THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI – 626 123.

(Affiliated to Madurai Kamaraj University, Re-accredited with A Grade by NAAC,
College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH)

DEPARTMENT OF PHYSICS

UG DEGREE PROGRAMME IN PHYSICS

COURSE OUTCOME

PROGRAMME EDUCATIONAL OBJECTIVES The Graduates will	
PEO1.	take up careers as educationalist, researcher, technical specialist and pursue higher studies in related fields including teaching and management
PEO2.	explore physical systems through theoretical models, experiments and communicate findings of the scientific work
PEO3.	become self employed in technical fields and consultancy services
PEO4.	possess moral responsibility to be self-disciplined, socially concerned and environment friendly individuals

PROGRAMME SPECIFIC OUTCOMES By the Completion of UG. Physics programme, the learners will be able to	
PSO1.	elucidate and demonstrate the fundamental principles and concepts of physics which include optics, mechanism, electricity, electromagnetism, thermodynamics, digital electronics, wave mechanics etc.
PSO2.	collect, analyze data critically and interpret the results to achieve valid conclusions
PSO3.	explore systematically the physical phenomenon by solving problems and performing projects and justify their report scientifically
PSO4.	communicate physics concepts, processes and results both in verbal and written form effectively using ICT tools
PSO5.	plan with team members, execute experiments, investigate the experimental results and prepare the documentation for the findings
PSO6.	project the true results of scientific findings and conscientious attempt to describe the physical phenomena accurately, without bias and any hyperbole
PSO7.	adapt to changes in technology by means of self-directed and lifelong learning in various fields like biopolymers, thinfilms, crystal growth, nanotechnology, fuel cell etc.

Major Course	
COURSE CODE: GLPH11	**COURSE TITLE: Mechanics and Properties of Matter**
On successful completion of the course, the learners should be able to	
CO1	state Newton's laws, Kepler's laws, Archimedes' principle, Bernoulli's equation, Poisson's ratio and properties of simple harmonic motion.
CO2	explain the concepts of dynamics, oscillations, central force, fluid mechanics and elastic nature of matter.
CO3	use the concepts of dynamics, fluid mechanics, gravitation and oscillation to explain relevant phenomenon
CO4	analyze the concepts behind conservation of angular momentum, simple harmonic motion, gravitational field, fluid mechanism and elastic constants.
CO5	apply the laws of mechanics and properties of matter to solve problems.

Major Course	
COURSE CODE: GLPH12	**COURSE TITLE: PHYSICS APPLICATIONS IN EVERYDAY LIFE**
On successful completion of the course, the learners should be able to	
CO1	recall the basics of electricity, fibre optics, lasers, geographic information system and solar energy.
CO2	explain the concepts of electricity, fibre optics, geographic information system, laser and solar energy.
CO3	differentiate the single phase supply with three phase supply, types of optical fibers and types of lasers.
CO4	analyze the applications of lasers, fiber optics and solar energy.
CO5	solve problems in the field of electricity, fibre optics and solar energy.

ALLIED COURSE - I	
COURSE CODE: GLPH1A	**COURSE TITLE: FUNDAMENTAL PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	recall basics of photo electricity, transport properties of gases, laws and parameters involved in electricity, rotational motion and gravitational laws
CO2	explain photo electric cells, Boy's experiment, laws related to electricity and gravitation
CO3	derive the expressions for transport properties of gases, time period, electric field for different charge distributions and parameters of rotational motion
CO4	analyze photoelectricity with respect to various parameters, 'g' using compound pendulum and compare the variation of 'g' with respect to latitude, depth and altitude
CO5	solve simple problems related to photo electricity, kinetic theory of gases, rotational motion, electricity and gravitation

Major Course	
COURSE CODE: GLPH21	**COURSE TITLE: OPTICS**
On successful completion of the course, the learners should be able to	
CO1	define aberrations, dispersion, diffraction and their types
CO2	describe and compare various optical phenomena, optical theories and optical devices
CO3	solve problems in optics by selecting appropriate equations
CO4	explain conditions and ideas to produce desired images through optical devices
CO5	analyse various parameters involved in aberrations, dispersion and diffraction

Major Course	
COURSE CODE: GLPH2L	**COURSE TITLE: LAB-I**
On successful completion of the course, the learners should be able to	
CO1	recall the measurements of physical parameters, thermal and optical properties
CO2	describe the physical concepts underlying the experiments
CO3	perform experiments applying thermal and optical properties
CO4	collect and analyse the data mathematically and graphically
CO5	do experiments with laboratory ethics

