PROGRAMME OUTCOMES AND COURSE OUTCOMES

2022 – 2023

NAME OF THE PROGRAMME: M.Sc Physics **PROGRAMME CODE: PAPH**

Programme Outcomes

PO1	Gain exposure on the analysis and interpretation of mathematical models including the problems of physics
PO2	Promote experimental skills
PO3	Develop entrepreneurship and employability skills

Course Outcomes

Course Code	Course Title	Course Outcomes
19PG1P1	Introduction To Mathematical Physics	CO1. Students will be able to define and deduce gauss divergence and stokes theorem and solving problems on gauss divergence and stokes theorem CO2.Students will be able to Discuss orthogonal curvilinear coordinates and spherical polar coordinates and solving problems using these coordinates

		CO3.Students will be able to Explain special type of matrices and its Eigen value problems and illustrate the properties of Fourier and Laplace transforms CO4.Students will be able to Define Beta and Gamma Functions and find its relations CO5.Students will be able to Define Gamma Functions and find its relations
19PG1P2	Applied Electronics	CO1. Students will be able to distinguish between BJT and FET CO2. Students will be able to explain the fundamental concepts of diode, BJT and transistor biasing to understand the small signal behaviour of FET for amplification applications CO3. Students will be able to Outline the basics of linear and non linear systems CO4. Students will be able to describe the design concept of counters and shift registers CO5. Students will be able to apply the theory of OPAMP to design the linear non linear applications of it

19PG1P3	Classical Mechanics	CO1. Students will be able identify different types of constraints imposed on systems CO2. Students will be able derive Lagrange's equation from Hamilton's variational principle and to write the equation of motion for any given system according to Lagrangian formulation. CO3. Students will be able explain the two body central force problem and classification of orbits and hence to discuss scattering in a central force field. CO4. Students will be able apply the theory of small oscillations to a linear triatomic molecule and get the normal modes and normal frequencies of te same. CO5. Students will be able derive Hamiltonh's equations using Legendre transformation. To evaluate the connection between conservation theorems and symmetry properties of the system. To solve problems related to canonical transformations and Poisson brackets
21PG1P4	Applied Optics	CO1: Students will be able to Understand and explain the properties of Laser beams and types of lasers CO2 : Students will be able to Describe the basic concepts of nonlinear

		optics and principles of second harmonic generation and optical mixing CO3. Students will be able to Acquire knowledge about the techniques of Fourier optics inclusive of diffraction CO4.Students will be able to Understand the fundamentals of optical signal processing and its techniques of analysis CO5.Students will be able to Describe the principles and practical problems of holography .
19PG1P5	Practicals-I (Non-Electronics)	Students will be able to handle the laboratory equipment's and develop lab skills in non-electronics experiments
19PG1P6	Practicals-I (Electronics)	Students will be able to handle the laboratory equipment's and develop lab skills in electronics experiments.
19PG2P7	Advanced Mathematical Physics	CO1.Students will be able to Perform algebra with complex numbers and to Identify and determine the differentiable functions and find its derivatives CO2. Students will be able to Identify the singularities of a function and determine whether they are removable poles are essential

		CO3. Students will be able to Perform algebra of tensors and apply four vectors in special relativity and the formulation of electrodynamics CO4. Students will be able to Discuss greens function for Sturn – Liouville operator and to compute dirac delta functions Green's functions and solving problems CO5. Students will be able to Represent delta function and apply delta calculus
19PG2P8	Quantum Mechanics	CO1. Students will be able to analyze the inadequacy of Classical mechanics to explain black body radiation, photoelectric effect, specific heat of solids and Compton effect. CO2. Students will be able to discuss the basic postulates of Quantum mechanics. CO3. Students will be able to 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.

