

**ST PETER'S COLLEGE KOLENCHERY , ERNAKULAM**

**DEPARTMENT OF PHYSICS**

- PROGRAMME - B.Sc
- **B.Sc PHYSICS Model 1** -MAHATMA GANDHI UNIVERSITY KOTTAYAM  
,KERALA

**Programme Outcome (PO)**

<b>PO 1</b>	Critical Thinking
<b>PO 2</b>	Environment and sustainability
<b>PO 3</b>	Self- directed and lifelong learning
<b>PO 4</b>	Computational thinking
<b>PO5</b>	Problem solving

**Programme Specific Outcome (PSO)**

<b>PSO 1</b>	Understand principles and theories of classical, statistical, quantum mechanics, properties of matter, and thermodynamics.
<b>PSO 2</b>	Understand and interpret the concepts of electricity, electrodynamics, spectroscopy, and relativity
<b>PSO 3</b>	Understand the principles of optics, Laser, fiber optics, solid state physics, nuclear and particle physics.
<b>PSO 4</b>	Understand the basics of semiconductor electronics, digital electronics, C++ programming, environmental physics, human Rights, astronomy and astrophysics.

## **COURSE OUTCOME (CO)**

**Semester : 1**

**Name of course: Methodology and Perspectives of Physics**

**Course Code : PH1CRT01**

**Credit :2**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Recognizing the milestones in the development of physics during the last century with special reference to the contributions of scientist.
<b>CO 2</b>	Understanding the classification of number system and the conversions.
<b>CO 3</b>	Recalling the properties of vectors and its applications in physics.
<b>CO 4</b>	Understanding the basic ideas of different co-ordinate systems.
<b>CO 5</b>	Understanding the basic experimental methods and error analysis.

**Semester : 2**

**Name of course: Mechanics and properties of matter**

**Course Code : PH2CRT02**

**Credit :2**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding wave motion and its Properties.
<b>CO 2</b>	Understanding oscillatory motion and its applications.
<b>CO 3</b>	Understanding the basics of rotational mechanics and to determine the Moment of inertia of given bodies.
<b>CO 4</b>	Understanding the basic ideas on elasticity and determine the moduli of elasticity
<b>CO 5</b>	Understanding the basic ideas of hydrodynamics and applications of surface tension

**Semester : 3**

**Name of course: Optics, laser and fiber optics**

**Course Code : PH3CRT03**

**Credit :3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding the basic ideas of interference, diffraction and polarization.
<b>CO 2</b>	Understanding the applications of interference.
<b>CO 3</b>	Differentiate Fresnel and Franhauffer diffraction.
<b>CO 4</b>	Understanding the production and detection of plane, Elliptical and circularly Polarized light.
<b>CO 5</b>	Understanding Principle and applications of Laser.
<b>CO 6</b>	Understanding the propagation of light in optical fiber and its applications

**Semester : 4**

**Name of course: Semiconductor Physics**

**Course Code : PH4CRT04**

**Credit :3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding P-N junction Diode and its applications
<b>CO 2</b>	Understanding the configurations and properties of transistor.
<b>CO 3</b>	Understanding the basic principles and Types of feedback system.
<b>CO 4</b>	Understanding the basic principles of amplifiers and oscillators.
<b>CO 5</b>	Understanding the characteristics and parameters of FET
<b>CO 6</b>	Understanding the characteristics and applications of op-amp.
<b>CO 7</b>	Understanding different types of modulations.

**Semester : 5**

**Name of course: Electricity and electrodynamics**

**Course Code : PH5CRT05**

**Credit :3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Analyzing the basic idea of alternating current in LR,RC and LCR circuit
<b>CO 2</b>	Understanding the concepts of network theorems
<b>CO 3</b>	Understanding the ideas of transient currents and thermoelectricity
<b>CO 4</b>	Recalling the fundamental theorems of divergence and curl
<b>CO 5</b>	Understanding the concepts and applications of theorems in electrostatics and magnetostatics.
<b>CO 6</b>	Understanding the concepts of Maxwell's equations, continuity equations and Poynting's theorem.
<b>CO 7</b>	Understanding the general ideas of wave equations.

