



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

CURRICULUM RELEVANCE TO THE LOCAL, REGIONAL, NATIONAL AND GLOBAL NEEDS

NAME OF THE PROGRAMME: M.Sc., PHYSICS

PROGRAMME CODE: PPH

PROGRAMME OUTCOMES

PO1: Demonstrate the knowledge and understanding of Science concepts and its relevant fields.

PO2: Identify, formulate, analyze complex problems and reach valid conclusions using the methodologies of Science.

PO3: Employ critical and analytical thinking in understanding the concepts and apply them in various problems appearing in different branches of Science.

PO4: Communicate the known concepts effectively within the profession and with any forum

PO5: Function successfully as a member/leader in any team and to apply ethics, accountability and equity in their life.

PO6: Use ICT tools in various learning situations, related information sources, suitable software to analyze data and furthermore participating in learning activities throughout life to meet the demands of work place through knowledge /up-skilling / re-skilling.



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Understand, demonstrate and solve the major findings in all branches of Physics.

PSO2: Employ critical thinking and scientific ideas to design, carry out the work and analyze the problems in real time

PSO3: Communicate effectively and develop skills such as effective oral presentations, writing of reports of practical works and documentation work of research projects

PSO4: Work effectively in a team to use modern techniques, recent equipment and software's in Physics in the fields of Electronics, Optics, Condensed Matter Physics and Quantum Mechanics

PSO5: Inculcate the scientific temperament and green route for sustainable development and moral values in their profession with active participation

PSO6: Extend contemporary research innovations based on societal needs regarding new renewable energy harvesting methods



