Programme Oucomes,Programme Specific Outcomes (PSO) & Course Outcomes (CO) of B.Sc. Physics (Department of Physics)

Programme Outcomes:

After successful completion of three year degree program in physics a student should be able to;

PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of physics.

PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion.

PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Physics experiments.

PO-4. Create an awareness of the impact of Physics on the society, and development outside the scientific community.

PO-5. To inculcate the scientific temperament in the students and outside the scientific community.

PO-6. Physics uses mathematics to organize and formulate experimental results.

PO-7. Use modern techniques,& decent equipment's.

Programme Specific Outcome:

PSO-1: Apply the knowledge in the principles of nature and ability to solve and apply the concepts of Physics in various fields including Mechanics, , Magnetic effect of electric current Thermodynamics & Statistical Mechanics, Solid-state physics, and Quantum mechanics etc.

PSO-2: Learning of laboratory skills, enabling measurements in basic physics and analysis of measurements to draw valid conclusions.

PSO-3: Development of the skills for problem solving and scientific reasoning for the prospective physicists and logical reasoning.

PSO-4: Analysis of the behavior of materials from atomic level to macroscopic level.

PSO-5: Develop research oriented skills & make aware to handle the sophisticated instruments.

Course Out Comes

Course Code & Course Title	**Course Out Comes**
DSC1-PHY104T	At the end of the course the student is expected to learn and assimilate the following:

Mechanics	**CO1.** Understand laws of motion and their application to various dynamical situations, notion of inertial frames and concept of Galilean invariance and center of mass. **CO2**. Understand the concept of law of conservation of momentum, energy and angular momentum apply them to basic problems. **CO3**. Understand the analogy between translational and rotational dynamics, and write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions. **CO4**. Apply Kepler's law to describe the motion of planets and satellite in circular orbit, through the study of law of Gravitation. **CO5.** Understand the principles of elasticity through the study of Young Modulus and modulus of rigidity. **CO6**. Explain the phenomena of simple harmonic motion and the properties of systems executing such motions and describe special relativistic effects and their effects on the mass and energy of a moving object
DSC2-PHY204T Electricity & Magnetism	**CO1**.Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges. **CO2**. Apply Gauss's law of electrostatics to solve a variety of problems. Articulate knowledge of electric current, resistance and capacitance in terms of electric field and electric potential. Demonstrate a working understanding of capacitors. **CO3**. Describe the magnetic field produced by magnetic dipoles and electric currents. Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields. Understand the dielectric properties, magnetic properties of materials and the phenomena of electromagnetic induction. **CO4**. Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe

	the graphical relationship of resistance, capacitor and inductor. **CO5**. Apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity, Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines. **CO6**. In the laboratory course the student will get an opportunity to verify various laws in electricity and magnetism such as Lenz's law, Faraday's law and learn about the construction, working of various measuring instruments.
DSC3-PHY303T Thermal Physics & Statistical Mechanics	**CO1**. Comprehend the basic concepts of thermodynamics, the laws of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations. **CO2**. Learn about Maxwell's thermodynamic relations, Joule-Thomson effect, Entropy-temperature diagram and the thitd law of thermodynamics. **CO3**. Learn the basic aspects of kinetic theory of gases , transport phenomenon.\ and its application to specific heat of gases. **CO4**. Learn about spectral distribution of black body radiation, Weins and Rayleigh-Jeans energy density distribution law and Steafns-Boltzman law. **CO5**. In the laboratory course, the students are expected to do some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, temperature coefficient of resistant, variation of thermo-emf of a thermocouple with temperature difference at its two junctions and calibration of a thermocouple. **CO6**. Understand the concepts of statistical physics and its applications, Fermi-Dirac distribution law of electron gas and Bose-Einstein distribution law.
DSC4-PHY403T Waves and Optics	**CO1.** Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems. Apply basic knowledge of principles and theories about the behavior of light and the physical environment to conduct experiments.

	CO2. Understand the principle of superposition of waves, so thus describe the formation of standing waves. **CO3**. Explain several phenomena we can observe in everyday life that can be explained as wave phenomena. **CO4**. Use the principles of wave motion and superposition to explain the Physics of polarization, interference and diffraction. **CO5**. Understand the working of selected optical instruments like biprism& diffraction grating,. **CO6.** In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. Resolving power of optical equipment can be learnt firsthand.
SEC1-PHY501T Physics Workshop Skills	**CO1.** Learn to use mechanical tools to make simple measurement of length, height, time, area and volume. **CO2**. Learn to acquire skills/ hands on experience / working knowledge on various machine tools, lathes, shapers, drilling machines, cutting tools, welding sets and also in different gear systems, pulleys etc. **CO3**.Learn to use various instruments for making electrical and electronics measurements using multimeter, oscilloscopes, power supply, electronic switches and relays
SEC2-PHY502T Basic Instrumentation Skills	**CO1**. The student is expected to have the necessary working knowledge on accuracy, precision, resolution, range and errors/uncertainty in measurements. **CO2**. Develop skills to use basic electrical instruments like multimeter, electronic voltmeter, cathode ray, and oscilloscope and acquire efficiency in making signal generators and analysis of obtained signals. **CO3**. Learn to understand and use various types of digital instruments and develop knowledge of making measurements with Impedance Bridges and Q meters.
	CO1. After an exposition of inadequacies of classical mechanics in

