202 | 5 |
| | Cou | irse Code | CHGE-01T | | | |
| 2 | Cor | irse Title | | NDAMENTAL CHEMIS | TRY-I | |
| 3 | Co | arse Type | | GE | | |
| 4 | Pre | e-requisite (if, any) | | As per Pi | rogram | |
| To know the contributions of ancient Indian scientists, study atorstructure, and periodic properties. To explore the concept of chemical bonding, including ionic and covalent bonding, hybridization, molecular orbital theory and intermolecular interactions. To learn about reaction mechanisms of inorganic reactions and their stoichiometry. To understand different acid-base theories and solvent system. | | | | | | and nd |
| 6 | 1 | redit Value | 3 Credits | Credit = 15 Hour | rs - learning & Ovservant | |
| $\frac{?}{7}$ | | otal Marks | Max. Marks: | 100 | Min Passing Marks: 40 |) |
| | | D. Comic | nd of the C | ourse | | |
| | | Total No. of Tea | ching-learning | Periods (01 Hr. per per | iod) - 45 Periods (45 Hou | rs) |
| _ | | 10111110101 | | opics (Course content | | No. o |
| | nit | | 10 | Chemical techniques in an | ncient India: General | |
| | | dyes, pigments, cos Ancient Indian Che Nagarjuna, Vagbha etc. Indian Chemist and work for Indian B. Atomic Structulimitations. Dual na Uncertainty princip Rules for filling elemaximum multiplic the atoms. Stability energy. Relative end (iii) Effective nuclea and Ionic radii. Ioniaffinity, Electronega | metics, Ayurveda lemist- Their Cor tta, Govindachary of 19th century- chemistry. re and Periodic lature of particles a le and its significations in various ity, Aufbau prince of half-filled and lergies of atomic of tur charge (ENC), zation energy and ativity—Pauling! | Properties: (i) Review of and waves, de Broglie's equance. (ii) Quantum number orbitals, Pauli's Exclusion its limitations, Ed completely filled orbitals orbitals. Anomalous electroshielding or screening effecting ionizates/Mulliken's electronegations. | ni Kanad, Aacharya ra, Somadava, Gopalbhatta ra Ray- His Contribution Bohr's theory and its quation, Heisenberg's ers and their significance. In Principle, Hund's rule of lectronic configurations of s, concept of exchange ronic configurations. Fect, Slater rules, Atomic ion energy. Electron | 11 |
| electronegativity with hybridization. II Chemical Bonding – I A) Ionic Bonding: General characteristics of ionic bonding. Ionic Bonding & Energy: Lattice and solvation energies and their importance in the context of stability and solubility of ionic compounds. Born-Haber Cycle and its Applications: Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules. B) Covalent Bonding: Lewis structures, Valence Bond theory, Hybridization (concept and types with suitable examples), dipole moment and percentage ionic character. Valence shell electron pair repulsion theory (VSEPR) and structure of NH ₃ , H ₂ O, SF ₄ , CIF ₃ , PCI ₅ , SF ₆ , XeF ₂ , XeF ₆ , XeO ₃ , XeOF ₄ , XeF ₄ . | | | | | 1 | |

Snaheed Nandkuthar Patel hwavidyalaya, Raigarh (C.G.)

Jed Nandkumar Patel Lyalaya, Raigarh (C.

Chemical Bonding - II A) MO theory: LCAO method-criteria of orbital, overlap, types of molecular orbitals-o- π - and, δ-MOs; formation of σ - and π -MOs and their, schematic illustration; qualitative MO energy, level diagram of homo- (N2 & O2(including peroxide, superoxide)) and hetero-diatomic molecules (NO, CO), magnetic properties, bond order and stability of molecules and ions. B) Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment). A. Chemical properties of s-block metals Reaction with water, air, and nitrogen, Anomalous behavior of Li and Be, Compounds of s-block metals: Oxides, hydroxides, peroxides, and superoxides (preparation and properties) Complexes of s-block metals, Complexes with crown ethers B. Chemistry of p-Block Elements Boron group: Hydrides (classification of boranes), Diborane (preparation, properties, and structure elucidation), Borazine (preparation and structure) Carbon group: Carbides (salt-like carbides, interstitial carbides, covalent carbides), 11 Silicates (classification, three-dimensional silicates - properties and structures) Nitrogen group: Hydrides of Nitrogen (hydrazine, hydroxylamine, hydrazoic acid) Structure of oxides of nitrogen (N2O, NO, NO2, N2O4, and N2O5), Structure of oxyacids of nitrogen (HNO2, HNO3, H2N2O7,), Nitrides (classification, preparation, properties, and Structure of Oxides and oxoacids of phosphorus: (P2O3, P2O5) H3PO2, H3PO3, H3PO4, H4P2O7 Halogen: Hydrides, Oxides and oxyacids of halogens (structure only) - Inter halogen compounds and pseudo halogens Electronic Effects in Organic Compounds Bond Cleavage: Homolytic and heterolytic cleavages, bond energy, bond length, and bond angle. Electron Displacement Effects: Inductive, inductomeric, electromeric, mesomeric (resonance), hyperconjugation, and steric effects. Tautomerism (keto-enol, amido-imidol, and nitro-acinitro forms). Reaction Intermediates: Formation and stability of carbocations, carbanions, free radicals, carbenes, nitrene and benzyne. B. Stereochemistry of Organic Compounds i) Optical Isomerism 11 Elements of symmetry, chirality, enantiomers, and optical activity, Chiral and achiral molecules with two stereogenic centers (Tartaric acid as an example), Erythreo & Threo, Diastercomers and meso compounds, Inversion, retention, and racemization, Relative configuration (D/L), and absolute configuration (R/S nomenclature: sequence rules). ii) Geometrical Isomerism Geometric isomerism (cis-trans isomerism) in alkenes with examples (maleic acid, fumaric acid, and 2-butene), E/Z system of nomenclature. Ancient Indian Chemistry, Atomic Structure, Periodic Properties, Chemical Bonding, s- &p-block elements, Electronic effects, Stereochemistry

Signature of Convener & Members (CBoS):

Vandkumar Patel dyalaya, Raigarh (C.G

Officer-In-Charge (Academia) Shaheed Nandkumar Patel shwavidyalaya, Raigarh (C.G.)

PART-C: **Learning Resources**

Text Books, Reference Books and Others

Text Books Recommended -

Text Books

- 1. Puri, B. R., Sharma, L. R., & Kalia, K. C. (2018). Principles of Inorganic Chemistry. Nagin Chand and Co., New Delhi.
- 2. Satyaprakash, G., Tuli, S. K., Basu, S. K., & Madan, R. D. (2017). Advanced Inorganic Chemistry (Vol. 1, 5th Ed.). S. Chand & Company.
- 3. Lee, J. D. (2010). Concise Inorganic Chemistry (5th Ed.). Blackwell Science.
- 4. Housecroft, C. E., & Sharpe, A. G. (2012). Inorganic Chemistry (4th Ed.). Pearson Education Limited.

Reference Books

- 1. Cotton, F. A., Wilkinson, G., & Gaus, P. L. (2002). Basic Inorganic Chemistry (3rd Ed.). John Wiley & Sons.
- 2. Douglas, B. E., Mcdaniel, D. T., & Alexander, J. J. (1994). Concepts and Models Of Inorganic Chemistry (3rd Ed.). John Wiley & Sons.
- 3. Huhcey, J. E., Keiter, E. A., & Keiter, R. L. (1993). Inorganic Chemistry (4th Ed.). Harpercollins College Publishers.
- Shriver, D. F., Atkins, P. W., & Langford, C. II. (2010). Inorganic Chemistry (5th Ed.). W. II. Freeman And Company.
- 5. Moeller, T. (1990). Inorganic Chemistry: A Modern Introduction. Wiley.

Online Resources-

- https://bit.ly/3AyV3mZ
- https://nptel.ac.in/courses/104/104/104104101/
- https://nptcl.nc.in/courses/104/103/104103019/
- ➤ https://nptcl.ac.in/courses/104/101/104101090/
- https://nptel.ac.in/courses/104/105/104105103/

Online Resources-

End Semester

Exam (ESE):

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

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

100 Marks Maximum Marks: Continuous Internal Assessment (CIA): 30 Marks

70 Marks

End Semester Exam (ESE): Continuous Internal Internal Test / Quiz-(2): 20,720 10

Assignment / Seminar -Assessment (CIA): 30 Total Marks -(By Course Teacher)

Two section - A & B

Section A: Q1. Objective $-10 \times 1 = 10 \text{ Mark}$; Q2. Short answer type- $5 \times 4 = 20 \text{ Marks}$ Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

kumar Patel dyalaya, Raigarh (C.G

Better marks out of the two Test / Quiz

+ obtained marks in Assignment shall be

considered against 30 Marks

Shaheed Nandkumar Patel shwavidyalaya, Raigarh (C.G.)

Officer-In-Charge (A. Maries)

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

| P | ART | Α. | Cours | SE CURRICULUM | 1 | |
|--------------------|---|---|--|--|--|------------------|
| | | | atroduction | n | _ | |
| (Ce | rujica | n: Bachelor ir nte/Diploma/De rse Code | Science | Semester - I | Session: 2024-20 | 025 |
| 2 | | | CHGE-01P | | | |
| 3 | | rse Title | Che | emistry Lab. Course-I | | |
| 4 | | rse Type | | GE | | |
| - | Pre- | requisite (if, any) | | As per Program | | |
| 5 | Cou Out | Analyze mixtures for cations (NH4*, Pb²*, etc.) & anions (CO3²-, S etc.) using H₂S or other methods. Perform titrimetric analysis (standardization, unknown conc. determination). Estimate the concentration of acetic acid in vinegar (using NaOH alkali content in antacids (using HCl), and free alkali in soaps/detergents. Utilize complexometric titrations for calcium (Ca²*), water hardne | | | | PH), |
| 6 | Cre | dit Value | Fe ²⁺ /Fe ³⁺ , and 1 Credits | | ratory or Field learning/I | raining |
| 7 | Tota | al Marks | Max. Marks: | 50 | Min Passing Marks: | 20 |
| PA | RT - | B: Conte | nt of the Co | ourse | | - Vi |
| | | Total No. o | f learning-Train | ning/performance Perio | ds: 30 Periods (30 Hours) | ı |
| | dule | | | opics (Course conten | | No. of Period |
| Tra Expe Cor | ./Field ining/ eriment etents ourse | analysis containi H ₂ S (hydrogen suinsoluble salts) Cations and anion Cations: NH ₄ +, F Sr ²⁺ , Ca ²⁺ , Na+ Anions: CO ₃ ²⁻ , S (Spot tests may be TITRIMETRIC Standardize sodius Determine the | ng up to four io ulfide) or other ap as that may be en 2b ²⁺ , Bi ³⁺ , Cu ²⁺ , C 2-, SO ₄ ²⁻ , NO ₃ -, C be used wherever ANALYSIS m hydroxide solic concentration | onic species (two cations ppropriate methods (Excludent countered include: Cd ²⁺ , Fe ²⁺ /Fe ³⁺ , Al ³⁺ , Co ²⁺ CH ₂ COO ⁻ , Cl ⁻ , Br ⁻ , l ⁻ , Note feasible.) | alic acid solution. (HCl) solution using | 30 |
| Кеун | ords | Qualitative Analysis | s (H2S method, Ca | | nions (CO,2- S2- etc.) Tite | imetric |

Signature of Convenet & Members (CBoS):

Soll W

Chairman

eed Nandkumar Patel Idyalaya, Raigarh (C.G

Snaheed Nandkumar Patel Shwavidyalaya, Raigarh (C.G.)

PART-C: **Learning Resources**

Text Books, Reference Books and Others

Textbooks Recommended:

- 1. Gurtu, J. N., & Kapoor, R. (1987). Experimental Chemistry. S. Chand & Co.
- 2. Bajpai, D. N., Pandey, O. P., & Giri, S. (2013). Practical Chemistry. S. Chand & Co.
- 3. Ahluwalia, V. K., Dhingra, S., & Dhingram, S. (2005). College Practical Chemistry. Universities Press.
- 4. Kamboj, P. C. (2014). Advanced University Practical Chemistry (Part I). Vishal Publishing Co.
- 5. Fultariya, C., & Harsora, J. (2017). Volumetric Analysis: Concepts and Experiments.

Reference Books Recommended:

- 1. Mcpherson, P. A. (2015). Practical Volumetric Analysis. Royal Society Of Chemistry.
- 2. Shobha, R., & Banani, M. (2017). Essentials of Analytical Chemistry. Pearson.
- 3. Venkateswaran, V., Veeraswamy, R., & Kulandaivelu, A. R. (2004). Basic Principles Of Practical Chemistry (2nd Ed.). S. Chand Publications.
- 4. Sundaram, S., & Raghavan, K. (1996). Practical Chemistry. S. Viswanathan Co. Pvt.
- 5. Svehla, G. (2011). Vogel's Textbook of Inorganic Qualitative Analysis (7th Ed.). Pearson Education

Online Resources-

- https://bit.ly/3B7tOQV-
- https://bit.ly/30V85ze
- ➤ https://bit.ly/3B5WOIQ
- ➤ https://bit.ly/3C9PXPS
- > https://bit.ly/30Ip9rZ
- https://bit.lv/3BPnwqc

Online Resources-

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

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

50 Marks Maximum Marks:

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE):

Internal Test / Quiz-(2): 10 & 10 Continuous Internal Assessment (CIA):

Assignment/Seminar +Attendance - 05 + obtained marks in Assignment shall be Total Marks -15 considered against 15 Marks

End Semester

(By Course Teacher)

A. Performed the Task based on lab. work Exam (ESE): B. Spotting based on tools & technology (written) - 10 Marks

Laboratory / Field Skill Performance: On spot Assessment

Better marks out of the two Test / Quiz

Managed by - 20 Marks | Course teacher as per lab.

status

35 Marks

C. Viva-voce (based on principle/technology) - 05 Marks

Name and Signature of Convener & Members of CBoS:

iairman

umar Patel /idyalaya, Raigarh (C.G

Micer-in-Charge (Across rate) Shaheed Nandkumar Patel anwavidyalaya, Raigarh (C.G.)

