

**PROGRAMME OUTCOME (PO), PROGRAMME SPECIFIC OUTCOME (PSO),
COURSE OUTCOME (CO) (2018-19)**

PROGRAMME NAME	BSC
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PROGRAMME OUTCOME
PO1:After completing BCOM students will gain expertise in accounting practices, financial system, taxation and its laws, business analysis and business management. PO2:The program will impart knowledge about applicability of financial techniques, project tools, forecasting of business and managing variations of businesses. PO3:The program is designed to develop entrepreneurial and strategic approach in students that will help the students to integrate at social level PO4:The program will develop the managing capabilities in students which will be enhanced by means of understanding global scenario of marketing and human resources management as well.

COURSE OUTCOME			
SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
I	PAPER I: DIFFERENTIAL CALCULUS		This course will enable the students to: 1. Know the concepts of calculus, namely, limits, continuity, differentiability and their applications in the form of mean value theorem and Taylor's theorem. 2. Understand real valued functions, sequences and series, their convergence. 3. Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference. 4. Apply derivatives in Optimization, Social sciences, Physics and Life sciences etc. 5. Get knowledge of curvature, envelopes and evolutes
	PAPER II: INTEGRAL CALCULUS		The course will enable the students to learn about: 1. Some of the families and properties of Riemann integrable functions, and the applications of the fundamental theorems of

		integration. 2. Beta and Gamma functions and their properties. 3. The valid situations for the inter-changeability of differentiability and integrability with infinite sum, and approximation of transcendental functions in terms of power series. 4. Compute area of surfaces of revolution and the volume of solids by integrating over cross-sectional areas.
	Inorganic Chemistry	B.Sc I CO-1: Structure of atoms and associated important rules, importance of chemical elements CO-2: Ionic, covalent and non-covalent bonding which always play pivotal role in deciding the chemistry and properties of any compound/material. CO-3: Periodic properties of elements and several parameters associated with elements CO-4: Solid state chemistry which forms the basis of the development of targeted crystalline solids inculcating varied defects which induces variety of materials properties viz. piezoelectricity CO-5: Reaction mechanism and synthesize simple inorganic compounds using the studied reactions. Relationships between inorganic chemistry and other disciplines are noted CO-6: Chemistry of elements belonging to s-block, noble gases and main group.
	Organic Chemistry	B.Sc.I CO-1. Understand the basics of chemical reactions i.e. Substrate and Reagent, types of Reagents, Electrophilic and Nucleophilic Homolytic and heterolytic fission. Electron mobility, Inductive effect etc CO-2. Understand various types of reactive intermediates and factors affecting their stability. CO-3. Recognize and draw constitutional isomers, stereoisomers, including enantiomers and

		diastereomers, racemic mixture and meso compounds. CO-4: Understand fundamental principles of organic chemistry and predict outcomes and derive mechanism of various types of organic reactions. CO-5: Understand the nomenclature, synthesis, isomerism and physical Properties of alkanes and cycloalkanes. CO-6: Understand the concept of Aromaticity of benzenoids & nonbenzenoids, the preparation, reactivity & structure of aromatic compounds
	PAPER I: Mechanics and Wave Motion	This course will enable the students to: 1. The students would clearly understand the conflict between Newtonian mechanics and Special Relativity and thus would know how the progress of the revolutionary scientific ideas is made through logical evidences and observations. 2. They would be able to understand the differences between inertial and noninertial frames and see how pseudo-forces arise in non-inertial frames. 3. They would have a clear understanding of the dynamics of conservative and non-conservative forces in real life such as in gravitational fields or mechanical systems having friction etc 4. They would feel the thrill to

		know that the same set of laws that work for planetary and galactic motions also work in our daily life. Further, they would be able to do mathematical calculations with application of these laws to various objects and artificial satellites. 5. They would be able to understand and calculate various macroscopic elastic properties as the response of the widely used materials through the application of simple classical laws 6. The students would be able to understand and apply the properties of oscillations (natural, damped and forced), and waves and appreciate their omnipresence in various phenomena around us
	PAPER II: Optics	The course will enable the students to learn about: 1. The student will get an introduction to the discipline of optics and its role in daily life. 2. The optics course will give the student a basic knowledge of interference, diffraction and polarization

