DEPARTMENT OF PHYSICS

M.Sc. Physics (Electronics)

Core - Theory

SEMESTER 1

PH010101	**Mathematical Methods in Physics – I**	**Credits: 3**
CO1	Solve the problems in vector space using vector algebra	
CO2	Illustrate vectors in different orthogonal curvilinear coordinates systems	
CO3	Apply matrix method to solve linear equations	
CO4	Understand the fundamentals of tensor algebra.	

PH010102	**Classical Mechanics**	**Credits: 4**
CO1	Apply Lagrangian and the Hamiltonian methods to solve problems in classical mechanics	
CO2	Understand the physics of small oscillations and the concepts of canonical transformations and Poisson brackets	
CO3	Deduce the basic ideas of central forces and rigid body dynamics	
CO4	Understand the Hamilton-Jacobi method and the concept of action-angle variables.	

PH010103	**Electrodynamics**	**Credits: 4**
CO1	Explain basic concepts of Electrostatics, Magnetostatics and Electrodynamics	
CO2	Derive the mechanisms of Electromagnetic wave propagation	
CO3	Understand basic concepts of Relativistic Electrodynamics	
CO4	Solve problems related to electrodynamics and magnetostatics	

PH010104	**Electronics**	**Credits: 4**
CO1	Recall the concept of differential amplifier and feedback	
CO2	Compare Op-Amp circuits with positive and negative feedbacks	
CO3	Express the General Linear Applications of practical OP-Amp	
CO4	Explain the frequency response of Op-Amp	
CO5	Construct filters and signal generator circuits	
CO6	Analyze the applications of timer ICs	
CO7	Compare various Analog Communication methods	

SEMESTER 2

PH010201	Mathematical Methods in Physics – II	Credits: 4
CO1	Apply complex functions, analytical nature, Cauchy integral formula and for the evaluation of integrals	
CO2	Apply Laplace and Fourier transforms in Earth mutation, Damped oscillators and LCR circuits	
CO3	Evaluate different integrals using beta and gamma functions	
CO4	Understand nth order differential equations like Bessel, Legendre, Laguerre, Hermite and Associated Legendre	
CO5	Solve Laplace equation, poisson's equation and scattering problems using Green's function	

PH010202	Quantum Mechanics I	Credits: 4
CO1	Understand the basic formulation of Quantum Mechanics	
CO2	Understand the central concepts and principles in Quantum Dynamics.	
CO3	Analyze the quantum mechanical properties of hydrogen atom	
CO4	Construct Schrodinger equation for solving quantum mechanical problems	

PH010203	Statistical Mechanics	Credits: 4
CO1	Understand the statistical basis of thermodynamics and different statistical ensembles	
CO2	Analyze different systems using the idea of grand canonical ensemble and its quantum mechanical formulation	
CO3	Analyze the thermodynamical behaviour of Bose and Fermi systems using the quantum mechanical ensemble theory.	
CO4	Understand the Phase Transitions, Thermodynamic potentials, First order phase transition and Clapeyron equation.	

PH010204	Condensed Matter Physics	Credits: 4
CO1	Understand the concepts of diffraction of waves, reciprocal lattice and crystal symmetry	
CO2	Discuss the behaviour of electrons with in the crystal lattice by different models and its applications	
CO3	Apply the theory of semiconductors and its application	
CO4	Analyze the thermal and magnetic behaviour of solids	

SEMESTER 3

PH010301	**Quantum Mechanics-II**	**Credits: 4**
CO1	Derive different stationary state approximation methods	
CO2	Distinguish Variational method and WKB method	
CO3	Discuss time dependent perturbation theory.	
CO4	Apply time dependent perturbation theory in different quantum systems.	
CO5	Distinguish different approaches in scattering theory	
CO6	Explain the concept of relativistic quantum mechanics	

