

	Program :	B.Sc. - Physics, Mathematics, Electronics (PME)		
	PHYSICS			
	PO Code	Programme Outcomes:		
	PO1	Provide a firm foundation in every aspect of physics and to explain a broad spectrum of modern trends in physics		
	PO2	Develop experimental, computational and mathematical skills of students		
Sem ester	CourseCode	CourseName	C O C o d e	
I	PHY1A	Physics I	C O 1	Significance of mass distribution and axis of rotation in moment of inertia.
			C O 2	Appreciation of oscillations to determine acceleration due to gravity.
			C O 3	Significance of Kepler's contribution to understand gravitation.
			C O 4	Understand elastic properties of solids and identify the materials suitable for different uses.
			C O 5	Understanding motion under various forces.
			C O 6	Acquire knowledge of basic forces in fluids at rest and in motion.
			C O 7	Understand the importance of frames of reference-inertial and non-inertial frames.
II	PHY2A	Physics II	C O 1	Understand the kinetics of transport phenomena in gases .
			C O 2	Create awareness of critical constants and its significance.

			C O 3	Learning the basic principles of heat engines and refrigerators.
			C O 4	Learning the thermodynamic relations connecting entropy, enthalpy and free energy.
			C O 5	Learn the basic principles of statistical mechanics, interpretation of temperature.
			C O 6	Learn the methods of attaining low temperature.
			C O 7	Basic understanding of different modes of heat transfer and its applications.
III	PHY3A	Physics III	C O 1	Understanding of principles of electrostatics and application in electromagnetism.
			C O 2	Application of effect of electrical current in magnetic field and effect of thermo e.m.f.
			C O 3	Describe and explain the generation of magnetic fields by electrical currents and vice versa.
			C O 4	Use methods of vector calculus to solve problems in electromagnetism
			C O 5	Describe and explain electrodynamics, Maxwell's equations, energy density of e.m. waves and their applications. .
			C O 6	Determine the transient containing R, L and C components
			C O 7	Determine the condition of oscillation in LCR circuit and significance of resonance in LCR circuits.
IV	PHY4A	Physics IV	C O 1	Understanding of different aspects of waves and their applications
			C O 2	Practical application of ray optics.
			C O 3	Study of various interference patterns using coherence sources.
			C O 4	Understanding resolving power of optical instruments using the diffraction properties of electromagnetic wave.
			C O 5	Understanding the principle and application of LASER

			C O 6	Understanding the transeverse nature of electromagnetic waves and application of polarized light.
V	PHY5A	Physics V	C O 1	Familiarize with the main aspects of the historical development of quantum mechanics.
			C O 2	Discuss and interpret experiments that reveal the wave nature of matter.
			C O 3	Understand the concepts of the uncertainty principle
			C O 4	Understand the central concepts and principles in quantum mechanics, such as the Schrödinger equation, the wave function and its statistical interpretation.
			C O 5	Able to solve the Schrödinger equation on your own for simple systems.
			C O 6	Analyze and study circuits for regulation, rectification, addition and amplification of voltages.
			C O 7	Study of cathode ray oscilloscope to analyse waveforms
V	PHY6A	Physics VI	C O 1	Understand the three basic statistics .
			C O 2	Prove the nonexistence of hypothetical ether, understand the limitations of Newtonian Mechanics and learn special theory of relativity
			C O 3	Provide in depth study of the atom and atomic spectra
			C O 4	Study the effect of magnetic and electric field in atomic spectra
			C O 5	Study of molecular spectra to analyse rotation vibration spectra
			C O 6	Learn scattering of light
			C O 7	Understand Raman effect to analyse Raman spectra
VI	PHY7A	Physics VII	C O 1	Study of X-ray spectra and X-ray diffraction to analyse crystal structure

