

BACHELOR OF SCIENCE (B.SC NON-MEDICAL)

PROGRAM OUTCOMES:

1. Understanding of major concepts in different disciplines of Nonmedical i.e. Physics, Chemistry and Mathematics.
2. Think scientifically drawing logical conclusions and solving problems independently.
3. Employ critical thinking and scientific knowledge to design, carry out, record and analyze results of the experiments.
4. Use modern techniques, lab equipments to have experimental knowledge.

PROGRAM SPECIFIC OUTCOMES:

1. They can pursue Post Graduation in any subject which they have studied in B.Sc.
2. Students can go for studies in courses like B.Ed, MBA, etc.
3. Teaching opportunities in schools, colleges and coaching institutes for subjects like Physics, Chemistry and Mathematics.

COURSE OUTCOMES OF B.SC. NON-MEDICAL

Semester I:

Course Code - CH-101,102,103

Course Name - Chemistry

COs: After completing this course, students will be able to

- Discuss Atomic Structure, Periodic Table and Atomic Properties viz. Ionisation Energy, Electron Affinity, Electronegativity, Quantum Numbers, Electronic Configuration of the Elements.

- Study the formation of Covalent Bond, Hybridisation, Bond Energy, Bond Length, Crystal Structure, Lattice Energy, Crystal Defects, Solvation Energy and Fajan's Rule.
- Discuss Kinetic Molecular Theory of Gases, Derivation of Vander waals Equation and its applications, Critical Temperature, pressure, volume, compressibility factor.
- Elaborate on the Structure and properties of Liquid, Classification of Solids, Crystal systems, and Bragg's Law.
- Understand localised and de-localized Chemical bonds, Electronic Effects, Isomerism, Configuration, E and Z, R and S Nomenclature, and Conformations.
- Draw the mechanism of Organic Reactions, the study of attacking reagents, Reaction Intermediates, method of preparation, nomenclature, and physical properties of alkanes and cycloalkanes.

Semester II

Course Code - CH-104,105,106

Course Name - Chemistry

COs: After completing this course, students will be able to

- Elaborate on hydrogen bonding, Vander Waal's forces, metallic bond, semiconductors, and compounds of S-block elements. Noble gases, bonding in Compounds of noble gases
- Discuss about p-block elements, structure, bonding and compounds of the Boron, Carbon, Nitrogen and halogen families.
- Understand the rate of reaction, Order of reaction, Half-life period, Arrhenius equation, Electrolytic conduction, dilution law, Kohlrausch law, Degree of dissociation, and Henderson-Hassel Equation.
- Study preparation and properties of Alkenes, Arenes, Aromaticity, Mechanism of Aromatic Electrophilic substitution, Activating and De-activating substituents and Orientation.
- Discuss the preparation methods, structure, and properties of Dienes, Alkynes, Alkyl and Arylhalides, and SN1 and SN2 mechanisms.

Semester III

Course Code - CH-201,202,203

Course Name - Chemistry

COs: After completing this course, students will be able to

- Discuss the Classification, properties, and Comparison of properties of 3d, 4d and 5d elements, Latimer and Frost diagrams, Structure and properties of Transition element compounds.

- Study nomenclature, Isomerism and bonding in Coordination compounds, Types of Solvents, Physical properties with special reference to liq.NH₃ and SO₂.
- Study the system types, Thermo-dynamic process, Heat capacity, Work, Joule- Thomson Effect.
- Elaborate on the preparation methods, and properties of alcohol, phenols, Epoxides, Fries, Claisen Re-arrangement, Riemer Tiemann, Kolbe's, Schottenand Baumann Reactions.
- Discuss Absorption laws, Chromophore, Auxochromes and Schifts, Calculation of wavenumber using Woodward Fieser rules, Application of UV-spectroscopy.
- Elaborate method of preparation, structure, bonding and properties of carboxylic acid and its derivatives, relative stability of derivatives, Esterification and hydrolysis.

Semester IV

Course Code - CH-204,205,206

Course Name - Chemistry

COs: After completing this course, students will be able to

- Discuss the Electronic configuration, properties of Lanthanides, actinides, Lanthanide Contraction, Separation of Np, Pu, Am for uranium, and Trans-uranic Elements.
- Elaborate on the basic and acidic radicals, their identification, Interference by acidic radicals, solubility product, and common ion effects.
- Discuss the Equilibrium, Law of Chemical equilibrium, Clausius-Calpeyron Equation, Nerst distribution law, degree of hydrolysis, process of Extraction.
- Study the Laws of Thermodynamics, Entropy and Enthalpy Change, Spontaneity of Reaction, Gibbs Free Energy, Collision Theory and Transition state Theory, Electrolytic and galvanic cell, S.H.E. and Ernst Equation. Discuss about IR spectroscopy in structure determination, Hook's law, Application of IR, separation of primary, secondary and tertiary amines, Preparation, reaction with Nitrous acid.
- Discuss the diazonium salts and synthetic applications, synthesis of aldehydes and ketones, special reagents, condensation reactions, oxidation and reduction reactions.

