

Bharati Vidyapeeth's
Dr. Patangrao Kadam Mahavidyalaya, Sangli
Department of Chemistry

Program Outcomes:

- PO-1:- Student will gain fundamental knowledge of chemistry which will help the for PG studies and Research
- PO-2:- Student will be able to know good laboratory practices and lab safety.
- PO-3:- To make the learner proficient in analyzing the various observations and chemical phenomena presented to him during the course.
- PO-4:- Students will be able to apply the fundamental knowledge to address the cross-cutting issues such as sustainable development
- PO-5:- Students will be able to solve various problems by identifying the essential parts of a problem, formulate strategy for solving the problem, applying appropriate techniques to arrive at a solution, test the precision and accuracy of the solution and interpret the results.
- PO-6:- Students will be able to communicate effectively i.e. being able to articulate, comprehend and write effective reports, make effective presentations and documentation and capable of expressing the subject through technical writing as well as through oral presentation.

Program Specific Outcomes:

- PSO-1:- Students will be able to explain fundamental concepts of inorganic, physical, organic, industrial and analytical chemistry.
- PSO-2. Identify chemical formulae and solve numerical problems.
- PSO-3. Students can use modern chemical tools, Models, Charts and Equipments.
- PSO-4. Students will be able to prepare and qualify for competitive examinations
- PSO-5. Students will understand good laboratory practices and safety.
- PSO-6. Students will develop research oriented skills.

Course Outcomes

Course Outcomes B. Sc. I (NEP-2020) Semester I	
Course	Outcomes
DSC-3A Paper I (Inorganic Chemistry)	After completion of these courses, students should be able to, CO-1: To learn and understand introductory inorganic chemistry. To understand size, shape and electron distribution in shells and sub- shells of an atom. CO-2: To learn different types of bonds and nature of bonding in inorganic compounds. Calculations of different energies associated with ionic bonding. CO-3: Knowledge of nature of bonding, geometry, stability, and magnetic characters of covalent compounds by applying VBT. CO-4: Understanding of role of acids and bases in chemistry. The study is useful in all chemical areas. CO-4: To learn and understand the properties and uses of the compounds of p-block elements.
DSE-4A Paper II, (Organic Chemistry)	CO-1: To understand the fundamentals and basic principles involved in organic chemistry CO-2: To know the spatial arrangement of atoms of organic molecule and types of stereoisomers. CO-3: To learn general properties and fundamental reactions of aromatic compounds. CO-4: To understand the basic knowledge, method of preparation and reactions of heterocyclic compounds namely Pyrrole and Pyridine.

Course Outcomes B. Sc. I (NEP-2020) Semester II	
Course DSC-3B: Paper -III (Physical Chemistry)	Outcomes After completion of these courses, students should be able to, CO-1: To understand basic concepts and rules of logarithms, graphs, derivative and integrations. CO-2: To gain Knowledge and coherent understanding of basic concepts in thermodynamics CO-3: To understand basic concepts in kinetics and first order, second order reactions with characteristics and suitable examples. CO-4: To know the terms such as surface tension, viscosity and refractive index with suitable examples. CO-5: To learn of basic concepts in electrochemistry, conductors and conductivity cells, measurement of conductance with suitable examples and numerical problems.
DSC-4B: Paper-IV, (Analytical Chemistry)	CO-1: To learn various analytical procedures, sampling, accuracy and precision CO-2: To know difference between classical and industrial chemistry, concentration terms and IPR CO-3: To know terms involved in chromatographic separation techniques CO-4: To understand various type of titrations, neutralization curves, indicators used in various titrations CO-5: To know about the chemical nature and cleansing action of soap
Course Outcomes B. Sc. I (Chemistry Practical)	
Course Laboratory practical	Outcomes After completion of these courses, students should be able to, CO-1: To learn preparation of standard solution. CO-2 : To determine percentage purity of the given sample. CO-3 : To learn separation and identification of different cations by Paper Chromatographic technique. CO-4: Organic estimations such as acetone, Vitamin-C and ester. CO-5: Identification of organic compounds including acids, bases, phenols and neutrals. CO-6: Estimation of Aniline, Acetamide, Aspirin Tablet