Allied course-II	
COURSE CODE: GLPH2A2	**COURSE TITLE: SOLID STATE PHYSICS & DIGITAL ELECTRONICS (FOR CHEMISTRY)**
On successful completion of the course, the learners should be able to	
CO1	recall the concepts of crystal structures, X-ray diffraction, semiconductors and logic gates.
CO2	explain different crystal structures, xrd methods, types of semiconductors and logic gates.
CO3	apply different methods to simplify the equations using combinational logic circuits
CO4	analyze crystal structures, semiconductors and digital logic theorems
CO5	determine lattice parameters, prove digital logic laws and truth tables of logic gates.

MAJOR COURSE	
COURSE CODE: GLPH4L	**COURSE TITLE: LAB – II**
On successful completion of the course, the learners should be able to	
CO1	recall the principles of the experiment
CO2	construct the electrical and electronic circuits, write C++ programme
CO3	perform the experiments and record data
CO4	analyze the data and draw conclusions mathematically and graphically
CO5	communicate the results of the experiments in an ethical manner

Allied	
COURSE CODE: GLPH2A1	**COURSE TITLE: DIGITAL ELECTRONICS**
On successful completion of the course, the learners should be able to	
CO1	explain the basic principles in digital systems.
CO2	interpret the functioning of gates, combinational logic circuits, number systems and flip flops.
CO3	identify logic gates, convert number system and codes
CO4	apply digital logic principles to solve simple circuits.
CO5	construct circuits for various arithmetic operations.

Allied course -II	
COURSE CODE: GLPH2A2	**COURSE TITLE: SOLID STATE PHYSICS & DIGITAL ELECTRONICS (FOR CHEMISTRY)**
On successful completion of the course, the learners should be able to	
CO1	recall the concepts of crystal structures, X-ray diffraction, semiconductors and logic gates.
CO2	explain different crystal structures, xrd methods, types of semiconductors and logic gates.
CO3	apply different methods to simplify the equations using combinational logic circuits
CO4	analyze crystal structures, semiconductors and digital logic theorems
CO5	determine lattice parameters, prove digital logic laws and truth tables of logic gates.

MAJOR COURSE	
COURSE CODE: GLPH2AL	**COURSE TITLE: ALLIED LAB**
On successful completion of the course, the learners should be able to	
CO1	recall the principle of the experiment
CO2	construct electronic and electrical circuits
CO3	perform the experiments and record data
CO4	analyse the physical parameters both manually and graphically
CO5	perform the experiments with confidence following the laboratory ethics

MAJOR COURSE	
COURSE CODE: GLPH31	**COURSE TITLE: Electricity**
On successful completion of the course, the learners should be able to	
CO1	state Gauss law and define electric potential, capacitance, electromotive force, direct and alternating current.
CO2	explain flux of an electric field, electric potential due to charges,electrical parameters, DC circuit, AC circuit and working of transformer.
CO3	solve problems related to electric field, potential, capacitance, electromotive force and power in AC circuits.
CO4	analyze various electrical parameters, capacitor with a dielectric, AC and DC circuits.
CO5	apply Gauss law to find the electric field in various charge distribution, Kirchhoff's voltage law and current law to examine the current and potential difference in circuits.

MAJOR COURSE	
COURSE CODE: GLPH32	**COURSE TITLE: ELECTROMAGNETISM**
On successful completion of the course, the learners should be able to	
CO1	recall magnetic phenomena/laws, magnetic materials/properties, electromagnetic oscillations/circuits, electromagnetic waves/basic equations and polarization
CO2	describe the determination of magnetic phenomena/currents/laws, inductance, magnetic materials/properties, electromagnetic oscillations/circuits, electromagnetic waves/basic equations and polarization phenomena
CO3	Apply magnetic phenomena/currents/laws, inductance, magnetic materials/properties, electromagnetic oscillations/circuits, electromagnetic waves/basic equations and polarization phenomena to solve problems
CO4	Analyse magnetic phenomena/currents/laws, inductance, magnetic materials/properties, electromagnetic oscillations/circuits/waves/basic equations and polarization phenomena
CO5	criticize the magnetic phenomena/currents/laws, inductance, magnetic materials/properties, electromagnetic oscillations/circuits/waves/basic equations and polarization phenomena