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

S.No	Course Code	Course Name	Course Outcomes
1	21PPHC11	Mathematical Physics - I	<p>CO1: Determine the rank of a matrix and also apply characteristic equation to find Eigen values and Eigen vectors.</p> <p>CO2: Solve the differential operations in vectors.</p> <p>CO3: Understand and compare different integrals such as line, surface and volume exclusively.</p> <p>CO4: Simplify complex functions through differentiation and integration.</p> <p>CO5: Determine residues of various complex functions and can evaluate the definite integrals.</p>
2	21PPHC12	Classical Mechanics	<p>CO1: Demonstrate the Lagrangian principles and D’alembert Principle.</p> <p>CO2: Acquire the fundamental Principles of Hamiltonian principles in various classical mechanical problems.</p> <p>CO3: Connect the principles of central body problems into Kepler’s law.</p> <p>CO4: Analyze the fundamentals of rigid body problem and oscillations.</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>CO5: Apply Hamilton's characteristic function to solve problems in Lagrange's and Poisson's brackets.</p>
3	21PPHC13	<p>Analog Electronics and Communications</p>	<p>CO1: Recognize the working of different semiconductor devices and describe their functions.</p> <p>CO2: Acquire the knowledge of operations of OP-AMP to perform the various mathematical logics.</p> <p>CO3: Use the significance of Op-amps and their importance in oscillator circuits.</p> <p>CO4: Appraise the use of amplitude and frequency modulation techniques.</p> <p>CO5: Construct devices used for various Communication systems efficiently.</p>
4	21PPHC14	<p>Electrodynamics</p>	<p>CO1: Solve electrostatic boundary value problems using Poisson's and Laplace equations.</p> <p>CO2: Acquire the knowledge in boundary conditions of electrostatics and Magnetostatics.</p> <p>CO3: Derive Maxwell's equation in differential and integral form.</p> <p>CO4: Discuss the propagation of</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>electromagnetic waves in different medium.</p> <p>CO5: Use the concept of interactions in electromagnetic waves with macroscopic matter for society.</p>
5	21PPHCP1	General Physics Practical	<p>CO1: Gain practical exposure about theoretical concepts and investigate the principles & effects of optics.</p> <p>CO2: Cultivate technical skills to troubleshoot the errors in various instruments and determine accurate results.</p> <p>CO3: Examine the strength of material by doing Young's modulus experiment.</p> <p>CO4: Interpret the science behind the electrical components and their properties.</p> <p>CO5: Develop the computer programming for Numerical method problems.</p>
6	21PPHCP2	Electronics Practical	<p>CO1: Demonstrate UJT behavior in the detailed form with the electronic circuits.</p> <p>CO2: Summarize different structural oscillators with their wave forms.</p> <p>CO3: Develop the knowledge to construct various multivibrators and their uses.</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>C04: Analyze the circuit performances with theoretical formulae.</p> <p>C05: Use the importance of applications of electronics in real life situations.</p>
7	21PPHC21	Mathematical Physics-II	<p>C01: Define differential equations of first and second order respectively.</p> <p>C02: Express various complex functions into simplified Fourier series form and as transforms.</p> <p>C03: Distinguish tensors into different order and types.</p> <p>C04: Analyze special function in terms of Legendre and Laguerre polynomials.</p> <p>C05: Evaluate various special functions by using Hermite and Bessel functions.</p>
8	21PPHC22	Quantum Mechanics-I	<p>C01: Have a clear understanding of the foundation of Quantum Mechanics.</p> <p>C02: Express the Schrodinger equation to exactly solvable problems.</p> <p>C03: Determine the effects of symmetries in quantum mechanics.</p> <p>C04: Classify the properties of operators in quantum</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>mechanics.</p> <p>CO5: Deduct the various perturbation methods to solve the quantum mechanical problems.</p>
9	21PPHC23	Digital Electronics	<p>CO1: Apply Boolean algebra and the Karnaugh map as tools in designing and to simplifying digital logic circuits.</p> <p>CO2: Know the fundamental concepts and techniques used in data storage elements.</p> <p>CO3: Construct arithmetic circuits and Digital Clocks in an accurate manner.</p> <p>CO4: Demonstrate the basic logic gates used in the formation of memory devices.</p> <p>CO5: Understand the behavior of a register with additional control signals and counters implementations.</p>
10	21PPHN21	Nanotechnology	<p>CO1: Develop a detailed knowledge about the origin of nanomaterials and its timeline.</p> <p>CO2: Identify different synthesis techniques and learn about the applications of nanomaterials.</p> <p>CO3: Develop knowledge about analyzing tools of nanomaterials.</p> <p>CO4: Analyze various</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>applications of nanomaterials in nanotechnology.</p> <p>CO5: Use the importance of learnt application of nanomaterials extensively in Nano electronics.</p>
11.	21PPHC31	Solid State Physics-I	<p>CO1: Illustrate the theory of lattice vibrations (phonons) and use that to determine thermal properties of solids.</p> <p>CO2: Classify the different physical mechanisms involved in crystal binding.</p> <p>CO3: Identify the vibrations of crystals and free electron gas.</p> <p>CO4: Distinguish the physical properties of solids in terms of its band-structure with the understanding of thermal properties of solids.</p> <p>CO5: Justify the concepts of band gap in semiconductors and Fermi surface</p>