**Semester : 5**

**Name of course: Classical and Quantum mechanics**

**Course Code : PH5CRT06**

**Credit :3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding the basic ideas of generalized co-ordinates, constraints and degrees of freedom and the comparison between Newtonian mechanics and modern classical mechanics
<b>CO 2</b>	Understanding Lagrangian equation and its applications
<b>CO 3</b>	Understanding Hamilton's Equation of motion and its applications and Hamilton's principle of least action
<b>CO 4</b>	Understanding the difference between classical mechanics and quantum mechanics
<b>CO 5</b>	Understanding the concepts of blackbody radiation ,Planck's Law, Photoelectric effect and Compton effect
<b>CO 6</b>	Understanding the dual nature of matter, uncertainty principle
<b>CO 7</b>	Understanding the time dependent and time independent Schrodinger equation and interpretation of wave function.
<b>CO 8</b>	Understanding the general solution of one dimensional Schrödinger equation for free particle.
<b>CO9</b>	Understanding dynamical variables , operators, eigen value equation
<b>CO10</b>	Understanding tunneling effect in quantum mechanics.



**Semester : 5**

**Name of course: Digital Electronics and programming**

**Course Code : PH5CRT07**

**Credit :3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding Boolean algebra and its laws.
<b>CO 2</b>	Understanding logic gates and its analysis and simplification
<b>CO 3</b>	Simplification of Boolean functions using Karnaugh map
<b>CO 4</b>	Understanding combinational and sequential logic in digital circuits.
<b>CO 5</b>	Understanding the working of flip-flops, registers, counters and converters.
<b>CO 6</b>	Understanding the working of adders/subtractors/ multiplexers/ demultiplexers/ encoders/decoders.
<b>CO 7</b>	Understanding the fundamentals of C++ programming structure
<b>CO 8</b>	Understanding various loops and arrays in C++ and writing programmes using loops

**Semester : 5**

**Name of course: Environmental physics and human rights**

**Course Code : PH5CRT08**

**Credit : 4**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding the basic concepts of water resources and its management
<b>CO 2</b>	Understanding the principles of remote sensing and its applications in environmental monitoring and assessment
<b>CO 3</b>	Understanding the various environmental pollution,its effects on human health and control methods
<b>CO 4</b>	Understanding different disaster management.
<b>CO 5</b>	Understanding the various elements and methods of waste management
<b>CO 6</b>	Understanding the basic ideas of environment assessment and control
<b>CO 7</b>	Understanding the basic ideas of renewable and non-renewable energy sources
<b>CO 8</b>	Explaining the principle and working of solar energy based equipments
<b>CO 9</b>	Understanding the human rights and its national perspective
<b>CO10</b>	Understanding human rights coordination within UN system

**Semester : 5**

**Name of course: Open Course**

**Course Code : PH5OPT02: Physics in daily life**

**Credit : 3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Recalling the fundamental and derived quantities, units and dimensions and significant figures
<b>CO 2</b>	Understanding light related phenomena- reflection, refraction, diffraction, interference ,scattering, total internal reflection
<b>CO 3</b>	Understanding mirrors and lenses , human eye and defects correction using lens
<b>CO 4</b>	Understanding the basics of linear and rotational motion
<b>CO 5</b>	Understanding electricity and its generation
<b>CO 6</b>	Understanding different phases of matter and the related phenomena
<b>CO 7</b>	Understanding heat energy, temperature and the temperature scales
<b>CO 8</b>	Understanding waves, lasers ,fluorescence, phosphorescence, electromagnetic waves and its applications
<b>CO 9</b>	Understanding planets, solar system, moon, eclipses, stars and galaxies
<b>CO10</b>	Understanding satellites and global positioning system

