DEPARTMENT OF PHYSICS

M Sc PHYSICS

COURSE OUTCOMES

PHY1C01-CLASSICAL MECHANICS

CO1. The Lagrangian and Hamiltonian approaches in classical mechanics.
CO2. The classical background of Quantum mechanics and get familiarized with Poisson brackets and Hamilton -Jacobi equation
C03. Kinematics and Dynamics of rigid body in detail and ideas regarding Euler's equations of motion CO4 Theory of small oscillations in detail along with basis of free vibrations.
CO5. Basic ideas about Non-linear equations and chaos.

PHY1C02-MATHEMATICAL PHYSICS

CO1.Learn about Gradient, Divergence and Curl in orthogonal curvilinear and their typical applications in physics.
CO2. Learn about special type of matrices that are relevant in physics and then learn about tensors.
CO3. Get introduced to Special functions like Gamma function, Beta function, Delta function, Dirac delta function, Bessel functions and their recurrence relations
CO4. Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
CO5. Learn the fundamentals and applications of Fourier series, Fourier and Laplace transforms, their inverse transforms etc.

PHY1C03-ELECTRODYNAMICS AND PLASMA PHYSICS

C01: have gained a clear understanding of Maxwell's equations and electromagnetic boundary conditions.
C02: know that laws of reflection, refraction are outcomes of electromagnetic boundary conditions. They will also be able design dielectric coatings which act like antireflection coatings. They will be able to distinguish between a good metal and a good dielectric.
C03: have grasped the idea of electromagnetic wave propagation through wave guides and transmission lines.
C04: extend their understanding of special theory of relativity by including the relativistic electrodynamics.
C05: understand the rather complex physical phenomena observed in plasma.

PHY1C04- ELECTRONICS

CO1. Field Effect Transistors, their principles and applications
CO2 Photonic devices like LED, Laser diode, photodetectors, solar cells etc and their working in detail

CO3 Basic operational amplifier characteristics, OPAMP parameters, applications as inverter, integrator, differentiator etc
CO4. Digital electronics basics using logic gates and working of major digital devices like flip flops, CMOS, CCD etc.
C05 Karunagh maps, flip Flops, counters and working of Microprocessor in detail.

PHY2C05- QUANTUM MECHANICS I

CO1 Linear vector spaces, Hilbert space, concepts of basis and operators and bra and ket notation
CO2 Both Schrodinger and Heisenberg formulations of time development and their applications
CO3 Theory of angular momentum and spin matrices, orbital angular momentum and Clebsh Gordan Coefficient
CO4 Space-time symmetries and conservation laws, theory of identical particles
CO5 Theory of scattering and calculation of scattering cross section, optical theorem, Born and Elkonal approximation, partial wave analysis etc.

PHY2C06- MATHEMATICAL PHYSICS - II

C01: know the method of contour integration to evaluate definite integrals of varying complexity.
C02: have gained ability to apply group theory to physics problems, which is a pre-requisite for deeper understanding of crystallography, particle physics, quantum mechanics and energy bands in solids.
C03: be able to apply calculus of variations to diverse problems in physics including isoperimetric problems. Another interesting aspect is the use of Lagrange multipliers in solving physics problems.
C04: to become familiar with the method of Green's function to solve linear differential equations with inhomogeneous term
C05: to find solutions to integral equations using different methods.

PHY2C07- STATISTICAL MECHANICS

CO1.Explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics
CO2. Apply the principles of statistical mechanics to selected problems
CO3. Grasp the basis of ensemble approach in statistical mechanics to a range of situations
CO4. To learn the fundamental differences between classical and quantum statistics and learn about quantum statistical distribution laws
CO5 Study important examples of ideal Bose systems and Fermi systems

PHY2C08- COMPUTATIONAL PHYSICS

CO1.Have a strong base in Python language regarding different data type such as list, sets, dictionary etc. CO2 It helps to understand the different modules like NUMPY, Matplotlib etc.
CO3 Understand Arrays and matrices and enables data visualization
CO4. Gets a wide knowledge of numerical methods in computational Physics that can be used to solve many problems which does not have an analytic solution
C05: Solve problems in physics such as standing waves, central field motion, Kirchhoff's law etc using python language.