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

| | | Cours | E CURRICULUM | I | |
|-----|---|---|---|--|------------------|
| | | ntroductio | | | |
| Pr | ogram: Bachelor i | n Science | | 2 1 20212 | 025 |
| (Ce | ertificate / Diploma / Do | gree/Honors) | Semester - II | Session: 2024-2 | ,025 |
| • | Course Code | CHGE-02T | | | |
| 2 | Course Title | FUN | DAMENTAL CHEMIS | STRY-II | |
| | Course Type | | GE | | |
| 1 | Pre-requisite (if, any) | | As per P | rogram | |
| 5 | Course Learning. Outcomes (CLO) | > To learn to bonded company to understand their | stand different acid-base the preparation, bonding ompounds stand the concept and ch reactions he basic concepts of vari | theories and solvent system, and reactions of C-C o- emistry of aromatic complous states of matter & undistry and chemical kineti | ounds derstan |
| 5 | Credit Value | 3 Credits | Credit = 15 Hour | s - learning & Observa | tion |
| 7 | Total Marks | Max. Marks: | 100 | Min Passing Marks: | 40 |
| _ | DT Pr Conto | at of the Co | urse | | |
| _ | Total No. of Teac | hing-learning P | eriods (01 Hr. per peri | od) -45 Periods (45 Ho | urs) |
| Jn | | | ics (Course contents | | No. o |
| | relative strengths of a of acids and bases. HSAB concept: Clas Borderline, Soft). App Selectivity, Redox Re Non-aqueous solvents | sification of Acids plications of HSA. actions Physical proper | is, Bronsted-Lowry, conjugate Lux-flood, solvent system and Bases According to B Theory in Inorganic Reties of a solvent, types of as a solvent. Acid-base, sof alkali and alkaline ear | HSAB Theory (Hard, eactions - Solubility, solvents and their precipitation and | 11 |
| II | CHEMISTRY OF C- Alkanes: Preparation (method). Reactions (m Cycloalkanes: Preparation hydrocarbons), Reaction Stability of cycloalkant Conformational structor CHEMISTRY OF C- | Wurtz reaction, re lechanisms): halog tion (Dieckmann's ons (mechanisms) les -Baeyer's strai ares of ethane, n- C π-BONDING | eduction/hydrogenation of genation, free radical substring closure, reduction as substitution and ring-of in theory, Sachse and Mutane and cyclohexane | of aromatic pening reactions. Ohr predictions, | 12 |
| | Alkenes: Preparation m Hoffmann and Saytzeff electrophilic and free ra bromide, water, hydrob Dienes: 1,2- and 1,4-add | ethods (dehydration rules, cis and transidical addition (hy oration, ozonolysiditions, Diels-Aldehydrohalogenation of water | on, dehydrogenation), R | ons (mechanisms): gen halide, hydrogen KMnO4). eactions: Acidity, | *** |

Shaheed Nandkumar Patel wavidyalaya, Raigarh (C.G.)

Dol.

andkumar Pater

| Aromatic Hydrocarbons Aromatic hydrocarbons: Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directive effects of the groups. III Behaviour of ideal gases: Kinctic theory of gases – postulates and derivation of the equation, PV = 1/3 mnc² and derivation of the gas laws- Maxwell's distribution of molecular velocities-effect of temperature-types of molecular velocities-degrees of freedom-Principle of equipartition of energy. Behaviour of Real gases: Deviation from ideal behaviour, derivation of van der Waals, equation of state and critical constants. Liquid state chemistry: structure of liquids(Eyring Theory), Properties of liquids, viscosity and surface tension. Solid state chemistry: Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, Crystal defects. IV A. Colloids and surface chemistry: Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Properties of colloids, Coagulation, Factors influencing rate of reaction, rate law, B. Chemical kineties: Rate of reaction, Factors influencing rate of reaction, rate law, B. Chemical kineties: Rate of reaction, Factors influencing rate of reaction, rate law, B. Chemical kineties: Rate of reaction, Factors influencing rate of reaction, rate law, B. Chemical kineties: Rate of reactions, rate determining order of reaction, Second order reactions, Rate and Rate Law, methods of determining order of reaction, Second order reactions, Rate and Rate Law, methods of determi | | | |
|--|----|---|--|
| mechanism. Directive effects of the groups. Behaviour of ideal gases: Kinctic theory of gases – postulates and derivation of the equation, PV = 1/3 mnc² and derivation of the gas laws- Maxwell's distribution of molecular velocities-effect of temperature-types of molecular velocities-degrees of freedom-Principle of equipartition of energy. Behaviour of Real gases: Deviation from ideal behaviour, derivation of van der Waals, equation of state and critical constants. Liquid state chemistry: structure of liquids(Eyring Theory), Properties of liquids, viscosity and surface tension. Solid state chemistry: Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, Crystal defects. IV A. Colloids and surface chemistry: Classification, Optical, Kinetic and Electrical Activation, chemisorption, B. Chemical kinetics: Rate of reaction, Factors influencing rate of reaction, rate law, B. Chemical kinetics: Rate of reaction, Factors influencing rate of reaction, rate law, B. Chemical kinetics: Rate of reaction, Factors influencing rate of reaction, rate law, B. Chemical kinetics: Rate and Rate Law, methods of determining order of reaction, Chain reactions. Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non-mathematical concept of transition state theory. C. Catalysis: Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristics of catalyst, Enzyme catalyzed reactions, Industrial applications of | | Aromatic hydrocarbons: Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation | |
| Behaviour of ideal gases: Kinctic theory of gases – postulates and derivation of the equation, PV = 1/3 mnc² and derivation of the gas laws- Maxwell's distribution of molecular velocities-effect of temperature-types of molecular velocities-degrees of freedom-Principle of equipartition of energy. Behaviour of Real gases: Deviation from ideal behaviour, derivation of van der Waals, equation of state and critical constants. Liquid state chemistry: structure of liquids(Eyring Theory), Properties of liquids, viscosity and surface tension. Solid state chemistry: Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, Crystal defects. IV A. Colloids and surface chemistry: Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotropy, Physical adsorption, chemisorption, B. Chemical kinetics: Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining order of reaction, Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions. Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non-mathematical concept of transition state theory. C. Catalysis: Homogeneous and Heterogeneous Catalysis, types of catalyst, Characteristics of catalyst, Enzyme catalyzed reactions, Industrial applications of | | initiation, sulphonation and Friedel-Craft's alkylation/acylation with their | |
| IV A. Colloids and surface chemistry: Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotropy, Physical adsorption, chemisorption, B. Chemical kinetics: Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions. Temperature dependence of reaction rate, Arrhenius theory, Physical Significance of Activation energy, collision theory, demerits of collision theory, non-mathematical concept of transition state theory. C. Catalysis: Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristics of catalyst, Enzyme catalyzed reactions, Industrial applications of | Ш | Behaviour of ideal gases: Kinctic theory of gases – postulates and derivation of the equation, PV = 1/3 mnc ² and derivation of the gas laws- Maxwell's distribution of molecular velocities-effect of temperature-types of molecular velocities-degrees of freedom-Principle of equipartition of energy. Behaviour of Real gases: Deviation from ideal behaviour, derivation of van der Waals, equation of state and critical constants. Liquid state chemistry: structure of liquids(Eyring Theory), Properties of liquids, viscosity and surface tension. Solid state chemistry: Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, | |
| actalysis Kingtic | IV | A. Colloids and surface chemistry: Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotropy, Physical adsorption, chemisorption, B. Chemical kinetics: Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions. Temperature dependence of reaction rate, Arrhenius theory, Physical Significance of Activation energy, collision theory, demerits of collision theory, non-mathematical concept of transition state theory. | |

Signature of Convener & Members (CBoS):

Learning Resources PART-C:

Text Books, Reference Books and Others

Textbooks Recommended:

1. Bahl, A., & Bahl, B. S. (2014). Organic Chemistry (22nd Ed.). S. Chand & Sons.

2. Ahluwalia, V. K., & Goyal, M. (2001). A Textbook of Organic Chemistry. Narosa Publishing

3. Jain, M. K., & Sharma, S. C. (2017). Modern Organic Chemistry. Vishal Publishing Company.

4. Puri, B. R., Sharma, L. R., & Pathania, M. S. (2013). Principles of Physical Chemistry (46th Ed.). Shoban Lal Nagin Chand And Co.

5. Bahl, B. S. A., & Tuli, G. D. (2009). Essentials of Physical Chemistry (Multicolour Ed.). S. Chand & Company Pvt Ltd.

6. Puri, B. R., Sharma, L. R., & Kalia, K. C. (2018). Principles of Inorganic Chemistry. Nagin Chand and Co., New Delhi.

Reference Books Recommended:

Paula, B. Y. (2014). Organic Chemistry (7th Ed.). Pearson Education, Inc. (Singapore).

Solomons, T. W. G. (2017). Qrganic Chemistry (Global Ed.). John Wiley & Sons.

fficer-In-Charge

Shaheed Nandkumar Patel mwavidyalaya, Raigarh (C.G.)

- Morrison, R. T., & Boyd, R. N. (2010). Organic Chemistry (7th Ed.). Prentice-Hall Of India
- 4. Laidler, K. J., & Meiser, J. H. (2006). Physical Chemistry (2nd Indian Ed.). CBS Publishers.
- 5. Atkins, P. W., & De Paula, J. (2006). Physical Chemistry (8th Ed.). Oxford University Press. 6. Dogra, S., & Dogra, S. (2006). Physical Chemistry through Problems (2nd Ed.). New Age International.
- 7. Sangaranarayanan, M. V., & Mahadevan, V. (2011). Textbook of Physical Chemistry. University Press.

Online Resources-

- > Online Resources-
- https://bit.ly/3Gb99iv
- https://www.organic-chemistry.org/
- https://bit.ly/3GduvMi
- https://bit.ly/30TXm8d
- > Web Resources
- https://application.wiley-vch.de/books/sample/3527316728_c01.pdf
- https://www.ncbi.nlm.nih.gov/books/NBK547716/

Online Resources-

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

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

100 Marks Maximum Marks:

30 Marks Continuous Internal Assessment (CIA):

70 Marks End Semester Exam (ESE):

Internal Test / Quiz-(2): 20 #20 Continuous Internal Assignment / Seminar -Assessment (CIA):

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be 10 considered against 30 Marks 30 Total Marks -

(By Course Teacher) End Semester Exam

Two section - A & B

(ESE):

Section A: Q1. Objective – 10 x1 = 10 Mark; Q2. Short answer type- 5x4 = 20 MarksSection B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

dkumar Patel yalaya, Raigarh (C.G

Mear-in-Livings Shahesd Nandkumar Patel hwavidyalaya, Haigarh (C.G.)

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

| P | AR' | Г- А: | COUR | SE CURR | CULUM | . 47 | |
|--------------------|--|---|---|--|---|--|------------------|
| | | | TTPON 40 | on | COLOW | | |
| | Program: Bachelor in (Certificate / Diploma / De 1 Course Code | | n C . | | ster - II | Session: 2024-2 | .025 |
| 2 | - | | CHGE-02P | | | | |
| 3 | - | irse Title | Che | emistry Lab. | Course-II | | |
| 4 | | irse Type | | GE | | Company of the same of the sam | |
| _ | Fre | -requisite (if, any) | | As per Pr | ogram | | |
| 5 | Course Learning. Outcomes (CLO) Demonstrating and using common glassware for accurate measurements Studying the functional group analysis organic compounds Determining melting points to assess compound purity and emplication and sublimation techniques to establish boiling points Equipping with essential skills in measuring liquid surface tensor | | | | ts | | |
| 6 | Cre | dit Value | solution visco | | Tours Labora | atory or Field learning/I | Craining |
| 7 | Tot | al Marks | Max. Marks: | | | Min Passing Marks: | 20 |
| PA | RT | B: Conte | nt of the Co | ourse | | | |
| | | | | | ance Periods | s: 30 Periods (30 Hours) | |
| | dule /Field | | To | opics (Cour | | | No. of Period |
| Tra Expe Cor | ining/ erimen- itents course | Demonstration of Thermometer: 86 133°C (Urea), 10 | f Laboratory Glas 0-82°C (Naphtha 00°C (Distilled W p Analysis of Or and functional gr | ilene), 113.5° Vater) ganic Compo | -114°C (Ace | ibration of tanilide), 132.5°C - tion of elements (N, | |
| - | | Surface tension (ii) drop weight mixture. Viscosity measur of aqueous solution Study of the variation | measurements: It method. Surfacement using Ostrons of (i) sugar (ation of viscosity Composition cur | wald's viscom ii) ethanol at of sucrose so | mposition cuncter, Determate temper plution with the contract of the contract | the concentration of | |
| Кеун | vords | Basic laboratory tec Physical chemistry, i | Aniques, Equipm | ents. Calibratio | on, Melting po | ture Pints, Qualitative analysis, | |
| | | | | | 0 | | 1 |

dyalaya, Raigarh (C.O.

Signature of Convener & Members (CBoS):

dfficer-In-Charge (Academia) Shaheed Nandkumar Patel

hwavidyalaya, Raigarh (C.G.)

