CO, PSO and PO for Physics Honours for the new CBCS program
Department of Physics, Krishnath College

SEMESTER-I

Course code	Course Title	Courses Outcome
PHY-H-CC-T-01	Mathematical Physics-I	1) Achieve knowledge of calculus which are integral part of any branch of Physics 2) Understand divergence, gradient and curl and their physical interpretation which are very important for theories of electricity and magnetism. 3) Understand basics of matrices and determinants i.e. inverses, adjoint, linear vector spaces, basis, basis transformations, how to calculate eigenvalues, eigenvectors 4) Apply the techniques for solving different problems and the concept Dirac delta function.
PHY-H-CC-T-02	Mechanics	1. Understand the motion of objects in different frame of references. 2) Know how to apply the conservation principle and symmetry of a system, work energy collision, 3. Explain general properties of different types of simple harmonic linear oscillations. 4. Student learns the topic special theory of relativity.
PHY-H-GE-T-01	Mechanics/ Electricity and Magnetism	1)To learn the motion of Particles in gravitation 2) To understand Oscillatory motion 3) Achieve knowledge in Special theory of relativity 4) To understand electrostatics, Gausses law, Coulombs law in dielectric media. 5) Maxwell equation in free space and dielectric media. 6) Students achieve knowledge on electromagnetic wave propagation.

SEMESTER-II

Course Code	Course Title	Course Outcomes
PHY-H-CC-T-03	ELECTRICITY AND MAGNETISM	1). To learn about basic concepts of electrical charges and currents and their properties 2). Enhance problem solving capability based on various realistic situation with electric charges system 3). Understand the concept of conductors, Dielectrics , inductance and capacitance with properties 4). Gather knowledge on the nature and characteristics Of magnetic materials 5). Understand the concept of static and time varying fields 6). Gain knowledge on electromagnetic induction and Faraday's law and its applications 7). To learn about EM waves and its propagation 8). Learn to use and solve Maxwell's equations
PHY-H-CC-T-04	WAVES AND OPTICS	1). To learn about basic concept of various types of waves and their propagation. 2). To provide a basic understanding of physical and geometrical optics 3). To provide a knowledge of various optical phenomena, for example interference, diffraction, polarization etc.
PHY-H-GE-T-02	THERMAL PHYSICS AND STATISTICAL MECHANICS/ WAVE AND OPTICS	1).To acquire knowledge about the fundamental principles of thermodynamics laws and it's applications 2). To learn about the kinetic theory of gases. 2).Gather knowledge on the entropy and thermodynamic potentials (Enthalpy, Gibbs ,Helmholtz, internal Energy, specific heat capacity) and It's application in various system. 3). Understand the concepts of Maxwell's relations and its application 4).To learn about on Maxwell –Boltzmann, Boss-Einstein, Fermi-Dirac distribution laws and comparison of three statistics . OR 1). To learn about basic concept of various types of waves and their propagation. 2). To provide a basic understanding of physical and geometrical optics 3). To provide a knowledge of various optical phenomena, for example interference, diffraction, polarization etc.

SEMESTER-III

Course Code	Course Title	Course Outcomes
PHY-H-CC-T-05	MATHEMATICAL PHYSICS-II	1) .Understand how to expand a function in a Fourier series. 2) Solving differential equation using power law Expansion (so called Frobenius method). Learn about various special functions i.e. Legendre, Bessel functions, generating functions and their Properties. 3) Fourier integral and its properties and application to signal analysis and also in quantum mechanics 4) Application of probability and various distribution functions in Physics. 5) Learn to solve partial differential equation which is very important in all branches of physics.
PHY-H-CC-T-06	THERMAL PHYSICS	1). To understand the principle of calorimetric 2). Understand the basic principle and laws of thermodynamics 3) Understand the concepts of Entropy, various thermodynamic potentials and their applications in various systems 4) Gain knowledge about microscopic behaviour of systems in explaining pressure, transport properties, viscosity, diffusion etc.
PHY-H-CC-T-07	DIGITAL SYSTEMS AND APPLICATIONS	To learn integrated circuits(IC), number system and Boolean description, introduction to logic systems, various Gates 2) To understand product and sum in logical expression, conversion between truth table and logical expression, Karnaugh map 3) To learn how to Implement different circuits: adder, subtractor, idea of multiplexer, demultiplexers, encoder, decoder 4) To know registers and counters, computer organization, data conversion.

PHY-H-SEC-T-01	ELECTRICAL CIRCUITS AND NETWORK SKILS	Students know about basic electricity principles, various electrical circuits and it's instruments (generators, transformers, AC motor etc).
PHY-H-GE-T-01	Mechanics/ Electricity and Magnetism	1)To learn the motion of Particles in gravitation 2) To understand Oscillatory motion 3) Achieve knowledge in Special theory of relativity 4) To understand electrostatics, Gausses law, Coulombs law in dielectric media. 5) Maxwell equation in free space and dielectric media. 6) Students achieve knowledge on electromagnetic wave propagation.