NON-MAJOR ELECTIVE COURSE	
COURSE CODE: GLPH3N	**COURSE TITLE: PHYSICS FOR THE NEW WORLD**
On successful completion of the course, the learners should be able to	
CO1	list the characteristics of lasers, ultrasonics and the basics of electrical safety and satellite communications
CO2	describe the ultrasonic scanning methods, earthing for safety, global positioning system
CO3	compare the ordinary light with laser, single phase with three phase power supply and the types of satellites
CO4	explain the sonograms, lightning arrestor for buildings, treatment of electric shock, GPS receiver
CO5	discuss the applications of lasers, ultrasonics, satellites

MAJOR COURSE	
COURSE CODE: GLPH41	**COURSE TITLE: Analog Electronics**
On successful completion of the course, the learners should be able to	
CO1	define transistor parameters, transistor classifications, various types of transistor biasing, feedback concepts, switching action of transistor &diodes and op-amps.
CO2	explain various transistor biasing methods, working of single stage, multistage transistor amplifiers, different types of oscillators, multivibrators and op-amps.
CO3	analyze different types of coupling in transistor amplifier, significance of feedback circuits and oscillators.
CO4	construct electronic circuits using diodes, transistors and op-amps for various applications.
CO5	evaluate the necessary parameters for the proper functioning of electronic circuits by applying appropriate conditions.

MAJOR COURSE	
COURSE CODE: GLPH4L	**COURSE TITLE: LAB II**
On successful completion of the course, the learners should be able to	
CO1	recall the principles of the experiment
CO2	construct the electrical and electronic circuits, write C++ programme
CO3	perform the experiments and record data
CO4	analyze the data and draw conclusions mathematically and graphically
CO5	communicate the results of the experiments in an ethical manner

NON-MAJOR ELECTIVE COURSE	
COURSE CODE: GLPH4N	**COURSE TITLE: SOLAR ENERGY AND ITS APPLICATIONS**
On successful completion of the course, the learners should be able to	
CO1	list the types of energy sources and solar energy devices
CO2	explain solar radiation, principle and working of solar based water heating/cooking/air heating/desalination and photovoltaics system
CO3	construct solar water heater, solar cooker, solar air heater, solar stills and solar cells
CO4	analyse solar energy, its applications, merits and demerits
CO5	apply the principle of solar energy to solve problems

DISCIPLINE SPECIFIC COURSE	
COURSE CODE: GLPH4DSL	**COURSE TITLE: LAB - SCIENTIFIC SKILL DEVELOPMENT**
On successful completion of the course, the learners should be able to	
CO1	report life history of scientists and their inventions
CO2	analyze a scientific journal
CO3	solve problems in Physics
CO4	troubleshoot the electrical and electronic circuits
CO5	acquire the presentation skills in conferences

Major Course	
COURSE CODE: GLPH51	**COURSE TITLE: CLASSICAL MECHANICS**
On successful completion of the course, the learners should be able to	
CO1	recall the basic concepts in Classical Mechanics
CO2	describe conservation laws, generalised coordinates, Lagrangian, Hamiltonian formulations, motion under central force and special theory of relativity
CO3	apply generalised coordinates, Lagrangian and Hamiltonian formulations, Kepler's laws, relativistic generalizations to solve problems
CO4	investigate Kepler's problem, two body problem, special theory of relativity and Lorentz transformations
CO5	explore the shape of the orbits or path of a moving particle

ELECTIVE COURSE	
COURSE CODE: GLPH5E1	**COURSE TITLE: DIGITAL ELECTRONICS**
On successful completion of the course, the learners should be able to	
CO1	state basic principles of number systems, codes and digital systems
CO2	explain the working of digital circuits for arithmetic/logical operations, memory, counters and converters
CO3	apply digital principles to solve problems and design circuits
CO4	use gates and flip flops for the construction of different kinds of digital circuits
CO5	analyze various types of gates, flip flops, registers, counters, D/A and A/D converters

ELECTIVE COURSE	
COURSE CODE: GLPH5E2	**COURSE TITLE: ATOMIC AND NUCLEAR PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	evoke various nuclear models, periodic table, the nuclear reaction and nuclear forces
CO2	comprehend the atomic spectra, coupling of electrons, atomic nucleus, particle detectors and nuclear decay
CO3	solve the problems in atomic and nuclear physics
CO4	Analyze various atomic and nuclear structures/models/spectra, types of coupling, radioactive decay and devices like detectors and accelerator
CO5	explain the important phenomena in atomic nucleus