		CO4. Students will be able to solve the problem of Simple harmonic oscillator by Schrodinger's method and also by abstract operator method. CO5. Students will be able to compare Schrodinger's notation with Dirac notation and to discuss the representation of state vectors and operators.
19PG2P9	Electromagnetic Theory	CO1. Students will be able to Gain insight about the electric field and their charge distribution at various condition such as in static and moving fields CO2. Students will be able to Cultivate knowledge in dealing with the static electric field in dielectric media and their elaborated parameter study. CO3. Students will be able to Develop thorough knowledge of static and moving magnetic fields of steady current and charged particles. CO4. Students will be able to Detailed understanding of time dependent electric and magnetic fields and their wave propagation properties. CO5. Students will be able to Acquire essential knowledge in circuitry in transmission lines and wave guides and a detailed study about

		antenna.
21PG2P10	Instrumentation and Microcontroller	CO1. Students will be able to understand the basic knowledge on various resistive transducers CO2. Students will be able to discuss the physics behind inductive and capacitive transducer CO3. Students will be able to comprehend the working principle behind the various optical,mechanical , digital and electrochemical transducers. CO4.Students will be able to assess and describe the basic properties and architecture of 8051 Microcontroller CO5. Students will be able to solve basic arithmetic operations and perform the necessary programming for it.
19PG2P11	Practicals (Non-Electronics)	Students will be able to handle the laboratory equipment's and develop lab skills innon-electronics experiments.
19PG2P12	Practicals (Electronics)	Students will be ale to handle the laboratory equipment's and develop lab skills in electronics experiments.
19PG3P11	Condensed Matter Physics	CO1. Students will be able to Explain Fourier analysis of crystals and compute the structure factor - Discuss the various types of crystal binding CO2. Students will be able to Discuss quantization of elastic waves in

		lattice vibrations CO3. Students will be able to Analyze the thermal properties of solids by applying different models CO4. Students will be able to Discuss the Kronig-Penney model and its implications CO5. Students will be able to Explain Fermi surfaces and determine the same by De Haas van Alphen effect
19PG3P12	Statistical Mechanics	CO1. Students will be able to Analyse classical equilibrium thermodynamics to make physical predictions, describe the effects of quantum mechanics on statistical mechanics CO2. Students will be able to Acquire knowledge on Canonical and Grand canonical ensembles. CO3. Students will be able to Understand the concepts of Bose Einstein condensation. CO4. Students will be able to Apply statistical mechanics to condensed matter systems such as Fermi gases, white dwarfs and nuclear matter. CO 5. Students will be able to

		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	CO1. Students will be able to understand range of alpha particles, spectra and Gamow's theory of alpha decay. And to describe Fermi's theory of Beta decay. CO2. Students will be able to Describe nuclear energy sources CO3. Students will be able to Explain various nuclear models CO4. Students will be able to Describe nuclear reactions and solve some problems related to cross section CO5. Students will be able to Classify the elementary particles and explain their various properties
19PG3P14	Practicals V (Advanced Non Electronics)	Students will experience conceptual understanding of electrical, magnetic, optical and magneto-opticproperties of materials, propagation of Ultrasonic waves through liquids, lattice parameters of crystals, principle and efficiency of solar water heater, properties of polarized light
19PG3P15	Practicals VI (Advanced Electronics)	Students will be able to use the various electronic devises for various applications. Also the student is exposed to Mathematica –Wolfram

		language and Wolfram cloud to plot simple functions.
19PG4P16	Advanced Condensed Matter Physics	CO1. Students will be able to Analyse the dispersion of electromagnetic waves in a non-magnetic solid CO2. Students will be able to 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 CO3. Students will be able to Identify dielectric medium and analyze their polarization properties. CO 4. Students will be able to Apply quantum theory and analyze the magnetisation and susceptibility properties CO5. Students will be able to Discuss the formation of plasmons, polaritons, polarons and excitons and their interactions with the solids.
19PG4P17	Molecular Spectroscopy	CO1. Students will be able to identify the various interactions of radiation with matter and the corresponding regions in the electromagnetic spectrum. CO 2. Students will be able to derive the relationship between molecular spectra and molecular properties

		CO 3. To explain Microwave , Spin Resonance, Infra Red, Raman , Electronic and NMR spectra and the associated techniques and instrumentation. CO4. Students will be able to apply the theory to understand molecular spectra CO5. Students will be able to a derive Bloch equations.
19PG4P18	Advanced Quantum Mechanics	CO1. Students will be able to understand perturbation theory and Solve quantum mechanical problems using variation method CO 2. Students will be able to Solve one dimension Schrödinger equation using WKB approximation method CO3. Students will be able to Explain about dipole approximation, harmonic perturbation, Fermi's Golden rule CO4. Students will be able to Understand partial wave analysis techniques CO5. Students will be able to Solve the problems using relativistic equations
19PG4P19	Practicals VII Physics of General Experiments	Students will be able to deals with electric, magnetic, optic and electromagnetic behaviour of materials,propagation of Ultrasonic waves through liquids, microwave characteristics

