

BACHELOR OF
SCIENCE
(NON-MEDICAL)

COURSE OUTCOMES

SEMESTER I

CH-101 Inorganic Chemistry

- CO1: To familiarise the concept of atomic structure and properties of periodic table.
- CO2: To develop the knowledge about the chemistry of Ionic structure of various solids.
- CO3: To develop basic concept about covalent bond.
- CO4: Enable students to understand basic concept of chemical bonds, shapes and structures of molecules.

CH-102 Physical Chemistry

- CO1: To understand the general characteristics of different states of matter.
- CO2: To impart Knowledge to the students about the liquefaction of gases and applications of liquid crystal.
- CO3: Familiarise students with various laws and concepts of Physical Chemistry.
- CO4: To study classification of solids and laws of crystallography.

CH-103 Organic Chemistry

- CO1: To study the basic methods of structure formation as well as bond formation.
- CO2: To improve their concept related to symmetry of compounds.
- CO3: To gain knowledge about nomenclature, reaction mechanism and chemical properties.
- CO4: To study chemical and physical properties of Alkanes and Cycloalkanes.

PH-101 : Mechanics

- CO1: To Understand Newton's Laws of motion and various conservation laws.
- CO2: To demonstrate knowledge of selected topics from classical mechanics and be able to apply this knowledge to analyse a broad range of physical phenomenon.
- CO3: To demonstrate proficiency in mathematics and mathematical concept needed for understanding of classical physics .
- CO4: Understand Lagrangian and Hamiltonian formulation and solve the problems using Lagrangian and Hamiltonian formulation.

PH-102 Electricity and Magnetism

- CO1: To calculate mathematical tools like gradient, curl, divergence to solved problems related with scalar and vector quantities .
- CO2: To solve problems related with scalar and vector quantities .
- CO3: To determine electric field and magnetic field, electric flux, magnetic flux.
- CO4: To explain properties of magnetic substance.

12BSM 111 Algebra

- CO1: Study the concept of matrix and rank of matrix, finding the eigen values and eigen

vectors.

CO2: Solve the system of homogeneous and non-homogeneous linear of 'm' equations in 'n' variables by using the concept of matrix.

CO3: Apply factor theorem, remainder theorem to solve problems on polynomials.

CO4: To understand how to find the roots of cubic and bi-quadratic equations by Cardon's method, Descartes and Ferrari method.

12BSM 112 Calculus

CO1: Find the higher order derivatives of the product of two functions.

CO2: Expand a function using Talyor's and Maclaurin's series

CO3: Conceive the concept of Asymptotes and obtain their equation

CO4: Conceive the concept of Curvature i.e. how to test Concavity and Convexity

12BSM 113 Solid Geometry

CO1: Solve the problems of lines in two and three dimensions, general equation of conic in second degree and tracing of conics.

CO2: Study of spheres, cones, cylinder and conicoid.

CO3: Learn how geometry is related to algebra by using algebraic equations.

CO4: Learn the concept of generating lines and confocal conicoid.

English (Chronicles of Time)

CO1: To enable students to appreciate the beauty rhyme and style of poem

CO2: To develop the imagination and aesthetic sense of the students

CO3: To develop knowledge of linguistic conventions for reading, writing and spoken language English.

CO4: To develop an understanding of variety of poetic forms and poetic devices.

Environmental Studies

CO1: Environmental studies, concepts and methods from ecological and physical science and their environmental problems solving.

CO2: Environmental studies majorly prepares students for career as leaders in understanding and addressing complex environmental issues from a problem oriented.

CO3: Students will have an understanding of primary environmental problems invasive species, climate change, small populations, water pollution and the science behind those problems and potential solutions.

CO4: Students will learn the science behind environmental problems and potential solutions.

SEMESTER II

CH-201 Inorganic Chemistry

CO1: To understand the qualitative idea of various types of bonds.

CO2: To get knowledge of various concepts of classifications of s & p-block elements.

CO3: To study chemical and physical properties of elements of s & p-block elements.

CO4: To study applications of their oxy-acids & oxides of elements in various fields.

CH-202 Physical Chemistry

CO1: To study rate, factors, order of reaction and different theories related to it.