**Semester : 6**

**Name of course: Thermal and statistical physics**

**Course Code : PH6CRT09**

**Credit :3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding the Zeroth, first and second laws of thermodynamics and its applications.
<b>CO 2</b>	Explain the working action of heat engine.
<b>CO 3</b>	Understanding the basic ideas of entropy and mention its significance.
<b>CO 4</b>	Explain Maxwell's thermodynamic potentials and Maxwell's thermodynamic relations.
<b>CO 5</b>	Understanding the modes of heat transfer, blackbody radiation and Plank's law.
<b>CO 6</b>	Understanding the basic ideas of equation of state for gases
<b>CO 7</b>	Understanding the concepts of statistics and Maxwell-Boltzmann distribution law.
<b>CO 8</b>	Understanding the need of quantum statistics and explain Bose-Einstein and Fermi-Dirac statistics.

**Semester : 6**

**Name of course: Relativity and spectroscopy**

**Course Code : PH6CRT10**

**Credit :4**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding special theory of relativity and classical theory of relativity
<b>CO 2</b>	Understanding the introductory concepts of General theory of Relativity
<b>CO 3</b>	Understanding types of atomic spectra and different atom models
<b>CO 4</b>	Understanding Zeeman Effect and Paschen Back effect
<b>CO 5</b>	Understanding the basic ideas of NMR and ESR Spectroscopy
<b>CO 6</b>	Understanding Electronic Energy levels of atoms
<b>CO 7</b>	Understanding rotational and vibrational Energy levels of molecules
<b>CO 8</b>	Understanding IR ,Microwave spectroscopes and Raman spectroscopy
<b>CO9</b>	Understanding fluorescence and phosphorescence

**Semester : 6**

**Name of course: Nuclear, Particle and Astrophysics**

**Course Code : PH6CRT11**

**Credit :3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding the basic ideas of nuclear structure and general properties of nuclei.
<b>CO 2</b>	Understanding the nuclear stability and theories of nuclear composition.
<b>CO 3</b>	Understanding the basic ideas of nuclear detectors, counters and particle accelerators.
<b>CO 4</b>	Understanding the basic ideas of radioactive disintegration.
<b>CO 5</b>	Understanding the working of various nuclear reactors.
<b>CO 6</b>	Explaining basic ideas of cosmic rays.
<b>CO 7</b>	Understanding the basic ideas of elementary particles and Quarks
<b>CO 8</b>	Understanding the classification and life cycle of stars

**Semester : 6**

**Name of course: Solid state Physics**

**Course Code : PH6CRT12**

**Credit :4**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding the concepts of Bravais lattice, Miller indices and reciprocal lattice.
<b>CO 2</b>	Understanding the concepts crystal systems, Bragg's law and bonding in solids.
<b>CO 3</b>	Understanding the concepts of free electron theory and elementary band theory
<b>CO 4</b>	Understanding the properties of semiconducting materials
<b>CO 5</b>	Understanding the principles of LED and Photodiodes.
<b>CO 6</b>	Recalling the basic ideas and equations in dielectrics and magnetism.
<b>CO 7</b>	Understanding the concept of polarization, dipole moment, Polarizability, Ferro electricity and piezoelectricity.
<b>CO 8</b>	Understanding the classification of magnetic materials and theories regarding them.
<b>CO 9</b>	Understanding the basic concept and theories regarding superconductors and its applications.

**Semester : 6**

**Name of course: Choice based course – XIV-V**

**Course Code : PH6CBT05: Astronomy and Astrophysics**

**Credit : 3**

<b>CO No.</b>	<b>CO Statement</b>
<b>CO 1</b>	Understanding the distance scales and observation tools in astronomy
<b>CO 2</b>	Understanding astronomy in different bands of electromagnetic radiation and radiation laws
<b>CO 3</b>	Understanding the celestial sphere and the three celestial co-ordinate systems
<b>CO 4</b>	Understanding time and seasons
<b>CO 5</b>	Understanding the structure and atmosphere of sun
<b>CO 6</b>	Understanding the morphology and classification of galaxies
<b>CO 7</b>	Understanding the evolution of stars and their classification
<b>CO 8</b>	Understanding the origin of universe and determination of its age.