K.L.E Society's
Raja Lakhamagouda Science Institute (Autonomous), Belagavi

(PO's/PSO's/CO's)

Program: M. Sc. Physics (PG01A01)

Programme Outcomes

PO1: Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts, theoretical principles and experimental findings in physics and its subfields.

PO2: Skilled communicator: Ability to transmit complex technical information relating to physics in a clear and concise manner in writing and orally.

PO3: Critical thinker and problem solver: Ability to employ critical thinking and efficient problem-solving skills in the basic and advanced areas of physics.

PO4: Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the field of physics, and planning, executing and reporting the results of an experiment or investigation.

PO4: Ethical awareness/reasoning: Avoiding unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, and appreciate environmental and sustainability issues.

PO6: Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.

Programme Specific Outcomes

PSO1: Demonstrate a fundamental/systematic or coherent understanding of the academic field of physics, its different learning areas and applications, and its linkages with related disciplinary areas/subjects.

PSO2: Demonstrate a procedural knowledge that creates different types of professionals related to physics area of study, including research and development, teaching and government and public service.

PSO3: Demonstrate a skill in areas related to specialization area relating the subfields and current developments in the academic field of physics.

PSO4: Demonstrate subject-related and transferable skills that are relevant to physics-related job trades and employment opportunities.

Course Outcomes

Semester I

Course Type	Course Code	Course Title	Course Outcome
DSC	AP01	Mathematical Methods of Physics & Computer Programming-I	**CO1:** In this course Series solution method is used to study special functions like Legendre, Bessel, Laguarre functions, etc **CO2:** Matrix representation of linear operators and their eigen values and eigen vectors provide knowledge that is useful in applications of physical problems. **CO3:** Fourier, Laplace and inverse transformations are studied in order to solve major problems in physics. **CO4:** Study of types of tensors. **CO5**: Knowledge of C-programming to design software, simulators, network devices, compilers, etc
DSC	AP02	Classical Mechanics	**CO1:** In-depth understanding of Newton's laws. **CO2:** To solve the Newton Equations for simple configurations using various methods. **CO3**: The foundations of chaotic motion
DSC	AP03	Electrical (General)	**CO1:** Students will understand the current and voltage characteristics of semiconductor devices. **CO2:** They will be able to analyze the circuits and relate ac models of semiconductor devices with their physical operation. **CO3:** Will be able to design and analyze electronic circuits. **CO4**: To evaluate frequency response to understand the behaviour of electronic circuits. **CO5:** To study digital system of design, circuit theory and networks
DSC	AP04	Solid State Physics	**CO1:** To analyze the crystal structure. **CO2:** To study the structural property relations. **CO3:** To understand thermal properties of the materials.

			CO4: To study the elemental and compound semiconductor. **CO5:** To study the defects in crystal structures.
Practical's	AP05	Practical's	**CO1:** Gain practical knowledge about the mechanical, magnetic properties (B-H loop and Curie temperature) and electronics properties (band gap and I-V characteristics) of materials. **CO2:** On completion of this paper students will be expertise in handling specific electronic equipments like CRO, function generators, diodes, transistors etc. **CO3:** Analyse the structure of a crystalline solid in terms of lattice, basis, unit cell, reciprocal lattice, Brillouin zone and symmetry elements.
Practical's	AP06	Practical's	**CO1:** Gain practical knowledge about the mechanical, magnetic properties (B-H loop and Curie temperature) and electronics properties (band gap and I-V characteristics) of materials. **CO2:** On completion of this paper students will be expertise in handling specific electronic equipments like CRO, function generators, diodes, transistors etc. **CO3:** Analyse the structure of a crystalline solid in terms of lattice, basis, unit cell, reciprocal lattice, Brillouin zone and symmetry elements

Semester II

Course Type	Course Code	Course Title	Course Outcome
DSC	BP01	Quantum Mechanics-I	**CO1:** Quantum mechanics is important because it plays a fundamental role in explaining how the world works. It governs the behaviour of microscopic systems. **CO2:** It governs the behaviour of all physical systems regardless of their size. **CO3:** quantum mechanics is tool used to design optical and electronic components
DSC	BP02	Atomic Molecular &Optical Physics (General)	**CO1:** To Overview the Salient features of atomic spectra and coupling schemes. **CO2:** To study lasers, their kinetics and applications. **CO3:** To acquire knowledge of Raman, Microwave, infrared and electronic spectroscopy for future studies in atomic and molecular physics.
DSC	BP03	Nuclear Physics	**CO1:** To study the basic properties of nucleus and experimental determination of certain properties. **CO2:** Various decays/ transitions in the nuclei and the liquid drop model are studied. **CO3:** Study of elementary particles in the nuclei provides deeper knowledge about their structure.