CO2: To study electrolytic conduction, factors affecting it, transport number, Kohlrausch's law and its applications

CO3: To study Buffer and their properties.

CO4: To study Ostwald's Dilution Law, Arrhenius theory of ionization & concept of pH & pKa.

CH-203 Organic Chemistry

CO1: To construct the conceptual ideas of basic rules of aromaticity.

CO2: To study the chemical & physical properties of alkenes.

CO3: To study nomenclature, classification and reaction mechanisms of dienes and alkynes.

CO4: To study mechanism & stereochemistry of various reactions of alkyl and aryl halides.

PH-201 Properties of Matters, Kinetic Theory and Relativity

CO1: To understand mechanical properties of matter.

CO2: To discuss bending of beam and obtain results for cantilever.

CO3: To study kinetic theory of Gases and to study and verify Maxwell Relations and applications.

CO4: To understand Galilean and Lorentz transformation.

PH-202 Electro-Magnetic Induction and Electronic Devices

CO1: It tells electric field generation whenever magnetic flux is changed.

CO2: It gives relation between voltage and current.

CO3: It explains concept of semiconductor diode and operation of transistors, and usage as amplifiers and oscillators.

CO4: Theory of electronics explain concepts of semiconductor diodes, describe structure.

12BSM 121 Number Theory and Trigonometry

CO1: Solve various problems on properties of integers and use of basic concepts of divisibility and their application in basic algebra.

CO2: Apply Euclid's algorithm and backward substitution.

CO3: To understand the definition of congruence's, residue classes and least residue.

CO4: Solve problems on Inverse Trigonometric functions and Hyperbolic functions.

12BSM 122 Ordinary differential Equation

CO1: A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognise basic geometrical figures and graphical, displays, state important facts resulting from their studies.

CO2: Distinguish between linear, non- linear partial ordinary differential equations.

CO3: Recognise and solve homogeneous differential equations, exact differential equations, linear differential equations by using integrated factors.

CO4: Identify ordinary and singular points.

12BSM 123 Vector Calculus

CO1: Compute scalar and vector product of three and four vectors, reciprocal of vectors.

CO2: Differentiate of scalar point functions and vector point functions. Find out derivatives along a curve and directional derivatives.

CO3: Determine Gradient of a scalar point function, Divergence and Curl of a vector point functions, Laplacian Operator and learn their properties .

CO4: Compute gradient, Divergence, Curl and Laplacian operator in terms of orthogonal curvilinear coordinates.

CO5: Evaluate line integrals, surface integrals and volume integrals. Analyse the fundamental theorems of vector calculus: gauss, green and stroke's. do problems based on them.

English (Ideas a glow)

CO1: To develop intellectual, personal and communicative skills for understanding of essays

CO2: To provide ample practice in writing section such as formal & informal letters, precis writing etc.

CO3: To convey the original tone and intent of a message through translating passages from

English to Hindi.

CO4: To develop student's insight and favourable attitude towards English language.

SEMESTER III

CH-301 Inorganic Chemistry

CO1: To understand the general characteristics of d & f- block elements.

CO2: To gain knowledge of different theories to explain the bonding in co-ordination compounds.

CO3: To study Non-Aqueous solvents in details.

CO4: To study chemistry of compounds of transition elements.

CH-302 Physical Chemistry

CO1: To study the thermodynamic terms , properties, process and mathematical relations.

CO2: To study Nernst distribution law.

CO3: To study Le-chatelier principle.

CO4: To study Clausius- Clapeyron equation and their applications.

CH-303 Organic Chemistry

CO1: To familiarise with the mechanism involved in alcohols & epoxides.

CO2: To study various name reactions of phenols.

CO3: To study the chemical & physical properties of Carboxylic acids and their derivatives.

CO4: To develop knowledge about UV absorption spectroscopy.

PH-301 Computer Programming and Thermodynamics

CO1: It will help to demonstrate the abilities to design and develop algorithm and implement them with analysis and interpretation of data

CO2: The ability to identify ,formulate and design solutions in the areas of computer science.

CO3: To understand the role of internal energy ,enthalpy, entropy, pressure, temperature and specific volume thermodynamic properties.