Semester V

Course Code - CH-301,302,303

Course Name - Chemistry

COs: After completing this course, students will be able to

- To discuss the Crystal field theory and metal-ligand bonding, Splitting octahedral, tetrahedral and square planar complexes, the thermodynamic stability of metal complexes, and trans effect.
- This paper discusses magnetic materials, magnetic susceptibility, the method of determining magnetic susceptibility, the spin-only formula, orbital contribution to magnetic moments, the application of magnetic moment data, Selection rules for d-d transition, and the Orgel energy level diagram.
- To discuss the Black-body radiation, Planck's radiation law, photoelectric effect, Hamiltonian operator, Hermitian operator, Optical activity, magnetic susceptibility and types of magnetism. To elaborate on the basic features of spectroscopy, here are the degrees of freedom. Rotational, Vibrational and Raman Spectrum.
- To discuss the NMR spectroscopy and its application in structure determination of Organic compounds.

Semester VI

Course Code - CH-305,306,307

Course Name - Chemistry

COs: After completing this course, students will be able to

- To study the concepts of Acids and bases, HSAB principle and its applications, Structure, and bonding in organometallic compounds.
- To discuss the metal ions present in biological systems, Cooperative effect, Bohr effect, Nomenclature, classification, preparation and uses of silicones and phosphazenes.
- To discuss the statistical thermodynamics, thermodynamic probability, partition function and physical significance, Laws of photochemistry, fluorescence, phosphorescence and quantum yield.
- This paper discusses Ideal and non-ideal solutions, Ligative properties, Applications in calculating molar masses of normal, dissociated, and associated solutes in solution, the Phase Rule, and phase equilibria of one- and two-component systems.

- To study the Organic synthesis using Enolates,
- Structure and method of preparation and reactions of Heterocyclic compounds.

COURSE OUTCOMES OF B.SC. NON-MEDICAL

Semester I:

Course Code - PH-101

Course Name - Physics

COs: After completing this course, students will be able to

- Students can define, present, and demonstrate basic mechanical concepts and their applications in daily life.
- Students can understand the motion of a body,

Course Code - PH-102

Course Name - Physics

COs: After completing this course, students will be able to

- Understand the basic mathematical concepts related to electromagnetic vector fields.
- Understanding of fundamental principles and concepts of electromagnetism and magnetostatics

Semester II

Course Code - PH-201

Course Name - Physics

COs: After completing this course, students will be able to

- By studying defects in solid, students can identify the defects existing in a given solid.

- Students will learn about different polymers and the importance of polymerisation in making superior-quality polymers.

Course Code - PH-202

Course Name - Physics

- Special Purpose diodes like LED, photodiode, Varactor, Optocoupler
- Amplifiers, Class A, Class B and Class C, Push Pull emitter follower and differential amplifier

Semester III

Course Code - PH-301

Course Name - Physics

COs: After completing this course, students will be able to

- Learn the Basic Programming Concepts.
- Improve logical and computational abilities.
- Memory allocation and utilisation technique learning.

Course Code - PH-302

Course Name - Physics

COs: After completing this course, students will be able to

- Image formation related to geometrical optics, Deviation, Magnification, Concept for Equivalent lens and Cardinal Points..
- Different types of monochromatic and chromatic aberrations and Achromatism in lenses

Semester IV

Course Code - PH-401

Course Name - Physics

COs: After completing this course, students will be able to

- To study the transport phenomena such as viscosity, thermal conductivity, and diffusion.
- To learn about thermodynamic functions, variables and their relations.

Course Code - PH-402

Course Name - Physics

COs: After completing this course, students will be able to

- Image formation related to geometrical optics, Deviation, Magnification, Concept for Equivalent lens and Cardinal Points
- Different types of monochromatic and chromatic aberrations and Achromatism in lenses

Semester V

Course Code - PH-501

Course Name - Physics

COs: After completing this course, students will be able to

- Introduction to Quantum Mechanics, Historical background, Matter Waves, Wave-particle duality, Phase and Group Velocity, Heisenberg's Uncertainty Principle
- Physical Interpretation of Wave function, Schrödinger's Wave Equation, Eigen Function and Eigenvalues

Course Code - PH-502

Course Name - Physics

COs: After completing this course, students will be able to

- Studying Basic properties of the nucleus, students got the idea of the inner information of the nucleus.
- From radioactivity chapter student knew that which radiations emit from radioactive material and how they are useful and harmful for the human.

Semester VI

Course Code - PH-601

Course Name - Physics

COs: After completing this course, students will be able to

- Students will able to study difference between crystalline and amorphous material, crystal structures, miller indices, interplaner distances, interatomic forces and bonds.
- From this study, students learn the basics of solid state physics.

Course Code - PH-602

Course Name - Physics

COs: After completing this course, students will be able to

- There are many atomic models that explain atomic structure, but none fully explain it. A new model called the vector atom model could explain all parameters of atomic structure.
- Studying this model, students can easily draw vector diagrams. Students learn how to find out interaction energy from different coupling schemes.

COURSE OUTCOMES OF B.SC. NON-MEDICAL

Semester I

Course Code - BM-111

Course Name - Algebra

COs: After completing this course, students will be able to

- Grasp the foundational principles of algebra, including equations, functions, and algebraic structures.
- Apply algebraic techniques to solve problems in mathematics, science, engineering, and economics.

