

Department of Physics
Nesamony Memorial Christian College, Marthandam
B. Sc. Physics
Course Outcome

Semester – I B. Sc. Physics					
Part	Course Name	Course Code	Credit	Hours	Course Outcome
Part - III	Core Theory – I: Properties of Matter and Acoustics	FCPH11	5	5	At the end of the course the student will be able to: CO1 Relate elastic behavior in terms of three moduli of elasticity and working of torsion pendulum. CO2 Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials. CO3 Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineering problems. CO4 Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains CO5 Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultra sonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves
	Core Practical - I: Physics Practical I	FCPHP1	3	3	At the end of the course the student will be able to: CO1 Apply various physics concepts to understand Properties of Matter & Acoustics, set up experimentation to verify theories, quantify and analyse CO2 do error analysis and correlate results
Part - IV	SEC-1: Physics for everyday Life	FSPH11	2	2	At the end of the course the student will be able CO1 to know where all physics principles have been put to use in daily life and appreciate the concepts with a better understanding CO2 to know about Indian scientists who have made significant contributions to Physics
	Foundation Course: Introductory	FFPH11	2	2	At the end of the course the student will be able to: CO1 Apply concept of vectors to understand concepts of Physics and solve problems CO2 Appreciate different forces present in Nature while learning about phenomena related to these

	Physics				different forces. CO3 Quantify energy in different process and relate momentum, velocity and energy CO4 Differentiate different types of motions they would encounter in various courses and understand their basis CO5 Relate various properties of matter with their behaviour and connect them with different physical parameters involved.
Semester – II B. Sc. Physics					
Part - III	Core Theory –II: Heat, Thermodynamics and Statistical Physics	FCPH21	5	5	At the end of the course the student will be able to: CO1 Acquires knowledge on how to distinguish between temperature and heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics. Student identifies the relationship between heat capacity, specific heat capacity. The study of Low temperature Physics sets the basis for the students to understand cryogenics, superconductivity, super fluidity and Condensed Matter Physics CO2 Derive the efficiency of Carnot’s engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines CO3 Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy CO4 Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them CO5 Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac . Apply to quantum particles such as photon and electron
	Core Practical -II: Physics Practical II	FCPHP2	3	3	Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results
Part - IV	SEC - 2: ASTROPHYSICS	FSPH21	1	2	At the end of the course the student will be able to introduce principles of astrophysics describing the science of formation and evolution of stars and interpretation of various heavenly phenomena and provide an understanding of the physical nature of celestial bodies along with the instrumentation and techniques used in astronomical research
	SEC – 3: Physics for Competitive Examinations	FSPH22	1	2	At the end of the course the student will be able to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales. Practical exhibition and explanation of transmission of heat in good and bad conductor. Relate the laws of thermodynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its relation

	NAAN MUTHALVAN		2	2	
Semester – III B. Sc. Physics					
Part - III	Core Theory –III: Mechanics	EMPH31	4	4	At the end of the course the student will be able to: CO1 Understand the Newton’s Law of motion, understand general theory of relativity, Kepler’s laws and Realize the basic principles behind planetary motion CO2 Acquire the knowledge on the conservation laws CO3 Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non conservative forces CO4 Gain knowledge on rigid body dynamics and solve problems based on this concept CO5 Appreciate Lagrangian system of mechanics, apply D’ Alemberts principle
	Core Practical - III: Physics Practical III	EMPHP3	2	2	Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept.
Part - IV	SEC - 4: Maintenance of Electrical appliances	ESPH31	2	2	At the end of the course the student will be able to understand the operations and safety handling of certain commonly used domestic appliances. The paper needs a basic knowledge in electricity and magnetism and the learners are expected to gain knowledge to design and trouble shoot electrical circuits.
	EVS: Environmental Studies	EEVS31	2	2	Upon completion of this course, Students would have CO1 To have a basic knowledge of Natural resources its classification, concepts, and natural resources of India. CO2 To obtain knowledge on different types of ecosystem CO3 To understand the values of biodiversity and conservation on global, national, and local scales CO4 To gain knowledge on different types of pollution in the environment CO5 To introduce the students in the field of Law and Policies and Acts both at the national and international level relating to environment.
	NAAN MUTHALVAN		2	2	
Semester – IV B. Sc. Physics					
Part - III	Core Theory –IV: Optics and Laser Physics	EMPH41	4	4	At the end of the course the student will be able to: CO1 Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces CO2 Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light