			CO4: Interaction of radiations with the matter and their detection
DSC	BP04	Probability Theory	**CO1:** Study of basic statistics **CO2**: Mathematical analysis of theory of probability. **CO3:** Various sampling techniques and hypothesis formulations are studied for the use in research areas.
Practical-II	BP05	Practical's	**CO1:** Understand the fundamentals of various physical phenomena and physical concepts. **CO2:** Know and learn about various type of detectors used in nuclear physics experiments and understand the phenomenon used in GM counter for estimating the range of different radioactive sources.
Practical-II	BP06	Practical's	**CO1:** Understand the fundamentals of various physical phenomena and physical concepts. **CO2:** Know and learn about various type of detectors used in nuclear physics experiments and understand the phenomenon used in GM counter for estimating the range of different radioactive sources.

Semester III

Course Type	Course Code	Course Title	Course Outcome
DSC	CP01	Mathematical Methods of Physics-II	**CO1:** Introduction to statistical methods, formulation and interactions of acroscopic systems. **CO2:** Basic methods, results and simple applications of statistical mechanics. **CO3**: Acquire knowledge of distribution functions like Maxwell Boltzmann, Bose – Einstein and Fermi Dirac and corresponding consequences. **CO4:** Statistical thermodynamics provides platform for the study of Brownian motion, Lengevin equation, Fourier analysis, Fluctuations and Onsager relations.
DSC	CP02	Statistical Mechanics	**CO1:** They study the applications of linear integral/differential equations & their relation with Volterra's equation. Hence, they offer a powerful technique for solving practical problems. **CO2:** Inhomogeneous differential equations can be solved using green's function to describe variety of phenomena ranging from motion of complex mechanical oscillators to the emission of sound waves from loudspeakers. **CO3:** Numerical methods such as iteration, bisection, Newton-Raphson method provide

			solution of algebraic and transcendental equations
DSC	CP03	Solid state physics-I	**CO1:** Band energy calculations by APW method and k-p method. **CO2:** Hall effect study for nature of charge carriers and carrier concentration. **CO3:** Study of magneto resistance phenomena. CO4: Study of Integer Quantum Hall Effect (IQHE) and fractional Hall effect.
Practical	CP05	Practical	**CO1:** Deduce the structure of a crystalline solid from an analysis of the XRD pattern and the theoretically calculated crystal structure factor.
Practical	CP06	Practical	**CO1:** Deduce the structure of a crystalline solid from an analysis of the XRD pattern and the theoretically calculated crystal structure factor.
DSC	CP07	Physics of Nanomaterials	**CO1:** Study the basics of Nanoscience including historical background, types of nano materials and quantum confinement. **CO2:** Basics of quantum mechanics such as Wave-particle duality, Heisenberg uncertainty principle, Schrodinger wave equations etc., **CO3:** Physical and chemical methods of synthesizing nano materials enables students to synthesize a compound for its further studies. **CO4:** Learning the characterization techniques enables them to implement those practically during their project work

Semester IV

Course Type	Course Code	Course Title	Course Outcome
DSC	DP01	Classical Electrodynamics	**CO1:** To acquire basic knowledge of electrostatics and magnetostatics. **CO2:** Various laws, equations and transformations of electrodynamics are studied. **CO3:** Electromagnetic waves and radiations along with their interactions and importance in other branches of physics are studied. **CO4:** To study the behaviour of plasma in magnetic field.
DSC	DP02	Quantum Mechanics	**CO1:** Linear vector algebra forms base to machine learning in the field of engineering. **CO2:** Study of approximation methods has applications in molecular physics. **CO3**: Relativistic quantum mechanics provides information about the interconnection of quantum mechanics with other branches of physics.
DSC	DP03	Solid state physics-II	**CO1:** Study of dielectric ferroelectric and piezoelectric materials. **CO2:** Study of spin-spin, spin-lattice relaxation using magnetic resonance. **CO3:** Optical properties of semiconductors. **CO4:** Solar cells and their efficiencies.

OEC	DP04	Solid state physics-III	**CO1**: Applications of low dimensional semiconductor structures. **CO2:** Methods of thin film deposition. **CO3:** Study of high Temperature superconductors. **CO4:** Properties of nano-structured materials. **CO5:** Spintronic material
Practical-III	DP05	Practical	**CO1:** Determination of different parameters of unit cell in a crystalline solid using XRD pattern.
Project	DP06	Project	**CO1:** Identify a research problem and carry out literature survey and analyse the research gap and formulate the problem. **CO2:** Interpret the data and report research findings in written and verbal forms.