Course Code - BM-112

Course Name - Calculus

COs: After completing this course, students will be able to

- Master the fundamental concepts of calculus, including limits, derivatives, and integrals.
- Apply calculus techniques to analyse and solve problems in various fields, such as physics, engineering, economics, and biology.

Course Code - BM-113

Course Name - Solid Geometry

COs: After successfully completing this course, students will be able to

- Develop a comprehensive understanding of three-dimensional shapes and their properties in solid geometry.
- Acquire proficiency in solving problems related to volumes, surface areas, and spatial relationships of geometric objects.

Semester II

Course Code - BM-121

Course Name - Number Theory

COs: After successfully completing this course, students will be able to

- Master the foundational concepts of number theory, including prime numbers, divisibility, and congruences.
- Develop proficiency in applying number theory techniques to solve problems in cryptography, algebra, and computer science.

Course Code - BM-122

Course Name - Ordinary Differential Equations

COs: After successfully completing this course, students will be able to

- Attain a deep understanding of ordinary differential equations (ODEs), including classification, solution methods, and existence theorems.
- Apply ODEs to model and analyze dynamic systems in various fields such as physics, engineering, and biology.

Course Code - BM-123

Course Name - Vector Calculus

COs: After successfully completing this course, students will be able to

- Master the fundamental concepts of vector calculus, including vector fields, line integrals, and surface integrals.
- Apply vector calculus techniques to solve problems in physics, engineering, and mathematics, including electromagnetism, fluid dynamics, and differential geometry.

Semester III

Course Code - BM-231

Course Name - Advanced Calculus

COs: After successfully completing this course, students will be able to

- Attain a deep understanding of advanced calculus topics, including multivariable calculus and vector calculus.
- Apply advanced calculus techniques to solve problems in optimization, differential equations, and mathematical modeling.

Course Code - BM-232

Course Name - PARTIAL DIFFERENTIAL EQUATIONS

COs: After successfully completing this course, students will be able to

- Master the fundamental concepts of partial differential equations (PDEs), including classification and solution techniques.
- Apply PDEs to model physical phenomena in various fields such as physics, engineering, and finance.

Course Code - BM-233

Course Name - Statics

COs: After successfully completing this course, students will be able to

- Understand the principles of static equilibrium and force analysis in engineering systems.
- Apply mathematical techniques to solve problems involving forces, moments, and structures in static equilibrium.

Semester IV

Course Code - BM-241

Course Name - Sequence and Series

COs: After successfully completing this course, students will be able to

- Acquire a comprehensive understanding of sequences and series, including convergence tests and power series.
- Develop analytical skills to determine convergence or divergence of sequences and series.

Course Code - BM-242

Course Name - Special Functions and Integral Transforms

COs: After successfully completing this course, students will be able to

- Attain a thorough understanding of special functions such as Bessel functions, Legendre polynomials, and hypergeometric functions.
- Learn techniques for solving differential equations using integral transforms like Fourier and Laplace transforms.

Course Code - BM-243

Course Name - Programming in C

COs: After successfully completing this course, students will be able to

- Master the C programming language, including syntax, data structures, and control flow.
- Develop proficiency in implementing numerical methods such as interpolation, numerical integration, and solving differential equations using C.

Semester V

Course Code - BM-351

Course Name - Real Analysis

COs: After successfully completing this course, students will be able to

- Master the foundational principles of real analysis, including sequences, series, and limits.
- Develop rigorous proof-writing skills to justify mathematical statements and theorems in real analysis.

Course Code - BM-352

Course Name - Group and Ring

COs: After successfully completing this course, students will be able to

- Develop a comprehensive understanding of abstract algebraic structures, including groups and rings.
- Demonstrate proficiency in proving theorems and solving problems related to group theory and ring theory.

Course Code - BM-353

Course Name - Numerical Analysis

COs: After successfully completing this course, students will be able to

- Gain proficiency in numerical methods for solving mathematical problems, including interpolation, numerical integration, and differential equations.
- Acquire skills in implementing algorithms and numerical techniques using programming languages such as MATLAB, Python, or C++
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Semester VI

Course Code - BM-361

Course Name - REAL & COMPLEX ANALYSIS

COs: After successfully completing this course, students will be able to

- Master the fundamental principles of real and complex analysis, including continuity, convergence, and differentiability.
- Apply advanced mathematical techniques to analyze and solve problems in both real and complex domains.

Course Code - BM-362

Course Name - Linear Algebra

COs: After successfully completing this course, students will be able to

- Acquire a strong foundation in fundamental concepts of linear algebra, including vector spaces, matrices, and linear transformations.
- Demonstrate proficiency in solving systems of linear equations and eigenvalue problems.

Course Code - BM-363

Course Name - Dynamics

COs: After successfully completing this course, students will be able to

- Understand the principles of Newtonian mechanics and dynamics, including kinematics and kinetics of particles and rigid bodies.
- Apply mathematical modeling techniques to analyze and solve dynamic systems in engineering and physics.