	CO-7 : To learn kinetics of reaction. CO-8 : To determine viscosity of given liquids CO-9: To determine the equivalent weight of Magnesium.
Course Outcomes B. Sc. II (Chemistry) Semester-III	
Course DSC-3C: Paper V (Physical Chemistry)	Outcomes After completion of these courses, students should be able to, CO-1: Understand the concept of conductivity and transport number of the aqueous solutions with different applications. CO-2: Gain knowledge of basic concepts in thermodynamics and concept of Entropy CO-3: Learn and understand third order reaction and methods for determination of order of reactions and numerical problems. CO-4: Study the behavior of gases, ideal gas as model system and its extension to real gases. CO-5: Study the concepts such as adsorption phenomenon, dynamic nature of surface and its applications.
DSC-4C: Paper VI (Analytical Chemistry)	CO-1: Study the basic concepts in gravimetric analysis CO-2: Learn the different water analysis techniques CO-3: Understand basic principle of corrosion and electroplating. CO-4 : Study the column and ion exchange chromatography CO-5: Understand of working of petroleum industries, biofuels, copyrights and trademarks
Course Outcomes B. Sc. II (Chemistry) Semester-IV	
Course DSC-D3- Paper No. VII (Inorganic Chemistry)	Outcomes After completion of these courses, students should be able to, CO-1: Understand the basic concepts of coordination chemistry. CO-2: Study the concept of chelate formation.. CO-3: Understand the properties of elements of 3d series. CO-4: Know the properties of 4f elements. CO-5: Learn the basic knowledge about inorganic semi-micro analysis.
DSC- D4 - Paper No. VIII (Organic Chemistry)	CO-1: Learn about the synthesis, reactivity and applications of carboxylic acids.

	<p>CO-2: Study about classification, preparation and applications of amines and diazonium salts.</p> <p>CO-3: Understand the classification, configuration and structure of carbohydrates.</p> <p>CO-4: Understand the nomenclature and reactivity of aldehydes and ketones.</p> <p>CO-5: Study the basic knowledge conformational analysis of organic compound.</p>
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Course Outcomes B. Sc. II (Chemistry Practical)

Course	Outcomes
Laboratory practical	<p>After completion of these courses, students should be able to,</p> <p>CO-1: Identification of organic compounds including acids, bases, phenols and neutrals.</p> <p>CO-2: Preparation of organic compounds and their purification.</p> <p>CO-3: Organic estimations such as acetone, Vitamin-C and ester.</p> <p>CO-4: Separation, identification and determination of R_f values using TLC.</p> <p>CO-5: Understand the gravimetric analysis of Fe and Ba.</p> <p>CO-6: Preparation of inorganic complexes.</p> <p>CO-7: Able to find out the unknown concentration by performing titration.</p> <p>CO-8: Understand semimicro analysis.</p> <p>CO-9: Study the chemical kinetics of hydrolysis of ester.</p> <p>CO-10: Illustrate the experiment of instrumental methods such as conductometry, refractometry, polarimetry etc.</p> <p>CO-11: Able to measure viscosities of different liquids.</p>

Course Outcomes B.Sc. III (Chemistry)**Semester-V**

Course	Outcomes
Paper No. IX (Inorganic Chemistry)	After completion of these courses, students should be able to, CO-1: Study the theoretical concepts of hard and soft acids and bases. CO-2: Understand the metal ligand bonding in transition metal complexes. CO-3: Study basic concepts and classification of inorganic polymers. CO-4: Study classification of conductors, insulators and semiconductor CO-5: Study synthesis and structures of organometallic compounds.
Paper No. X (Organic Chemistry)	CO-1: Study the basic concept of spectroscopy. CO-2: Understand factors affecting UV-absorption spectra. CO-3: Understand factors affecting on vibrational frequency. CO-4: Interpret IR-spectra on basic values of IR-frequencies. CO-5: Learn basic principle of NMR spectroscopy, chemical shift, shielding and deshielding. CO-5: Study instrumentation of mass spectrometry, and fragmentation pattern. CO-7: Solve the combined problem of UV, IR, and NMR.
Paper No. XI (Physical Chemistry)	CO-1: Learn and understand quantum Chemistry, Heisenberg's uncertainty principle, concept of energy operators (Hamiltonian), learning of Schrodinger wave equation. Physical interpretation of the ψ and ψ^2 . Particle in a one dimensional box CO-2: Gain Knowledge about spectroscopy, Electromagnetic spectrum, Energy level diagram, Study of rotational spectra of diatomic molecules: Rigid rotor model, Microwave oven, vibrational spectra of diatomic molecules, simple Harmonic oscillator model, Raman spectra: Concept of polarizability, pure rotational and pure Vibrational Raman spectra of diatomic molecules, related knowledge will be gained by the students. CO-3: Learn and understand photochemical laws, reactions and various photochemical phenomena.

