Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
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Department of Physics

Program: M.Sc Physics

Academic Year :2022-2023

Course Code	Course Title	CO. No	Description of the course Outcome
22PH5101	Mathematical Physics	CO1	Understand the classification of analytical functions, complex integration and evaluation of definite integrals
		CO2	Apply the Beta and Gamma functions and some special functions
		CO3	Apply the transformation techniques to solve complex functions
		CO4	Apply the numerical technique to solve functions and system of equations
22PH5102	Classical Mechanics	CO1	Apply Newtonian mechanics to solve mechanics of particle and solving Lagrange's equations of motion from D'Alembert principle.
		CO2	Apply the principles of classical mechanics to reduce the two body problem to One body problem and Classification of orbits
		CO3	Apply Hamilton's equations to solve Canonical transformations and Illustrate the Poisson brackets, Invariance of Poisson bracket under canonical transformations–Principle of least action
		CO4	Apply the Hamilton Jacobi equations to solve various characteristic functions, Action and angle variables, small oscillations and their applications
		CO1	Understand the concepts of Laplace and Poisson's equations, Static fields in material media, Polarization vector, macroscopic equations, classification of dielectric media, Molecular polarizability and electrical susceptibility, Clausius-Mossetti relation.

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22PH5103	Electrodynamics	CO2	Apply the EM concepts to explain the differential equations of magneto statics, vector potential, magnetic fields of a localized current distribution, Singularity in dipole field, Fermi-contact term, Force and torque on a localized current distribution.
		CO3	Apply the Formal solution of electrostatic boundary value problem with Green function, Method of images with examples, Magneto static boundary value problems. Wave guide and its types, Introduction of TE, TM modes and their boundary values
		CO4	Apply the principles of EM theory to explain the Faraday's law of induction, displacement current, Maxwell equations, scalar and vector potential, Gauge transformation, Lorentz and Coulomb gauges, conservation of energy, Poynting Theorem, Conservation of momentum.
22PH5104 22PH5106	Analog Electronics + Lab	CO1	Understand the working of Different Semiconductor devices (Construction, Working Principles and V-I characteristics) and their applications.
		CO2	Understand the working of Different Negative feedback amplifiers.
		CO3	Apply the basic operational amplifier characteristics, OPAMP parameters, applications as inverter, integrator, differentiator etc
		CO4	Design the basic applications of LP, HP, BP, BS filters etc.
		CO5	Analyze the semiconductor and operational circuits implementation.
22PH5105	Computational Physics	CO1	Apply the concepts of C language and Python and be able to create simple programs using the C language and Python operators.
		CO2	Apply the concepts of MATLAB and be able to develop simple programs to solve some application problems.
		CO3	Understand the equations and simultaneous equations with algorithms and apply it in real time problems that arise in Computational Physics.
		CO4	Apply the notations of interpolations, numerical differentiation and integration with algorithms to solve problems involving numerical techniques.
22PH5107	Computational Physics Lab	CO1	Apply C language and Python operators and functions for symbolic processing and solving simple programs.
		CO2	Apply MATLAB operators and functions for symbolic processing and solving equations, Eigen values and Eigen vectors, curve fitting and interpolation.
		CO3	Apply MATLAB tools and codes for solving a linear system and Gauss elimination method.

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		CO4	Apply MATLAB tools and codes for solving linear interpolation, polynomial curve fitting, and least square curve fitting and general nonlinear fits.
22PH5201	Statistical Mechanics	CO1	Understand the Microstates and macro states of Ideal gas and Microstate and microstate in classical systems, and derivation of Maxwell's relations, and thermodynamic laws.
		CO2	Applications of these ensembles to classical ideal gas and explaining about types of oscillators.
		CO3	Apply the postulates of Quantum Statistical Mechanics and types of ensembles and energy distributions
		CO4	Apply the Thermodynamic behavior of Ideal, Bose, Fermi gases and applications of statistical mechanics
22PH5202	Quantum Mechanics - 1	CO1	Apply the basic concepts of Quantum Mechanics and solve the related problems
		CO2	Apply the Vector Space methods in core problems of physics.
		CO3	Apply the Schrodinger's Wave equation to exactly solvable problems.
		CO4	Apply the Schrodinger's Wave equation to many body problems and arrive the solution.
22PH5203	Fiber optics and nonlinear optics	CO1	Understand the fundamentals of optical fibers and their characteristics with applications.
		CO2	Apply the concepts of optical fibers to explain the types of fibers, error schemes and transverse electric and magnetic fields in fibers.
		CO3	Understand the concepts of nonlinear phenomena of light and information about interferometers and sensors.
		CO4	Apply the nonlinear optics to describe the applications of frequency modulation of light and relevant theories.
22PH5204	Solid State Physics-1	CO1	Apply the structure of crystalline solids, application to crystal structure-properties and its relationship, crystal diffraction and the experimental concepts of reciprocal lattice
		CO2	Apply and explain the origin of chemical bonds in ionic and vander wall bonds; motion of electron in gas and metal and heat capacity of metal
		CO3	Apply the concepts of materials to explain the Periodic Zone schemes, Fermi surfaces and different types of orbits and quantization of orbits in a magnetic field
		CO4	Apply and demonstrate the concept of energy bands and effect of the electric field on Materials.