			3. The student will be able to analyze and calculate interference between light waves and application of the theory to various interferometers along with their practical applications 4. The student would know the conditions for near and far-field diffraction and be able to calculate the far-field diffraction from gratings and simple aperture functions. 5. The student would understand how the polarization of light changes at reflection and transmission at interfaces.
II	PAPER I: MATRICES & DIFFERENTIAL EQUATIONS		This course will enable the students to: 1. Find the rank and eigen values of matrices 2. Study the system of linear homogeneous and non-homogeneous equations. 3. Comprehend the geometric meaning of differential equations. 4. Configure various types of differential equations and develop problem solving skills for solving the same.
	PAPER II: GEOMETRY		The course will enable the students to: 1. know about regular geometrical figures and their properties. 2. They have the foundation for going for higher course in

		geometry.
Physical Chemistry	B.Sc	CO-1: Students would gain knowledge regarding the basic of computers and Mathematical concepts of log, permutation and combination, differential and integration of some relevant functions.. CO-2: Student would gain understanding of gaseous state, critical Phenomenon, liquid state, solid state, colloidal state and liquid crystals. CO-3: It would help students recognize the importance of chemical kinetics and catalysis. CO-4: Apply fundamental principles of measurement, matter, atomic theory, chemical periodicity, chemical bonding, general chemical reactivity and solution chemistry to subsequent courses in science
PAPER I: Electricity and Magnetisim		This course will enable the students to: Understand the basic (1).mathematical concepts related to Electromagnetic fields, and use the understanding of calculus along with basic principles to solve problems encountered in science (2). Comprehend and apply the understanding of fundamental laws and concepts in electricity and magnetism, primarily with regard to Maxwell's laws, to explain natural physical processes and related technological advancements (3). Learn about the origin and

		basic properties of static as well as dynamic Electric and Magnetic fields, and the kinds of physical phenomena they generate - Electromagnetic waves and their properties (4). Account for the importance of electricity and magnetism in society, especially with regard to technological applications. (5). Visualize and design experiments based on the basic concepts of electricity and magnetism, and obtain information in order to explore physical principles
	PAPER II: Heat And Thermodynamics	The course will enable the students to: (1).. The students will understand the fundamental principles of thermodynamics, including the first and second laws (2). They would learn the idea of entropy and associated theorems, and the thermodynamic potentials and their physical meanings (3). Students will have an understanding of Maxwell's thermodynamic relations (4). They will acquire the knowledge about the

			fundamentals of gas kinetic theory and transport phenomenon
III	PAPER I: ALGEBRA		The course will enable the students to: 1. Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc. 2. Link the fundamental concepts of Groups and symmetrical figures. 3. Analyze the subgroups of cyclic groups. 4. Explain the significance of the notion of cosets, normal subgroups, and factor groups.
	PAPER II: MATHEMATICAL METHODS		The course will enable the students to: 1. know about limit and continuity, maxima and minima of functions of two variables. 2. find out transformations (Laplace inverse Laplace and Fourier transformation) and its various applications. 3. know about higher different mathematical methods and will help them in going for higher studies and research
	Physical Chemistry	B.Sc	CO-1: After the completion of the semester, student will acquire knowledge of first law and second law of thermodynamics, thermochemistry, entropy enthalpy etc. CO-2: It will also make them familiar with conductance, equivalent conductance, Kohlrausch's law, Ostwald dilution law, Debye-Huckel Onsager equation, e.m.f. of cell, types of cell, liquid junction potential, pH and pka, Henderson- Hazel equation etc.
	PAPER I: Perspectives of Quantum Physics		The course will enable the students to:

1. It will help students understand the basic concepts of Quantum Physics

2. It will make students understand the development of quantum mechanics as a continuity of classical concepts and also as a leap jump from classical to quantum world of Physics

3. A student will be able to understand as to how the inadequacies of classical Physics were overcome by various concepts and theoretical developments of modern Physics i.e. Understand how major concepts developed and changed over time

4. A study of the Heisenberg's Uncertainty principle and its applications will make students understand the most modern concept of wave particle duality as to how a wave could behave like a particle and how a particle could behave like a wave

5. An appreciation of the Schrödinger Wave Equation and its application to various problems in quantum mechanics will make students