PH010302	**Computational Physics**	**Credits: 4**
CO1	Understand the elements of Interpolation and Curve fitting	
CO2	Solve the problems based on Numerical Integration and Differentiation	
CO3	Solve the Ordinary Differential Equation and Partial Differential Equations using different methods	
CO4	Apply matrix method for solving equations	

PH010303	**Atomic and Molecular Physics**	**Credits: 4**
CO1	Explain atomic structure and spectra of typical one- electron and two-electron systems.	
CO2	Apply the theory of microwave spectroscopy in problems	
CO3	Elaborate on electronic, microwave, infra - red spectroscopy	
CO4	Apply concepts of non - linear Raman effect in molecular spectroscopy	
CO5	Express the ideas of Mossbauer spectroscopy	

PH800301	**Digital Signal Processing**	**Credits: 3**
CO1	Differentiate Continuous time and Discrete time signals and systems with suitable examples	
CO2	Apply concepts of Fourier Transform in the analysis of Discrete time systems	
CO3	Explain the concept of Z-transform in Digital signal processing technique	
CO4	Develop design techniques for finite impulse response and infinite impulse response digital filters	

SEMESTER 4

PH010401	**Nuclear and Particle Physics**	**Credits: 4**
CO1	Explain the basic properties of the nucleus and the nuclear forces	
CO2	Indicate the major models of the nucleus and explain the theory behind the nuclear decay process	
CO3	Discuss the physics of nuclear reactions Analyze the feasibility of an interaction between elementary particles on the conservation laws	
CO4	Analyze the feasibility of an interaction between elementary particles on the conservation laws	
CO5	Discuss recent developments in Physics involving discovery of Higg's Boson, LIGO experiment etc	

PH800402	**Microelectronics and Semiconductor Devices**	**Credits: 3**
CO1	Describe the architecture and programming of the microprocessor 8085	
CO2	Distinguish and analyze the properties of Microprocessors & Microcontrollers	
CO3	Explain the architecture and programming of the microprocessor 8086.	
CO4	Demonstrate the Fabrication of Integrated Circuit	

PH800403	**Communication Systems**	**Credits: 3**
CO1	Distinguish various techniques of digital communication systems	
CO2	Elaborate the concepts of mobile communication and apply it in wireless communication through 2G, 3G and 4G systems.	
CO3	Discuss satellite communication system and applications in TV broadcasting , GPS systems	
CO4	Comment on the working of a RADAR system and explain different RADAR systems like CW RADAR, pulsed RADAR and Phase/Planar array type RADAR.	
CO5	Explain fibre optic communication system, its mode of transmission and different fibre losses	

Core – Practical

SEMESTER 1 & 2

PH010105	General Physics Practical	Credits: 4
CO1	Apply basic concepts of physics to experimentation	
CO2	Design experiments to obtain physical constants	
CO3	Develop observational and analytical skill	
CO4	Hypothesize and verify the results of experiments	

PH010206	Electronics	Credits: 4
CO1	Design electronic devices and circuits	
CO2	Analyze the working of active filters and oscillators using op -amp	
CO3	Construct linear integrated circuits using IC 555	

SEMESTER 3 & 4

PH010402	Computational Physics	Credits: 5
CO1	Apply Python language for programming	
CO2	Develop algorithm / Flowchart for computational physics programs	
CO3	Construct codes for different computational physics programs	
CO4	Apply numerical methods to obtain approximate solutions to mathematical problems.	

PH800302	Advanced Practical in Electronics	Credits: 5
CO1	Design electronic devices and circuits	
CO2	Design combinational and sequential circuits	
CO3	Simulate basic microprocessor programs using simulation software.	
CO4	Apply the theories of Communication Electronics in practical cases.	

PROJECT

PH010403	Project	Credits: 5
CO1	Identify a research topic of relevance and novelty	
CO2	Demonstrate conceptual understanding of fundamental physics principles	
CO3	Formulation and testing of hypothesis	
CO4	Data collection and analysis	