			C O 2	Understand basic ideas of crystal structure
			C O 3	Apply free electron theory to study conductivity of metals
			C O 4	Understand Fermi level and Fermi energy in semiconductors
			C O 5	Familiarise with properties and applications of superconducting materials
			C O 6	Study of preparation methods, characterisation and properties of thin films
			C O 7	Understand the applications and uses of nano and smart materials
VI	PHY8A	Physics VIII	C O 1	Understand the basic nucleus and nuclear properties
			C O 2	Describe the properties of strong and weak interaction
			C O 3	Calculate the kinematics of various nuclear reactions and decay processes
			C O 4	Explain the different processes by which ionising radiation interacts with matter
			C O 5	The functionality of detectors and the accelerators for radioactivity
			C O 6	Understanding of solid-state devices whose properties are affected by light and its applications
			C O 7	Understanding of the properties and life cycle of stars.
	MATHEMATICS			
PO Code	Programme Outcomes			
PO1	Enables the students to take up advanced studies in the core subjects and enable them to find opportunities			

	in careers in Science and Technology and Management where a high level of competence and dependence on many of the science subjects is demanded.			
PO2	Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.			
PO3	Formulate and develop mathematical arguments in a logical manner.			
PO4	Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.			
PO5	Understand, formulate and use quantitative models arising in physical sciences, business and other contexts.			
Sem ester	CourseCode	CourseName	C O C o d e	Course Outcomes
I	MAT1MAI	Mathematical Analysis-I	C O 1	Define and recognize the basic properties of the field of real numbers.

				Define and recognize the basic properties of the field of real numbers
			C O 2	Improve and outline the logical thinking.
			C O 3	Have the knowledge of the series of real numbers and convergence.
			C O 4	Application of Integral Calculus by solving the problem of standard curves .
			C O 5	Shown the ability of working independently and with groups.
			C O 6	Studying Leibnitz theorem – Roll’s theorem, Langrange’s Mean Value theorem, Taylor’s theorem Maclarurin’s expansion Theorem and Cauchy criteria.
			C O 7	Skill of solving integral calculus like reduction formulae.
II	MAT2MAIIA	Mathematical Analysis-II	C O 1	Define and recognize the differentiability of real functions and its related theorems
			C O 2	Have the knowledge of real functions- limits of functions and their properties. Interpret how to Know the differentiability and related theorems.
			C O 3	Define and recognize the basic topological properties of R Define and recognize the continuity of real functions
			C O 4	Interpret how to Know the continuity using the internet.
			C O 5	Studying the differentiability of real functions and related theorems .
			C O 6	Skill of solving problems on Fourier series.
III	MAT3DE	Differential Equations	C O 1	Apply the concepts of Ordinary Differential Equations and Partial Differential Equations for their resolution and developed the knowledge to solve problems in higher order ordinary linear differential equations, Methods of finding Complementary function and Particular integral.

			C O 2	Understand the difficulty of solving problems analytically and capable to formulate and solve problems in concepts like simultaneous differential equations, Legendre's linear differential equation and Cauchy's linear differential equation.
			C O 3	Recognize and work with problems in Second Order Ordinary Differential Equations with variable coefficient with various methods and developed skills to understand concepts like Special functions.
			C O 4	Able to work and apply concepts in Second order linear partial differential equations, canonical form for parabolic, elliptic and hyperbolic equations.
			C O 5	Use computational tools to formulate and solve problems of one-dimensional heat and wave equation and two-dimensional Laplace equation using Fourier series
			C O 6	Analyze real world problems and recognize when partial differential equations are appropriate, formulate problems about them, creatively model these (using technology, if appropriate) to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results.
IV	MAT4AGR	Algebra - Groups and Rings	C O 1	Assess properties implied by the definitions of groups and rings.
			C O 2	Use various canonical types of groups (including cyclic groups) and canonical types of rings (including Quotient rings).
			C O 3	Analyze and demonstrate examples and theorems of subgroups, normal subgroups and quotient groups.
			C O 4	•Analyze and demonstrate examples of Subring, Integral domains, Ideals, Maximal Ideals and quotient rings.
			C O 5	• Use the concepts of isomorphism and homomorphism for groups and rings.
			C O 6	• Produce rigorous proofs of propositions arising in Fundamental theorem of homomorphism in groups and rings.

