Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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Department of Physics

Program: M.Sc Physics

Academic Year : 2020-2021

Course Code	Course Title	CO NO	Description of the Course Outcome
19PH5101	Mathematical Physics	CO1	Classify the analytical functions, complex integration and evaluation of definite integrals
		CO2	Analyze Beta and Gamma functions and some special functions
		CO3	Describe and Apply the transform technique for functions
		CO4	Apply the numerical technique to solve functions and system of equations
19PH5102	Classical Mechanics	CO1	Explain the applications of Newtonian mechanics and the formulation of 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
19PH5103	Electrodynamics	CO1	Explain about 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.
		CO2	Discuss about 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.

1

		CO3	Explain about 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	Discuss about 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.
19PH5104 19PH5106	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.
19PH5105	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.
19PH5107	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.
		CO4	Apply MATLAB tools and codes for solving linear interpolation, polynomial curve fitting, and least square curve fitting and general nonlinear fits.
20PH5108	Seminar-1		To motivate the students towards presenting and preparing presentation effectively
		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.

19PH5201	Statistical Mechanics	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	
19PH5202	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.	
19PH5203	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.	
19PH5204	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	Illustrate 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.	
		CO5	Apply the knowledge of physics principles and performing experiments and preparation of new glass materials and study their spectroscopic properties	
19PH5205	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	
19PH5207	Digital Electronics Lab	CO5	Apply the knowledge of Digital electronics for devices	
			To motivate the students towards presenting and	

Code	Course	CO	Course Outcome
19PH5208	Seminar-2	CO1	preparing presentation effectively
19PH5301	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.
19PH5302	Atomic and Molecular Spectroscopy	CO1	Understand the electronic structure in atoms using different spectra
		CO2	Explain molecular energy levels using rotational and vibrational spectroscopy
		CO3	Illustrate 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.
19PH5303	**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	Applications the knowledge of Nuclear Models, gas and liquid and explaining about types of beta, alpha particle, optical model.
		CO3	Apply of Radioactive Decays (Alpha, Beta, Gamma radiations) and types of radioactive decay and radioactive transformation in alpha decay.
		CO4	Apply of Nuclear Reaction, Fission and Fusion behavior of Energetic of nuclear reactions and Characteristics of fissions and fusion reactors.
19PH5304	**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	Application of existing knowledge in Mossbauer Spectroscopy, radioactive, and conservation laws.

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19PH5305	Solid state Physics-2	CO1	Understand semiconductor physics: direct and indirect band-gaps, the effects of doping a semiconductor.
		CO2	Applying 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 materials, magnetic behavior and be able to distinguish types of magnetism.
		CO4	Applying the knowledge of polarization to know the properties of piezo and ferro electric materials
19PH5306	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.
19PH5307	Term paper	CO1	Collecting literature from any interested topic related to dissertation of IV semester
19PH5308	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.
		CO3	Apply the knowledge of optical and dielectric experiments by applying physics principles
		CO4	Analyze the properties of nano materials which leads to research and development
20UC1102	DESIGN THINKING AND INNOVATION – 1	CO1	Understand the basics of design thinking and its implications in product or service development
		CO2	Understand and Analyse the requirements of a typical problem
		CO3	Plan the necessary activities towards solving the problem through ideation and prototyping
		CO4	evaluate the solution and refine them based on the customer feedback
19PH5401	Dissertation	CO5	Prepare new materials and Characterization studies and analysis of Spectroscopy to Performing materials
	Experimental	CO1	Apply the EM radiation and Experimental techniques and X- ray scattering techniques and Powder X-ray diffractometer.

5

19PH54E1	Techniques	CO2	Applications of Sem, TEM, EDAX and WDS, ESCA and PES
		CO3	Apply of Rutherford back scattering method, Magnetic Characterization: M-H
		CO4	Analysis data of DTA, TGA, and DSC with suitable glass and ceramic materials
19PH54E2	Basic Communication Theory	CO1	To provide relevant information on the generation of amplitude modulation waves
		CO2	To understand the concepts of frequency and phase modulation in AM waves
		CO3	To provide effective information on random variables and characterization techniques used for filtering the noise in AM waves
		CO4	To understand methods and codes used in transfer of information theory
19PH54E3	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
		CO2	Explain the basics of principles associated with characterization techniques andusage of thetechniques
		CO3	Identifying the change in properties of the nanomaterial in case of metals, semiconductors, insulators, ceramics and polymers and make use of nanomaterials in those devices
		CO4	Understand synthesis of carbon nanotubes and explore their applications.
19PH54E4	Radar Systems and Satellite communication Radar Systems and Satellite communication	CO1	To be learn the Radar operations, types of radar and applications
		CO2	To be learn the signal and data processing for radars, antenna characteristics
		CO3	To be learn the satellite communications, orbital constitutions and Telemetry, Tracking
		CO4	To be learn the coding techniques for INMARSAT VSAT, GPS, RADARSAT, INTELST applications.
19PH54E5	Thin Film Technology	CO1	Explain the concept of thin film technology and the preparation and techniques
		CO2	Explaining the growth and techniques and kinetics
		CO3	Explaining about XRD,TEM and other techniques for Thin film characterization
		CO4	Explaining the various properties of thin films.
	DESIGN THINKING AND INNOVATION - 2	CO1	Understand the problem statement, requirements and formulating approaches to solve real world problems.
		CO2	Implementing Design Thinking Framework.

20UC1203		CO3	Develop innovative thinking ability through design thinking and also develop metrics for successful implementation of Design Thinking.
		CO4	Understand the copyright, IPR, Trademark, Patent and license agreement policies for protecting own R&D innovations and enhancing brand image.
19PH54E6	Antenna theory and Radio wave Propagation	CO1	To be learn the antenna characteristics, radiation and applications
		CO2	To be learn antenna arrays, advantages; impedance measurements
		CO3	To be learn types of antennas, excitation techniques for designing the antennas
		CO4	To be learn ground wave space wave and sky wave propagation for wireless Communications

Academic Professor I/C