12	21PPHC31	Quantum Mechanics-II	<p>CO1: Demonstrate the concepts of Spin and angular momentum in Quantum mechanics.</p> <p>CO2: Apply the ideas on Born approximation transformation and concepts of scattering theory.</p> <p>CO3: Construct the principles of quantum</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>mechanics in semi classical theory.</p> <p>CO4: Analyze the difference between relativistic and non-relativistic equations and their solutions.</p> <p>CO5: Deduct the Dirac matrices and gained knowledge about spin and magnetic movement of electron.</p>
13	21PPHCP3	Advanced Physics Practical	<p>CO1: Understand the behavior of electronic components and perform analysis and design of electronic circuits.</p> <p>CO2: Set up testing strategies and select proper instruments to evaluate performance characteristics of electronic circuits.</p> <p>CO3: Choose the testing and experimental procedures on different types of electronic circuits and analyze their operation in different operating conditions.</p> <p>CO4: Gain knowledge of semiconductor devices and their applications.</p> <p>CO5: Build the skills in handling instruments and make measurements.</p>
14	21PPHPR1	Project	<p>CO1: Familiarize various theories behind the</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>instrumentation involved in the Characterizations techniques.</p> <p>CO2: Get hands on experience on different instrumentation techniques to design a research problem and solve it using different research methods.</p> <p>CO3: Organize and pursue a scientific and industrial research project and work effectively as an individual in multidisciplinary settings.</p> <p>CO4: Analyze the theoretical problems and solve from knowledge of basic Physics ideas.</p> <p>CO5: Have a comprehensive idea on research methods, methodology and ethics to communicate the research findings.</p>
15	21PPHE31	Thermodynamics and Statistical Mechanics	<p>CO1: Examine the different laws of thermodynamics to statistical mechanics.</p> <p>CO2: Discovering the thermodynamic concepts, which are related to materials properties, various areas of research and development.</p> <p>CO3: Identify the relation between microscopic and</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>macroscopic particles and their properties.</p> <p>CO4: Analyzing how to apply ensemble approach to solve classical and quantum thermodynamic systems.</p> <p>CO5: Evaluate and check the knowledge from thermal properties of solids and electrical properties of materials.</p>
16	21PPHE32	Energy Physics	<p>CO1: Classify the present energy scenario and the need for energy conservation.</p> <p>CO2: Separate the various energy resources in different environment.</p> <p>CO3: Outline division aspects and utilization of renewable energy sources for both domestics and industrial applications.</p> <p>CO4: Survey the concept of various forms of renewable and non-renewable energy resources.</p> <p>CO5: Predict the aspects of ocean energy in human needs.</p>
17	21PPHE33	Physics of Human body	<p>CO1: Infer the dynamics of fluid in human body.</p> <p>CO2: Focus the physics of circulation system such as blood</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>pressure, osmotic pressure, metabolic needs, etc.,</p> <p>C03: Apply breathing technique in a effective way which resulted from the understanding of detailed theory behind breathing.</p> <p>C04: Distinguish various sources of sound.</p> <p>C05: Justify the various visual impairments and about their corrective measures.</p>
18	21PPHE34	<p>Microprocessor and Microcontroller</p>	<p>C01: Discover an assembly language programming (ALP) in 8085 microprocessor for the given specification.</p> <p>C02: Organize the architecture and functional block of 8051 microcontroller.</p> <p>C03: Construct an embedded C and ALP in 8051 microcontroller using the internal functional blocks for the given specification.</p> <p>C04: Differentiate various peripherals devices such as 8051, 8085 and 8052.</p> <p>C05: Reframe electrical circuitry to the Microprocessor I/O ports in order to interface the processor</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			to external devices.
19	21PPHE35	Analytical Instrumentation	<p>CO1: Categorize the required instruments for spectroscopic analysis.</p> <p>CO2: Analyze the effects of different constituent in a process outcome and the performance of various instruments.</p> <p>CO3: Compute the working of X- ray diffractometer and scanning electron microscope.</p> <p>CO4: Classify the frequency selection of the substance from spectrum analysis.</p> <p>CO5: Interpret the experimental analysis for analyzing the real samples using instruments.</p>
20	21PPHE36	Crystal Growth Methods & Characterization	<p>CO1: Analyze the theory of nucleation for crystal growth.</p> <p>CO2: Assume the detailed description on solution and gel growth techniques.</p> <p>CO3: Experiment with the melt and vapour growth techniques easily.</p> <p>CO4: Examine the preparation of crystals using vapour deposition method.</p> <p>CO5: Importance on different characterization techniques.</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