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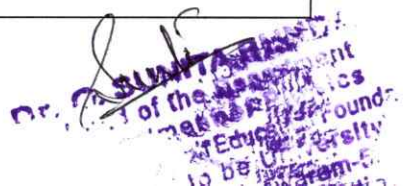
		CO5	Apply the knowledge of physics principles and performing experiments and preparation of new glass materials and study their spectroscopic properties
22PH5205	Digital Electronics	CO1	Understand number systems and basic connects of digital electronics and techniques for minimization of gates.
		CO2	Design of combinational logic circuits.
		CO3	Design of sequential logic circuits.
		CO4	Implementation of digital circuits using PAL, PLA, FPGA and CPLD
22PH5207	Digital Electronics Lab	CO5	Apply the knowledge of Digital electronics for devices
22PH5208	Seminar	CO1	Understand the basics of Physics and encouragestudents towards presenting and preparing presentation effectively
22PH5301	Quantum Mechanics - 2	CO1	Apply Perturbation theory in different areas of physics
		CO2	Apply Approximation methods in Perturbation theory and apply in many branches of physics.
		CO3	Apply the Operators algebra in various physical phenomenon.
		CO4	Apply the Relativistic Quantum Mechanics and extend the application in to other areas of Physics.
22PH5302	Atomic and Molecular Spectroscopy	CO1	Understand the electronic structure in atoms using different spectra
		CO2	Apply the mechanism of rotational and vibrational spectroscopy to demonstrate the molecular energy levels
		CO3	Apply the principles of vibrational spectroscopy to explain the Raman effect of rotational, vibrational and polyatomic molecules
		CO4	Apply the knowledge of principles to study electronic spectra and resonance spectroscopy like NMR and ESR.
22PH5303	Nuclear Physics	CO1	Understand the deuteron and Magnetic dipole moment and nuclear forces and scattering cross section High energy nucleon-nucleon and nuclear forces.
		CO2	Apply the knowledge of Nuclear Models, gas and liquid and explaining about types of beta, alpha particle, optical model.
		CO3	Apply the concepts of Nuclear physics to explain the Radioactive Decays (Alpha, Beta, Gamma radiations) and types of radioactive decay and radioactive transformation in alpha decay.



		CO4	Apply the fundamentals to demonstrate the Nuclear Reaction, Fission and Fusion behavior of Energetic of nuclear reactions and Characteristics of fissions and fusion reactors.
22PH5304	Particle Physics	CO1	Understand the Kinematics of Nuclear - Elementary Particle Reactions - Scattering and Form Factors - Broad classification of elementary particles - particle interactions in nature of conservation laws.
		CO2	Understand the concept of Elementary Particles, ideas, CPT invariance, particle reaction and quarks.
		CO3	Apply the knowledge of Electroweak interaction, Quark hypothesis, Quark model, cyclotron and LHC accelerators.
		CO4	Apply the existing knowledge in Mossbauer Spectroscopy, radioactive, and conservation laws.
22PH5305	Solid state Physics-2	CO1	Understand semiconductor physics: direct and indirect band-gaps, the effects of doping a semiconductor
		CO2	Apply the knowledge of basic concepts of superconductivity to explain the AC and DC Josephson effect, some attempts to explain superconductivity, the BCS model etc.
		CO3	Understand the source of a magnetic materials and the their behavior
		CO4	Apply the knowledge of polarization to know the properties of piezo and ferro electric materials
22PH5306	Lasers and Photonics	CO1	Understand the mechanisms of energy distribution and principles involved in designing laser systems.
		CO2	Apply the basic principles and mechanisms of laser systems and demonstrate the types of lasers with its applications.
		CO3	Understand the linear and nonlinear concepts of light and its propagation in different optical media.
		CO4	Apply the nonlinear phenomena of light to explain the scattering theory and advanced optical properties of materials.
22PH5307	Term paper	CO1	Apply the fundamentals of Physics to Collect research information from the literature of any interested topic related to dissertation
22PH5308	Solid State Physics -2 Lab	CO1	Apply physics principles to understand the mechanical and magnetic properties of materials.
		CO2	Apply thermodynamic principles to understand the Physics experiments.
			Apply the knowledge of optical and dielectric

