PANCHAKOT MAHAVIDYALAYA
ISO - 9001:2015, ISO - 14001:2015
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Course Outcome (CO) of Chemistry

3-year Undergraduate Programme Degree Course

(Under CBCS)

Course Type	Semester	Course Code	Course Title	Credit	Course Outcomes
CC-1	1	BCEMCCRC101	Organic Chemistry-I	6	CO1: Understand the concept of hybridization, resonance, hyperconjugation, inductive effect, bond dissociation energy and idea gain on Baeyer's strain theory and dipole moments. CO2: Gain the knowledge on concept of HOMO, LUMO and SOMO, Hückel's rules for aromaticity and concept of antiaromaticity and homoaromaticity, non-aromatic molecules, Frost diagram. CO3: To learn about addition, elimination and substitution reactions and elementary idea gain on electrophiles, nucleophiles, carbocations (carbenium and carbonium ions), carbanions, carbon radicals, carbenes. CO4: To know about Fischer, sawhorse, flying-wedge and Newman projection formulae, symmetry elements and point groups, centre of chirality, asymmetric and dissymmetric molecules, enantiomers and diastereomers, relative and absolute configuration, E/ Z- isomerisms Practical: CO5: Knowledge gains how to separate Benzoic acid/p-Toluidine, p-Nitrobenzoic acid/p- Aminobenzoic acid, p-Nitrotolune/p-Anisidine, etc. and how to calculate boiling point of ethyl methyl ketone, cyclohexanone, acetylacetone, anisole, etc. CO6: To learn how to identify of tartaric acid, citric acid, formic acid, acetic acid, methyl alcohol, etc.
CC-2	2	BCEMCCRC201	Inorganic Chemistry-I	6	CO1: Gather an in-depth knowledge about atomic structure, Bohr's theory, Sommerfeld's Theory, de Broglie equation, Heisenberg's Uncertainty Principle, Schrödinger's wave equation, Pauli's Exclusion Principle, Hund's rules and study on radial and angular wave functions and shapes of s, p, d and f orbital. CO2: Understand the periodic properties of the elements, effective nuclear charge, Slater's rules, ionization potential, electron affinity, electronegativity and to learn group trends and periodic trends of s-, p- and d-block elements. CO3: Concept gain on acid-base concept, Arrhenius concept, Bronsted-Lowry's concept, Lux-Flood concept, Lewis concept, HSAB principle, pH, buffer, indicator. CO4: To learn about the Nernst equation, redox titration, redox indicators, Latimer and Frost diagrams, disproportionation and comproportionation reactions, solubility product, common ion effect. Practical: CO5: Knowledge gain how to do acid and base titrations and oxidation-reduction titration.

CC-3	3	BCEMCCRC301	Physical Chemistry – I	6	CO1: To learn about the basic concept of kinetic theory of gases, collision number and mean free path, Maxwell's distribution of speed and energy, kinetic energy distribution and concept gain on the calculations of average, root mean square and most probable values, real gas and virial equation, van der Waals equation and its features, intermolecular forces. CO2: Understand the 1st law of Thermodynamics, concept of heat, work, internal energy, calculations of q, w, U and H for reversible, irreversible. Knowledge on isothermal and adiabatic conditions, Joule's experiment, Thermochemistry, Laws of thermochemistry, Kirchhoff's equations. CO3: Idea on rate laws, rate equations of different types of reactions, determine rate constant values, order of reactions, effect of temperature and other factors on reaction rate, homogenous catalysis, catalytic effect on reaction rate, equations related to chemical catalysis. Practical: CO4: Knowledge gain how to calculate the heat of neutralization, study of kinetics, heat of solution, kinetics of decomposition.
CC-4	4	BCEMCCRC401	Inorganic Chemistry-III	6	CO1: Knowledge gain on Metallurgy, Ellingham diagrams, purification of metals, Electrolytic Kroll process, Parting process, van Arkel-de Boer process and Mond's process, Zone refining. CO2: To study of preparation and basic properties boric acid and borates, boron nitrides, borohydrides (diborane) and graphitic compounds, silanes, oxides and oxoacids of nitrogen, phosphorus, sulphur, chlorine, peroxo acids of sulphur, sulphur-nitrogen compounds, interhalogen compounds, polyhalide ions, pseudohalogens, fluorocarbons and of halogens. CO3: Idea gain on preparation and properties of XeF2, XeF4 and XeF6, nature of bonding in noble gas compounds, xenon-oxygen compounds and molecular shapes of noble gas compounds. CO4: Knowledge gain on types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicone, siloxanes, borazines, silicates and phosphazenes. Concept gain on Werner's theory of coordination complexes, classification of ligands, ambidentate ligands, chelates, coordination numbers, isomerism, constitutional and stereo isomerism, geometrical and optical isomerism. Practical: CO5: Knowledge gain on complexometric titration of Zn(II),Cu(II), Ca(II) and Mg(II). CO6: Learn to preparations of Inorganic compounds.
DSE-1	5	BCEMDSRC1	Inorganic Materials of Industrial Importance	6	CO1: Helps to understand about the manufacture, properties, compositions, classes and applications of industrially important materials such as ceramics, glasses, cements, fertilizers, surface coating materials and batteries. CO2: To know about alloys, manufacture of steel, composition and properties of different types of steels. CO3: To learn about the general principles, properties, classification, industrial use, deactivation and regeneration of catalysis. CO4: Helps to understand about the preparation and explosive properties of organic and inorganic explosives. Practical:

					CO5: Learn to estimate free acidity, Calcium, phosphoric acid from fertilizer. To learn how to analysis of (Cu, Ni); (Cu, Zn) in alloy, how to analysis of Cement and preparation of pigment (zinc oxide).
DSE-1	5	BCEMDSRC2	Instrumental Methods of Chemical Analysis	6	CO1: To learn theory and application of NMR, Infrared spectroscopy, UV-Visible/ Near IR, Mass spectroscopy, Chromatography. Practical: CO2: Knowledge gain on instrumental techniques from UV/Vis spec, IR Absorption Spectra, Gas Chromatography, HPLC, Cyclic Voltametry, Nuclear Magnetic Resonance.
DSE-2	6	BCEMDSRC3	Green Chemistry	6	CO1: To learn about green chemistry and its necessity. CO2: To study about the principles of green chemistry and designing the green synthetic routes. CO3: To know about the examples of green reactions and future trends in green reaction. Practical: CO4: Knowledge gain how to use safer starting materials and how to get alternative green solvents, and alternative sources of energy. CO5: To learn what is therenewable resources and how enzymes use as a catalyst and how avoiding the waste.
DSE-2	6	BCEMDSRT4	Polymer Chemistry	6	CO1: To gain knowledge about the history, classification and functionality of polymeric materials. CO2: To know about the kinetics of polymerization, details on crystallization and morphology of crystalline polymers, determination of crystalline melting point of a crystalline material and the factors effecting crystalline melting point. CO3: To understand the nature and structure of polymers, determination of molecular weight of polymers and thermodynamics of polymer solution. CO4: To study the preparation, structure, properties and application of different types of addition and condensation polymers. CO5: To know how to prepare polymers by using free radical polymerization, redox polymerization, interfacial polymerization, precipitation polymerization, addition polymerization and condensation polymerization process. Practical: CO6: Knowledge gain how to prepare, characterize and analyze the polymer molecules.