ELECTIVE COURSE	
COURSE CODE: GLPH5E3	**COURSE TITLE: FIBRE OPTICS**
On successful completion of the course, the learners should be able to	
CO1	list the basic concepts and importance of fibre optics
CO2	explain the requirements of fibre optic techniques
CO3	classify the fabrication techniques and differentiate the functions of wave guides
CO4	elucidate the required light sources for dispersion in optical fibres
CO5	discuss about the transmission through optical fibres

ELECTIVE COURSE	
COURSE CODE: GLPH5E4	**COURSE TITLE: ENERGY PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	list the basics of energy sources
CO2	describe the applications of different energy sources
CO3	distinguish solar photovoltaic and solar distillation processes
CO4	analyse solar energy, wind energy and geothermal energy
CO5	appraise the advantages and disadvantages of energy sources

Major Course	
COURSE CODE: GLPH5L	**COURSE TITLE: LAB III**
On successful completion of the course, the learners should be able to	
CO1	explain the principles of the experiments
CO2	construct and analyse electronic and non-electronic circuits
CO3	determine the physical parameters through various experimental techniques
CO4	analyse the data and draw conclusions manually and graphically
CO5	do experiments with laboratory ethics

Major Course	
COURSE CODE: GLPH61	**COURSE TITLE: SOLID STATE PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	recall interatomic forces, unit cells, different types of bondings, semiconductors and superconductors
CO2	discuss about the different structures based on packing factor, current conduction, generation and recombination of charge carriers
CO3	explain the crystal system, structures, properties of semiconductors and super conductors
CO4	analyze various lattice and electrical parameters of different types of conductors.
CO5	apply the principles of solid state physics to solve problems

MAJOR COURSE	
COURSE CODE: GLPH62	**COURSE TITLE: WAVE MECHANICS**
On successful completion of the course, the learners should be able to	
CO1	recall the fundamental concepts in wave mechanics
CO2	outline different theories and formalism of wave mechanics
CO3	solve the harmonic oscillator, rigid rotator, particle in a box, square potential barrier and alpha emission problems
CO4	discuss the one dimensional and three dimensional energy eigenvalue problems
CO5	analyze the energy eigenvalue problems such as square potential with rigid, finite walls, square potential barrier, rigid rotator and hydrogen atom

Major Course	
COURSE CODE: GLPH6L	**COURSE TITLE: LAB IV**
On successful completion of the course, the learners should be able to	
CO1	explain the principles of the experiments
CO2	construct and analyse electronic and non-electronic circuits
CO3	determine the physical parameters through various experimental techniques
CO4	analyse the data and interpret appropriate conclusions
CO5	do experiments with laboratory ethics

Major Course	
COURSE CODE: GLPH6P	**COURSE TITLE: PROJECT WORK**
On successful completion of the course, the learners should be able to	
CO1	implement the basic principles of physics in exploring new avenues
CO2	design and conduct scientific studies for specific purposes
CO3	use scientific reasoning to gather, evaluate and interpret data
CO4	communicate the result of the study in oral and written form
CO5	solve physics problems using qualitative and quantitative reasoning including sophisticated mathematical techniques

ELECTIVE COURSE	
COURSE CODE: GLPH6E1	**COURSE TITLE: THERMODYNAMICS**
On successful completion of the course, the learners should be able to	
CO1	define the properties of thermodynamic systems and the laws governing them
CO2	explain the energy equation, entropy changes, thermodynamic potentials and properties of substances
CO3	use the laws of thermodynamics to determine heat flow, change in entropy and properties of substances
CO4	analyse the properties of gases, phase transitions in closed and open systems
CO5	apply T-dS equations and thermodynamic relations to study the properties of specific systems

ELECTIVE COURSE	
COURSE CODE: GLPH6E2	**COURSE TITLE: BIO PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	recall the separation techniques, principles of spectroscopy, crystallography and microscopy
CO2	describe the features of spectroscopy, crystallography, microscopy and separation techniques
CO3	analyse crystal structures, XRD data, NMR data
CO4	discuss various electron microscopy
CO5	apply NMR spectroscopy in chemistry, biochemistry and biophysics

Self-Employment course	
COURSE CODE: GLSE66	**COURSE TITLE: DOMESTIC ELECTRICAL APPLIANCES SERVICING**
On successful completion of the course, the learners should be able to	
CO1	define the basic electrical and electronic parameters
CO2	describe the basic household wiring, types of earthing, electrical devices and appliances
CO3	compare the types of transformer and batteries
CO4	list the possible defects in household appliances
CO5	analyse the colour coding of resistors and working of domestic electrical appliances