					<p>through working of interferometer</p> <p>CO3 Extend the knowledge about nature of light through diffraction techniques; apply mathematical principles to analyse the optical instruments</p> <p>CO4 Interpret basic formulation of polarization and gain knowledge about polarimeter, appraise its usage in industries</p> <p>CO5 Relate the principles of optics to various fields of IR, Raman and UV spectroscopy and understand their instrumentation and application in industries</p>
	Core Practical -IV: Physics Practical IV	EMPHP4	2	2	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results. Also, construct circuits to learn about the concept of electricity and magnetism.
Part - IV	SEC - 5: Maintenance of Electronic appliances	ESPH41	2	2	At the end of the course the student will be able to understand the operations and safety handling of certain commonly used domestic appliances. The paper needs a basic knowledge in electricity and magnetism and the learners are expected to gain knowledge to design and trouble shoot electrical circuits.
	VBE: Value Based Education	EVBE41	2	2	<p>CO1 Identify the contribution of social reformers and factors that influence social justice</p> <p>CO2 Compare and list the legal rights provided to women, children, Dalits, minorities and physically challenged as per human rights and Indian constitution</p> <p>CO3 Stay as a responsible citizen and raise voice for any violence against women</p> <p>CO4 analyze the prospects and challenges in mass media role of media in</p> <p>CO5 assess the influence of new media on children and youth and use them to inculcate communal harmony and social justice</p> <p>CO6 frame their own personal values based on social ethics to moderate the social issues and lead a secular society</p>
	NAAN MUTHALVAN		2	2	
Semester – V B. Sc. Physics					
Part - III	Core subject - V: Basic Electronics	CMPH51	4	6	<p>On completion of this course, students will be able to</p> <p>CO1 Differentiate between constant voltage source and constant current source</p> <p>CO2 Explain Norton's theorem and Thevinin's theorem</p> <p>CO3 Design a voltage regulator using Zener diode</p> <p>CO4 Construct a half wave bridge rectifier using diodes and capacitors</p> <p>CO5 Explain the forward bias and reverse bias action of a transistor</p> <p>CO6 Analyse the circuit of a stable and monostable multivibrator</p>