PART-C: **Learning Resources**

Text Books, Reference Books and Others

Textbooks Recommended:

- 1. Ahluwalia, V. K., Dhingra, S., & Gulati, A. (N.D.). College Practical Chemistry. University
- 2. Khosla, B. D., Garg, V. C., & Gulati, A. (2011). Senior Practical Physical Chemistry. R. Chand & Co.

Reference Books Recommended:

- 1. Garland, C. W., Nibler, J. W., & Shoemaker, D. P. (2003). Experiments in Physical
- 2. Mendham, J. (2009). Vogel's Quantitative Chemical Analysis (6th Ed.). Pearson Education.
- 3. Mann, F. G., & Saunders, B. C. (2009). Practical Organic Chemistry. Pearson Education.
- 4. Furniss, B. S., Hannaford, A. J., Smith, P. W. G., & Tatchell, A. R. (2012). Practical Organic Chemistry (5th Ed.). Pearson Education.

Online Resources-

- http://heecontent.upsdc.gov.in/Home.aspx
- > https://nptel.ac.in/courses/104/106/104106096/
- http://heecontent.upsdc.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtml/introl.htm
- https://nptel.ac.in/courses/104/103/104103071/W

Online Resources-

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

| PART -D: Asses | sment and Evalua | ition | | |
|--|--|---|---|---|
| Suggested Continuous Maximum Marks: Continuous Internal A End Semester Exam (I Continuous Internal | ssessment (CIA): 15 Mar SSESE): 35 Mar | rks ks ks 10 & 10 unce - 05 | Better marks out of the to to the desired marks in Assi | gnment shall be |
| Assessment (CIA): (By Course Teacher) End Semester Exam (ESE): | Total Marks - Laboratory / Field Skill Pe D. Performed the Task ba E. Spotting based on tools F. Viva-voce (based on pri | erformance: sed on lab. w & technolog | york - 20 Marks gy (written) – 10 Marks | Managed by Course teacher as per lab. status |
| ame and Signature of Conve | | a 0 | we Squir | v Wy |

Chairman

dyalaya, Raigarh (C.G

officer-in-Charge Shaheed Nandkumar Patel wavidyalaya, Raigarh (C.G.)

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

| | | DEPART | MENT OF CHEMIST | RY | | |
|-----|----------------------------------|---|--|--|---------|--|
| P | ART-ALLIS | Cours | SE CURRICULUM | M | | |
| n | ART-A: Introdu | ection | | | | |
| (C) | ogram:Bachelor in | Science egree/Honors) | Semester-I/III/V | V Session: 2024- | 2025 | |
| | Course Code | CHVAC | A CONTRACTOR OF THE PARTY OF TH | | | |
| 2 | Course Title | | Chemistry in Daily Life | | | |
| 3 | Course Type | Value Added Course(VAC) | | | | |
| 4 | Pre-requisite(if,any) | | As ner Pros | ranı | 0. | |
| 5 | Course Learning Outcomes(CLO) | To introduce the student about dairy product, beverages, food additives, artificial sweeteners, flavors, food colorants, paints, pigments, dyes etc. To make aware the students about air pollution, hydrological cycle, composition of soil, fertilizers etc. To introduce the students about carbohydrate, vitamins, drugs. To introduce students about concept of thermodynamics used in day to day life. | | | | |
| 6 | Credit Value | 2 Credits | | rs -learning & Observa Min Passing Marks:20 | | |
| 7 | Total Marks | Max.Marks:50 | | Win Fassing Warksize | | |
| PA | RT -B: Content | of the Cour | se | 20 D : 1- (20 Hour | ·c) | |
| | TotalNo.of Teacl | ning-learning Pe | eriods(01 Hr. per period | l) - 30 Periods (30 Hour | No. of | |
| Un | it | Topics(Course contents) | | | | |
| I | minerals in milk and | I butter. Estimation | k and milk products. And in of added water in milk offee and tea, detection of f methyl alcohol in alcoh | chicory in coffee, | n 1 / 3 | |

| - 1 | Unit | Topics (Course contents) | 1 Cliou |
|-----|-----------------------------------|--|---------|
| | I | Dairy Products: Composition of milk and milk products. Analysis of fat content, minerals in milk and butter. Estimation of added water in milk. Beverages: Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, estimation of methyl alcohol in alcoholic beverages. Food additives, adulterants and contaminants: Food preservatives like benzoates, propionates, sorbates, disulphites. Artificial sweeteners: spartame, saccharin, dulcin, sucralose and sodium cyclamate. Flavors: 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. Paints & Pigments: White pigments (white lead, ZnO, lithopone, TiO2). 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. Dyes: 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. | 08 |
| | s F F tt n V er | Air Pollution: Air pollutants, prevention and control, Greenhouse gases and acid rain. Ozone hole and CFC's. Photochemical smog and PAN. Catalytic converters for mobile ources. Bhopal gas tragedy. Hydrologic cycle, sources, criteria and standards of water quality - safe drinking water. Public health significance and measurement of water quality parameters - (Colour, probidity, total solids, acidity, alkalinity, hardness, sulphate, fluoride, phosphate, nitrite, itrate, BOD and COD). Vater purification for drinking and industrial purposes. Toxic chemicals in the environment. Detergents - pollution aspects, eutrophication. Pesticides and insecticides - collution aspects. Heavy metal pollution. Solid pollutants - treatment and disposal. Treatment of industrial liquid wastes. Sewage and industrial effluent treatment. | 07 |

Officer-In-Charge
Shaheed Nandkumar Pater
dyalaya, Raigarh (C.G.)

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| NAME OF STREET | | |
|----------------|--|--------|
| | Composition of soil incoming | |
| | Composition of soil - inorganic and organic components in soil - micro and macronutrients. | 1 |
| | | 1/1 |
| | Fertilizers: Classification of fertilizers - Straight Fertilizers, Compound/Complex | |
| | Fertilizers, Fertilizer Mixtures. Manufacture and general properties of fertilizer products - Urea and DAP. | |
| III | | |
| 111 | Carbohydrates: Structure, function and Chemistry of some important mono and | |
| | disaccharides. | 7 |
| | Vitamins: Classification and Nomenclature. Sources, deficiency diseases and | |
| | structures of Vitamin A ₁ , Vitamin B ₁ , Vitamin C, Vitamin D, Vitamin E & Vitamin | |
| | K ₁ . | |
| | Drugs: Classification and nomenclature. | |
| | Structure and function of: Analgesics –aspirin, paracetamol. | 08 |
| | Anthelmentic drug:mebendazole. | |
| | Antiallergic drug: Chloropheneramine maleate. | 8 |
| | Antibiotics: PenicillinV, Chloromycetin, Streptomycin. | 100 |
| | Anti-infalmmatory agent: Oxypheno-butazone. | |
| 1 | Antimalarials: Primazuine phosphate & Chloroquine. | - |
| | Antimalarials: Primazuine phosphate & Chloroquine. Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and | |
| 1 | | |
| | Soaps & Detergents: Structures and methods of use of soaps and detergents. Chemical Thermodynamics: Concept of fugacity and free energy, Activity and | |
| IV | Chemical Thermodynamics: Concept of fugacity and free energy changes. Partial activity coefficient, spontaneity of processes-entropy and free energy changes. Partial activity coefficient, spontaneity of processes-entropy and free energy changes. Partial | ilen. |
| | activity coefficient, spontaneity of processes-entropy and needenergy and needene | |
| 1 | molar quantities, colligative properties, Economics | |
| 1 | Enzyme catalyzed reactions. Principles of Reactivity: Basis kinetic concepts, rates of simple and complex Principles of Reactivity: Basis kinetic concepts, rates of simple and complex | - File |
| | Principles of Reactivity: Basis kinetic concepts, fates of simple and chemical reactions, empirical rate equations. Temperature dependence of rates and chemical reactions, empirical rate equations – explosion limits. Oscillatory | 08 |
| | chemical reactions, empirical rate equations. Temperature dependence of activation parameters. Branched chain reactions – explosion limits. Oscillatory | |
| | activation parameters. Dranched chain research | |
| 1 | reactions. Chemical energy system and limitations, principles and applications of primary & Chemical energy system and limitations, principles and applications of primary & Chemical energy system and limitations, principles and applications of primary & Chemical energy system. | |
| | Chemical energy system and limitations, principles and appropriate secondary batteries and fuel cell. Basics of solar energy, future energy storer. | 4 |
| 1 | secondary batteries and fuel cell. Basics of solar energy, and the aerospace materials. Problems of plastic waste management. Strategies for the | 1 1 1 |
| | development of environment friendly polymers. | - |
| | development of environment friendly polyniers. Air pollution, carbohydrate, vitamins, LeChatteliar's law, Dairy product, artificial sweeteners. | |
| Keywords | fertilizers, Paint, pigment, dyes. | |
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| Ų | my John Wall | 10) |
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| | 1/1/19/2019 | |
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officer-In-Charge (Control of Shaheed Nandkumar Patel Shaheed Nandkumar Patel of Shaheed Nandkumar (C.G.)

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. Many, N. S., & Swamy, S. (1998). Foods: Facts and Principles (4th ed.). New Age
- 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.). FAL
- 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.swayam2.ac.in/nos22_sc23/preview

https://www.researchgate.net/publication/343585969 Chemistry in Everyday Life

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

https://www.slideshare.net/sanjaijosephMancsh/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 Test / Quiz-(2): 10,&10 |
|--------------------|---|
| InternalAssessment | Internal Test / Quiz-(2): 10,&10 Assignment/Seminar +Attendance- 05 total Marks -15 |
| (CIA): | Otal Marks -13 |

Better marks out of thetwo Test / Quiz+obtained marks in Assignment shall be considered against 15 Marks

(By Course Teacher)

End Semester

Exam (ESE):

Two section - A & B

Section A: Q1. Objective -05 x1 = 05 Mark; Q2. Short answer type-5x2 = 10 MarksSection B: Descriptive answer type qts., 1out of 2 from each unit-4x05=20Marks

Name and Signature of Convener & Members of CBoS:

JKligh

Micer-In-Charge (Automobi) shaheed Nandkumar Patel hwavidyalaya, Raigarh (C.G.) riyalaya, Raigarh (C.C.

FOUR YEAR UNDERGRADUATE PROGRAM (2024 - 28) **DEPARTMENT OF CHEMISTRY**

| | | | | E CURRICULUM | | |
|------------------------------|-------|--|---|--|--|----------------------|
| | | -A: Introdu | | | 7.4.202 | 5 |
| Program: Bachelor in Science | | | Science | Semester - | Session: 2024-202 | .5 |
| | | ite / Diploma / De | | II/IV/V/VI | | |
| 1 Course Code CHSEC | | CHSEC | | | | |
| 2 | Cou | rse Title | GREEN CHEMISTRY | | | |
| 3 Course Type SEC | | | | | | |
| 4 | Pre- | -requisite(if, any) | | As per Prog | | |
| 5 | | arse Learning. | | nd execute case study, si | tions. urvey, and projects on Greek | |
| 6 | Cre | dit Value | 2 Credits (1C + 1C) | = 30 Hours Labora | rs -Theoretical learning tory or Field learning/Train Min Passing Marks:20 | ung |
| _ | Total | al Marks | Max.Marks:50 | | Min Passing Warner | |
| 7 | 101 | -B: Content | C | ·c0 | | |
| <u> </u> | IRI | -B: Content | Total No | of Teaching-learning] | Periods: | - |
| | | Theory-15 Per | iods (15 Hrs.) and | Lab. of Fleid-learning | | No. of |
| | odule | | Te | opics (Course conter | its) | Period |
| | | Principles of Green Principles of Green Products; maximus products, Atom E. Prevention/ mir (hazard × exposure). Green solvents liquids, fluorous and how to comparative Trends in | een Chemistry and so of Green Chemon the following: Green Synthesis are incorporation conomy, addition minimization of hazere); waste or pollubiphasic solvent, are greenness of so Green Chemist | using these principles; of the materials used i substitution, and eliminardous/ toxic products tion prevention hierarchids, water as a solvent PEG, solventless procolvents. | Prevention of Waste/ by n the process into the final nation reactions. reducing toxicity, and risk | i is ic its |
| | | green chemistry; | Proliferation of s | olventiess reactions; Or | pic acid, catechol, disodiu | |

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Case study/Project

Case study/Project on Green chemistry, Role of green chemistry in lab safety, and implications of green chemistry.

Green chemistry, Green synthesis, Green solvents, Green reactions, principles of Green chemistry, Hofmann elimination, Diels-Alder reaction, oxidation, and reduction.

Signature of Convener & Members (CBoS):

PART-C:Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended-

- 1. Ahluwalia, V.K. (2013). Green chemistry: A textbook. Alpha Science International.
- 2. Shukla, S., Gulati, S., & Batra, S.K. (2020). A textbook of green chemistry: benign by design Shree kala Prakashan.
- 3. Kumar, V. (2013). An introduction to green chemistry. Vishal publishing Co.
- 4. Lancaster, M. (2020). Green chemistry: an introductory text. Royal society of chemistry.

Reference books Recommended:

- 1. Perosa, A., & Zecchini, F. (2007). Methods and reagents for green chemistry: an introduction
- 2. Clark, J. H., & Macquarrie, D. J. (Eds.). (2008). Handbook of green chemistry and technology.
- 3. Ameta, S. C., & Ameta, R. (Eds.). (2023). Green Chemistry: Fundamentals and Applications. CRC press.
- 4. Anastas, P. T. (Ed.). (2013). Handbook of green chemistry (Vol. 1). Wiley-VCH.