CO4: To become familiar with various thermodynamic processes and work done in each of these process.

PH-302 Optics I

CO1: To have developed the idea of interference, diffraction and polarisation.

- CO2: To provide a knowledge of the behaviour of light.
CO3: List the basic ideas in image formation and the defects involved.
CO4: To understand the basics of matrix method to solve problems of geometrical optics.

12BSM 231 Advanced Calculus

- CO1: Understand Continuity, Sequential continuity, properties of continuous functions, uniform continuity theorem such as Rolle's Theorem and Lagrange's mean value theorem and their geometrical interpretations.
CO2: Understand concept of Partial differential, Total differentials, Composite and Implicit functions, homogenous functions and theorems such as Euler's and Taylor's theorem for function of two variables.
CO3: Recognise the Limit, Continuity and Differentiability of real valued function of two variables, Schwarz and Young's, Implicit function theorem and maxima, minima of functions of two variables
CO4: Got familiar with concepts of differential geometry such as principle normal, binormal, tangent, Serret-Frenet formulae, centre of curvature, spherical curvature, Involutives, Evolutes and Bertrand curves etc.

12BSM 232 Partial differential Equation

- CO1: Introduce students to how to solve linear Partial Differential with different methods
CO2: To derive heat and wave equations in 2D and 3D
CO3: Technique of separation of variables to solve PDEs and analyse the behaviour of solutions in terms of Eigen function expansions.
CO4: Find the solutions of PDEs are determined by conditions at the boundary of the spatial domain and initial conditions at time zero

12BSM 233 Statics

- CO1: Define resultants, Component of a force, Coplanar forces, like and unlike parallel forces, Moment of a force and Couple with examples
CO2: Prove the Parallelogram Law of forces, triangular law of forces, Polygon of forces, Lami's Theorem, Varignon's Theorem of Moments
CO3: Learn about how to find the Resultant of Coplanar couples, equilibrium of couples
CO4: Conceive the concept of Friction, force of friction, Angle of friction and laws of friction and Find the tension at any point and discuss its geometrical properties

Sanskrit (Literature and language)

'Balkand' from valmiki ramayan & words formation by pratyay

- CO1: Students will be familiar with Indian culture and values.

- CO2: Students will gain knowledge on fundamental principles of Sanskrit grammar.
CO3: To develop intellectual, personal and communication skills to understand stories.
CO4: Students can express command over Sanskrit and its linguistic structure.

SEMESTER IV

CH-401 Inorganic Chemistry

- CO1: To study the chemistry of f- block elements.
CO2: To correlate the optical and magnetic properties of lanthanoids.
CO3: To correlate the optical and magnetic properties of actinoids.
CO4: To impart thorough knowledge of systematic qualitative analysis of mixtures containing acidic and basic radicals.

CH-402 Physical Chemistry

- CO1: To study basics of chemical cell, concepts and various mathematical relations.
CO2: Further detailed study of thermodynamics with stress on third law of thermodynamics.
CO3: To study the detailed concept of entropy & criteria of spontaneity.
CO4: To study the concept and application of concentration cells, liquid junction potential and potentiometric titrations.

CH-403 Organic Chemistry

- CO1: To study fundamentals and applications of IR spectroscopy.
CO2: To study structure, nomenclature, preparation & reactions of Amines.
CO3: Gain knowledge about Diazonium salts and nitro compounds.
CO4: Detailed study of Aldehydes and Ketones.

PH-401 Statistical Mechanics

- CO1: This course develops concept, how to use probability to find distribution of molecules of particles in a given system.
CO2: To learn Postulates of statistical mechanics.
CO3: To learn statistical interpretation of thermodynamics micro canonical, canonical and grand canonical ensembles.
CO4: To study the methods of statistical mechanics are used to develop the statistics for Bose- Einstein and Fermi-Dirac.

PH-402 Optics II

- CO1: To learn production and detection of circularly and elliptically polarised light
CO2: To understand the concept of interference pattern due to reflected light in thin wedge shaped film.
CO3: To understand theory of plain transmission grating and calculate refractive index.

CO4: To determine wavelength of source and refractive index using Newton's ring and spectrometer.