			C O 7	<ul style="list-style-type: none"> Apply problem-solving using advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematical contexts.
V	MAT5CAA	Complex Analysis	C O 1	1. The student realizes the importance of fundamental concepts of complex analysis and their role in modern mathematics and applied contexts
			C O 2	2. The student will be able to analyze the ideas of complex differentiation and complex integration in a coherent and meaningful manner and use appropriate techniques for solving related problems and for establishing theoretical results.
			C O 3	3. The student gains knowledge about Complex Number System and understands the relation to other existing number systems
			C O 4	4. The student will develop the critical thinking ability by proving mathematical conjectures and establishing theorems
			C O 5	5. The student gains competence to understand the operations with complex numbers, use the complex derivatives function, use and operate analytic functions, demonstrate knowledge of integration in the complex plane, use the Cauchy integral theorem and Cauchy integral formula, manipulate and use power series, understand residues and their use in integration, demonstrate the understanding of conformal mappings
			C O 6	6. The student will be able to appreciate the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations
V	MAT5LAA	Linear Algebra	C O 1	Use computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, Eigenvalues and eigenvectors, orthogonality and diagonalization. (Computational and Algebraic Skills).
			C O 2	Use visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems, and view solutions, especially in R^2 and R^3 , as well as conceptually extend these results to higher dimensions. (Geometric Skills).

			C O 3	Critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra. (Proof and Reasoning).
			C O 4	Use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions (Technological Skills).
			C O 5	Communicate and understand mathematical statements, ideas and results, both verbally and in writing, with the correct use of mathematical definitions, terminology and symbolism (Communication Skills).
			C O 6	Work collaboratively with peers and instructors to acquire mathematical understanding and to formulate and solve problems and present solutions (Collaborative Skills).
VI	MAT6EEDG	Elementary Differential Geometry	C O 1	Compute the curvature and torsion of space curves.
			C O 2	Understand the notion of Serret-Frenet frame for space curves.
			C O 3	Understand definition of directional derivative and gradient and illustrate geometric meanings with the aid of sketches.
			C O 4	Calculate directional derivatives and gradients and apply gradient to solve problems involving steepest ascent and normal vectors to level curves.
			C O 5	Compute double integrals and triple integrals and change of variables. Can compute triple integrals in rectangular, cylindrical and spherical coordinates and illustrate its geometric meaning with the aid of sketches, and apply it to compute integrals over regions.
			C O 6	Understand the integral theorems: Green's , Gauss divergence and Stoke's and also its applications.
VI	MAT6EOTC	Optimization Techniques	C O 1	The student will understand the importance of optimization of industrial process management
			C O 2	The student will be able to apply basic concepts of mathematics to formulate an optimization problem

			C O 3	The student will analyze and appreciate variety of performance measures for various optimization problems
			C O 4	The student can develop and promote research interest in applying optimization techniques in problems of Engineering and Technology
			C O 5	The student will be able to solve a multi-objective problem through weighted and constrained methods
VI	MAT6NAA	Numerical Analysis	C O 1	Understand the importance of computers and the role of approximations and errors in the implementation and development of numerical methods.
			C O 2	Gain sufficient information to successfully approach a wide variety of problems dealing with roots of equations
			C O 3	Solve problems involving linear algebraic equations and appreciate the application of these equations in many fields.
			C O 4	Approach a wide variety of engineering problems dealing with optimization.
			C O 5	Enhance their capability to fit curves to data.
			C O 6	Solve ordinary differential equations and eigenvalue problems
	ELECTRONICS			
	PO Code	Programme Outcomes:		
	PO1	Apply knowledge and skill in the design and development of Electronics circuits to cater to the needs of Electronic Industry.		
	PO2	Acquire in-depth knowledge of Electronic devices, Linear and digital electronics, behaviour of linear and non-linear circuits, Hardware description		