Self-Employment course	
COURSE CODE: GLSE66L	**COURSE TITLE: DOMESTIC ELECTRICAL APPLIANCES SERVICING-LAB**
On successful completion of the course, the learners should be able to	
CO1	identify the color codes of resistors
CO2	solder the electrical components
CO3	acquire the entrepreneurship skill
CO4	carry out the basic household wiring
CO5	service the household appliances

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DEPARTMENT OF PHYSICS

PG DEGREE PROGRAMME IN PHYSICS

PROGRAMME EDUCATIONAL OBJECTIVES	
The Graduates will	
PEO1.	become competent professional in industry, consultancy, education, research and public administration
PEO2.	excel as Junior Research Fellow, research associates and analyze complex problems to reach substantiated conclusions
PEO3.	become tutors, tech or digital entrepreneur and undertake projects
PEO4.	interpret and analyze the experimental data in physics imbibed by ethical, moral and social values leading to highly cultured and civilized physicist

PROGRAMME SPECIFIC OUTCOMES	
By the Completion of PG. Physics programme, the learners will be able to	
PSO1.	apply graduate-level acquaintance in solving problems and proving the theories in various areas of physics like quantum mechanics, solid state physics, molecular spectroscopy, mathematical physics and nanophysics
PSO2.	possess scientific attitude, experimental skills, analyze data and interpret the results obtained in physics related problems
PSO3.	implement the physical concepts in a high quality research or creative capstone project under appropriate disciplinary or multi disciplinary context
PSO4.	present the recent trends in physics effectively in seminars, conferences using ICT tools
PSO5.	plan and carry out group discussions, respond to the views of team members and perform complicated projects successfully
PSO6.	follow scientific ethics in all stages of scientific practices such as data collection, transcription, validation of results through replication and publication
PSO7.	realize the impact of science on society and engage in lifelong learning and professional development through self study or higher studies in the diverse fields like material science, electronics, energy devices, eco friendly materials etc.

COURSE OUTCOME

Core Course	
COURSE CODE: HLPH11	**COURSE TITLE:** MATHEMATICAL PHYSICS-I
On successful completion of the course, the learners should be able to	
CO1	define matrices, vectors, theorems, differential equations, Beta function, Gamma function, Bessel and Legendre functions.
CO2	discuss about vectors, matrices, differential equations and special functions
CO3	solve differential equations using special functions
CO4	apply the generating function to obtain the recurrence relations for special functions
CO5	analyze the orthogonal property and recurrence relations of special functions

Core Course	
COURSE CODE: HLPH12	**COURSE TITLE: CLASSICAL AND STATISTICAL MECHANICS**
On successful completion of the course, the learners should be able to	
CO1	define fundamental concepts of both classical and statistical mechanics
CO2	discuss the equations of Lagrangian, Hamiltonian, canonical and different ensembles of statistical mechanics
CO3	solve simple problems in Lagrangian formulation, canonical transformations, Poisson's bracket and statistical mechanics
CO4	analyze various functions in classical, statistical and quantum statistical mechanics
CO5	appraise the requisites of classical and statistical mechanics

Core Course	
COURSE CODE: HLPH13	**COURSE TITLE: LINEAR INTEGRATED CIRCUITS**
On successful completion of the course, the learners should be able to	
CO1	list the various steps in fabrication of semiconductors, basic information of op-amp, comparator, timer and phase locked loops
CO2	explain the characteristics of op-amp and operation of 555 timer
CO3	use op-amp for different applications and construct active and passive components
CO4	analyze waveform generators, detectors, oscillators, op-amp, filters, multivibrators and fabrication technology of ICs.
CO5	discuss the working of op-amp, 555 timer and phase locked loop with necessary diagrams

Core Course	
COURSE CODE: HLPH1L	**COURSE TITLE: LAB – I**
On successful completion of the course, the learners should be able to	
CO1	recall the basic principles required for carrying out experiments
CO2	construct electronic and non-electronic circuits
CO3	perform experiment and collect data
CO4	analyze the data both manually and graphically
CO5	do the experiments by following the laboratory ethics

ELECTIVE COURSE	
COURSE CODE: HLPH1E1	**COURSE TITLE:** MICROPROCESSOR
On successful completion of the course, the learners should be able to	
CO1	analyse the architecture and instruction set of the microprocessor Intel 8085
CO2	explain programming techniques with additional instructions
CO3	describe the counters and time delay
CO4	perform data and code conversions
CO5	interface data converters