DSE1-PHY503P1 Quantum Mechanics	explaining microscopic phenomena, quantum theory formulation is introduced through Schrodinger equation. **CO2.** The interpretation of wave function of quantum particle and probabilistic nature of its location and subtler points of quantum phenomena are exposed to the student. **CO3**. Through understanding the behavior of quantum particle encountering a i) barrier, ii) potential, the student gets exposed to solving non-relativistic hydrogen atom, for its spectrum and eigenfunctions. **CO4**. Study of influence of electric and magnetic fields on atoms will help in understanding Stark effect and Zeeman Effect respectively. **CO5**. In the laboratory course, with the exposure in computational programming in the computer lab, the student will be in a position to solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical one dimensional and three dimensional potentials.
DSE2-PHY503P2 Solid State Physics	**CO1**. A brief idea about crystalline and amorphous substances, about lattice, unit cell, miller indices, reciprocal lattice, concept of Brillouin zones and diffraction of X-rays by crystalline materials. **CO2**. Knowledge of lattice vibrations, phonons and in depth of knowledge of Einstein and Debye theory of specific heat of solids. **CO3**. At knowledge of different types of magnetism from diamagnetism to ferromagnetism and hysteresis loops and energy loss. **CO4**. Understanding above the band theory of solids and must be able to differentiate insulators, conductors and semiconductors. Hall effect, **CO5**.Understand the basic idea about superconductors and their classifications, Type I & II superconductors and high temperature superconductor. **CO6**. To carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical

	conductivity and the hall set up to determine the hall coefficient of a semiconductor.
SEC3-PHY601T Radiation Safety	**CO1**: Provide good understanding in ionizing and non – ionizing radiations. **CO2** : Perform the synthesis of radioactive isotopes based on cyclotron and nuclear reactor. **CO3**: Demonstrate the non-ionizing radiations applications in medical diagnosis and radiation therapy
SEC4-PHY602T Renewable Energy &Energy Harvesting	**CO1**. The students are expected to learn not only the theories of the renewable sources of energy, but also to have hands-on experiences on them wherever possible. Some of the renewable sources of energy which should be studied here are: (i) off-shore wind energy, (ii) tidal energy, (iii) solar energy, (iv) biogas energy and (v) hydroelectricity. All these energy sources should be studied in detail. **CO2**. Learn about piezoelectricity, carbon- captured technologies like cells, batteries. **CO3.** The students should observe practical demonstrations of (i) training modules of solar energy, wind energy etc., (ii) Conversion of vibration into voltage using piezoelectric materials, (iv) conversion of thermal energy into voltage using thermoelectric modules.
DSE4-PHY603P1 Nuclear & Particle Physics	**CO1:** Provide basic understanding on nucleus and different nuclear models. **CO2:** Provide necessary understanding on various radiation detectors for detection of radiations. **CO3:** Realize the mechanism of different nuclear reactions involved in nuclear reactor and cosmos. **CO4.** Learn about the detectors of nuclear radiations- the Geiger-Mueller counter, the scintillation counter, the photo-multiplier tube, the solid state and semiconductor detectors.
	CO1 Focus on the application of Physics to clinical medicine. & gain a

DSE4-PHY603P2 Medical Physics	broad and fundamental understanding of Physics while developing particular expertise in medical applications.. **CO2**. Learn about the human body, its anatomy, physiology and Bio-Physics, exploring its performance as a physical machine. Other topics include the Physics of the senses. **CO3**. Students will study diagnostic and therapeutic applications like the ECG, radiation Physics, X-ray technology, ultrasound and magnetic resonance imaging. & Gain knowledge with reference to working of various diagnostic tools , medical imaging techniques, how ionizing radiation interacts with matter, how it affects living organisms and how it is used as a therapeutic technique and radiation safety practices . **CO5**.Imparts functional knowledge regarding need for radiological protection and the sources of an approximate level of radiation exposure for treatment purposes. In the laboratory course, the student will be exposed to the workings of various medical devices. **CO6**. Students gets familiarized with various detectors used in medical imaging, medical diagnostics. The hands-on experience will be very useful for the students when students enter the job market.