FATIMA COLLEGE (AUTONOMOUS),MADURAI–625018

COURSE OUTCOMES

NAME OF THE PROGRAMME: M.SC PHYSICS **PROGRAMME CODE: PAPH**

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
19PG1P1	INTRODUCTION TO MATHEMATICAL PHYSICS	CO 1: Define and deduce gauss divergence and stokes theorem and solving problems on gauss divergence and stokes theorem. CO 2: Discuss orthogonal curvilinear coordinates and spherical polar coordinates and solving problems using these coordinates. CO 3: Explain special type of matrices and its Eigen value problems and illustrate the properties of Fourier and Laplace transforms CO 4: Define Beta and Gamma Functions and find its relations
19PG1P2	APPLIED ELECTRONICS	CO 1: Distinguish between BJT and FET. CO 2: Explain the fundamental concepts of diode, BJT and transistor biasing to understand the small signal behaviour of FET for amplification applications. CO 3: Outline the basics of linear and nonlinear analog systems. CO 4: Describe the design concepts of counters and shift registers. CO 5: Apply the theory of OPAMP to design the linear and nonlinear applications of it. CO6. Describe the design concepts of counters and shift registers. Demonstrate the various techniques to develop A/D and D/A converters

19PG1P03	CLASSICAL MECHANICS	CO 1: Different types of constraints imposed on systems. CO 2: Derive Lagrange's equation from Hamilton's variational principle and to write the equation of motion for any given system according to Lagrangian formulation. CO 3: Explain the two body central force problem and classification of orbits and hence to discuss scattering in a central force field. CO 4: Apply the theory of small oscillations to a linear triatomic molecule and get the normal modes and normal frequencies of the same. CO 5: To derive Hamilton's equations using Legendre transformation. CO 6: Evaluate the connection between conservation theorems and symmetry properties of the system. And solve problems related to canonical transformations and Poisson brackets.
19PGP1E1	MODERN PHOTOGRAPHY	CO 1: Comprehend the basic parts of camera, its important control parameters and composition techniques of photography CO 2: Handle SLR camera and apply various composition techniques and shoot professional photographs CO 3: Understand the modern technique of photoshop and develop skills to manipulate, edit and enhance the real time photographs using photoshop. CO 4: Prepare their own digital ids and greeting cards with photoshop.

19PG2P6	PRINCIPLES IN ADVANCED MATHEMATICAL PHYSICS	CO 1: Perform algebra with complex numbers and to Identify and determine the differentiable functions and find its derivatives. CO 2: Identify the singularities of a function and determine whether they are removable poles are essential. CO 3: Perform algebra of tensors and apply four vectors in special relativity and the formulation of electrodynamics. CO 4: Discuss greens function for Sturn – Liouville operator and to compute dirac delta functions Green's functions and solving problems CO 5: Represent delta function and apply delta calculus. CO 6: Describe group, cyclic group , sub group and multiplication tables CO 7: Prove great orthogonality theorem and construct character tables of a group.
PG2P07	QUANTUM MECHANICS	CO 1: Analyze the inadequacy of Classical mechanics to explain black body radiation, photoelectric effect, specific heat of solids and Compton effect. CO 2: Discuss the basic postulates of Quantum mechanics. CO 3: Explain the general formalism of wave function and to write the Schrodinger's equation and obtain the Eigen values and Eigen functions of a particle in a square potential well; To discuss the problem of barrier penetration. CO 4: Solve the problem of Simple harmonic oscillator by Schrodinger's method and also by abstract operator method. CO 5: Compare Shrodinger's notation with Dirac notation and to discuss the representation of state vectors and operators. And outline the matrix representation of orbital and spin angular momenta and to calculate Clebsch -Gordon coefficients.

19PG2P8	ELECTROMAGNETIC THEORY	CO 1: Gain insight about the electric field and their charge distribution at various condition such as in static and moving fields CO 2: Cultivate knowledge in dealing with the static electric field in dielectric media and their elaborated parameter study. CO 3: Develop thorough knowledge of static and moving magnetic fields of steady current and charged particles. CO 4: Detailed understanding of time dependent electric and magnetic fields and their wave propagation properties. CO 5: Acquire essential knowledge in circuitry in transmission lines and wave guides and a detailed study about antenna.
19PGP1E1	MODERN PHOTOGRAPHY	CO 1: Comprehend the basic parts of camera, its important control parameters and composition techniques of photography CO 2: Handle SLR camera and apply various composition techniques and shoot professional photographs CO 3: Understand the modern technique of photoshop and develop skills to manipulate, edit and enhance the real time photographs using photoshop. CO 4: Prepare their own digital ids and greeting cards with photoshop.
19PG3P11	CONDENSED MATTER PHYSICS	CO 1: Explain Fourier analysis of crystals and compute the structure factor - Discuss the various types of crystal binding CO 2: Discuss quantization of elastic waves in lattice vibrations CO 3: Analyze the thermal properties of solids by applying different models CO 4: Discuss the Kronig-Penney model and its implications CO 5: Explain Fermi surfaces and determine the same by De Haas van Alphen effect.