IV			more analytical. This will give them the needed tool to solve problems across science subjects as Schrödinger equation appears in multidisciplinary subjects. 6. It will make students capable of analyzing and solving problems using reasoning skills based on the concepts of modern physics
	PAPER I: DIFFERENTIAL EQUATIONS	B.Sc	The course will enable the students to 1. Formulate Differential Equations for various Mathematical models. 2. Solve first order non-linear differential equation and linear differential equations of higher order using various techniques. 3. Apply these techniques to solve and analyze various mathematical models
	PAPER II: MECHANICS	B.Sc	The course will enable the students to understand: 1. The significance of mathematics involved in physical quantities and their uses. 2. To study and to learn the cause-effect related to these. 3. The applications in observing and relating real situations/structures.
	PAPER I: Electronics	B.Sc	The course will enable the students to: 1. Utility of resonant circuits and AC bridges 1. The basic electronic devices and their applications 2. Transistor biasing 3. Concept of frequency

		response, bandwidth and audio amplifiers 4. Feedback circuits 5. The importance of amplitude modulation and demodulation Applications of various electronic instruments.
Inorganic Chemistry	B.Sc	CO-1: Chemistry of transition and inner-transition elements. These insights are important as they help in the rational selection of the cations of these elements for tailor-made syntheses of newer complexes CO-2: Concepts of coordination chemistry and their applications CO-3: Importance of different acid-base concepts which forms the basis of Rational ligand designing and coordination complex formation for specific bioinorganic, materials and optoelectronic applications.. CO-4: Importance and different chemical aspects of non-aqueous solvents which now-a-days are gaining importance in varied targeted syntheses of drugs and materials for technological applications.
Organic Chemistry	B.Sc	CO-1: The preparation and chemical reactions of Alcohols and Epoxides - Alcohols Dihydric alcohols: (Ethylene Glycol) CO-2: Understanding the order of reactivity of different carboxylic acid derivatives and the reactivity of different carboxylic acid derivatives. CO-3: Able to recognize structures of acid halides, esters, amides, acid anhydrides. CO-4: Able to write down structure of phenol and phenoxide ion and chemical reactions of phenols CO-5: Know the mechanism of named reactions of carbonyl compounds and condensation reactions as well as their use in food and pharmaceuticals

	PAPER I: NUMERICAL ANALYSIS		The course will enable the students to learn the following: 1. Some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision. 2. Interpolation techniques to compute the values for a tabulated function at points not in the table. 3. Applications of numerical differentiation and integration to convert differential equations into difference equations for numerical solutions.
	PAPER II: LINEAR & ABSTRACT ALGEBRA		The course will enable the students to learn about: 1. The fundamental concept of Rings, Fields, subrings, integral domains and the corresponding morphisms. 2. The concept of linear independence of vectors over a field, the idea of a finite dimensional vector space, basis of a vector space and the dimension of a vector space. 3. Basic concepts of linear transformations, the Rank-Nullity Theorem, matrix of a linear transformation, algebra of transformations and the change of basis. 4. Automorphisms for constructing new groups from the given group. 5. External direct product applies to data security and electric circuits. 6. Group actions, Sylow's theorems and their applications to check nonsimplicity. 7. Compute inner products and determine orthogonality on vector spaces.
	PAPER III: LINEAR PROGRAMMING		This course will enable the students to learn: 1. Analyze and solve linear programming models of real-life situations. 2. The graphical solution of LPP with only two variables, and illustrate the concept of convex set

		and extreme points. The theory of the simplex method is developed. 3. The relationships between the primal and dual problems and their solutions with applications to transportation, assignment and two-person zero-sum game problem.
	PAPER I: SOLID STATE PHYSICS	The course will enable the students to 1.The crystal geometry with respect to symmetry operations 2. The power of X-ray diffraction and the concept of reciprocal lattice 3. The various properties based on crystal bindings 4. Lattice dynamics and its influence on the properties of materials 5. Physics of electrons in solids and 6. Magnetic, dielectric and superconducting properties of solids along with recent published results by various researchers. 7. Such study would provide a foundation for research in condensed matter physics, material science and nanotechnology
	PAPER II.NUCLEAR PHYSICS	The course will enable the students to understand: 1Grasp the knowledge about basic nuclear properties and

		nuclear models for a better understanding of nuclear reaction dynamics 2. Analyze quantum mechanical phenomena in nuclear physics and develop an understanding of quantum mechanics also. 3. Comprehend the general understanding of phenomena like nuclear fusion and fission and develop the skills required for solving basic problems in nuclear physics at different nuclear energy ranges. 4. Develop the basic understanding of accelerator physics and particle Detectors 5. Acquire and apply basic nuclear physics knowledge in subjects such as medicinal, archaeology, geology, and other multidisciplinary fields of Physics and Chemistry .
	PAPER III LASER AND OPTOELECTRONICS I	The course will enable the students to learn the following: 1 Opting for this course will give the students an opportunity to know and understand applications of fiber