Course code	Course Title	Courses Outcome
PHY-H-CC-T-08	Mathematical Physics-III	1. Student can learn basic ideas and formulas for Fourier Transform so that they can solve many modern problems in quantum mechanics and solid state physics. 2. Students can learn ideas for Laplace Transform and solve differential equations to unravel the mystry of many natural problems. 3. To study complex analysis, Cauchy Riemann conditions, Analyticity, Cauchy Integral formula, Laurent and Taylor series expansion and definite integrals using contour integration.
PHY-H-CC-T-09	Elements of Modern Physics	1) To know about Radiation and its nature, old quantum theory, concept of wave-particle duality and de Broglie hypethesis. 2) Understand and explain the differences between classical and quantum mechanics. 2) To learn about Schrodinger equation as first principle, probabilistic interpretation of quantum mechanics, commutation relation and their meaning. These are very crucial as students learn Quantum Mechanics for the first time and these are basic building block of modern physics. Solve Schrodinger equation for simple potentials. 3) Students learn about Nuclear structure and various models. Interaction within and with nucleus. Gamma,Beta decay. Nuclear Fission and Fusion. Identify properties of the nucleus and other sub-atomic particles. Describe theories explaining the structure of atoms and the origin of the observed spectra.
PHY-H-CC-T-10	Analog Systems and Applications	1) To know basic boolean principle and how various electronic instruments work based on this 2) To motivate the students to apply the principles of electronics in their day-to-day life. 3) Learn various network theorems, diodes and their application 4) Study various theory and working principles of transistors, regulated power supply, amplifiers, concept of feedback, OPAMP, Multivibrators and Oscillators.

PHY-H-SEC-T-02	Renewable Energy and Energy harvesting	1. Able to understand the renewable energy sources available at present. Students learn about fossil fuels and its hazards and need for alternative energy sources, how to harvest energy from various non-conventional energy sources. 2.Able to understand the solar energy operation and its characteristics. 3.To educate the wind energy operation and its types. 4.To educate the tidal and geothermal energy principles and its operation.
PHY-H-GE-T-02	THERMAL PHYSICS AND STATISTICAL MECHANICS/ WAVE AND OPTICS	1).To acquire knowledge about the fundamental principles of thermodynamics laws and it's applications 2). To learn about the kinetic theory of gases. 2).Gather knowledge on the entropy and thermodynamic potentials (Enthalpy, Gibbs ,Helmholtz, internal Energy, specific heat capacity) and It's application in various system. 3). Understand the concepts of Maxwell's relations and its application 4).To learn about on Maxwell –Boltzmann, Boss-Einstein, Fermi-Dirac distribution laws and comparison of three statistics . OR 1). To learn about basic concept of various types of waves and their propagation. 2). To provide a basic understanding of physical and geometrical optics 3). To provide a knowledge of various optical phenomena, for example interference, diffraction, polarization etc.

SEMESTER-V

Course Code	Course title	Course Outcome
PHY-H-CC-T-11	Quantum Mechanics and applications	It is one of the most important subject in undergraduate course. Upon successful completion, students will have knowledge and skill to (i) identify and understand the kinds of experimental results which are incompatible with classical physics. (ii) interpret waveforms and apply operators to it to obtain particle's physical property. (iii) can solve Schrodinger equation to obtain wave function for some basic potential and estimate the shape of wave function based on the shape of potential. (iv) can know the fine structure of hydrogen atoms----- application of Quantum Mechanics for atomic systems. (v) can learn many electron atoms , identical particles, Pauli's exclusion principle.
PHY-H-CC-T-12	Solid State Physics	After successful completion , (i) students can investigate the structural and physical properties of materials by developing better understanding of crystal structure with emphasis on electric and magnetic behavior of solids. (ii) they can understand concept related to lattice vibrations and lattice waves in solids. (iii) they will have concept related to thermal and elastic properties of solids. (iv) they can understand elementary band theory and superconductivity which is one of the major breakthrough in modern science.

PHY-H-DSE-T-01	Classical Dynamics	In this course(i) they will learn about classical mechanics of point particles (ii) will understand special theory of relativity and will have basic concept on electromagnetic radiation.
PHY-H-DSE-T-02	Nuclear and particle Physics	In this course ,(i) they will learn general properties of nuclei, various nuclear models , radioactivity etc. (ii) they will understand nuclear reactions and interaction of nuclear radiation with matter (iii) they can know about detectors for nuclear radiation and particle accelerators. (iv) they will learn and understand fundamentals of particle Physics.

SEMESTER-VI

Course Code	Course title	Course Outcome
PHY-H-CC-T-13	Electromagnetic theory	After successful completion of this course (i) students will be able to solve electromagnetic problems using Maxwell's equations for time varying fields. (ii) they can investigate the behavior of electromagnetic problems using Maxwell's equations for time varying fields. (iii) they can investigate the behavior of electromagnetic waves in different media and can calculate average power density radiated. (iv) they can have concept about polarization of e.m .wave. (v) they will have idea about waveguide and optical fibre.
PHY-H-CC-T-13	Statistical Mechanics	After successful completion of this course (i) students can understand statistical properties of matter, contacts between statistics and thermodynamics. (ii) they can use these theory in particle systems (ideal gas, Bose and Fermi systems) (iii) they can learn B.E statistics and its application, F.D statistics and its application.
PHY-H-DSE-T-03	Nanomaterials and Applications	Students (i)will learn about nano scale systems, their band structure, application of Schrodinger equation for such nanostructures. (ii) to know how to synthesis nano materials, their optical and electrical properties. (iii) Moreover, they will know various applications of nano materials.

PHY-H-DSE-T-04	Dissertation	By the end of this module, students will be able to (i) identify an appropriate research question and can select an appropriate methodology. (ii) they can design and manage a piece of original project work. (iii) they can synthesis knowledge and skills previously gained and apply them to an in-depth study.