12BSM 241 Sequences and Series

CO1: Define different types of Sequence

CO2: Discuss the behavior of Geometric Sequence

CO3: Learn how to prove properties of convergent and divergent Sequence

CO4: Conceive the concept that how the given sequence is convergent or divergent

12BSM 242 Special functions and integral transforms

CO1: Develop series solutions for linear second order ODE's, using regular and singular point expansions.

CO2: To analyse properties of special functions by their integral representations

CO3: To determine properties of Laplace, Fourier Transform & Legendre's polynomial which may be solved by application of special functions.

CO4: Develop Fourier series and Fourier integral representations of given suitable functions

12BSM 243 Programming in C and Numerical methods

CO1: Analyse the given problem and develop an algorithm and flow chart to solve the problem.

CO2: Use of C language constructs in right way.

CO3: Design and develop program written in 'C'.

CO4: Use different data types in computer program.

Sanskrit Grammar-letter writing, word formation and translation chapter- 'raghu-vansh' by great poet kalidas

CO1: Students will be familiar with Indian culture and moral values. Inculcate skill of speaking Sanskrit language.

CO2: Students will gain knowledge on fundamental principles of Sanskrit grammar.

CO3: To learn the literary background of the greatest Sanskrit Granths.

CO4: Enable students to understand Indian culture.

SEMESTER V

CH-501 Inorganic Chemistry

- CO1: To understand metal- ligand bonding.
- CO2: To explain magnetic and spectral properties of transition metal complexes.
- CO3: To study thermodynamic and kinetic aspects of metal complexes.
- CO4: To study electronic spectra of transition metal complexes.

CH-502 Physical Chemistry

- CO1: To understand the concept of black body radiation, operators, photo-electric effect, Compton effect & postulates of quantum mechanics, and particle in 1-D box.
- CO2: To study various physical properties like optical activity, dipole moment, magnetic susceptibility and their applications.
- CO3: To study the basic features of spectroscopy and degree of freedom.
- CO4: To acquire knowledge of Rotational, Vibrational and Raman spectra.

CH-503 Organic Chemistry

- CO1: To study different technique and principles involved in NMR spectroscopy.
- CO2: To study applications of NMR spectroscopy for organic compounds.
- CO3: To study types and chemical reactions of carbohydrates.
- CO4: To study organometallic compounds and their applications.

PH-501 Solid State Physics

- CO1: Know the principles of structures determination by diffraction.
- CO2: To understand the principles and techniques of X-rays diffraction.
- CO3: To provide the knowledge of structure of crystal.
- CO4: To determine the concept of reciprocal lattice, miller indices.

PH-502 Quantum Mechanics

- CO1: Understand De-Broglie hypothesis and Uncertainty principle.
- CO2: Derive Schrodinger time dependent and independent equations.
- CO3: Solve the problems using Schrödinger wave equation and get knowledge of simple harmonic oscillator.
- CO4: Understand different operators in Quantum Mechanics .

12BSM 351 Real Analysis

- CO1: Understand the term convergence and apply it on problem;
- CO2: Identifies continuity and discontinuity of various functions in different contexts;

CO3: Understand Partitions and their Refinements.

CO4: Understand integrability and theorems of integrability.

12BSM 352 Groups and Rings

CO1: Demonstrate understanding of the idea of a group, a ring and an integral domain, and examples of these structures

CO2: Understand and be able to apply the fundamental theorem of finite abelian groups

CO3: Appreciate the significance of unique factorisation in rings and integral domains.

CO4: Apply the theory in the course to solve a variety of problems at an appropriate level of difficulty.

12BSM 353 Numerical Analysis

CO1: Discuss the different Difference operators: Forward, Back, Central. And their relations and do Interpolation with Equal internal and Unequal intervals using different interpolation formulas

CO2: Learn probability distribution of Random variables: Binomial distribution, Poison Distribution and Normal Distribution. Also compute their mean, SD and variation

CO3: Compute Numerical derivatives of functions using Interpolation formulas and Numerical Integration using Trapezoidal, Simpson 1/3, Simpson 3/8, Gauss Quadrature etc.