					<p>CO7 Explain the working of a Hartley and Colpitts Oscillator</p> <p>CO8 Design the circuit for low and high pass filter and explain the frequency response curve</p>
Core subject - VI: Spectroscopy	CMPH52	4	5	<p>On completion of this course, students will be able to</p> <p>CO1 Explain different types of motion. Classify molecules according to rotational modes.</p> <p>CO2 Discriminate the effect of isotopic substitution</p> <p>CO3 Discuss the 3 IR regions. Justify the interaction of rotations & vibrations on molecules.</p> <p>CO4 Analyzed the IR techniques & explain its importance in research</p> <p>CO5 Distinguish Rayleigh & Raman scattering Categorize classical & quantum theory of Raman effect Validate the rule of mutual exclusion</p> <p>CO7 Formulate Lamber- Beer Law & Calculate transmission from absorbance</p> <p>CO8 Relate the use of UV spectrum in research</p> <p>CO9 Explain magnetic resonance & its principles.</p> <p>CO10 List the uses of MRI Interpret NMR spectra</p>	
Core subject - VII: Atomic and Nuclear Physics	CMPH53	4	6	<p>On completion of this course, students will be able to</p> <p>CO1 Understand the concepts of free electron theory, band theory and positive rays.</p> <p>CO2 Derive the expressions for electrical conductivity, thermal conductivity and to explain Hall effect and Hall coefficient.</p> <p>CO3 Explain the vector atom model, coupling schemes and Zeeman effect.</p> <p>CO4 Analyse the Stern and Gerlach experiment with derivation.</p> <p>CO5 Understand the production, properties, usage of Xrays and various X-ray diffraction methods.</p> <p>CO6 Explain the basics of primary and secondary cosmic rays, cosmic ray shower and Van Allen belts.</p> <p>CO7 Find the general properties of nucleus by using liquid drop model and shell model and to understand laws of radioactivity.</p> <p>CO8 Explain the construction, working and application of G.M.counter, Wilson cloud chamber, Cyclotron and betatron.</p> <p>CO9 Apply the concepts of nuclear fission and fusion to atom bomb and hydrogen bomb.</p> <p>CO10 Classify the elementary particles with examples and understand the concept of quark model.</p>	
Major Elective: Programming in C++	CEPH51	4	5	<p>On completion of this course, students will be able to</p> <p>CO1 Understand the basics of C++ programming.</p> <p>CO2 Understand the applications of C++ modules.</p> <p>CO3 Understand the basic techniques of numerical analysis.</p> <p>CO4 Understand and apply computational techniques to physical problems.</p>	

					<p>CO5 Understand the procedural and object-oriented paradigms with concepts like streams, classes, functions, and arrays.</p> <p>CO6 Understand dynamic memory management techniques using member functions, classes, constructors, etc.</p> <p>CO7 Understand the concept of function overloading and operator overloading.</p> <p>CO8 Understand inheritance and its types of inheritance.</p> <p>CO9 Managing the C++ streams with operations and classes</p> <p>CO10 Understand the fundamental C++ file operations for single and multiple files</p>
	Practical – V: General Practical	CMPHP5	3	3	
	Practical -VI: Electronics	CMPHP6	3	3	
Part - IV	Skill Based Common: PERSONALITY DEVELOPMENT	CCSB51	2	2	
Semester – VI B. Sc. Physics					
	Core subject - IX: Quantum Mechanics	CMPH61	4	5	<p>On completion of this course, students will be able to</p> <p>CO1 Understand the quantum concepts of black body radiation, Planck's theory and photoelectric effect.</p> <p>CO2 Apply the Bohr's quantization concept of angular momentum to hydrogen atom. 1, 7 Ap, Ca</p> <p>CO3 Acquire the knowledge of De Broglie's hypothesis and concepts of phase and group velocities.</p> <p>CO4 Explain the concepts of diffraction and interference of electrons and wave packet</p> <p>CO5 Understand the Heisenberg's uncertainty principle and its proof between energy and time.</p> <p>CO6 Illustrate some thought experiments to explain the Heisenberg's uncertainty principle.</p> <p>CO7 Derive Schrodinger's time-dependent and timeindependentwave equations.</p> <p>CO8 Understand the concepts of wave function, eigenfunction, eigen value, operators and postulates of quantum mechanics.</p> <p>CO9 Apply the concepts of quantum mechanics to particle in one-dimensional box and to particle in a rectangular three-dimensional box</p> <p>CO10 Acquire knowledge of application of quantum mechanics to simple harmonic oscillator and transmission across a potential barrier.</p>