19PG3P12	STATISTICAL MECHANICS	CO 1: Analyse classical equilibrium thermodynamics to make physical predictions, describe the effects of quantum mechanics on statistical mechanics. CO 2: Acquire knowledge on Canonical and Grand canonical ensembles. CO 3: Understand the concepts of Bose Einstein condensation CO 4: Apply statistical mechanics to condensed matter systems such as Fermi gases, white dwarfs and nuclear matter. CO 5: Compute fluctuations in the systems of canonical, micro canonical and grand canonical ensembles and comprehend random process using Fourier analysis.
19PG3P13	NUCLEAR AND PARTICLE PHYSICS	CO 1: Define nuclear fission and fusion process and beta decay CO 2: Describe nuclear energy sources CO 3: Explain various nuclear models CO 4: Describe nuclear reactions and solve some problems related to cross section CO 5: Classify the elementary particles and explain their various properties.

19PG3PE1A	COMMUNICATION SYSTEMS	CO 1: Explain amplitude modulation techniques and sideband principles CO 2: Describe the concepts of angle modulation and compare frequency and phase modulation CO 3: Describe the key modules of digital *communication systems* with emphasis on...PAM, Pulse code modulation (PCM), DM CO 4: Deduce the fundamental laws of of satellite communication and explain the principle of optical fiber communication CO 5: Describe about basic, high frequency, microwave , wideband and special purpose antennas and principles of microwave generation.
19PG3PE1B	NUMERICAL METHODS & PROGRAMMING IN C++	CO 1: Solve Algebraic and Transcendental equations numerically using Regula Falsi and Newton Raphson method CO 2: Apply newton's forward and backward interpolation formulae to equal and unequal intervals CO 3: Evaluate numerical differentiation and integration. CO 4: Compose C++ program using structures and classes and apply inheritance and polymorphism features in C++ programming. CO 5: Describe the design concepts of counters and shift registers. Demonstrate the various techniques to develop A/D and D/A converters.

19PG4P16	ADVANCED CONDENSED MATTER PHYSICS	CO 1: Analyse the dispersion of electromagnetic waves in a non-magnetic solid CO 2: Identify lattice vacancies and defects and explain the color centers in crystals, Compare the behaviour of normal conductor and superconductor, Explain superconductivity based on various models and theories CO 3: Identify dielectric medium and analyze their polarization properties CO 4: Identify magnetic solids and their properties. Apply quantum theory and analyze the magnetisation and susceptibility properties. CO 5: Discuss the formation of plasmons, polaritons, polarons and excitons and their interactions with the solids.
PG4PI7	MOLECULAR SPECTROSCOPY	CO 1: Identify the various interactions of radiation with matter and the corresponding regions in the electromagnetic spectrum. CO 2: Derive the relationship between molecular spectra and molecular properties CO 3: Explain Microwave , Spin Resonance, Infra Red, Raman , Electronic and NMR spectra and the associated techniques and instrumentation. CO 4: Apply the theory to understand molecular spectra CO 5: Derive Bloch equations CO 6: Analyze the results of measurements using molecular spectroscopic methods and to solve problems related to spectroscopic studies of molecules

19PG4P18	ADVANCED QUANTUM MECHANICS	CO 1: Understand perturbation theory CO 2: Solve quantum mechanical problems using variation method and solve one dimension Schrödinger equation using WKB approximation method CO 3: Explain about dipole approximation, harmonic perturbation, Fermi's Golden rule CO 4: Understand partial wave analysis techniques CO 5: Solve the problems using relativistic equations
19PG4PE2A	MATERIALS SCIENCE	CO 1: Deduce the expressions of Nucleation phenomena and explain various Crystal growth techniques CO 2: Explain the mechanism of molecular movements in Ceramics, Polymers and Composites CO 3: Analyse various methods of preparing thin films and its measurement techniches CO 4: Explore novel methods of preparing carbon nanomaterials and carbon nanotubes. CO 5: Understand the concepts of Diffraction analysis, Thermal analysis and Electron microscopy used in crystal characterisation

19PG4PE2B	ASTROPHYSICS	CO 1: Outline variety of objects in the Universe with a sense of scale for size and time and different types of observing techniques, instruments used in Astronomy. CO 2: Acquire knowledge about the stellar evolution and mechanism of stellar energy generation CO 3: gain an idea of fate of massive stars exploding as dazzling supernovae and medium mass stars condensing as neutron stars CO 4: explain the surface features and regions of the nearest star Sun and the impacts of the solar activities on earth. CO 5: obtain knowledge about the origin and evolution of the Universe and comprehend its future course.
19PGSLP1	INSTRUMENTATION AND EXPERIMENTAL METHODS	CO 1: Explain the field of nanoscience to analyze and fit the experimental data with different kind of errors CO 2: Explain principle, theory and application of various sensors and transducers CO 3: Describe the various methods of vacuum and thin film measurements CO 4: Discuss the basic principle and importance of the different AC and DC measurement techniques. CO 5: Explain the developing instruments and their uses