CO4: Solve Linear Differential Equations using Euler's, Euler's Modified, R-K, Picard's methods etc.

SEMESTER VI

CH-601 Inorganic Chemistry

CO1: To have knowledge of different Hard and Soft Acids and bases.

CO2: To study basic idea, synthesis and properties of organometallic compounds.

CO3: To develop understanding for silicones and phosphazenes.

CO4: To understand how two disciplines of science (biology and chemistry) are linked.

CH-602 Physical Chemistry

CO1: To study the detail knowledge of Electronic Spectrum.

CO2: To study the laws of Photochemistry, fluorescence, phosphorescence & quantum yield.

CO3: To study the various colligative properties and experimental methods for their determination.

CO4: To study phase diagrams of water, Sulphur, lead-silver systems.

CH-603 Organic chemistry

- CO1: To develop basic understanding of types, reactions and physical properties of heterocyclic compounds and organ Sulphur compounds.
- CO2: To study organic synthesis via enolates.
- CO3: To study synthetic polymers.
- CO4: To study classification, structure, nomenclature and chemical properties of amino acids, peptides and proteins.

PH-601 Atomic Molecular and Laser Physics

- CO1: Understand the basic principle and working of different types of lasers.
- CO2: To understand molecular spectra of atom.
- CO3: To study the Raman spectra.
- CO4: To study the Zeeman Effect.

PH-602 Nuclear Physics

- CO1: Know the properties of nucleus like binding energy, magnetic dipole moment and electric quadrupole moment .
- CO2: To understand the concept of radioactivity and decays law.
- CO3: To study achievement of Nuclear Models of Physics and its limitations.
- CO4: To give an extended knowledge about nuclear reactions such as nuclear fission and fusion .

12BSM 361 Real and Complex Analysis

- CO1: Understand the concepts of Jacobian, Beta and Gamma functions;
- CO2: Solve numerical on double integrals and triple integrals;
- CO3: Understand Fourier's series for even and odd functions and determine Fourier expansion of monotonic functions
- CO4: Understand the concepts of analyticity, Cauchy-Riemann equations and harmonic and entire

12BSM 362 Linear Algebra

- CO1: Understand the concepts of the terms vectors space, subspace, span, linear independence, basis, and dimension, and apply these concepts to various vector spaces and subspaces,
- CO2: Use matrix algebra and the related matrices to linear transformations.
- CO3: Learn properties of inner product spaces and determine orthogonality in inner product spaces.

- CO4: Realize importance of adjoin of a linear transformation and its canonical form
12BSM 353 Dynamics
- CO1: Compute velocity and acceleration along radial, transverse, tangential and normal directions. Also compute relative velocity and acceleration
- CO2: Understand the concept of Simple harmonic motions and Elastic stream problem based on them.
- CO3: Apply Newton's Law of Motion and do their applications. Also understand the formulas and definition of Work Power & Energy and solve problems based on them.
- CO4: Know about motion on smooth and rough plane curves, Projectile motion, Central Orbits, Kepler's laws and motion in three dimensions.

PROGRAMME OUTCOMES

This programme is most beneficial for students who have a strong interest and background in science and mathematics. Following are the various outcomes:

- PO1: After completing this course student can go for higher studies i.e. MSc., PhD.
- PO2: Students can go in several industries or may opt for their own industrial unit.
- PO3: They have the option to join civil services.
- PO4: Students are recruited directly by big MNC'S after completion of this course.
- PO5: Apart from the research job students can also work in business, teaching, pharmaceutical and other technical fields.

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Develop analytical skills and problems solving skills using applications of chemistry.
- PSO2: Acquires the ability to synthesis, separate and characterise the compounds by using laboratory and instrumentation techniques.
- PSO3: Students are expected to acquire more knowledge in Physics, including the major premises of classical mechanics, quantum mechanics and EMT.
- PSO4: Create an awareness of the impact of Physics on the society, and development out the scientific community.
- PSO5: Students enable to define mathematical concepts, calculate quantities, estimate solutions, solve problems develop models, interpret data, explore systems and communicate mathematical thoughts.
- PSO6: Good understanding of number theory which can be used in modern online cryptographic technologies.