	optics and laser technology 2. Students will be able to appreciate the importance of lasers, fiber optical methods and sensors in all spheres of life i.e. various communication requirements, medical, travel etc 3. Students will learn about optical fibers in detail and will be able to appreciate the current communication system existing globally 4. They will also gain the knowledge of basic concepts of optical communication and of different types of optical fibers thereby getting enabled to appreciate the huge advantage of such systems 5. Students will be able to know about various types of fiber optic sensors and their use in the areas of security, safety, medical and space ventures 6. Finally, students may emerge with an idea for new sensor or a new application of the existing ones.
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	PAPER IV: Second quantum revolution		The course will enable the students to learn about: 1.. To understand the main ideas of quantum computation 2. To develop an understanding of the fundamental concepts of the field 3. To equip the student with enough technical expertise to may be take up a career in this new, exciting and rich field of research 4. To introduce some experimental developments pertaining to quantum computers.
VI	PAPER I: ANALYSIS		The course will enable the students to: 1. Understand the basic concepts of metric spaces. 2. Know the concepts such as open balls, closed balls, compactness, connectedness etc. 3. Understand the significance of differentiability of complex valued functions leading to the understanding of Cauchy-Riemann equations. 4. Evaluate the contour integrals and understand the role of Cauchy-Goursat theorem and the Cauchy integral formula. 5. Expand some simple functions as their Taylor and Laurent series, classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals.
	PAPER II: DIFFERENTIAL GEOMETRY & TENSOR ANALYSIS		By the end of this course students will be able to-

		1. Explain the concept of differentiable geometry. 2. Understand the concepts of tensors in differentiable geometry. 3. Apply various concept of differential calculus in tensors.
PAPER III: DISCRETE MATHEMATICS		After the course, the student will be able to understand the concepts of: 1. Lattices and their types; 2. Boolean algebra, switching circuits and their applications; 3. Graphs, their types and its applications in study of shortest path algorithms
PAPER I ATOMIC AND MOLECULAR SPECTRA		. 1. After completion of the course students will be able to understand the spectra produced by one and two valence electron systems, intensity of spectral lines and effect of magnetic field on one electron systems as well as origin of hyperfine structure 2. Students will acquire knowledge of rotational, vibrational and electronic spectra of molecules in addition to acquaintance with the principle of electron spin and nuclear magnetic resonance, nuclear quadrupole spectroscopy and their applications 3. They will also learn the

		Laser principle, basic Lasers and its applications.
PAPER II.HISTORY OF SCIENCE IN INDIA		The course will enable the students to: 1. Students will realize and sense the excitement how deeply the mysteries of the starry sky and several socio-cultural aspects of human coexistence with nature have puzzled the great minds of all times in India and motivated them into extensive enquiry 2. Students will learn about the long tradition of the monumental ancient-to-modern wisdom in science contributed by Indian scientists with their sheer dedication and intellect despite the obvious lack of adequate resources and experimental facilities 3. They would clearly understand how the scientific ideas progress through the application of mathematics built on reason and logical methods and ultimately lead to scientific

		revolutions. 4. 4. Thus, students will appreciate the role of human observations in verification of the scientific principles and necessity of the technological tools to add to or modify or overturn the already acquired knowledge along the line of history
PAPER III: PLASMA PHYSICS AND SPACE SCIENCE		By the end of this course students will be able to- 1. After completing the course the students will understand the basic concepts of plasma physics and will have very good knowledge of mathematical models for plasma and will be able to distinguish the dynamics of plasmas and neutral fluid media. 2. They will be able to describe the propagation of waves in plasmas and will have good insight into plasma instabilities. 3. Students will be able to know about the atmospheric structures, the Sun-Earth system and space weather 4. The students will feel a great deal of excitement with our

		current understanding into the mysteries of the stars and universe, especially with the modern state-of-the-art technology like "Hubble Space Telescope" and "Planck" spacecraft..
	PAPER I CLASSICAL AND STATISTICAL MECHANICS	After the course, the student will be able to understand the concepts of: 1. Understand the concepts of generalized coordinates and D'Alembert's principle 2. Understand the Lagrangian dynamics and the importance of cyclic coordinates