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

- https://www.mygreenlab.org/uploads/2/1/9/4/21945752/gc green chem guidebeyond benign my green lab.pdf
- > https://www.organic-chemistry.org/topics/green-chemistry.shtm
- https://royalsocietypublishing.org/doi/10.1098/rsos.191378
- https://www.gvsu.edu/labsafety/green-chemistry-99.htm

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

50 Marks Maximum Marks:

Continuous Internal Assessment(CIA):15 Marks

35Marks End Semester Exam(ESE):

Internal Test / Quiz-(2): 10 &10 Continuous Internal Assignment/Seminar +Attendance- 05 Assessment(CIA): otal Marks -15 (By Course Coordinator)

Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):

Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on learned skill - 20 Marks

B. Spotting based on tools (written) - 10 Marks

C. Viva-voce (based on principle/technology) - 05 Marks

Managed by Coordinator as per skilling

Name and Signature of Convener & Members of CBoS:

Micer-In-Charge haheed Nandkumar Patel iwavidyalaya, Raigarh (C.G.)

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.) (छत्तीरागढ़ विश्वविद्यालय अधिनियम 1973 द्वारा राष्ट्रापित राजकीय विश्वविद्यालय)



राष्ट्रीय शिक्षा नीति – 2020 के तहत तृतीय एवं चतुर्थ सेमेस्टर नवीन पाठ्यक्रम (सन्न 2025–26)



Department of CHEMISTRY

Course Curriculum

FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)

Program: Bachelor in Science

DISCIPLINE-CHEMISTRY

Session-2024-28

| OSC- 01 to 08 | | DSE-01 to 12 | | DGE-01 to | 06 |
|---------------|--------------------------------------|------------------------|---|-----------------|--------------------------------|
| Code | Title | Code | Title | Code | Title |
| CHSC-01T | Fundamental Chemistry-I | CHSE-01T | Basic Analytical Chemistry | CHGE-01T | Fundamental Chemistry-I |
| CHSC-01P | Chemistry Lab. Course-I | CHSE-01P | Course | CHGE-01P | Chemistry Lab. Course-I |
| CHSC-02T | Fundamental Chemistry-II | CHSE-02T | | CHGE-02T | Fundamental Chemistry-II |
| CHSC-02P | Chemistry Lab. Course-II | CHSE-02P | Environmental Chemistry Lab. Course | CHGE-02P | Chemistry Lab. Course-II |
| CHSC-03T | Chemistry-I | CHSE-03T | Dyes & Polymer Chemistry | | |
| CHSC-03P | Chemistry Lab. Course-III | CHSE-03P | Dyes & Polymer Chemistry Lab. Course | | |
| CHSC-04T | Organic and Physical Chemistry-I | CHSE-04T | Heterocyclic Chemistry | | |
| CHSC-04P | Chemistry Lab. Course-IV, | CHSE-04P | Heterocyclic Chemistry Lab. Course | | |
| CHSC-05T | Organic & Inorganic-I | CHSE-05T | Photochemistry & Pericyclic Reactions | | |
| CHSC-05P | Chemistry Lab. Course-V | CHSE-05P | Photochemistry & Pericyclic Reactions Lab. Course | Alexander 1 | 7 |
| CHSC-06T | Organic and Physical Chemistry-II | CHSE-06T | Spectroscopy-I | | |
| CHSC-06P | Chemistry Lab, Course-VI | CHSE-06P | Spectroscopy-I Lab. Course | 1017 | |
| CHSC-07T | Inorganic & Physical Chemistry-II | CHSE-07T | Chemical Kinetics & Nuclear Chemistry | (B) | |
| CHSC-07P | Chemistry Lab. Course-VII | CHSE-07P | Chemical Kinetics & Nuclear Chemistry Lab. Course | , 20 A | |
| CHSC-08T | Organic & Inorganic-II | CHSE-08T | Electrochemistry & Surface Chemistry | a di di | |
| CHSC-08P | Chemistry Lab. Course-VIII | CHSE-08P | Electrochemistry & Surface Chemistry Lab. Course | | ke a to |
| | | CHSE-09T | Spectroscopy-II | | William In the second |
| | | CHSE-09P | Spectroscopy-II Lab. Course | | 224 |
| | | CHSE-10T | Nanotechnology & Solid State | SEC | |
| | * * | CHSE-10P (VIII SEM) | Nanotechnology & Solid State Lab Course |). | |
| | | CHSE-11T | Medicinal Chemistry & Natural Products | CHSEC- 01T&P | Chemical Analysi Techniques |
| | | CHSE-11P | Medicinal Chemistry & Natural Products Lab. Course | i i kalenda | |
| | | CHSE-12T | Instrumental Methods of Analysis | VAC | |
| | | CHSE-12P | Instrumental Methods of Analysis Lab. Course | CHVAC- 01T | Chemîstry in Dail |

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Officer-In charge (Neadonic)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

Chairman

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FOUR YEAR UNDERGRADUATE PROGRAM(NEP-2020)

Program: Bachelor in Science DISCIPLINE-CHEMISTRY Session-2024-28 PO & PSO

PROGRAMME OUTCOMES (PO)

PO-1: B.Sc. Chemistry curriculum is so designed to provide the students a comprehensive understanding about the fundamentals of chemistry covering all the principles and perspectives.

PO-2: The branches of Chemistry such as Organic Chemistry, Inorganic Chemistry, Physical Chemistry and Analytical Chemistry expose the diversified aspects of chemistry where the students experience a broader outlook of the subject.

PO-3: The syllabi of the B.Sc. Chemistry course are discretely classified to give stepwise advancement of the subject knowledge right through the four years of the term.

PO-4: The practical exercises done in the laboratories impart the students the knowledge about various chemical reagents and reactions. They are also trained about the adverse effects of the obnoxious chemicals and the first aid treatment.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO-1: The students will understand the existence of matter in the universe as solids, liquids, and gases which are composed of molecules, atoms and sub atomic particles.

PSO-2: Students will learn to estimate inorganic salt mixtures and organic compounds both qualitatively and quantitatively using the classical methods of analysis in practical classes.

PSO-3: Students will grasp the mechanisms of different types of reactions both organic and inorganic and will try to predict the products of unknown reactions.

PSO-4: Students will learn to synthesize the chemical compounds by maneuvering the addition Theinh De V. She Alway Square of reagents under optimum reaction conditions

Chairman

idyalaya, Raigarh (C.G.)

Officer-In-Charge (Academic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

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

| 7 | ART-A: Introdu | | | | |
|-------|--|--|--|--|---------------|
| D | ogram: Bachelor in iploma/Degree/Honors) | | Semester - II | I Session: 2024 | -2025 |
| l | Course Code | CHSC-03T | | | 3 |
| ! | Course Title | INO | RGANIC AND PHY | SICAL CHEMISTRY-I | |
| } | Course Type | a e sej na ka | DSC | Alema Color I de Color Color Color | |
| 1 | Pre-requisite(if,any) | | | · Program | |
| | Course Learning. Outcomes(CLO) | their application Master the principle Grasp the core phenomena. | indamental chemical cons. Inciples of coordination Principles of thermod | concepts of transition elem | |
| | Credit Value | 3 Credits | Credit = 15 Ho | ours -learning & Observ | ation |
| | Total Marks | Max.Marks: | 100 | Min Passing Marks:4 | |
| A. | RT -B: Content | of the Cours | se | | |
| | | | | iod) - 45 Periods (45 Ho | urs) |
| Jn | it | · . | ics(Course content | en i tri tu un en e | No. o |
| | Atomic and ionic r | adii, lonization p | otential Variable ovi | | |
| | (ii) Chemistry of configuration of 4d | omplex formation telements of seconand 5d transition | endency and catalytic and and third transic series. Comparative t | dation states, Magnetic activity. ition series: Electronic reatment with their 3d- tion states and magnetic | 12_ |
| | (ii) Chemistry of configuration of 4d analogous (Group Chemistry of Lanth radii, magnetic, and scomplex formation, extraction and ion extraction and ion extraction contains the complex formation of the contains th | elements of second and 5d transition of tran | tendency and catalytic and and third transic series. Comparative to the series of oxidate the series of oxidate the series of th | etivity. Ition series: Electronic reatment with their 3d- tion states and magnetic et, oxidation states, ionic on and its consequences, of lanthanides: solvent chemistry of actinides, and Am from uranium | 12_ |
| | (ii) Chemistry of configuration of 4d analogous (Group Chemistry of Lanth radii, magnetic, and scomplex formation, extraction and ion extraction and ion extraction contains the complex formation of the contains th | elements of secon and 5d transition to trans | tendency and catalytic and and third transister. Comparative to the series. Comparative to the series. Comparative to the series and the series are series are series and the series are series are series and the series are series are series as the series are series are series as the series are series are series as the series are series as the series are series are series as the series are series are series are series are series are series as the series are series are series are series are series as the series are series are series are series as the series are seri | etivity. Ition series: Electronic reatment with their 3d- tion states and magnetic et, oxidation states, ionic on and its consequences, of lanthanides: solvent chemistry of actinides, and Am from uranium | 12_ |
| | (ii) Chemistry of configuration of 4d analogous (Group Chemistry of Lanth radii, magnetic, and secomplex formation, extraction and ion extraction and ion extraction and reduction and reduction and reductions of the configuration and reductions definitions of the configuration and reductions definitions of the configurations of the configuration and reductions definitions of the configuration of the configura | elements of secon and 5d transition of transition occurrence and exchange method. So, chemistry of so, the later actinides a transition (5 hrs) of oxidation and retimer diagram of the oxidation and retired the oxidation and retir | endency and catalytic and and third transis series. Comparative to the series of oxidates: Electronic structures. Lanthanide contraction isolation, Separation General features and exparation of Np, Pu and the later lanthanide eduction, Balancing of Chlorine and Oxygen | etivity. Ition series: Electronic reatment with their 3d- tion states and magnetic et, oxidation states, ionic on and its consequences, of lanthanides: solvent chemistry of actinides, and Am from uranium | 1 <u>1</u> 2_ |
| | (ii) Chemistry of configuration of 4d analogous (Group Chemistry of Lanth radii, magnetic, and scomplex formation, extraction and ion extraction and reduction method, La Nitrogen and Oxygen | elements of secon and 5d transition of trans | endency and catalytic and and third transis series. Comparative to the series of oxidates: Electronic structures. Lanthanide contraction isolation, Separation General features and exparation of Np, Pu and the later lanthanide eduction, Balancing of Chlorine and Oxygen | extivity. Ition series: Electronic reatment with their 3d- tion states and magnetic exting a constant of the | |

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compounds. Types of ligands based on denticity. Werner's Coordination theory and its experimental verification. Sidgwicks 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.

Structural isomerism and B) Isomerism in coordination compounds: Stereoisomerism (Geometrical and optical) in coordination compounds with four and six coordination numbers.

Thermodynamics-I: (5 hrs)

A. Basic concept of thermodynamics: System, surrounding, types of system (closed, open & isolated). Intensive & extensive properties. Thermodynamic processes: isothermal, adiabatic, isobaric, isochoric, cyclic, reversible & irreversible. State function & path functions and their differentiation, concept of heat & work. Zeroth law of thermodynamics, First law of thermodynamics. Definition of internal energy & enthalpy. Concept of heat capacity, heat capacity at constant volume & at constant pressure, and their relationship.

Joule-Thomson experiment, Joule-Thomson coefficient (no derivation) & inversion temperature. Calculations of w, q, E & H for expansion of gases for isothermal &

adiabatic conditions for reversible process.

B. Thermochemistry(2 hrs.)

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 & its applications. Variation of enthalpy change of reaction with temperature (Kirchoff's equation).

C. Thermodynamics II (4 hrs.)

Second law of thermodynamics: Limitations of first law and need for the second law. Statements of second law. Carnot cycle & 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.

D.Third law of thermodynamics (1 hr)

Statement of third law, Nernst heat theorem, Absolute entropy of solids, liquids, and

IV Electrochemistry-1

> 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.

> Single electrode potential, standard electrode potential, electrochemical series and its applications. Concept of overvoltage.

> 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.

> Migration of ions: Transport number-definition and determination by Hittorf method and moving boundary method.

> 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 ΔG , ΔH and ΔS for cell reaction, polarization, Over potential and hydrogen overvoltage.

D & f-block elements, Coordination compounds, Werner's theory, VBT, Isomerism, Thermodynamics,

Thermochemistry, Electrical/electrolytical conductance, Transport number.

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PART-C: **Learning Resources**

Text Books, Reference Books and Others

Text Books Recommended -

- Jauhar, S. P. (2010). Modern Approach to Inorganic Chemistry: A Textbook for B. Sc. I Students. 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

Lee, J. D. (2008). Concise inorganic chemistry. John Wiley & Sons.