Core Elective Course	
COURSE CODE: HLPH1E2	**COURSE TITLE: DIGITAL LOGIC DESIGN**
On successful completion of the course, the learners should be able to	
CO1	simplify the Boolean functions and to construct circuits
CO2	explain the working of digital circuits (combinational and sequential) with diagram
CO3	design combinational and sequential circuits using gates and flip flops
CO4	analyze combinational and sequential circuits using gates and flip flops
CO5	apply the design procedure to solve problems

Core Course	
COURSE CODE: HLPH21	**COURSE TITLE: QUANTUM MECHANICS - I**
On successful completion of the course, the learners should be able to	
CO1	state the properties of Schrodinger formulation and matrix formulation of quantum mechanics
CO2	explain Schrodinger wave equation, eigen functions, eigen values of energy and momentum, Hermite polynomial, Laguerre polynomials and equations of motion
CO3	apply Schrodinger wave equation to exactly solvable systems of bound state, collision problems and matrix theory to linear harmonic oscillator problem
CO4	interpret the significance of Ehrenfest theorem, eigen values, eigen functions, operators and delta function
CO5	analyse discrete energy levels and wave functions of bound state, Hilbert space of state vectors, commutator brackets and equations of motion using matrix formulation of quantum theory

Core Course	
COURSE CODE: HLPH22	**COURSE TITLE:** MATHEMATICAL PHYSICS-II
On successful completion of the course, the learners should be able to	
CO1	define tensors, Fourier transforms, Laplace transforms, complex variables, Dirac Delta function, green function and types of groups
CO2	explain the types of tensor, properties of Fourier, Laplace transforms, Dirac delta function, reducible and irreducible representations
CO3	explain the types of tensor, properties of Fourier, Laplace transforms, Dirac delta function, reducible and irreducible representations
CO4	construct the analytic functions of complex variable and the character table for point group
CO5	analyze Fourier transform, Laplace transform, complex variables, Dirac delta, green functions and character table for point group

Core Course	
COURSE CODE: HLPH23	**COURSE TITLE: ELECTROMAGNETIC THEORY**
On successful completion of the course, the learners should be able to	
CO1	recall the basic concepts and different laws of electrostatic fields, magnetic fields, propagation of waves and Maxwell's equations
CO2	describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.
CO3	apply different techniques of vector calculus to solve problems related to electromagnetic field
CO4	analyze the propagation of electromagnetic waves in different media and their interfaces
CO5	apply Maxwell's equations for electromagnetic wave propagation in different transmission lines and media

Core Course	
COURSE CODE: HLPH2L	**COURSE TITLE: LAB – II**
On successful completion of the course, the learners should be able to	
CO1	state the principles of the experiments
CO2	perform electronic and non-electronic experiments
CO3	calculate the physical parameters
CO4	analyse the data and draw conclusions manually and graphically
CO5	do experiments with laboratory ethics

Elective Course	
COURSE CODE: HLPH2E1	**COURSE TITLE: APPLIED PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	list various optical and medical instruments, various types of communication
CO2	describe the working of optical and medical instruments, fibre optics and various communication systems
CO3	solve problems related to fibre optics and communication system
CO4	compare various telescopes, scanning methods, classification of holograms, types of optical fibre and power budget calculation
CO5	appraise the application of optical phenomenon and medical instrument in their relevant field

Core Elective Course	
COURSE CODE: HLPH2E2	**COURSE TITLE: –MICROCONTROLLER**
On successful completion of the course, the learners should be able to	
CO1	explain the architecture and instruction set of the microcontroller Intel 8051
CO2	write the assembly language programming for the microcontroller Intel 8051
CO3	list the features of 8051
CO4	identify interrupts sources and interrupt vector addresses
CO5	disseminate different programmable devices and methods to interface them

Core Course	
COURSE CODE: HLPH31	**COURSE TITLE: SOLID STATE PHYSICS - I**
On successful completion of the course, the learners should be able to	
CO1	recall elastic / thermal properties, parameters of different crystals / materials
CO2	discuss parameters of different crystals/elastic waves, heat capacity, electrical and thermal properties of different materials/models
CO3	interpret parameters of different types of crystals/elastic waves and models
CO4	examine elastic waves, thermal/electrical parameters of different crystals/ models/materials and carrier concentrations
CO5	derive parameters of inert gas/ionic/semiconductor crystals, elastic waves and different models

