**DINABANDHU MAHAVIDYALAYA**

**COURSE OUTCOME (NEP SEM 1, SEM 2, SEM 3, SEM 4)**

 **DEPARTMENT OF CHEMISTRY (Hons)**

**B.Sc. Program Outcome:**

After completion of the B.Sc. Degree program, the students will be able to

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| **PO No.** | **Program Outcome** | **Cognitive Level** |
| PO 1 | Recognize the scientific concepts and tempers that can be advantageous for society, as scientific advancements have the potential to foster rapid growth within nations or communities. | R |
| PO 2 | Understand scientific knowledge and engage in sharing dialogues with fellow stakeholders; raise awareness about the ethical and sustainable use of resources. | U |
| PO 3 | Comprehend and implement environmental considerations and sustainable development as fundamental interdisciplinary priorities. | U, Ap |
| PO 4 | Develop the capability to conduct experiments, analyze, and interpret precise outcomes, thereby acquiring problem-solving skills and engaging in critical, autonomous, and innovative thought processes. | An, E, C |
| PO 5 | Acquire proficiency to apply and generate innovative ideas, granting a competitive edge for pursuing advanced studies either domestically or internationally, as well as for securing positions in academia, research, or industry. | Ap, E |
| PO 6 | Utilize the comprehensive understanding of applied subjects to cultivate professional and employable skills, enabling students to build careers and venture into entrepreneurship across various domains. | C |

R= remembering, U = understanding, Ap = applying, An = analysing, E = evaluating, and C = creating

**B.Sc. Program Specific Outcome:**

After completion of the B.Sc. Degree program, the students will be able to

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| **PSO No.** | **Program Specific Outcome** | **Cognitive Level** |
|  **PS01** | Students will have clear understanding about the importance of sustainable development by identifying green chemical reaction routes and reduce the use of waste as well as toxic chemicals.  | R,U |
| **PS02** | Students pursuing this course will inculcate spirit of originality and novelty necessary for scientific research and hence adopt scientific method of analyzing problems in an innovative way. | An |
| **PS03** | The course will give good opportunity to students for getting jobs not only in academics field but also in industries as they will be acquiring knowledge about characterizing and analyzing chemical compounds.  | An |
| **PS04** | Students will confidently handle modern instruments, evaluate data, and follow safety protocols while handling toxic, explosive chemicals, will show proficiency as team player and also make development outside the scientific community. | E |
| **PS05** | Develop skills required to apply in Glass industry, Cement Industry, Polymer Industry, use potentiometer, conductometer, pH meter, being trained about the adverse effect of corrosive chemicals. | Ap, C |
| **PSO6** | The well-being of future generations being a priority, the students are expected to adhere by methods which can create a pollution-free planet by adopting environmental friendly approach in all frontiers of life. | C |

R= remembering, U = understanding, Ap = applying, An = analysing, E = evaluating, and C = creating

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| **SEMESTER -I** |
| **Course name** | **Major**  |
| **Course Code** | **CEMDSC101T and CEMDSC101P** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | Learn about Atomic Structure by implementing on various principles and limitations. | **Ap** | **PO3** | **PSO5** |
| CO-2 | Discuss about basics of Organic Chemistry like resonance, hyperconjugation, reaction intermediates, etc | **U** | **PO2,PO3** | **PSO1** |
| CO-3 | Correlate general properties of s and p block elements based on their electronic configuration. | **An** | **PO4** | **PSO2,PSO3** |
| CO-4 | Acquire in depth knowledge about kinetics prioritizing the concept of Collision number, mean free path, Maxwell's distribution of speeds. | **E** | **PO5** | **PSO4** |
| CO-5 | Develop idea about preparation of standard solutions, measure boiling point of liquids and identify pure organic compound. | **R,C** | **PO1,PO6** | **PSO1,PSO6** |