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

Physical Chemistry

- Puri, L. B., Sharma, L. R., & Pathania, M. S. (2013). Principles of physical chemistry. Vishal
- 2. Atkins, P. W., De Paula, J., & Keeler, J. (2023). Atkins' physical chemistry. Oxford university
- 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://bvjus.com/jee/electrochemistry/

Online Resources-

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

| ment andEvaluation | |
|---|---|
| Evaluation Methods: | |
| sessment(CIA):30 Marks | |
| 73 | |
| 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 |
| Two section $-A \& B$ Section A: Q1. Objective $-10 \times 1 = 1$ | 10 Mark; Q2. Short answer type- 5x4 =20Marks ats.,1out of 2 from each unit-4x10=40 Marks |
| | Assignment / Seminar - 10 Total Marks - 30 Two section - A & B Section A: O1, Objective - 10 x1=1 |

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 - 28) DEPARTMENT OF CHEMISTRY

| | ART- | | | | | |
|-------------------------|------------------------------|--|---|--|---|----------|
| Pro Dij | ploma . | n: Bachelor in /Degree/Honors | Science | Semester - III | Session: 2024-20 | 025 |
| | Cour | seCode | CHSC-03P | The weet the solid | | |
| 2 | Cour | seTitle | | CHEMISTRY LAB. | COURSE III | |
| 3 | | seType | est och Praess | DSC | COURSE-III | * r defe |
| 4 | Pre- | requisite(if,any) | Kirth Tuesday | | | |
| 5 | Outo | rse Learning. comes(CLO) | > Employ the different ten > Apply Born > Determine s | the principle of determinity other allotropic salts. principle of determination in peratures. Haber cycle to determine of trength of an acid, ionizational of the conductometric of the principle of the conductometric of the principle of the conductometric of the co | of solubility of a given sa enthalpy and lattice energ | It at |
| 6 | | ditValue | 1 Credits | Credit =30 Hours Labor | ratory or Field learning/T | rainin |
| 7 | | lMarks | Max.Marks: | 50 | Min Passing Marks:20 | |
| A | RT- | B: Content | | | | i. 18 |
| | | Total No | o. of learning-Ti | aining/performancePerio | ds:30 Periods (30 Hours) | |
| M | odule | | | Topics(Course content | | No. o |
| | b./Field | m | | | | D |
| Ехр Со | aining/ eriment ntents | /dialometric metl Thermochemist A. Determination | nperature of a sal n of the transition hod (e.g. SrBr ₂ .2 ry on of solubility: | t hydrate – determination on temperature of the given so H ₂ O or MnCl ₂ .4H ₂ O). | f molecular weight. substance by thermometric | |
| Exp Co | aining/ eriment ntents | 1) Transition tem 2) Determination /dialometric metl Thermochemist A. Determination 1) To determinated determine ΔH of B. Calorimetry: 1) To determine | apperature of a sal a of the transition hod (e.g. SrBr ₂ .2 ry on of solubility: the dissolution p the enthalpy of | t hydrate – determination of temperature of the given s H ₂ O or MnCl ₂ .4H ₂ O). of benzoic acid at differencesses. | f molecular weight. substance by thermometric | |
| Ехр Со | aining/ eriment ntents | 1) Transition tem 2) Determination /dialometric metl Thermochemist A. Determination 1) To determine determine ΔH of B. Calorimetry: 1) To determine sodium hydroxid 2) (a) To determine strong base (sod (b) To determine versus strong ac base, 3) To determine lattice energy. Conductometry 1) Conductometry 1) Conductometry 1) Conductometry 1) Conductometry | nperature of a sale of the transition of the transition hod (e.g. SrBr ₂ .2 ry on of solubility: e the solubility: the enthalpy of the enthalpy of the enthalpy of the enthalpy of id (hydrochloric the enthalpy of id (hydrochloric the enthalpy of the enthalpy of id (hydrochloric the enthalpy of the en | t hydrate – determination of temperature of the given s H ₂ O or MnCl ₂ .4H ₂ O). of benzoic acid at differencesses. | f molecular weight. Substance by thermometric rent temperatures and to oric acid (strong acid) by acid (acetic acid) versus onization of weak acid. se (ammonium hydroxide) alpy of ionization of weak chloride and calculate the | 30 |

using standard alkali (NaOH) solution.

- 3) To determine the strength of strong acid and a week acid in the given mixture conductometrically against a standard alkali solution.
- 4) To determine the ionization constant of weak acid conductometrically. Solubility Product
- 1) To determine the solubility and solubility product of a sparingly soluble salt conductometrically.
- 2) Potentiometry Determination of solubility product of a sparingly soluble substance.

Keyword:

Solution, Acid, Alkali. Transition temperature, Thermochemistry, Temperature, Enthalpy, Conductometric titrations, Potentiometric titrations, Solubility product.

Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended -

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

Reference Books recommended:

- 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.

Online Resources-

- > 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://www.ulm.edu/chemistry/courses/manuals/chem1010/experiment 10.pdf

Online Resources-

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

PART -D: Assessment and Evaluation Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks Continuous Internal Assessment(CIA): 15 Marks End Semester Exam(ESE): 35 Marks Internal Test / Quiz-(2): Continuous Internal 10 & 10 Better marks out of the two Test / Quiz Assessment(CIA): Assignment/Seminar +Attendance - 05 +obtained marks in Assignment shall be (By Course Teacher) Total Marks considered against 15 Marks Laboratory / Field Skill Performance: On spot Assessment **End Semester** Managed by G. Performed the Task based on lab. work Exam (ESE): Course teacher - 20 Marks H. Spotting based on tools & technology (written) - 10 Marks as per lab. status Viva-voce (based on principle/technology) - 05 Marks

Name and Signature of Convener & Members of CBoS:

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

| | ART-A: Introdu ogram: Bachelor in | | tions and the second second | I will place in the second | |
|----------|--|--|---|--|---------------|
| (Dip | oloma/Degree/Honors | Science | Semester - IV | Session: 2024-2 | 025 |
| <u>'</u> | Course Code | CHSC-04T | | | |
| 2 | Course Title | OR | GANIC AND PHYSICA | I CHEMICEDY I | all Aller |
| 3 | Course Type | Contay resulting | DSC | L CHEMISTRY-I | |
| 4 | Pre-requisite(if,any) | and the second | | Carlos de Color de Carlos de C Notaciones de Carlos | 9.2 |
| 5 | Course Learning. Outcomes(CLO) | organic chemi representation organic chemi representation of the property of t | inciples of chemical/ionic plications e diagrams for one and tw rees of freedom, and ident nciples and applications o | erstand their significance equilibria, their influence po-component systems, lify the triple point. If liquid-liquid mistures, | e in |
| 6 | Credit Value | 3 Credits | tenry's law, and Nernst di | istribution law. | |
| | Total Marks | Max.Marks: | | -learning & Observation Min Passing Marks:40 | on . |
| I | A. Halides (5 hrs) (i) Alkyl Halides: | Preparation: from | n alkenes and alcohols. | | No.o Perio |
| | Williamson's ether substitution reaction (ii) Aryl Halides: Coreaction. Aromatic reaction. Aromatic reaction. Aromatic reaction (or NaNH ₂ /NH ₃). ReVinyl halides. B. Alcohols & Phen (i)Alcohols (a)Monohydric-nondistinction between reactions. | synthesis), me synthesis), me s (SN1 and SN2), is (SN1 and SN2), is shorteness Presucteophilic substitutes and Relations (7hrs) | chanism and stereochen factors affecting SN1 and Sparation by aromatic halog tution involving Benzyne live strength of C-Halogen s of formation, Properties | & isonitrile formation, nistry of nucleophilic SN2 reactions. genation and Sandmeyer Mechanism: KNH2/NH3 bond in alkyl and aryl/ | |
| | ethylene, epoxide, evicinal glycols: wi Pb(OAc)4 and HIO4 (c) Trihydric alcohol | th carbonyl com and Pinacol-Pinacols: Nomenclature acrolein), chemic | methods of formation of e and ethylene diamine). pounds, dehydration, ox colone rearrangement (with and methods of formation all reactions of glycerol (wi | Chemical reactions of cidative cleavage with mechanism). | 12 |

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Aldehydes/Ketones and acid/its derivatives A. Aldehydes and Ketones (6 hrs) Nomenclature and structure of the carbonyl group, synthesis of aldehydes and ketones. Acidity of alpha hydrogens and formation of enolate, Concept of reactive methylene group, Keto-enol tautomerism in Acetoacetic ester. Oxidation of aldehydes by KMnO4, and Tollen's reagent, Reduction of aldehydes by LiAlH4 and NaBH4. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on aldol, Perkin, and Knoevenagel reactions. Wittig and Mannich reaction (without mechanism), Baeyer-Villiger oxidation of Ketones (without mechanism), Cannizaro reaction (with mechanism), MPV, Clemmensen, and Wolf-Kishner reaction. B. Acid & its derivatives (5 hrs) (i) Carboxylic Acids 11 Nomenclature, structure, physical properties, acidity of carboxylic acids, effect of substituent on acid strength, method of preparation and chemical reaction. Hell-Volhard -Zeilinsky (HVZ) reaction, Reduction of carboxylic acids, Mechanism of decarboxylation. Di carboxylic acids: - Methods of formation and chemical reactions, effect of heat and Dehydrating agents. (ii) Carboxylic Acid Derivatives Structure, method of preparation & physical properties of acid chlorides, esters, amides (Urea) and acid anhydrides. Relative stability of acyl derivatives. Ш Equilibrium A. Chemical equilibria (3 hrs) Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constants and their quantitative dependence on temperature, pressure, and concentration, factors affecting equilibrium - Le Chatelier's principle. B. Ionic Equilibria (5 Hrs) Ionization of acids and bases, Strong and weak electrolytes, degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect and solubility product (with illustrative examples), Salt hydrolysis - calculation of hydrolysis constant and degree of hydrolysis for salt of strong 11 acid and weak base, Buffer solutions - Introduction, Henderson-Hasselbalch equations for acidic and basic buffer. (C). Phase Equilibrium (3 hrs) (A)Gibbs phase (no derivation), phase, component and degree of freedom, Application of phase rule to one component system (water system and Sulphur systems), Reduced phase rule. Application of phase rule to two component systems: Pb-Ag system. Congruent-Ferric chloride system. Photochemistry and liquid-liquid mixtures A) Photochemistry (8 hrs) Interaction of radiation with matter, difference between thermal and photochemical reactions, Laws governing absorption of light, laws of photochemistry, Jablonski diagram depicting various processes, quantum yield, determination of quantum yield of reactions, reasons for low and high quantum yields. Some examples of photochemical reactions (e.g. Photochemical decomposition of Hydrogen iodide, Photosynthesis of HBr from H2 11 and Br2 and photosynthesis of HCI from H2 and Cl2). Photosensitization and Quenching, Photosensitized reactions. B)Liquid-Liquid mixtures(3 hrs) Ideal liquid mixtures, Raoult's law of ideal solutions, Henry's law and its applications, Nernst distribution law, limitations, and applications (association and dissociation - No derivation). Halides (alkyl & aryl halides), Alcohols, Phenols, Aldehydes & Ketones, Carboxylic acids & Keywords their derivatives, Equilibrium (Chemical, Ionic, and Phase equilibria), Photochemistry, Liquidliquid mixtures. Der Ko Shu J

PART-C: **Learning Resources**

Text Books, Reference Books and Others

Text Books Recommended -

- I. Bahl, A. (2010). Advanced organic chemistry. S. Chand publishing.
- 2. Singh, J & Yadav, L. D. S. (2016) Advanced organic chemistry. Pragati Prakashan Meerut.
- 3. Puri, L. B., Sharma, L. R., & Pathania, M. S. (2013). Principles of physical chemistry. Vishal Publishing Co.
- 4. Kapoor, K. L. (2019). A Textbook of Physical Chemistry, Thermodynamics and Chemical Equilibrium (SI Units) - Vol. 2, 6th Edition.

Reference Books recommended-

- 1. Boyd, R. N., & Morrison, R. T. (1983). Organic Chemistry: (uden title). Allyn and Bacon.
- 2. Physical Chemistry
- 3. Atkins, P. W., De Paula, J., & Keeler, J. (2023). Atkins' physical chemistry. Oxford university
- 4. 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://ncert.nic.in/ncerts/l/lech202.pdf
- https://unacademy.com/content/wp-content/uploads/sites/2/2022/10/30.-Aldehydes-Ketones-and-Carboxylic-Acid.pdf
- https://egyankosh.ac.in/bitstream/123456789/68232/3/Unit-3.pdf
- > https://magadhmahilacollege.org/wp
 - content/uploads/2020/04/photochemistry and jablonski diagram M.sc II Sem.pdf

Online Resources-

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

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA):30 Marks

End Semester Exam(ESE): 70 Marks

Continuous Internal Internal Test / Quiz-(2): 20/7-20 Assignment / Seminar - 10 Assessment(CIA): Total Marks -(By Course Teacher) 30

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks

End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective - 10 x1= 10 Mark; Q2. Short answer type- 5x4 = 20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

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

| P | APT At Indust | | E CURRICULUM | | |
|---------------|--|---|--|--|--------------|
| | ART-A: Introd | | | The definition of the second | |
| | rogram: Bachelor i | | Semester - IV | Session: 2024-2 | 025 |
| $\frac{D}{1}$ | iploma / Degree/Hono Course Code | 7 | COLUMN STATES TO STATES | SCSSICII. 2024 2 | 023 |
| 2 | | CHSC-04P | | the second and the second | |
| | Course Title | | CHEMISTRY LAB. | COURSE-IV | |
| 3 | Course Type | 二年。伊州大汉4月 | DSC | The second second | Autoria; |
| 4 | Pre-requisite(if, any |) | As per Pro | ogram | 1974 |
| 5 | Course Learning. Outcomes(CLO) | preparation o > Identify funct > Determine the > Apply the con temperature a | he fundamentals of organic f sodium extract and detectional groups and prepare of the pH of various samples like cepts of phase equilibria to and study concepts of Nernalibrium constant of vario | tion of elements. derivatives. te water/acid/base/soil et o determine critical solut st distribution law and | c. |
| 6 | Credit Value | 1 Credits | Credit =30 Hours Labora | | rainin |
| 7 | Total Marks | Max.Marks:5 | | Min Passing Marks:20 | |
| Α | RT -B: Content | of the Cour | 'se | | n sayani |
| 1 | | | ining/performancePeriod | s:30 Periods (30 Hours) | |
| Mo | odule | | opics (Course contents | NY DECEMBER OF STREET | No. o |
| Cor | a. Test for aliphatents b. Test for saturate. Detection of ed. Identification i) Carboxylic Carbohydrates v e. Determination f. Preparation of pH determination Determination of To measure the pTo determine the To prepare and s Phase Equilibrial) To determine (phenol-water | ation and unsaturation and unsaturation and unsaturational group of functional group cacids ii) Pheno ii) Amines viii) Amines viii) Amines viii) Amines viii) Amines viii) Amines viii) Amines and boi solid derivatives. on f pH of soil, water. When the function of Ka for an and the properties um: the critical solution of systems). | ature of substances. ion. halogens) in organic compos: ols iii) Aldehydes iv) Halogen compoutiling points. ions using pH indicators and unknown acid. of buffer solutions. | Ketones, v) Esters vi) inds d pH meter. lly miscible liquids | 30 |
| | (HOOC-CH ₂ -CH miscible liquids (| [2-COOH] on the | ch as (i) sodium chloride (critical solution temper | NaCl), (ii) succinic acid | THE STATE OF |

3) To construct the phase diagram of two components (e. g. diphenylamine-

1) To determine the partition coefficient of Iodine between water and carbon

2) To determine the partition coefficient of benzoic acid between water and benzene.

benzophenone system) by cooling curve method.