	Core subject - X: Digital Electronics	CMPH62	4	5	On completion of this course, students will be able to CO1 Define binary number CO2 Differentiate the various codes in Binary system CO3 Construct the circuit for the basic logic gates CO4 Explain the half and full subtractor using logic gates CO5 Draw the circuit for frequency divider CO6 Analyse the circuit of a stable and monostable multivibrator CO7 Explain the function of a multiplexer and De- multiplexer CO8 Differentiate A/d and D/A converter
	Core subject - XI: Solid State Physics	CMPH63	4	5	On completion of this course, students will be able to CO1 Explain the seven classes of crystals and to illustrate about the Bravais lattice in three dimensions. CO2 Imagine and elaborate about Simple cubic, Face centered cubic, Body centered cubic and Hexagonal closed packed structures. To make use of Braggs's law and reciprocal lattice to SCC, BCC and FCC lattices. CO3 Illustrate Langevin's theory of Paramagnetism, Weiss Paramagnetism. To analyze the concept of Ferromagnetism and to summarize about domain theory of ferromagnetism and antimagnetism CO4 Elaborate about the different types of electric polarizations and to classify and compare about the ionic, orientation and space charge polarization CO5 Classify and about types of bonds in crystals. To illustrat about Vanderwaal's and hydrogen bonding. Comparison of ionic and covalent solids . CO6 Elaborate about cohesive energy of ionic solids and the application towards Sodium chloride crystal and the evaluation of Madelung Constant for sodium chloride can be done. CO7 Interpret the general properties of Super conductors. Elaborate the effect of magnetic field and Meissner effect, current of effect. CO8 Illustrate about entropy. To list out the application of super conductors CO9 Describe about the nano particles and synthesis and its classification. Explain the techniques used in synthesis of nanomaterials and about chemical vapour deposition techniques CO10 Classify and compare the properties of nano materials. Applications of nano materials can also be explained.
	Major Elective: Energy Physics	CEPH61	4	5	On completion of this course, students will be able to CO1 Understand the importance of conventional and nonconventional energy resources. CO2 Understand the applications, merits, and demerits of conventional and non-conventional energy resources.

					<p>CO3 Understand the basic aspects of solar energy.</p> <p>CO4 Understand solar energy appliances with their merits and demerits.</p> <p>CO5 Understand the basic aspects of the photovoltaic principle.</p> <p>CO6 Learn about photovoltaic appliances and how they work.</p> <p>CO7 Understand the solar cell with its applications and its types.</p> <p>CO8 Understand the basic ideas of biomass energy and recognise their merits and demerits.</p> <p>CO9 Understand the methods and classifications of biomass energy.</p> <p>CO10 Understand the basic principles of wind energy conversion.</p> <p>CO11 Understand the fundamental concepts of oceans and chemical energy resources, as well as their benefits and drawbacks.</p>
	Practical -VII: General Practical	CMPHP7	3	3	
	Practical -VIII: Electronics	CMPHP8	3	3	
	PROJECT		4	4	
Semester – I Allied Physics					
Part - III	Elective-I: Allied Physics I	FEPH11	3	4	<p>On completion of this course, the students will Programme be able to:</p> <p>CO1 Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.</p> <p>CO2 Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life. Connect droplet theory with Corona transmission.</p> <p>CO3 Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.</p> <p>CO4 Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyze them mathematically verify circuits and apply the concepts to construct circuits and study them.</p> <p>CO5 Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. Infer operations using Boolean algebra and acquire elementary ideas of IC circuits. Acquire information about various Govt. programs/ institutions in this field.</p>
	Lab Course: Elective-I- ALLIED PRACTICAL– I	FEPHP1	3	2	

Semester – II Allied Physics

Part - III	ELECTIVE : ALLIED PHYSICS-II	FEPH21	3	4	<p>On completion of this course, the students will be able to</p> <p>CO1 Explain the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns</p> <p>CO2 Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Relate the importance of interpreting improving theoretical models based on observation. Appreciate interdisciplinary nature of science and in solar energy related applications.</p> <p>CO3 Summarize the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models. Solve problems on decay rate half-life and mean-life. Interpret nuclear processes like fission and fusion. Understand the importance of nuclear energy, safety measures carried and get our Govt. agencies like DAE guiding the country in the nuclear field.</p> <p>CO4 To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa. Relate this with current research in this field and get an overview of research projects of National and International importance,</p> <p>CO5 Summarize the working of semiconductor devices like junction diode, Zenerdiode, transistors and practical devices we daily use like USB chargers.</p>
	ALLIED PRACTICAL– II	FEPHP2	3	2	