21	21PPHC41	Solid State Physics-II	<p>CO1: Analyze the basic concepts of the occurrence of Super Conductivity and to study the characteristic properties, types and applications of superconductors.</p> <p>CO2: Categorize about properties and phase change phenomena in Magnetic materials.</p> <p>CO3: Apply the concepts of electron, phonon and excitons with their optical properties in crystals.</p> <p>CO4: Relate and differentiate the basic theories to explain the behaviors of various materials like dielectric, ferroelectric materials.</p> <p>CO5: Make use of the concepts of defects and dislocations in crystals for higher studies</p>
22	21PPHC42	Molecular Spectroscopy	<p>CO1: Illustrate the spectra's of atom and discuss about the influences of external fields such as electric and magnetic field on matter.</p> <p>CO2: Elaborate the rotational spectra for various molecules in detail.</p> <p>CO3: Develop the information on the vibrational spectra of molecules in various</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>forms such as diatomic molecules and poly atomic molecules.</p> <p>CO4: Analyze Raman spectra of different molecules by its instrumentation.</p> <p>CO5: Measure the electronic spectra of molecules from the detailed understanding from rotational – vibrational spectra.</p>
23	21PPHCP3	Advanced Physics Practical	<p>CO1: Understand the behavior of electronic components and perform analysis and design of electronic circuits.</p> <p>CO2: Set up testing strategies and select proper instruments to evaluate performance characteristics of electronic circuits.</p> <p>CO3: Choose the testing and experimental procedures on different types of electronic circuits and analyze their operation in different operating conditions.</p> <p>CO4: Gain knowledge of semiconductor devices and their applications.</p> <p>CO5: Build the skills in handling instruments and make measurements.</p>
24	21PPHPR1	Project	<p>CO1: Familiarize various theories</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>behind the instrumentation involved in the Characterizations techniques.</p> <p>CO2: Get hands on experience on different instrumentation techniques to design a research problem and solve it using different research methods.</p> <p>CO3: Organize and pursue a scientific and industrial research project and work effectively as an individual in multidisciplinary settings.</p> <p>CO4: Analyze the theoretical problems and solve from knowledge of basic Physics ideas.</p> <p>CO5: Have a comprehensive idea on research methods, methodology and ethics to communicate the research findings.</p>
25	21PPHE41	Nuclear and Particle Physics	<p>CO1: Describe the basic nuclear properties and the concept of nuclear forces.</p> <p>CO2: Build the knowledge of radioactivity and the essential instrumentation for detection.</p> <p>CO3: Compute the nuclear models and</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>particle accelerators.</p> <p>CO4: Analyze the energy values in kinematics of nuclear reactions, fission and fusion reactions.</p> <p>CO5: Evaluate the properties of elementary particles and their associated symmetries, conservation laws.</p>
26	21PPHE42	Communication Electronics	<p>CO1: Classify the digital communication system and about its various components.</p> <p>CO2: Correlate the radio wave propagation through various atmospheric layer such as in tropospheric, ionospheric, surface and at ground zones.</p> <p>CO3: Collect depth knowledge on antenna in terms of power gain, effective area and effective length, etc.,</p> <p>CO4: Analyze satellite communication in terms of its orbit, positioning and station keeping.</p> <p>CO5: Predict the theory behind light transmission that occurs in fiber optics.</p>
27	21PPHE43	Advanced Optics	<p>CO1: Analyze the propagation of light in conducting and non-conducting media.</p> <p>CO2: Examine the laser behavior and light matter</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>interaction.</p> <p>CO3: Apply wave optics and diffraction theory to a range of problems.</p> <p>CO4: Classify the tools, methodologies, language and conventions of physics for test and communicative ideas and explanations.</p> <p>CO5: Predict the properties of various lasers and the propagation of laser beams.</p>
28	21PPHE44	Astrophysics	<p>CO1: Discover the spectral classifications of the stars.</p> <p>CO2: Apply basic physical principles from a broad range of topics in physics to astronomical situations.</p> <p>CO3: Develop skills to design observing instruments with research telescopes and take projects upon literature data and achieves.</p> <p>CO4: Distinguish the competence in focused areas of astronomical theory and its experiment.</p> <p>CO5: Categorize the various types of stars with their spectral analyses.</p>
29	21PPHE45	Bio-medical Instrumentation	<p>CO1: Describe the basic transducer</p>



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

			<p>principles and their sources.</p> <p>C02: Compute the cardiovascular system and measurement of heard sound.</p> <p>C03: Apply the principles of monitoring equipment into the patient care monitoring.</p> <p>C04: Analyze the techniques of respiratory therapy equipment and ultrasonic diagnosis equipment.</p> <p>C05: Conclude the clinical instrument of diagnosis X-rays & radio therapy.</p>
--	--	--	---



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

30	21PPHE46	Computer Oriented Numerical methods	<p>CO1: Simplify the numerical differentiation and integration whenever and wherever routine methods are not applicable.</p> <p>CO2: Compare the various interpolation methods and finite difference concepts in least square approximation functions.</p> <p>CO3: Apply numerical methods to find out solution of algebraic equations using different methods under different conditions and numerical solution of system of algebraic equations.</p> <p>CO4: Simplify the calculation and interpretation of errors in numerical methods.</p> <p>CO5: Justify the functions from the programming language library for efficient calculations.</p>
----	----------	--	---