19PG4P20	Practicals VIII PROGRAMMING IN C++	Students will be familiar the to apply numerical methods in modern scientific computing.
19P1EDC/ 19P2EDC	Modern Photography	CO1. Students will be able to Understand the basic phenomena of photography. CO2.Students will be able to comprehend the basic parts of camera, its important control parameters and composition techniques of photography CO3. Students will be able to handle SLR camera and apply various composition techniques and shoot professional photographs CO4. Students will be able to understand the modern technique of photoshop and develop skills to manipulate, edit and enhance the real time photographs using photoshop. CO5. Students will be able to prepare their own digital ids and greeting cards with photoshop
19PG3PE1A	Communication Systems	CO1. Students will be able to Explain amplitude modulation techniques and sideband principles CO2. Students will be able to Describe the concepts of angle modulation and compare frequency and phase modulation CO3. Students will be able to Describe the key modules of

		digital *communication systems* with emphasis on...PAM, Pulse code modulation (PCM), DM CO4. Students will be able to Deduce the fundamental laws of of satellite communication and explain the principle of optical fiber communication CO5. Students will be able to Describe about basic, high frequency, microwave , wideband and special purpose antennas and principles of microwave generation.
19PG3PE1B	Numerical Methods & Programming in C++	CO 1. Students will be able to Solve Algebraic and Transcendental equations numerically using Regula Falsi and Newton Raphson method CO 2. Students will be able to Apply newton's forward and backward interpolation formulae to equal and unequal intervals CO3. Students will be able to Evaluate numerical differentiation and integration CO4. Students will be able to Compose C++ program using structures and classes and apply inheritance and polymorphism features in C++ programming. CO5.Students will be able to Describe the design concepts of counters and shift registers.Demonstrate the various techniques to develop A/D

		and D/A converters
19PG4PE2A	Materials Science	CO1. Students will be able to Deduce the expressions of Nucleation phenomena and explain various Crystal growth techniques CO2. Students will be able to Explain the mechanism of molecular movements in Ceramics, Polymers and Composites CO3. Students will be able to Analyse various methods of preparing thin films and its measurement techniches CO4. Students will be able to Explore novel methods of preparing carbon nanomaterials and carbon nanotubes. CO5. Students will be able to nderstand the concepts of Diffraction analysis, Thermal analysis and Electron microscopy used in crystal characterisation
19PG4PE2B	Astro Physics	CO 1. Students will be able tooutline 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. CO2. Students will be able to acquire knowledge about the stellar evolution and mechanism of stellar energy generation CO3. Students will be able to gain an idea of fate of massive stars

		exploding as dazzling supernovae and medium mass stars condensing as neutron stars CO4. Students will be able to explain the surface features and regions of the nearest star Sun and the impacts of the solar activities on earth. CO 5. Students will be able to obtain knowledge about the origin and evolution of the Universe and comprehend its future course.
19PAD2CA	Computer Applications LATEX	CO 1. Students will be able to Install and understand the basics of Latex CO2. Students will be able to Defines commands for symbols, alignment and page layout in Latex CO3. Students will be able to Create tables, figures using Latex CO 4. Students will be able to Write documents containing mathematical formulas using Latex CO5. Students will be able to Prepare presentation, articles, books using Latex.
19PGSLP1	Instrumentation and Experimental Methods	CO1. Students will be able to Explain the field of nanoscience to analyze and fit the experimental data with different kind of errors CO2. Students will be able to explain principle, theory and application of various sensors and transducers

		CO3. Students will be able to describe the various methods of vacuum and thin film measurements CO4. Students will be able to Discuss the basic principle and importance of the different AC and DC measurement techniques. CO5. Students will be able to Explain the developing instruments and their uses
21PG2PSL1	Nanotechnology for All	CO 1. Students will be able to brief about fabrication techniques and resources of nanotechnology. CO 2. Students will be able to Build a Better world with Nanomaterials CO3. Students will be able to describe The carbon nanotube connections CO4. Students will be able to understand the Nano fibers CO5. Students will be able to understand Nanotechnology in medical applications.