Nernst Distribution Law

tetrachloride/Kerosene.

3) To determine the equilibrium constant of the reaction, $KI + I_2 = KI_3$ by distribution Organic analysis, Aromatic/Aliphatic compounds, Saturated/unsaturated compounds, Element detection, Functional groups, Derivatives for functional groups, pH, Phase equilibria, Nernst distribution law.

Signature of Convener & Members (CBoS):

PART-C: **Learning Resources**

Text Books, Reference Books and Others

Text Books Recommended -

- 1. Sahu, D. P.& Bapat, K. N. (2022) Unified Practical Chemistry, Navbodh Prakashan.
- 2. Yadav, J. B. (2006). Advanced Practical Physical Chemistry. Krishna Prakashan Media.
- 3. Pandey, O. P., Bajpai, D. N., Giri, S. (2010). Practical Chemistry. S. Chand Publisher.

Reference Books Recommended:

- 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.
- 4. Leonard. J, Lygo. B & Procter, G. (2013). Advanced Organic Practical Chemistry, CRC Press.

Online Resources-

- > e-Resources / e-books and e-learning portals
- https://faculty.ksu.edu.sa/sites/default/files/vogel practical organic chemistry 5th edition.pdf
- 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 Ge neral Chemistry for Majors II/1%3A Thermochemistry (Experiment)
- https://www.ulm.edu/chemistrv/courses/manuals/chem1010/experiment 10.pdf
- https://www.masterjeeclasses.com/wp-content/uploads/2019/02/11.Practical-Organic-ChemistryTheory.pdf

Online Resources-

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

| | PART -D: Asses | sment and Evaluation | |
|----|--------------------------------------|---|---|
| 2 | Suggested Continuous | Evaluation Methods: | |
| 1 | Maximum Marks: | 50 Marks | |
| | Continuous Internal A | ssessment(CIA): 15 Marks | |
| | End Semester Exam(E | SE): 35 Marks | |
| | Continuous Internal Assessment(CIA): | Internal Test / Quiz-(2): 10 & 10 | Better marks out of the two Test / Quiz |
| | (By Course Teacher) | Assignment/Seminar +Attendance - 05 Total Marks - 15 | +obtained marks in Assignment shall be |
| | End Semester | Laboratory / Field Skill Performance | considered against 15 Marks |
| | Exam (ESE): | K. Spotting based on tools & technole L. Viva-voce (based on principle/tech | work - 20 Marks Course teacher |
| ٧a | me and Signature of Conve | oner & Members of CDoC. | - US MATES |

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

| | 0.00 m | uction | | | |
|-----|--|--|--|--|-------------------|
| Di | ogram:Bachelor in iploma / Degree/Honor | Science | Semester - III | Session: 2024 | -2025 |
| | Course Code | CHSE-01T | Section of the section of | | 1023 |
| 2 | Course Title | 1 - 5 - 3 - 15 - 17 - 1 - 19 - 19 - 19 - 19 - 19 - 19 | PACIC ANIAT TIME | | |
| 3 | Course Type | | BASIC ANALYTICAL | CHEMISTRY | - N |
| 4 | Pre-requisite(if,any) | Year Mark Live - As a | DSE | The state of the s | e g- 4 |
| 5 | Course Learning Outcomes(CLO) | of chemical read To understan | id the volumetric analysis 4 | and treatment of sames for analysis in diffe | ple. erent typ |
| 6 | Credit Value | 3 Credits | ia ine gravimetric analysis i | technique | |
| 7 | Total Marks | Max.Marks: | Credit = 15 Hours | -learning & Observa | tion |
| PAI | RT -B: Content | of the Cours | 100 N | Ain Passing Marks:40 | |
| | Total No. of Teac | ching looming | se | | |
| Uni | | eming-learning I | Periods(01 Hr. per period) | - 45 Periods (45 Hou | irs) |
| | | To | pics(Course contents) | The state of the s | No. o |
| I | Qualitative and qua | ntitative conset- | C . | A Company of Lands | Period |
| | Additive and propo parameters for data coefficient of variation | Types of errors: rtional. Normal evaluation: Mean | of analysis es, Qualitative and quantitat affecting choice of analytic Systematic and random, A distribution of indetermin a, median, average deviatio | cal method. Errors in Absolute and relative, tate errors. Statistical n, standard deviation | 12 |
| T | Additive and propo parameters for data coefficient of variatic Comparison of data problems. | Types of errors: ortional. Normal evaluation: Mean on, relative stand using F and t- | Country of the country of an analytic | cal method. Errors in Absolute and relative, tate errors. Statistical n, standard deviation | 12 |
| n | chemical analysis. Additive and propoparameters for data coefficient of variation Comparison of data problems. Sampling and sample Criteria for represent Sampling statistics. Methods of sample Hazards in sampling, ashing, acid digestion | Types of errors: ortional. Normal evaluation: Mean on, relative stand using F and t- e treatment stative sample. If cechniques of sample dissolution: | Systematic and random, A distribution of indetermin, median, average deviation and deviation. Accuracy and test, rejection of data using Bulk, gross, incremental ampling of ambient air, was Coning and quartering, rolon methods for elemental a | Absolute and relative, ate errors. Statistical in, standard deviation, diprecision of results. In Q test. Numerical and analysis sample, ter and soil samples. Illing and quartering, nalysis: Dry and malysis of the property | 12 |
| | chemical analysis. Additive and propoparameters for data coefficient of variation Comparison of data problems. Sampling and sample Criteria for represent Sampling statistics. Methods of sample Hazards in sampling, ashing, acid digestion analysis: Macro, semiconstituents of a sample Volumetric analysis | Types of errors: ritional. Normal evaluation: Mean on, relative stand using F and t- e treatment stative sample. If rechniques of san size reduction: Sample dissolution, fusion processe -micro, micro, su le. | Systematic and random, A distribution of indeterminal, median, average deviation and deviation. Accuracy and test, rejection of data using the system of the | Absolute and relative, ate errors. Statistical in, standard deviation, diprecision of results. In Q test. Numerical and analysis sample, ter and soil samples. Illing and quartering, nalysis: Dry and wet it is samples. Types of ajor, minor and trace | 12 |
| Ш | chemical analysis. Additive and propoparameters for data coefficient of variation of data problems. Sampling and sample Criteria for represent Sampling statistics. A Methods of sample Hazards in sampling, ashing, acid digestion analysis: Macro, semiconstituents of a sample Volumetric analysis General principle. Critical secondary standarion ormality, molarity are external indicators. To complexometric titration | Types of errors: ortional. Normal evaluation: Mean on, relative stand using F and t- e treatment stative sample. If fechniques of san size reduction: Sample dissolution, fusion processed micro, micro, substantial for reactions ards. Concepts and various method cheories of indicates. | Systematic and random, A distribution of indeterminal, median, average deviation and deviation. Accuracy and test, rejection of data using the system of the | Absolute and relative, ate errors. Statistical in, standard deviation, diprecision of results. The process of a constant and analysis sample. The and soil samples. Illing and quartering. In alysis: Dry and wet it is samples. Types of a constant and trace samples. Primary standards molecular weight, rations. Internal | 12 |
| III | chemical analysis. Additive and propoparameters for data coefficient of variation of data problems. Sampling and sample Criteria for represent Sampling statistics. A Methods of sample Hazards in sampling. ashing, acid digestion analysis: Macro, semiconstituents of a sample Volumetric analysis General principle. Critical secondary standar normality, molarity are external indicators. The complexometric calculation of the complexometric calculation of the complex of th | Types of errors: ortional. Normal evaluation: Mean on, relative stand using F and t- e treatment stative sample. If fechniques of sal size reduction: Sample dissolution, fusion processed micro, micro, subsections. Concepts and various method in various method in conditions of procedures of indications in various type conditions of procedures of indications in vari | Systematic and random, A distribution of indeterminal, median, average deviation and deviation. Accuracy and test, rejection of data using the system of the | Absolute and relative, ate errors. Statistical in, standard deviation, deprecision of results. The process of a control of the process of t | 11 |

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

Signature of Convener & Members (CBoS):

PART-C:Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. Pandey, O. P., Bajpai, D. N., Giri, S., Shrivastava, B. B. L., & Mishra, A. (2010). Practical chemistry (1st ed.). S. Chand & Company.
- 2. Shrivastava, B. B. L., & Mishra, A. ([Year]). Fundamentals of analytical chemistry.

Reference books Recommended:

- 1. Harris, D. C. (2000). Quantitative chemical analysis W. H. Freeman and Company.
- 2. Mikes, O., & Chalmers, R. A. (2007). Laboratory handbook of chromatographic methods Elsevier.
- 3. Christian, G. D., Dasgupta, P. K., & Snyder, S. (2001). Concepts of instrumental analysis, Oxford University Press.

Online Resources:

- https://edu.rsc.org/resources/analysis
- > https://guides.loc.gov/chemistry-resources/print-materials/analytical
- https://www.classcentral.com/course/swayam-analytical-techniques-13896
- https://www.technic.com/analytical-controls/capabilities/volumetric-analysis
- https://chem.libretexts.org/Ancillary Materials/Laboratory Experiments/Wet Lab Experiments/General Chemistry Labs/Online Chemistry Lab Manual/Chem 11 Experiments/07%3A Gravimetric Analysis (Experiment)

PART-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods:

MaximumMarks: 100 Marks

ContinuousInternal Assessment(CIA):30 Marks

EndSemesterExam(ESE): 70 Marks

Continuous
Internal Assessment
(CIA):

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

(By Course Teacher)

End Semester Two section - A & B

Exam (ESE): Section A: Q1. Objective - 10 x1= 10 Mark; Q2. Short answer type- 5x4

=20Marks

Section B: Descriptive answer type qts., 1 out of 2 from each unit-

4x10=40Marks

Name and Signature of Convener & Members of CBoS:

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

| Program:Bachelor in Science (Diploma / Degree/Honors) Course Code CHSE-01P Course Title BASIC ANALYTICAL CHEMISTRY LAB. COURSE DSE Pre-requisite(if,any) Source Learning. Outcomes(CLO) To demonstrate the volumetric titration. To learn the testing of solubility, pH of soil and water. Coredit Value 1 Credits Total No. of learning-Training/performance Periods:30 Periods (30 Hours) Dab/Field Training/Superiment Contents Course 1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration. 2. Estimation of oxalic acid by titrating it with KMnO4 (potassium permanganate) by volumetric itration. 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4 (potassium permanganate). 4. Estimation of Fed Di ons by titrating it with K₂Cr₂O₂ (podassium dichromate) using an internal indicator. 5. Estimation of Fed Di ons by titrating it with K₂Cr₂O₂ (podassium dichromate) using an internal indicator. 5. Estimation of Fed Orught of enutralization of hydrochloric acid with sodium hydroxide. 8. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 9. Determination of forabonate and bicarbonate. (d) Determination of forabonate and bicarbonate. (d) Determination of carbonate and bicarbonate. | | | A: Introdu | | | | |
|--|---------------|-------------------|--|--|---|--|-----|
| Course Code CHSE-01P | Pr | ogram | :Bachelor in | Science | Somoston III | | |
| Course Title BASIC ANALYTICAL CHEMISTRY LAB. COURSE | $\frac{D}{1}$ | ploma / | Degree/Honors | | Semester-III | Session: 2024-20 | 025 |
| TotalMarks Total No. of learning-Training/performance Periods:30 Periods (30 Hours) Togics (Course Contents of Course Contents of Course Course Course Total No. of learning-Training/Experiments Totalwarks of Course of Course Cour | <u>-</u> | | | CHSE-01P | | TO THE SECTION OF THE PERSON | |
| Pre-requisite(if,any) As per Program To make the student aware of Common analytical method. To demonstrate the volumetric titration. To demonstrate the students about gravimetric analysis. To demonstrate the students about gravimetric analysis. To learn the testing of solubility, pH of soil and water. Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Training TotalMarks Max.Marks:50 Min Passing Marks:20 PART -B: Content of the Course Total No. of learning-Training/performance Periods:30 Periods (30 Hours) Module Topics (Course contents) No. of Period Course 1.=Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration. Estimation of oxalic acid by titrating it with KMnO4 (potassium permanganate) by volumetric titration. Estimation of Fe(II) ions by titrating it with KMnO4 (potassium permanganate) using an internal indicator. Estimation of Fe(II) ions by titrating it with K2Cr2O7 (potassium dichromate) using an internal indicator. Estimation of heat capacity of a calorimeter for different volumes. Determination of ionization of acetic acid. Determination of ionization of acetic acid. Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization. Analysis of soil: (a) Determination of total soluble salts. (b) Determination of carbonate and bicarbonate. | | | | BASIC | ANALYTICAL CHEM | ISTRVI AR COURSE | |
| Pre-requisite(if,any) As per Program | | | | P. Land H. W. D. | | AND LOUISE | |
| Course Learning. Outcomes(CLO) | 4 | Pre-r | equisite(if,any) | | | an. | |
| TotalMarks Max.Marks:50 Min Passing Marks:20 PART -B: Content of the Course Total No. of learning-Training/performance Periods:30 Periods (30 Hours) Module Topics (Course contents) No. of Period Inab./Field Inab./Fi | | Outco | omes(CLO) | > To demonds > To demonds > To learn | the student aware of Connistrate the volumetric titranstrate the students about the testing of solubility, p | amon analytical method. ation. gravimetric analysis. H of soil and water. | |
| PART -B: Content of the Course Total No. of learning-Training/performance Periods:30 Periods (30 Hours) Module Topics (Course contents) 1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration. 2. Estimation of oxalic acid by titrating it with KMnO4 (potassium permanganate) by volumetric titration. 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4 (potassium permanganate). 4. Estimation of Fe(II) ions by titrating it with K2Cr2O7 (potassium dichromate) using an internal indicator. 5. Estimation of Cu(II) ions iodometrically using Na2S2O3 (sodium thiosulfate). 6. Determination of heat capacity of a calorimeter for different volumes. 7. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 8. Determination of ionization of acetic acid. 9. Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization. 10. Analysis of soil: (a) Determination of total soluble salts. (b) Determination of carbonate and bicarbonate. | _ | | | | Credit =30 Hours Labor | | |
| Total No. of learning-Training/performance Periods:30 Periods (30 Hours) Module Topics (Course contents) 1.—Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration. 2. Estimation of oxalic acid by titrating it with KMnO4 (potassium permanganate) by volumetric titration. 3. Estimation of oxalic acid by titrating it with KMnO4 (potassium permanganate). 4. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4 (potassium permanganate). 5. Estimation of Fe(II) ions by titrating it with K2Cr2O7 (potassium dichromate) using an internal indicator. 5. Estimation of Cu(II) ions iodometrically using Na2S2O3 (sodium thiosulfate). 6. Determination of heat capacity of a calorimeter for different volumes. 7. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 8. Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization. 10. Analysis of soil: (a) Determination of total soluble salts. (b) Determination of carbonate and bicarbonate. | | | | | | Min Passing Marks:20 |) |
| Topics (Course contents) No. o Perior | | | | | | | |
| Lab/Field Training/ Experiment Contents Of Course 1.—Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration. 2. Estimation of oxalic acid by titrating it with KMnO4 (potassium permanganate) by volumetric titration. 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4 (potassium permanganate). 4. Estimation of Fe(II) ions by titrating it with K2Cr2O7 (potassium dichromate) using an internal indicator. 5. Estimation of Cu(II) ions iodometrically using Na2S2O3 (sodium thiosulfate). 6. Determination of heat capacity of a calorimeter for different volumes. 7. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 8. Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization. 10. Analysis of soil: (a) Determination of total soluble salts. (c) Determination of carbonate and bicarbonate. | - | | Total No. | of learning-Trai | ning/performance Period | ls:30 Periods (30 Hours) | |
| 1.—Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration. 2. Estimation of oxalic acid by titrating it with KMnO4 (potassium permanganate) by volumetric titration. 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4 (potassium permanganate). 4. Estimation of Fe(II) ions by titrating it with K2Cr2O7 (potassium dichromate) using an internal indicator. 5. Estimation of Cu(II) ions iodometrically using Na2S2O3 (sodium thiosulfate). 6. Determination of heat capacity of a calorimeter for different volumes. 7. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 8. Determination of ionization of acetic acid. 9. Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization. 10. Analysis of soil: (a) Determination of total soluble salts. (b) Determination of carbonate and bicarbonate. | 51 - 5 | | | I i i i i i i i i i i i i i i i i i i | 엄마들은 사람들이 가지 않는 사람들이 가득하는 것이 되었다. 그 그 그 그 없는 사람들이 없다고 있다. | | |
| | Exp Co | eriment ntents | 2. Estimation by volum 3. Estimation (potassium) 4. Estimation using an initial statement of the statement o | n of oxalic acid by etric titration. n of water of crys in permanganate). n of Fe(II) ions by internal indicator. n of Cu(II) ions io ation of heat capacation of enthalpy of solubility of solubilization. of soil: nination of pH of mination of total si | tion. y titrating it with KMnO ₄ (tallization in Mohr's salt by titrating it with K ₂ Cr ₂ O ₇ (by dometrically using Na ₂ S ₂ C city of a calorimeter for di of neutralization of hydroc of acetic acid, of benzoic acid in water a soil. oluble salts. | potassium permanganate) y titrating with KMnO4 potassium dichromate) O3 (sodium thiosulfate). fferent volumes. hloric acid with sodium | 30 |

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PART-C:Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. Chatwal, G. R., & Sharma, A. (2017). Instrumental methods of chemical analysis. Himalaya Publishing House.
- 2. Sharma, L. R. (2021). Practical inorganic chemistry.
- 3. Fernelius, W. G. (2009). Experimental inorganic chemistry (Adapted by R. K. Sharma & G. Panda). New Age International Publishers.
- 4. Yadava, T. F. (2010). A textbook of soil chemistry. Kalyani Publishers.

Reference Books Recommended:

- 1. James, A. M., & Prichard, F. E. (1981). Practical physical chemistry (3rd ed, repr). Longman. Bassett, J., Denney, R. C., Jeffery, G. H., & Mendham, J. (Eds.). (2000). Vogel's textbook of quantitative chemical analysis (6th ed.). Pearson Education India. (Original work by A. I. Vogel)
- 2. Svehla, G. (Ed.). (1978). A textbook of quantitative inorganic analysis (by A. I. Vogel). ELBS Publishers and Distributors.

Online Resources:

- https://swayam.gov.in/explorer_
- > https://in.indeed.com/career-advice/career-development/analytical-skills
- > https://chemcollective.org/labtech

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

MaximumMarks: 50 Marks

ContinuousInternal Assessment(CIA):15 Marks

| EndSemesterExam(E. Continuous | Internal Test / Quiz-(2): 10 &10 | Better marks out of thet | two Test / Quiz |
|-------------------------------|--|--------------------------|---|
| InternalAssessment(| CAssignment/Seminar +Attendance- 0 | +obtained marks in Assi | ignment shall be |
| IA): (By Course Teacher) | otal Marks -15 | considered against | 15 Marks |
| End Semester Exam (ESE): | Laboratory / Field Skill Performan A. Performed the Task based on Marks B. Spotting based on tools& tech | lab. work - 20 | Managed by Course teacher as per lab. status |
| | Marks C. Viva-voce (based on principle | Markwala - N | |

Name and Signature of Convener & Members of CBoS:

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

| PA | RT-A: I | ntroduction | SE CURRICULUM | | |
|------------|---|---|--|--|----------------|
| (D | rogram: Bachelo Piploma /Degree/Hor | rs in Science | Semester-IV | Session: 2024 | 1-2025 |
| 1 | Course Code | CHSE-02T | The second second | | e day |
| | Course Title | EN | VIRONMENTAL CHEM | IISTDV | |
| 3 | Course Type | | DSE | | |
| 4 | Pre-requisite(if, any) | | As per P | rogram | |
| 5 | Course Learning Outcomes(CLO) Credit Value | interactions atmosphere. To delve into challenges o To develop c multifaceted To investigat potential sol | he environment through the between the biosphere, lith pecological principles, bion of thermal and noise pollution to the air pollution, soil compositions for environmental cutions for environmental compositions. | nosphere, hydrosphere, and a geochemical cycles, and a ion. ater management, and th ake center stage. osition, radiation chemist challenges. | nd the e |
| 0 | Credit Value | 03 Credits | Credit = 15 Hours - lear | ning & Observation | |
| 7 | Total Marks | Max.Marks:1 | 00 | Min. PassingMarks:40 | |
| A | | nt of the Cours | | | |
| | Total No.of Te | aching–learning F | Periods(01 Hr. per period) | - 45 Periods (45 Hours) | |
| Mod /Un | | То | pics(Course contents) | | No.of Perio |
| I | Biosphere, Lithos of ecology, clas nitrogen, phospho | sification, types crous, oxygen, hyd | hemistry re and Atmosphere, Ecolo of ecosystems. Biogeoch rogen. Thermal pollution: n. Noise pollution: sources | emical cycles- carbon, sources, harmful effects. | 12 |
| I | Water Origin, physico-criteria of water harvesting, water | quality, Water r | es of water, sources of wa management- water shed ces, consequences and ha tion control. | management, rainwater | 11 |
| 11 | II Air | | | | |
| | inversion and air the stratospheric | pollution episode ozone, greenhous | e, composition of the a s, photochemistry of the a e effect, greenhouse gases rain, photochemical smog | tmosphere, depletion of , remedial measures for | 11 |
| T | inversion and air the stratospheric reversion of greer Soil and radiatio Chemical and mi saline and alkalin properties—Ion e Introduction to | pollution episode ozone, greenhouse house effect, acid n pollution neralogical compore, physical proper xchange capacity, radiation chemist | s, photochemistry of the a | tmosphere, depletion of remedial measures for particulate matter. on of soil, types of soil- y, permeability, chemical per nutrient availability. The pollution, effects of | 11 |

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Signature of Convener & Members (CBoS):

PART-C

Learning Resources: Text books, Reference Books and Others

Textbooks Recommended-

- 1. Dara, S. S. (2002). Environmental chemistry. New Delhi: S Chand & Company Ltd.
- 2. De, A. K. (2003). Environmental chemistry. New Delhi: New Age International.
- 3. Mahajan, (2010). Environmental chemistry. New Delhi: S Chand & Company Ltd.

4. Kudesia, V. P. (1985). Water pollution. Pragati Prakashan.

Reference Books Recommended

- 1. Chiras, D. D. (1994). Environmental science (4th ed.). Jones & Bartlett Learning.
- 2. Bockris, J. O. M. (1977). Environmental chemistry. Academic Press.
- 3. Lodge, J. P. (1994). Methods of air sampling and analysis. Publications, Jaipur.

4. Moore, W., & Moore, J. (2010). Environmental chemistry. CRC Press.

OnlineResources-e-Resources/e-booksande-learningportals

- https://ncert.nic.in/textbook/pdf/kech207.pdf
- https://archive.nptel.ac.in/courses/122/106/122106030/
- https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/
- https://www.ncbi.nlm.nih.gov/books/NBK83730/
- https://ebooks.inflibnet.ac.in/esp16/chapter/waterpollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than% 20saline%20water.
- https://chem.libretexts.org/Bookshelves/General Chemistry/Map%3A Chemistry -The Central Science (Brown et al.)/18%3A Chemistry of the Environment
- https://byjus.com/chemistry/environmental-chemistry/
- https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis

| Part-D: Assessment | | |
|--|--|---|
| Suggested Continuous Maximum Marks: | Evaluation Methods: 100 Marks | |
| Continuous Internal A EndSemester Exam(ES | | |
| Continuous InternalAssessment (CIA): (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 |
| End Semester Exam(ESE): | Two section – A & B Section A: Q1. Objective – 10 x1= 10 M =20Marks Section B: Descriptive answer type qts.,1 Marks. | |

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

| rogran | · A: Introdu | | | * | |
|---|---|--|---|---|--------------------------------------|
| | n: Bachelor in Scienc / Degree/Honors) | e | Semester - IV | Session: 2 | 2024-202 |
| | urse Code | CHSE-02P | | | |
| Co | urse Title | ENVIRO | NMENTAL CHEMIS | TRY LAB. C | OURSE |
| 3 Co | urse Type | Then In 18 Sec. | DSE | | |
| 4 Pr | e-requisite (if, any) | 1 A | The company of the | Markey Arthur | |
| | ourse Learning utcomes (CLO) | acidity alkali To get experi To understar To have an e soil and Colo | e basic idea on technolity ence with the calculate ad the basics of soil and experience on the deter orimetric estimation of e with interpretation o | ons of BOD analysis viz. pH, (mination of he iron and mang | id COD Conductivit cavy metals |
| 6 C | redit Value | 01Credit | Credit =30 Hou Field learning/I | ers Laboratory | or |
| 7 T | otal Marks | Max.Marks:5 | 0 M | in. Passing Ma | rks:20 |
| PART-B | | | | | |
| AKI-D. | Total No. of learning-T | raining/performa | nce Periods: 30 Peri | ods (30 Hours |) |
| Module | and a sheet of the | The second secon | irse contents) | Salar State State | No. of Period |
| Experiment Contents of Course. | c. Temporary d. Sulphate | , Permanent and to and COD s ed in water and wa | tal hardness | | |

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Determination of macro and micro nutrients in soil.

Sampling of water- tap water, well water, overhead storage tank water pond water and lake water.

Physicochemical and organoleptic characteristics of the above water samples.

Statistical evaluation of the data obtained for optimization of results.

Determination of Total solids, Total dissolved solids and total suspended solids and its significance.

Determination of noise pollution in a particular area with noise dosimeter.