		Language, Microprocessors and Microcontrollers in wider and global perspective, with an ability to discriminate, evaluate, analyze, synthesize and integrate for enhancement of knowledge.		
Sem ester	CourseCode	CourseName	C O C o d e	Course Outcomes
I	ELE1ECA	Electronic Devices & Circuit Analysis	C O 1	Learning about how oscillations can be produced with different frequencies.
			C O 2	Analyze a series and parallel resonant circuit.
			C O 3	Apply network theorems to analyze the complex electrical circuits.
			C O 4	Design a power supply for a given specifications with and without filters.
			C O 5	Develop various wave shaping circuits using diodes.
			C O 6	Understanding different types and transistors and biasing techniques.
II	ELE2A	Amplifiers	C O 1	able to solve the problems based on small signal equivalent model for the calculation of voltage gain, current gain, power gain input impedance and output impedance.
			C O 2	able to identify and he will be able to solve the engineering programs based on large signal power amplifiers for the calculation of power dissipation, Q-point and efficiency.
			C O 3	will have a thorough understanding of working principle of various power devices

III	ELE3LDEC	Linear Integrated Circuits & Digital Electronics	C O 1	Students will be able to understand filtering concept, design of all types of filters and oscillators.
			C O 2	Students will have a thorough understanding of IC 555 timer operation and its applications.
			C O 3	Students will be able to design any regulator of any specifications.
			C O 4	Students will be able to represent data in digital codes.
			C O 5	Students will be able to perform binary and hexadecimal arithmetic.
			C O 6	Able to explain the basic logic operations of NOT, AND, OR, NAND, NOR, and XOR.
			C O 7	Able to interpret logic functions, circuits, truth tables, and Boolean algebra expressions.
			C O 8	Able to apply the laws of Boolean algebra to simplify circuits and Boolean algebra expressions.
			C O 9	Able to use the methods of systematic reduction of Boolean algebra expressions including Karnaugh maps.
IV	ELE4DEA	Digital Design and VHDL programming	C O 1	Students will be able to Apply the knowledge of digital circuit concepts to optimize a digital circuit.
			C O 2	Students will be able to Analyze digital circuits and arrive at suitable conclusions.
			C O 3	Students will be able to Design a digital circuit for given problem statement by applying the digital circuit concepts.
			C O 4	Students will be able to Apply the knowledge of HDL for modeling and functional verification of digital circuits.
			C O 5	Students will be able to Analyze digital circuits using suitable VHDL modeling
			C O 6	Students will be able to Design and synthesize a digital circuit for complex systems using VHDL at several level of abstractions: behavioral, structural and data flow.
V	ELE5CIA	Communication I	C O 1	The student will be able to understand the basics of noise and Modulation techniques.

			C O 2	The student will be able to understand the differentiate modulation techniques.
			C O 3	The student will be able to understand the working principle of AM & FM Modulation and analysis of Transmitter and Receivers.
			C O 4	The student will be able to apply the concept of Transmission lines and the importance of Antennas and Radars.
			C O 5	The student will be able to understand the concept of Television ,Transmission and modern trends in Television.
V	ELE5MPIA	Microprocessors & Interfacing	C O 1	To understand the different language formats used in programming of Microprocessors
			C O 2	To gain knowledge about the architecture and programming concepts of the microprocessor.
			C O 3	To apply the acquired knowledge and program the processor.
			C O 4	To develop hardware using interfacing concepts and analyze the circuits.
VI	ELE6CIIA	Communication II	C O 1	The student will be able to understand digital and pulse modulation.
			C O 2	The student will be able to analyze the different digital modulation such as PCM,PAM,PPM,ASK,PSK and QPSK
			C O 3	The student will be able to understand the working principle of data communication and its analysis.
			C O 4	The student will be able to understand the principle of satellite communication and analysis of CDMA,FDMA and TDMA.
			C O 5	The student will be able to understand the concept of Optical fibre communication and light sources.
			C O 6	The student will be able to acquire knowledge about Mobile Communication and cellular networks.
VI	ELE6MCA	8051 Microcontroller	C O 1	To distinguish between a microprocessor and a microcontroller.
			C O 2	To understand the architecture and programming concepts of 8051 microcontroller

			C O 3	To apply the acquired knowledge of programming to solve different logical problems
			C O 4	To develop hardware using interfacing concepts and analyze the circuits.