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 chobonding, 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 | ours) |
| 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.)

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| | 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.)

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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 the enough that may be used wherever that may be used where the enough that may be used that may be used to be | 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. Solutio | 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 serious of ethane, C-C π-BONDIN methods (dehyd teff rules, cis and e radical addition roboration, ozono-additions, Diels-in (dehydrohalogen) | , 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 figure of the state of the | |
| | 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 | n in | |
|--------------------|-------------------------------------|--|--|---|--|------------------|
| | | | 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:

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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-σ- 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:

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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 structure 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 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 | | | |
|--|----|---|--|
| 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 | ICULUM | . 47 | |
|--------------------|--------------------------------------|---|---|--|---|--|------------------|
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| | 1 | im: Bachelor i Pate / Diploma / Do Pate 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 | ograni | | |
| 5 | Cor Our | irse Learning. teomes (CLO) | > Studying the > Determining distillation an | ng and using of ts functional gr melting poin ud sublimation ith essential si | common glas oup analysis ts to assess contechniques | sware for accurate organic compounds ompound purity and emp to establish boiling poin uring liquid surface tens | ts |
| 6 | Cre | dit Value | 1 Credits | | 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 ourse | 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 | nposition cuncter, Determine 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 | tion | | |
|--|---|--|--|---|
| Suggested Continuous Maximum Marks: Continuous Internal A End Semester Exam (I Continuous Internal | Evaluation Methods: 50 Mar ssessment (CIA): 15 Mar ESE): 35 Mar | ks ks ks 10 & 10 nce - 05 | Better marks out of the to to tained 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 bas E. Spotting based on tools F. Viva-voce (based on pri | rformance: sed on lab. v & technolog | gy (written) – 10 Marks | Managed by Course teacher as per lab. status |
| ame and Signature of Conve | | a 0 | note Squit | 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-ALLING | 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 1 | Daily Life | |
| 3 | Course Type | Valu | ie Added Course(VAC) | C. | |
| 4 | Pre-requisite(if,any) | | As ner Pros | ranı | 0. |
| 5 | Course Learning Outcomes(CLO) | artificial swee ➤ To make awar composition of ➤ To introduce of day life. | teners, flavors, jood coll re the students about air if soil, fertilizers etc. The students about carbo students about concept o | product, beverages, food according to paints, paints, pigments, pigments, pollution, hydrological children with the product of | vcle, a day to |
| 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 | Toj | pics(Course contents | s) | Period |
| 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, | - 1/3 - 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
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dyalaya, Raigarh (C.G.)

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| NAME OF STREET | | |
|----------------|--|---------|
| | Composition of soil incomi | |
| | 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. | |
| | 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 | i de la |
| | activity coefficient, spontaneity of processes-entropy and needenergy and needene | |
| | molar quantities, colligative properties, Le-Ghateries | |
| 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 | - F1 1v |
| | 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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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:

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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 | | | 1 202 | 15 |
| Program: Bachelor in | | n: Bachelor in | Science | Semester - | Session: 2024-202 | 25 |
| | | te / Diploma / De | | II/IV/V/VI | | |
| 1 | Cour | rse Code | CHSEC | | | |
| 2 | Cou | rse Title | | GREEN CHE | MISTRY | |
| 3 | Con | rse Type | | SEC | | |
| 4 | Pre- | requisite(if, any) | | As per Prog | | |
| As per Frogram | | | | | |
| 6 | Cre | dit Value | 2 Credits (1C + 1C) | = 30 Hours Labora | rs -Theoretical tearming/Train tory or Field learning/Train Min Passing Marks:20 | ning |
| _ | Tot | al Marks | Max.Marks:50 | | Min Passing Warne | |
| 7 | 101 | -B: Content | 241 00000 | · C O | | 7.3 |
| <u> </u> | KI | -B: Content | Total No | of Teaching-learning | Periods: | |
| | | Theory-15 Per | iods (15 Hrs.) and | Lab. of Fleid learning | | No. of Period |
| M | odule | | Te | opics (Course conte | nts) | Period |
| | | Principles of Gre Twelve principles special emphasis of Designing a Corollers, Maximu products, Atom Energy Prevention/ min (hazard × exposur) Green solvents- liquids, fluorous and how to comparature Trends in | sen Chemistry and so of Green Chemistry and so of Green Chemistry and the following: Green Synthesis are incorporation conomy, addition a supercritical flushiphasic solvent, are greenness of so Green Chemist | d Designing a Chemical mistry with their explains using these principles; of the materials used in substitution, and eliminardous/ toxic products tion prevention hierarchids, water as a solvent PEG, solventless products. | Prevention of Waste/ by in the process into the final nation reactions. reducing toxicity, and risk | y 15 ic ts |
| Tra | ./Field ining itents | Green Syniminodiace Microwav to benzoic in organic Right fit propigments. | etate (alternative to assisted reaction acid, oxidation of solvents Diels-Afgment: synthetic | to Strecker synthesis). Ons in water: Hofmann If toluene and alcohols; Ider reaction and Decad azo pigments to replace | elimination, methyl benzo microwave assisted reaction boxylation reaction. ce toxic organic and inorgation widely applicable pla | ate ons nic |
| | | | acid) made from | | O. | |

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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.)