Study of particulate matter.

Study of atmospheric chemistry.

Air Monitoring

Gas detection.

Keywords Sampling, Water, soil, N/P/K, pH, Conductivity, acidity & alkalinity, Heavy metals.

Signature of Convener & Members (CBoS):

PART-C

Learning Resources: Text Books, Reference Books andOthers

Textbooks Recommended-

1. Dara, S. S., & Asole, B. G. (2017). Environmental chemistry: Practical approach (2nd ed.). New Age International (India) Publishers.

2. Trivedi, R. K., Goyal, P., & Trisal, B. S. (2018). Manual of water and wastewater analysis (2nd

ed.). ABD Publishers & Distributors.

3. Sehgal, H. S. (2010). A textbook of soil chemical analysis (2nd ed.). Kalyani

Reference Books Recommended-

- 1. Vogel, A. I. (1955). A text-book of quantitative inorganic analysis: theory and practice. Longmans,
- 2. Green and Company.
- 3. Sandell, E. B. (1945). Colorimetric determination of traces of metals (Vol. 59, No. 6, p. 481). LWW.
- 4. Boubel, R. W., Vallero, D., Fox, D. L., Turner, B., & Stern, A. C. (2013). Fundamentals of air
- 5. pollution. Elsevier.
- 6. Clesceri, L. S. (1998). Standard methods for examination of water and wastewater. American public
- 7. health association, 9.
- 8. Rump, H. H. (1999). Laboratory manual for the examination of water, waste water and soil (No. Ed. 3). Wiley-VCH Verlag GmbH.

OnlineResources- e-Resources/e-booksande-learningportals

- https://ncert.nic.in/textbook/pdf/kech207.pdf
- https://archive.nptel.ac.in/courses/122/106/122106030/
- https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/
- https://www.ncbi.nlm.nih.gov/books/NBK83730/
- https://ebooks.inflibnet.ac.in/esp16/chapter/waterpollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than% 20saline%20water.
- https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry -The Central Science (Brown et al.)/18%3A Chemistry of the Environment
- https://byjus.com/chemistry/environmental-chemistry/
- https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis
- https://www.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analysergains-qall-ceftification-for-so2/60799.

| PART -D: Assess | sment and Evaluation | |
|---|---|--|
| Suggested Continuous | Evaluation Methods: | |
| Maximum Marks: | 50 Morles | |
| Continuous Internal As | Ssessment (CIA). 15 Marks | |
| End Semester Exam (E | SE): 35 Marks | |
| 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 Exan (ESE): | Laboratory / Field Skill Performanc D. Performed the Task based on la Marks E. Spotting based on tools & techn Marks F. Viva-voce (based on principle/t Marks | ab. work - 20 Course teacher as per lab. status |

Name and Signature of Convener and Members of CBoS

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

| | | uction | 4 - 1 - 7 - 20 - 300 Mg - 1 - 1 - 1 | | |
|-------|--|--|--|---|--|
| Ce | ogram:Bachelor i ertificate / Diploma / J | n Science Degree/Honors) | Semester-I/III/V | Session: 2024-20 | 025 |
| l | Course Code | CHVAC | | | |
| 2 | Course Title | | Chemistry in D | aily Life | |
| 3 | Course Type | Valu | ue Added Course(VAC) | | |
| 4 | Pre-requisite(if,any |) | As per Progr | am | ************************************** |
| 5 | Course Learning Outcomes(CLO) | artificial swee ➤ To make awa composition of ➤ To introduce | eteners, flavors, food color re the students about air p of soil, fertilizers etc. the students about carboli | roduct,beverages,food add rants, paints, pigments, dy pollution, hydrological cyc ydrate, vitamins,drugs. Thermodynamics used in | ves etc. cle, |
| 6 | Credit Value | 2 Credits | Credit = 15 Hour | s -learning & Observati | on |
| 7 | Total Marks | Max.Marks:50 | | Min Passing Marks:20 | |
| 7 | ART -B: Conten | | | | an Silve |
| | TotalNo.of Te | aching-learning P | eriods(01 Hr. per period |) - 30 Periods (30 Hours | 5) |
| U | Init | | pics(Course contents | 그 없는 그 이 사람이 되어 그렇게 그렇게 가입하게 되었다. | No. o |
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| | Food additives, propionates, sorb Artificial sweeters: Vanilling food colorants: Opesticide residues Paints & Pigment yellow and green Emulsion, latex; Solvents and thin Dyes: Colour and applying dyes to and methyl orang | adulterants and co ates, disulphites. ners: spartame, sac a, alkyl esters (fruit oal tar dyes and nor in food. ats: White pigments pigments. Paints ar uminescent paints. ners for paints. constitution (electro the fabrics. A general | of methyl alcohol in alcohol in the internation of methyl alcohol in alcohol in the internation of the inter | ratives like benzoates, and sodium cyclamate. an glutamate. Artificial etallic salts. Analysis of one, TiO ₂). Blue, red, ant of a good paint. anamels, lacquers. on of dyes. Methods of | 08 |

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need Andkumar Patel Midyalaya, Raigarh (C.G. 1017/2

| disaccharides. Vitamins: Classification and Nomenclature.Sources, deficiency diseases and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E & Vitamin K1. Drugs: Classification and nomenclature. Structure and function of: Analgesics—aspirin, paracetamol. Anthelmentic drug: mebendazole. Antiallergic drug: Chloropheneramine maleate. Antibiotics: PenicillinV, Chloromycetin, Streptomycin. Anti-infalmmatory agent: Oxypheno-butazone. Antimalarials: Primazuine phosphate & Chloroquine. Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like aregemone oil and mineral oils. Soaps & Detergents: Structures and methods of use of soaps and detergents. IV Chemical Thermodynamics: 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. Principles of Reactivity: 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. Chemical energy system 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. Air pollution, carbohydrate, vitamins, LeChatteliar's law, Dairy product, artificial sweeteners. | T _e rson | Composition of soil | |
|---|---------------------|---|-------|
| Fertilizers, Fertilizer Mixtures. Manufacture and general properties of fertilizer products - Urea and DAP. Carbohydrates: Structure, function and Chemistry of some important mono and disaccharides. Vitamins: Classification and Nomenclature. Sources, deficiency diseases and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E & Vitamin K1. Drugs: Classification and nomenclature. Structure and function of: Analgesics—aspirin, paracetamol. Anthelmentic drug: Chloropheneramine maleate. Antibiotics: Penicillin V, Chloromycetin, Streptomycin. Anti-infalmatory agent: Oxypheno-butazone. Antimalarials: Primazuine phosphate & Chloroquine. Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like aregemone oil and mineral oils. Soaps & Detergents: Structures and methods of use of soaps and detergents. Chemical Thermodynamics: Concept of fugacity and free energy, Activity and activity coefficient, spontaneity of processes-entropy and free energy changes. Partial molar quantities, colligative properties, Le-Chatclier principle, phase equilibrium. Enzyme catalyzed reactions. Principles of Reactivity: 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. Chemical energy system 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. Air pollution, carbohydrate, vitamins, LeChatteliar's law, Dairy product, artificial sweeteners. | | macronutrients in soil - micro and organic components in soil - micro and | |
| Carbohydrates: Structure, function and Chemistry of some important mono and disaccharides. Vitamins: Classification and Nomenclature.Sources, deficiency diseases and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E & Vitamin K1. Drugs: Classification and nomenclature. Structure and function of: Analgesics - aspirin, paracetamol. Anthelmentic drug: mcbendazole. Antibiotics: Penicilliny, Chloropheneramine maleate. Antibiotics: Penicilliny, Chloromycetin, Streptomycin. Anti-infalmmatory agent: Oxypheno-butazone. Antimalarials: Primazuine phosphate & Chloroquine. Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like aregemone oil and mineral oils. Soaps & Detergents: Structures and methods of use of soaps and detergents. IV Chemical Thermodynamics: 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. Principles of Reactivity: 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. Chemical energy system 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. Air pollution, carbohydrate, vitamins, LeChatteliar's law, Dairy product, artificial sweeteners. | | Fertilizers: Classification | |
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| Antiallergic drug: Chloropheneramine maleate. Antibiotics: PenicillinV, Chloromycetin, Streptomycin. Anti-infalmmatory agent: Oxypheno-butazone. Antimalarials: Primazuine phosphate & Chloroquine. Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like aregemone oil and mineral oils. Soaps & Detergents: Structures and methods of use of soaps and detergents. IV Chemical Thermodynamics: 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. Principles of Reactivity: 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. Chemical energy system 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. Air pollution, carbohydrate, vitamins, LeChatteliar's law, Dairy product, artificial sweeteners. | | Annetmentic drug:mebendazole. | 08 |
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Chairman of Studies 1 need Nandkumar Patel adyalaya, Raigarh (C.G.

Officer-In-Charge (Academic)
Shaheed Nandkumar Patel
Shaheed Nandkumar (C.G.)

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. Many, N. S., & Swamy, S. (1998). Foods: Facts and Principles (4th ed.). New Age
- 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.swayam2.ac.in/nos22 sc23/preview

https://www.rescarchgate.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

Internal Test / Quiz-(2): 10, £10 InternalAssessment | Assignment/Seminar + Attendance- 05

otal Marks -15

Better marks out of thetwo Test / Quiz+obtained marks in Assignment shall be considered against 15 Marks

(CIA): (By Course Teacher)

End Semester Exam (ESE):

Two section - A & B

Section A: Q1. Objective - 05 x1= 05 Mark; Q2. Short answer type- 5x2 =10Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x05=20Marks

Name and Signature of Convener & Members of CBoS:

ifficer-in-Charge (Academic)

Shaheed Nandkumar Patel ahwavidyalaya, Raigarh (C.G.) ieed Nandkumar Patel idyalaya, Raigarh (C.G

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

| P | ART. | A: Introdu | ction | | | |
|---|---|--|---|--|--|--------|
| Pr | ogran | : Bachelor in | Science Semester - Session: 2024-20 | | 5 | |
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| 5 | Pre-requisite(if, auy) As per Program Solution of twelve principles of chemistry. Understand and application of twelve principles of chemistry. Understand and application of twelve principles of chemistry. Design green solvents and green reactions. To interpret and execute case study, survey, and projects on Green To interpret and execute case study, survey, and projects on Green | | | | | |
| · | | | Chemistry. 2 Credits Credit = 15 Hours – Theoretical learning and (1C + 1C) = 30 Hours Laboratory or Field learning/Training Min Passing Marks: 20 | | | |
| 6 | Cred | lit Value | (1C + 1C) | = 30 Hours Labora | Min Passing Marks:20 | , va d |
| 7 | Tota | l Marks | Max.Marks:50 | | Will I document | 77 |
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| | | Di Gontona | Total No | of Teaching-learning | raining 30Periods (30 Hours) | |
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| development. Lab./Field Training Contents Oreen Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis). Microwave assisted reactions in water: Hofmann elimination, methyl benzoate to benzoic acid, oxidation of toluene and alcohols; microwave assisted reactions in organic solvents Diels-Alder reaction and Decarboxylation reaction. Right fit pigment: synthetic azo pigments to replace toxic organic and inorganic pigments. An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn. | | | | | | |

Shaheed Nandkumar Patel Shaheed Nandkumar Nandku

1017/2

Case study/Project

Case study/Project on Green chemistry, Role of green chemistry in lab safety, and implications of green chemistry.

Keywords

Green chemistry, Green synthesis, Green solvents, Green reactions, principles of Green chemistry, Hofmann elimination, Diels-Alder reaction, oxidation, and reduction.

Signature of Convener & Members (CBoS):

PART-C:Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended-

1. Ahluwalia, V.K. (2013). Green chemistry: A textbook. Alpha Science International.

2. Shukla, S., Gulati, S., & Batra, S.K. (2020). A textbook of green chemistry: benign by design. Shree kala Prakashan.

3. Kumar, V. (2013). An introduction to green chemistry. Vishal publishing Co.

4. Lancaster, M. (2020). Green chemistry: an introductory text. Royal society of chemistry.

Reference books Recommended:

1. Perosa, A., & Zecchini, F. (2007). Methods and reagents for green chemistry: an introduction. John Wiley & Sons.

2. Clark, J. H., & Macquarrie, D. J. (Eds.). (2008). Handbook of green chemistry and technology. John Wiley & Sons.

3. Ameta, S. C., & Ameta, R. (Eds.). (2023). Green Chemistry: Fundamentals and Applications. CRC press.

4. Anastas, P. T. (Ed.). (2013). Handbook of green chemistry (Vol. 1). Wiley-VCH.

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

- https://www.mygreenlab.org/uploads/2/1/9/4/21945752/gc green chem guidebeyond benign my green lab.pdf
- https://www.organic-chemistry.org/topics/green-chemistry.shtm
- https://royalsocietypublishing.org/doi/10.1098/rsos.191378
- https://www.gvsu.edu/labsafety/green-chemistry-99.htm

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):

Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance- 05

Better marks out of the two Test / Quiz +obtained marks in Assignment shall be

(By Course Coordinator) | otal Marks -15 **End Semester**

Exam (ESE):

Laboratory / Field Skill Performance: On spot Assessment

considered against 15 Marks

A. Performed the Task based on learned skill - 20 Marks B. Spotting based on tools (written)

-10 Marks C. Viva-voce (based on principle/technology) - 05 Marks

Managed by Coordinator as per skilling

Name and Signature of Convener & Members of CBoS:

Officer-In-Charge (Academic) Shaheed Nandkumar Patel Ashwavidyalaya, Raigarh (C.G.) Chairman

eed Norkumar Patel

idyalaya, Rajgarh (C.G