		CO3	experiments by applying physics principles
		CO4	Analyze the properties of nano materials which leads to research and development
20UC1102	Design thinking and Innovation	CO1	Understand the basics of design thinking and its implications inproduct or service development
		CO 2	Understand and Analyze the requirements of a typical problem
		CO3	Apply the necessary activities and plan towards solving the problem through ideation and prototyping
		CO4	Analyze the solution and refine them based on the customer feedback
22PH5401	Dissertation	CO5	Analyze the Spectral properties of synthesized new materials.
22PH54E1	Experimental Techniques	CO1	Apply the EM radiation and Experimental techniques and X- ray scattering techniques and Powder X-ray diffractometer.
		CO2	Apply the principles to explain instrumentation of SEM, TEM, EDAX and WDS, ESCA and PES
		CO3	Apply the Rutherford back scattering method, Magnetic Characterization: M-H
		CO4	Apply the mechanisms and illustrate the data of DTA, TGA, and DSC with suitable glass and ceramic materials
22PH54E2		CO1	Understand the relevant information on the generation of amplitude modulation waves
	Basic Communication Theory	CO2	Apply the concepts of frequency and phase modulation in AM waves to explain communication theory
		CO3	Apply the concepts for effective information on random variables and characterization techniques used for filtering the noise in AM waves
		CO4	Apply the methods and codes used in transfer of information theory to explain the communication theory
22PH54E3	Nano Photonics	CO1	Understand students to acquire the optical Sensors - Mathematical Methods in Nanophotonic
		CO2	Apply the fundamental concepts of physics which is necessary for Plasmonic biosensors - nanofabrication
		CO3	Apply the basic principles of Nano lasers Sensors and Nanophotonics and its importance
		CO4	Apply the principles of Nuclear Reaction, Fission and Fusion behavior ofEnergetic of nuclear reactions and Characteristics of fissionsand fusion reactors.
	Physics of Nanomaterials	CO1	Understand the basics of nanomaterials, parameters which get effected by scaling down the size of the material, Major approaches and synthesis procedure

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22PH54E4		CO2	Apply the principles associated with characterization techniques and usage of the techniques
		CO3	Understand the properties of the nanomaterial in case of metals, semiconductors, insulators, ceramics and polymers and make use of nanomaterials in those devices
		CO4	Apply the methos for the synthesis of carbon nanotubes and explore their applications.
22PH54E5	Radar Systems and Satellite communication	CO1	Understand the Radar operations, types of radar and applications
		CO2	Apply the principles of Radar systems to explain the signal and data processing for radars, antenna characteristics
		CO3	Apply the techniques to demonstrate the satellite communications, orbital constitutions and Telemetry, Tracking
		CO4	Apply the coding techniques for INMARSAT VSAT, GPS, RADARSAT, INTELST applications
22PH54E6	Nano Electronics	CO1	Understanding of the principles, limitations, and applications of nano electronics.
		CO2	Understanding of the nano scale effects, techniques for nanoscale transistor fabrication, industrial CMOS technology, and non-classical elements of nano MOSFETs.
		CO3	Understanding of the introduction to nanostructures, the fabrication and patterning techniques used to create nanostructures, and the characterization techniques.
		CO4	Understanding of nano sensors, nano actuators, memory devices, photovoltaic cells, and their applications in communication, industry, commercial settings, agriculture, biomedical fields, and the Internet of Things (IoT).
22PH54E7	Thin Film Technology	CO1	Understand the concept of thin film technology and the preparation techniques
		CO2	Understand the crystal growth and techniques
		CO3	Apply XRD,TEM and other techniques for Thin film characterization
		CO4	Apply the methods of Thin film techniques to demonstrate the various properties of thin films.
22PH54E8	Antenna theory and Radio wave Propagation	CO1	Understand the antenna characteristics, radiation and applications
		CO2	Apply the principles of antenna theory to explain antenna arrays, advantages; impedance measurements
		CO3	Apply the principles of radiowave propagation to classify

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			the types of antennas, excitation techniques for designing the antennas
		CO4	Apply the method to differentiate ground wave space wave and sky wave propagation for wireless communications
22PH54E9	Nanomaterials for Renewable Energy Materials	CO1	Apply the basic concepts of energy conversion systems.
		CO2	Understand the working of fuel cells current status and future trends
		CO3	Apply the knowledge of photovoltaic cells and energy conversion systems to improve their performance.
		CO4	Apply the knowledge of photovoltaic systems to understand the working of Solar cells

Academic Professor I/C

HOD-Physics

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