	<p>CO-4: Learn the various types of solutions, vapour pressure, temperature relations.</p> <p>CO5: Learn and understand the knowledge of emf measurements, types of electrodes, different types of cells, various applications of emf measurements.</p>
Paper No. XII (Analytical Chemistry)	<p>CO-1: Understand the basic concepts of Gravimetric Analysis and learns different types of precipitations.</p> <p>CO-2: Understand the flame photometry and its applications and limitations.</p> <p>CO-3: Understand the theory of colorimetry, applications of colorimetry and spectrophotometry</p> <p>CO-4: Understand the different types of electrodes, titrations and their applications</p> <p>CO-5: Understand the different types of chromatographic techniques and their applications</p>
<p>Course Outcomes B.Sc. (Chemistry) Semester-VI</p>	
<p>Course</p> <p>Paper No. XIII (Inorganic Chemistry)</p>	<p>Outcomes</p> <p>After completion of these courses, students should be able to,</p> <p>CO-1: Understand the thermodynamic and kinetic aspects of metal complexes.</p> <p>CO-2: Study the nuclear reactions and role of radio isotopes.</p> <p>CO-3: Understand properties and classification of lanthanides and actinides.</p> <p>CO-4: Study techniques involved in extraction of iron from its ore.</p> <p>CO-5: Understand role of metals and non-metals in our health.</p>
Paper No. XIV (Organic Chemistry)	<p>CO-1: Study the various Name reaction and reagents with examples.</p> <p>CO-2: Learn mechanism of rearrangement reaction.</p> <p>CO-3: Understand basic terms used in retrosynthetic analysis.</p> <p>CO-5: Solve electrophilic and nucleophilic addition reaction problems</p> <p>CO-5: Study analytical and synthetic evidences of natural products such as citral and nicotine.</p>

	CO-7: Learn different types of drugs and their synthesis and uses.
Paper No. XV (Physical Chemistry)	CO-1: Learn and understand phase rule, Learn and understand One component, Two component and Three component systems phase diagrams with suitable examples. CO-2: Gain Knowledge about basic concept of Thermodynamics, free energy, Gibbs-Helmholtz equation and its applications, Able to solve problem related with it. CO-3: Understand basic concept of solid state chemistry, learn basic terms, Laws of crystallography, learn crystal structure analysis using X-rays CO-4: Understand kinetics of Simultaneous reactions such as i)opposing reaction ii)side reaction iii)consecutive reactions: iv) chain reaction v) explosive reaction CO-5: Learn and understand the knowledge of distribution law, its modifications, applications of distribution laws, process of extraction, determination of solubility, distribution indicators, and molecular weights.
Paper No. XVI (Industrial Chemistry)	CO-1: Understand the methods of manufacturing of sugar CO-2: Understand the mechanism of manufacture of industrial heavy chemicals. CO-3: Understand the different types of polymers and their applications CO-4: Understand the different types of hydrocarbons and application of petrochemicals. CO-5: Understand the different methods for nonmaterial preparations and their applications.
Course Outcomes B.Sc.III (Chemistry Practical)	
Course Laboratory practical	Outcomes After completion of these courses, students should be able to, CO-1: Understand the gravimetric estimation such as Fe, Ba, Ni. CO-2: Study different types of inorganic preparations. CO-3: Understand titration and percentage purity of different types of solutions CO-4: Separation of binary mixture and identification of individual compound.

	<p>CO-5: Preparation of organic compounds and their purification.</p> <p>CO-6: Preparation of organic derivatives.</p> <p>CO-7: Organic estimation</p> <p>CO-8: Understand the kinetic reactions and their mechanisms, energy of activation, partial molar volume.</p> <p>CO-9: Understand different instruments such as pH Meter, potentiometer, refractometer etc.</p>
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