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| **SEMESTER -II** |
| **Course name** | **MAJOR** |
| **Course Code** | **CEMDSC202T and CEMDSC202P** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | Provide insight into Acid-base reactions by implementing on HSAB principle, solubility product, common ion effect, etc | **Ap** | **PO3** | **PSO5** |
| CO-2 | Able to discuss elements of symmetry, stereoisomerism and conformation. | **U** | **PO2** | **PSO1** |
| CO-3 | Develop idea about catalysis and different theories of Chemical Kinetics by recalling order of reactions. | **R, C** | **PO1,PO6** | **PSO1,PSO6** |
| CO-4 | Get an exposure about analyzing solid organic compounds. | **An** | **PO4** | **PSO2, PSO3** |
| CO-5 | Evaluate rate constant by studying kinetics of acid-catalyzed hydrolysis of methyl acetate. | **E** | **PO5** | **PSO4** |

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| **SEMESTER -I** |
| **Course name** | **SKILL ENHANCEMENT COURSE****Basic Analytical Chemistry** |
| **Course Code** | **SE-1** |
| **Credits** | **3** |
| **Marks** | **50** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | Understand the importance of accuracy and precision in analytical measurements and comprehend some spectrophotometric identification. | **U** | **PO2** | **PS01** |
| CO-2 | Apply the principles of ion-exchange chromatography to determine ion exchange capacity, learn the basics of paper and Thin Layer Chromatography. | **Ap** | **PO3** | **PS05** |
| CO-3 | Analyze the composition of soil and water samples, chromatographic separations and ion-exchange processes. | **An** | **PO4** | **PS02, PS03** |
| CO-4 | Develop methods for the identification of adulterants in food products and constituents in cosmetics and assess the impact of contaminants on water quality. | **E,C** | **PO5, PO6** | **PS04, PS06** |

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| **SEMESTER -II** |
| **Course name** | **SKILL ENHANCEMENT COURSE 2****Analytical Clinical Biochemistry** |
| **Course Code** | **SE-2** |
| **Credits** | **3** |
| **Marks** | **50** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | **Recall the structure and functions of nucleic acids, including DNA and RNA, and their roles in genetic processes.** | **R** | **PO1** | **PS01** |
| CO-2 | **Apply knowledge of enzyme inhibition to understand its mechanisms and implications** | **U, Ap** | **PO3, PO5** | **PS05** |
| CO-3 | **Analyze the properties and functions of lipoproteins and steroid hormones, biochemical basis of diseases and their diagnostic approaches** | **An** | **PO4** | **PS02, PS03** |
| CO-4 | **Evaluate the significance of blood coagulation and design strategies for the preservation and analysis of blood and urine samples** | **E,C** | **PO5, PO6** | **PS04, PS06** |

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| **SEMESTER -III** |
| **Course name** | **MAJOR** |
| **Course Code** | **CEMDSC303T and CEMDSC303P** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | **Have clear ideas on Chemical periodicity and distinguish between various redox reactions** | **An** | **PO4** | **PSO2, PSO3** |
| CO-2 | **Gain in-depth knowledge about mechanism of various elimination and substitution reactions by memorizing reactivity pattern** | **R** | **PO1** | **PS01** |
| CO-3 | **Master concept of laws of thermodynamics and implement on isothermal and adiabatic conditions as well as Carnot cycle.** | **Ap** | **PO4** | **PSO5** |
| CO-4 | **Estimation of concentration of Inorganic compounds and devise separation technique of solid organic components from a binary mixture** | **U,C** | **PO2, PO6** | **PSO6** |
| CO-5 | **Evaluate heat of neutralization and heat of solution.** |  **E** |  **PO5** | **PSO4** |

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| **SEMESTER -IV** |
| **Course name** | **MAJOR** |
| **Course Code** | **CEMDSC404T and CEMDSC404P (INORGANIC CHEMISTRY 1)** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | **Acquire in-depth knowledge about radioactivity assessing various Nuclear models and Nuclear reactions** | **E** | **PO5** | **PSO4** |
| CO-2 | **Explain Ionic bond and weak chemical forces.** | **An** | **PO4** | **PSO2, PSO3** |
| CO-3 | **Learn about VSEPR theory and implement on Fajan’s Rule and Bent’s Rule.** | **Ap** | **PO3** | **PSO5** |
| CO-4 | **Construct Molecular Orbital Theory and gather essential knowledge about metallic bond.** | **C** |  **PO6** | **PS06** |
| CO-5 | **Master concept of Gravimetry estimation of Nickel, chloride and sulphate.** |  **U** |  **PO2** | **PSO1** |