PHY3C09- QUANTUM MECHANICS II

CO1. Approximation methods for time-independent problems like the WKB approximation
CO2. The variational equation and its application to ground state of the hydrogen and Helium atom CO3 Perturbation theory and Interaction of an atom with the electromagnetic field
CO4. Relativistic Quantum Mechanics using Dirac equation, Dirac matrices, The Klein Gordon equation etc.
CO5. Second quantization of the Schrödinger wave field for bosons and fermions

PHY3C10- NUCLEAR AND PARTICLE PHYSICS

CO1 - have a basic knowledge of nuclear size, shape, binding energy etc. and also the characteristics of nuclear force in detail.
CO2 – be able to gain knowledge about various nuclear models and potentials associated.
CO3 – acquire knowledge about nuclear decay processes and their outcomes. Have a wide understanding regarding beta and gamma decay.
CO4 –Grasp knowledge about Nuclear reactions, Fission and Fusion and their characteristics.
C05 understand the basic forces in nature and classification of particles and study in detail conservations laws and quark models in detail

PHY3C11- SOLID STATE PHYSICS

CO1 - have a basic knowledge of crystal systems and spatial symmetries, - be able to account for how crystalline materials are studied using diffraction, including concepts like reciprocal lattice and Brillouin zones
CO2- know what phonons are, and be able to perform estimates of their dispersive and thermal properties, be able to calculate thermal and electrical properties in the free-electron model
CO3- know Bloch's theorem and what energy bands are and know the fundamental principles of semiconductors
CO4-know the fundamentals of dielectric and ferroelectric properties of materials CO5- know basic models of dia, para and ferromagnetism
CO6 – be able to explain superconductivity using BCS theory

PHY3E07- RADIATION PHYSICS

CO1 demonstrate a knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions and the interaction of radiation and matter.
CO2 discuss nuclear and radiation physics connection with other physics disciplines – solid state, elementary particle physics, radiochemistry, astronomy.
CO3 discuss nuclear and radiation physics applications in medical diagnostics and therapy, energetics, geology, archaeology.
CO4 describe experimental techniques used (or developed) for nuclear physics purposes (logic circuits, gamma cameras, semiconductor detectors) and discuss their influence on development of new technologies.
CO5 explore an application of nuclear and/or radiation physics and communicate their understanding to a group of their peers in a short presentation.

PHY4C12- ATOMIC & MOLECULAR SPECTROSCOPY

C01: know about different atom model and will be able to differentiate different atomic systems, different coupling schemes and their interactions with magnetic and electric fields.
C02: Have gained ability to apply the techniques of microwave and infrared spectroscopy to elucidate the structure of molecules
C03: Be able to apply the principle of Raman spectroscopy and its applications in the different field of science & Technology.
C04: To become familiar with different resonance spectroscopic techniques and its applications
C05: to find solutions to problems related different spectroscopic systems.

PHY4E11- MATERIALS SCIENCE

CO1 An idea about all types of crystal defects and dislocations
CO2 information about Phase diagrams and general diffusion theory in detail
CO3 A fair idea of plastic deformation and fracture of material from an engineering point of view
CO4 A bridge between a physicist and a material scientistCO4 A comprehensive awareness of the most important engineering material of the century namely polymers
CO5 State of the art facts and techniques of the synthesis and characterization of nano materials

PHY4E11- MICROPROCESSORS AND APPLICATION

CO1, Study the Organization and internal architecture of the Intel 8085, CO2 learn assembly language programming and arithmetic
CO2 Aware of Memory interfacing, and different Data transfer schemes, CO4 CO5 Learn interfacing with peripheral I/O devices
CO6 Learn common applications of microprocessors like E Analog to Digital convert 7 segment LED displays; Temperature measurement and control using a microprocessor etc.