NEHRU MEMORIAL COLLEGE (AUTONOMOUS)

NATIONALLY ACCREDITED WITH "A" GRADE BY NAAC

PUTHANAMPATTI,TRICHY – 621007

DEPARTMENT OF PHYSICS

PG

COURSE OUTCOME (COS)

Name of the Course	Course Outcomes
MATHEMATICAL PHYSICS-I	**CO 1:** The students will be able to understand and apply the mathematical skills to solve quantitative problems in the study of physics. **CO 2:** Learn about Gradient, Divergence and Curl in orthogonal curvilinear and their typical applications in physics. The students should be able to formulate and express a physical law in terms of vectors, and simplify it by use of coordinate transforms. **CO 3:** Learn different ways of solving second order differential equations and familiarized with singular points and Fresenius method. **CO 4:** Learn the fundamentals and applications of Fourier series, Fourier and Laplace transforms, their inverse transforms etc. Will enable students to apply integral transform to solve mathematical problems of interest in physics. The students will be able to use Fourier transforms as an aid for analyzing experimental data. Get introduced to Special functions like Gamma function, Beta function, Bessel functions and their recurrence relations. **CO 5:** To become familiar with the method of Green's function to solve linear differential equations with inhomogeneous term.
CLASSICAL DYNAMICS AND SPECIAL RELATIVITY	**CO 1:** Solve the simple physical system using all the three formalisms. **CO 2:** Realize the physical concepts involved in rigid body dynamics. **CO 3:** Apply special theory of relativity to elementary particles

ELECTRONICS AND INSTRUMENTATION	**CO 1:** The students will understand the working principles of various electronic devices, circuits, optoelectronic devices, electronic instrumentation and nonlinear circuits.
PIC MICROCONTROLLER AND APPLICATIONS	**CO 1:** Understand the basic working of PIC Microcontroller **CO 2:** Understand and apply the fundamentals of assembly programming for microcontroller. **CO 3:** Get comprehensive knowledge on the interrupts and timers **CO 4:** Understand the significance of input-output device interface **CO 5:** Able to design a project or product with microcontroller
MICROCONTROLLER PROGRAMMING LAB	**CO 1:** Understand the real concept of interfacing **CO 2:** Work on different projects making use of the PIC microcontroller **CO 3:** Able to solve some mathematical expressions using microcontroller **CO 4:** Design of real time systems
MATHEMATICAL PHYSICS-II	**CO 1:** The students will be able to understand and apply the mathematical skills to solve quantitative problems in the study of physics. **CO 2:** Know the method of contour integration to evaluate definite integrals of varying complexity.

	CO 3: Learn about special type of matrices that are relevant in physics and then learn about tensors. **CO 4:** 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.
STATISTICAL MECHANICS	**CO 1:** Explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics. **CO 2:** Apply the principles of statistical mechanics to selected problems. **CO 3:** Grasps the basis of ensemble approach in statistical mechanics to a range of situations. **CO 4:** To learn the fundamental differences between classical and quantum statistics and learn about quantum statistical distribution laws. **CO 5:** Study important examples of ideal Bose systems and Fermi systems.
QUANTUM MECHANICS	**CO 1:** Familiarize with the postulates of quantum mechanics **CO 2:** Understand the operator formalism **CO 3:** Solve the Schrodinger equation of simple systems
COMPUTATIONAL METHODS	**CO 1:** Develop C++ programs for numerically solving problems **CO 2:** Derive computational methods and error analysis for various mathematical operations and tasks

	CO 3: Make an appropriate curve fit for a given data set; **CO 4:** Apply appropriate algorithm for interpolating data and value of a function; **CO 5:** Understand and apply methods of constructing solutions of system of linear equations; **CO 6:** Familiar with numerical integration and differentiation of functions.
ELECTROMAGNETIC THEORY	**CO 1:** To explain and solve advanced problems based on classical electrodynamics using Maxwell's equation. **CO 2:** The students will be able to analyze s radiation systems in which the electric dipole, magnetic dipole or electric quadruple dominate. **CO 3:** The students will have an understanding of the covariant formulation of electrodynamics and the concept of retarded time for charges undergoing acceleration. **CO 4:** Learn various concepts of electromagnetic waves.
SOLID STATE PHYSICS	**CO 1:** Structures in solids and their determination using XRD. **CO 2:** Behavior of electrons in solids including the concept of energy bands and effect of the same on material properties. **CO 3:** Electrical, thermal, magnetic and dielectric properties of solids. **CO 4:** The students will be able to formulate basic models for electrons and lattice **CO 5:** vibrations for describing the physics of crystalline materials;

	CO 6: Develop an understanding of relation between band structure and the electrical/optical properties of a material.
ATOMIC AND MOLECULAR PHYSICS	**CO 1:** Atomic spectroscopy of one and two valance electron atoms. **CO 2:** The change in behavior of atoms in external applied electric and magnetic field. **CO 3:** Rotational, vibrational, electronic and Raman spectra of molecules. **CO 4:** Electron spin and nuclear magnetic resonance spectroscopy. **CO 5:** Quantum behavior of atoms in external electric and magnetic fields; and become familiar with the working principle of laser.
CRYSTAL GROWTH AND THIN FILMS	**CO 1:** Nucleation mechanisms and different kinds of nucleation **CO 2:** important crystal growth techniques like (Bridgman, Czochralski (Pulling method),solution growth, gel ,flux and hydrothermal methods) **CO 3:** gain in depth knowledge on thin films growth methods of Physical and chemical. **CO 4:** Understanding of various characterization techniques of a) Powder and Single crystal XRD b) FTIR, c) UV-Visible and PL, d) micro hardness e) SEM and TEM
NUCLEAR AND PARTICLE PHYSICS	**CO 1:** The students will have an understanding of the structure of the nucleus, radioactive decay, nuclear reactions and the interaction of nuclear radiation with matter; and develop an insight into the building block of matter along with the fundamental interactions of nature.

	CO 1: After successful completion of the course, the student is expected to **CO 2:** Have a basic knowledge of nuclear size, shape, bindingenergy.etc and also the characteristics of nuclear force in detail. **CO 3:** be able to gain knowledge about various nuclear models and potentials associated. **CO 4:** Acquire knowledge about nuclear decay processes and their outcomes. Have a wide **CO 5:** understanding regarding beta and gamma decay. **CO 6:** Grasp knowledge about Nuclear reactions, Fission and Fusion and their **CO 7:** characteristics. Understand the basic forces in nature and classification of particles **CO 8:** and study in detail conservations laws and quark models in detail **CO 9:** Weak interaction between quarks and how that this is responsible for β decay. . **CO10:**Leptons and how the (electron) neutrinos and (electron) antineutrinos are produced during β+ and β- decays respectively.
ELECTRONIC COMMUNICATION SYSTEMS	**CO 1:** Optical fiber communication. **CO 2:** Satellite communication and mobile communication.
NANOSCIENCE	**CO 1:** Preparation of Nanoparticles and nonmaterial's. **CO 2:** Quantum computers, MEMS and NEMS.