Core Course	
COURSE CODE: HLPH32	**COURSE TITLE: QUANTUM MECHANICS - II**
On successful completion of the course, the learners should be able to	
CO1	state various approximation methods for bound state, time dependent perturbation problems and scattering problems
CO2	describe various approximation methods of perturbation problems and scattering problems, emission and absorption of radiation, angular momentum and relativistic theories
CO3	apply the appropriate approximation methods to find solutions of variety of eigen value problems of stationary and time dependent perturbation problems and scattering problems
CO4	interpret eigen values of angular momentum, Schrodinger and Dirac relativistic equations
CO5	analyse the asymptotic behavior of wave function in various collision problems,dirac matrices and spin orbit interaction

Core Course	
COURSE CODE: : HLPH33	**COURSE TITLE: Computer Oriented Numerical Methods**
On successful completion of the course, the learners should be able to	
CO1	list the features of C++, numerical methods of solving various types of equations, 8085 MPU architecture, 8085 MPU features, memory, I/O devices
CO2	explain the features of C++ with syntax and examples,numerical methods,solution for different type of equations, 8085 MPU architecture/features,memory,I/Odevices
CO3	apply appropriate numerical techniques to solve different types of equations
CO4	solve problems using algorithms/C++/8085 microprocessor
CO5	analyse C++, numerical methods and 8085 features

Core Course	
COURSE CODE: HLPH3L	**COURSE TITLE: LAB – III**
On successful completion of the course, the learners should be able to	
CO1	write programs for numerical methods, microprocessor and draw circuit diagrams for data processing circuits
CO2	implement the programs and construct the circuits
CO3	record observation in a systematic way
CO4	analyze the collected data and report the results
CO5	interpret the results following laboratory ethics

Core Elective Course	
COURSE CODE: HLPH3E1	**COURSE TITLE: CSIR UGC-NET Preparatory course - Physics**
On successful completion of the course, the learners should be able to	
CO1	solve problems using mathematical concepts
CO2	apply classical, quantum and thermodynamical concepts to solve problems
CO3	solve problems on electromagnetic waves
CO4	apply various concepts of atomic, nuclear and molecular physics to solve problems
CO5	apply different laws to solve problems in electronics

Core Elective Course	
COURSE CODE: HLPH3E2	**COURSE TITLE: RECENT TRENDS IN PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	list the basic concepts of simulation and applications of nanotechnology
CO2	describe various nano lithographic techniques, modeling, smart materials and self healing structures
CO3	classify system simulation and discrete system simulation, sensors
CO4	analyze the applications of nanotechnology in optics and electronics
CO5	solve problems using simulation

Core Course	
COURSE CODE: HLPH41	**COURSE TITLE: SOLID STATE PHYSICS - II**
On successful completion of the course, the learners should be able to	
CO1	recall different parameters of different materials and different particles.
CO2	explain properties/parameters of metals, magnetic materials, different particles.
CO3	determine Fermi surfaces and metals, super conductivity and different magnetic materials and different particles.
CO4	analyze parameters of metals, super conductivity, magnetic materials, plasmons, polaritons and polarons
CO5	describe orbits, energy bands of metals, survey of superconductor, parameters of magnetic materials/different particles

Core Course	
COURSE CODE: HLPH42	**COURSE TITLE: NUCLEAR PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	list the properties of nuclear forces, nuclear models, nuclear reactions, fission, fusion and elementary particles
CO2	explain the different scatterings, nuclear models, types of nuclear reactions, types of fission, classification of elementary particles and quarks
CO3	outline the existence of non-central forces, predictions of the shell model, classical and partial wave analysis of reaction cross-sections, compound nucleus, controlled thermonuclear reactions
CO4	analyze Breit-Wigner Dispersion formula, Bohr and Wheeler's theory of nuclear fission, conservation laws of nuclear reactions and elementary particles
CO5	apply the conservation laws of elementary particles to solve simple problems

Core Course	
COURSE CODE: HLPH43	**COURSE TITLE: MOLECULAR SPECTROSCOPY**
On successful completion of the course, the learners should be able to	
CO1	state the nature of interaction of various radiations on different types of molecules
CO2	obtain the energy expressions for interacting molecules using microwave, infrared, Raman, electronic and spin resonance spectroscopic method
CO3	estimate the interatomic distances of rotors, vibrating molecules and vibrating rotors
CO4	analyse the structure and intensity of rotational, vibrational, electronic spectra and spin resonance spectra of molecules
CO5	explain the experimental techniques involved in microwave, infrared, Raman and spin resonance spectroscopic methods