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| **SEMESTER -IV** |
| **Course name** | **MAJOR** |
| **Course Code** | **CEMDSC405T and CEMDSC405P (ORGANIC CHEMISTRY 1)** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | **Predict chirality arising out of stereo-axis and learn configurational descriptors.** | **E** | **PO5** | **PSO4** |
| CO-2 | **Explain concept of prostereoisomerism, racemization and** **aromatic Substitution Reactions**  | **An** | **PO4** | **PSO2, PSO3** |
| CO-3 | **Understand synthesis, general properties of alkanes, alkenes, alkynes, Alcohols, Ethers, Carboxylic acids and implement on related reactions.** | **U, Ap** | **PO2, PO3** | **PSO1, PSO5** |
| CO-4 | **Detect special elements and functional groups in solid organic compounds, outline preparation of crystalline derivatives and identify compounds through literature survey.** | **R** | **PO1** | **PSO1** |
| CO-5 | **Devise methods for preparation of organic compounds following green methodology** |  **C** |  **PO6** | **PSO6** |

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| **SEMESTER -IV** |
| **Course name** | **MAJOR** |
| **Course Code** | **CEMDSC406T and CEMDSC406P (PHYSICAL CHEMISTRY 1)** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | **Outline concept of different Thermodynamic relations, understanding partial properties and chemical potential.** | **R, U** | **PO1, PO2** | **PS01** |
| CO-2 | **Get an exposure towards understanding Equilibrium constant, Le Chatelier Principle and apply on Activity and Activity Coefficient.** | **Ap** | **PO3** | **PS05** |
| CO-3 | **Accumulate knowledge on theory of radiation, de Broglie hypothesis, hence evaluate Schrödinger time-independent equation**  | **E** | **PO5** | **PS04** |
| CO-4 | **Become familiar with viscosity coefficient, Poiseuille’s equation, and develop concept of Conductance and Transport Number.** | **C** |  **PO6** | **PS06** |
| CO-5 | **Focus on the concept of conductometric titrations, Ostwald dilution law and solubility product through practical work.** |  **An** |  **PO4** | **PS02, PS03** |

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| **SEMESTER -IV** |
| **Course name** | **MAJOR** |
| **Course Code** | **CEMDSC407T and TUTORIAL** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | **Interpret NMR, IR, UV, and rotational spectra to determine structural and molecular characteristics such as bond lengths, functional groups, and electronic transitions.** | **Ap** | **PO3** | **PSO5** |
| CO-2 | **Analyze the factors influencing spectral characteristics (e.g., shielding/deshielding, solvent effects, conjugation) and correlate spectral data with molecular structures.** | **An** | **PO4** | **PSO2, PSO3** |
| CO-3 | **Evaluate the role of selection rules, isotopic effects, anharmonicity, and mutual exclusion in rotational, vibrational, and Raman spectra for various molecules.** | **E** | **PO5** | **PSO4** |
| CO-4 | **Design and conduct structure elucidation using a combination of spectroscopic methods to identify unknown compounds and assess their chemical environment.** | **C** |  **PO6** | **PSO6** |

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| **Course name** | **MULTIDISCIPLINARY COURSE** |
| **Course Code** | **CEMDSC406T and CEMDSC406P (PHYSICAL CHEMISTRY 1)** |
| **Credits** | **5** |
| **Marks** | **100** |

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| **After completion of these course students should be able to** |
|  |  | Bloom Taxonomy | PO addressed | PSO addressed |
| CO-1 | Learn about basic concepts and important topics related to Chemistry. | An | PO4 | PSO2 |
| CO-2 | Able to discuss about different atomic theories. | An | PO4 | PSO2 |
| CO-3 | Retrieve the concept of heat, work, internal energy and statement of first law of thermodynamics, enthalpy etc. | R | PO1 | PSO1 |
| CO-4 | Understand thermodynamic conditions for equilibrium and monitor shifting of equilibrium due to change in external parameters. | U, E | PO2, PO3 | PSO1, PSO4 |
| CO-5 | Understand different concepts of acid and bases, nutralization reation, tritations etc. | U | PO3 | PSO6 |