Core Course	
COURSE CODE: HLPH4P	**COURSE TITLE: PROJECT AND VIVA VOCE**
On successful completion of the course, the learners should be able to	
CO1	identify and analyze the nature of the problems
CO2	interpret relevant data, manipulate them and find solution
CO3	develop the writing skills of project report in an ethical manner
CO4	present their findings in conferences
CO5	defend their dissertations in viva-voce

Core Elective Course	
COURSE CODE: HLPH4E1	**COURSE TITLE: NANO PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	label the basics of microscopic techniques, features of individual nanoparticles, CNT and nanosensors
CO2	explain the working of different microscopies, synthesis, structure and properties of nanoparticles, CNT and nanosensors
CO3	discuss the microscopic techniques and applications of nanoclusters, metal and semiconductor nanoparticles, carbon nanotubes and nanosensor devices
CO4	apply the techniques of microscopes in characterization of metal/semiconducting nanoparticles, CNT and nanoscale organization of nanosensors
CO5	inspect electron/scanning probe microscopies, individual nanoparticle/ CNT and nano sensing devices

Elective Course	
COURSE CODE: HLPH4E2	**COURSE TITLE: MEDICAL PHYSICS**
On successful completion of the course, the learners should be able to	
CO1	describe the physiological effects of ultrasound in therapy
CO2	apply the theory of light in medical applications
CO3	create an insight on various aspects of radiology
CO4	apply the physical principles of the instruments used in medical diagnosis & therapy
CO5	explain the physics behind radiation therapy

CERTIFICATE PROGRAMME IN DIGITAL PHOTOGRAPHY AND PHOTOSHOP

PROGRAMME EDUCATIONAL OBJECTIVES By the Completion of the certificate programme in Digital Photography and Photoshop, the learners will be able to	
PEO1	be effective photographer with mastery of the materials including the uses of camera, film, light and digital technique
PEO2	be self employed/freelance commercial photographers and photo composer

PROGRAMME SPECIFIC OUTCOMES By the Completion of the certificate programme in Digital Photography and Photoshop, the learners will be able to	
PSO1	handle software to design digital photos creatively
PSO2	develop images by intermingling arts and science in an unique way
PSO3	use digital photo technique instead of mechanical tools to have eco-friendly

Certificate course	
COURSE CODE: ACDP11	**COURSE TITLE: DIGITAL PHOTOGRAPHY AND PHOTOSHOP**
On successful completion of the course, the learners should be able to	
CO1	define parts of camera, digital camera, pixels, storage card, photoshop program window, digital zoom and optical zoom, image edit tools and various file formats.
CO2	explain types of camera, camera parts, lens types, digital camera, metering, sensors, storage card, photoshop program window, tool box and file format
CO3	apply different file formats to create images
CO4	create images with different tools, use screen modes in photoshop program window
CO5	develop photos of required size using different tools, file formats, matrix, metering, sensors, pixels, rotating, cropping and editing images

Certificate course

COURSE CODE: ACDP1L		COURSE TITLE: PHOTOGRAPHY AND PHOTOSHOP TECHNIQUES-LAB
On successful completion of the course, the learners should be able to		
CO1	recall menu and menu options in Photoshop	
CO2	explain the various image editing tools.	
CO3	apply various effects and adjustment options for an image	
CO4	perform experiments to produce pleasant required image	
CO5	able to create greeting card, work with Photoshop.	

ADD ON COURSE- 1		
COURSE CODE: GLPHEC1		COURSE TITLE: NANOTECHNOLOGY
On successful completion of the course, the learners should be able to		
CO1	define the basics of nanomaterials and characterization techniques	
CO2	discuss the synthesis, characterization and applications of carbon nanotubes/nanomaterials	
CO3	describe the properties of carbon nanotubes and nanomaterials	
CO4	analyze the significance of various microscopic and diffraction techniques	
CO5	compare the different synthesis routes of nanomaterials	

ADD ON COURSE- 2		
COURSE CODE: GLPHEC2		COURSE TITLE: Physics for Competitive Examinations
On successful completion of the course, the learners should be able to		
CO1	define the basic laws of motion, gravitation, thermal, optics and electronics	
CO2	describe the concepts of work, waves, atomic and nuclear physics	
CO3	classify the different electronic devices and communication systems	
CO4	solve problems in Physics	
CO5	appraise the importance of recent trends in Physics	