

**Payyanur College, Payyanur
(Affiliated to Kannur University)**

Programme Outcomes (POs)

BSc DEGREE PROGRAMME (FOR SCIENCE)

PROGRAMME OUTCOMES (PO)

PO1. Critical Thinking:

- 1.1. Acquire the ability to apply the basic tenets of logic and science to thoughts, actions and interventions.
- 1.2. Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.
- 1.3. Develop self-critical abilities and also the ability to view positions, problems and social issues from plural perspectives.

PO2. Effective Citizenship:

- 2.1. Learn to participate in nation building by adhering to the principles of sovereignty of the nation, socialism, secularism, democracy and the values that guide a republic.
- 2.2. Develop and practice gender sensitive attitudes, environmental awareness, empathetic social awareness about various kinds of marginalization and the ability to understand and resist various kinds of discriminations.
- 2.3. Internalize certain highlights of the nation and region history. Especially of the freedom movement, the renaissance within native societies and the project of modernization of the post-colonial society.

PO3. Effective Communication:

- 3.1. Acquire the ability to speak, write, read and listen clearly in person and through electronic media in both English and in one Modern Indian Language
- 3.2. Learn to articulate, analyze, synthesize, and evaluate ideas and situations in a well-informed manner.
- 3.3. Generate hypotheses and articulate assent or dissent by employing both reason and creative thinking.

PO4. Interdisciplinarity:

- 4.1. Perceive knowledge as an organic, comprehensive, interrelated and integrated faculty of the human mind.
- 4.2. Understand the issues of environmental contexts and sustainable development as a basic interdisciplinary concern of all disciplines.
- 4.3. Develop aesthetic, social, humanistic and artistic sensibilities for problem solving and evolving a comprehensive perspective.

Programme Specific Outcomes (PSOs)

Name of the Programme: **BSc PHYSICS**

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1.

Understand and apply the principles of Classical mechanics, Quantum mechanics, Thermodynamics, Nuclear physics and Electrodynamics

PSO2.

Understand and apply the principles of Solid-state physics, Optics, Photonics and Spectroscopy

PSO3.

Understand the principles of Electronics, Design and test electronic circuits

PSO4.

Understand and apply the principles of Mathematical Physics and Computational Physics and do Error analysis in measurements.

Course Outcomes (COs)

Name of the Programme: **BSc PHYSICS**

COURSE OUTCOMES (COs)

Sl. No	Name of the Course	Outcomes
1.	1B01PHY MECHANICS I	CO1: Understand Newton's laws of motion, the concepts of linear and angular momentum and torque. CO2: Determine the Centre mass of a given configuration. CO3: Understand the principle of work, energy and power. CO4: Determine angular momentum of a body about any given axis.
2.	2B02PHY MATHEMATICALPH YSICS AND ERROR ANALYSIS	CO1: Understand vector operations and vector algebra. CO2: Determine derivative and integral of various functions. CO3: State fundamental theorems of calculus. CO4: Compare differential operators in various coordinate systems. CO5: Understand the basic concepts of modeling. CO6: Solve first order and second order ODEs. CO7: Estimate uncertainties in measured values.
3.	3B03PHY MECHANICS II	CO1: Understand the concept of Galilean transformations and uniformly accelerating systems. CO2: Determine the trajectory of a body in central force problem using Newton's laws. CO3: Understand Kepler's laws of planetary motion. CO4: Formulate the mathematical equation of waves. CO5: Understand the concept and consequences of special theory of relativity.
4.	4B04PHY ELECTRONICS I	CO1: Understand the basics of PN junction diode, Zener diode and their applications. CO2: Understand the structure, operations and characteristics of BJT and FET. CO3: Understand the biasing methods and design of BJT and FET circuits. CO4: Understand the different number systems, conversions and binary arithmetic operations. CO5: Understand the basic combinational logic gates.

		<p>CO6: Understand the Boolean algebra & logic simplification using Boolean Algebra.</p>
5.	<p>4B05PHY GENERAL PHYSICS PRACTICAL I</p>	<p>CO1: Familiarize with apparatus for mechanical, electrical, magnetic and optical experiments.</p> <p>CO2: Develop skill in setting up of apparatus for accurate measurement of physical quantities.</p> <p>CO3: Understand multiple experimental techniques for determining physical quantities.</p> <p>CO4: Develop skill in systematic way of measurements by minimizing possible errors.</p> <p>CO5: Develop skill to analyze by plotting graphs using software.</p> <p>CO6: Develop skill for systematic trouble shooting.</p>
6.	<p>5B06PHY QUANTUM MECHANICS</p>	<p>CO1: Understand the limitations of classical mechanics.</p> <p>CO2: Explain Blackbody radiation problem, Photoelectric effect and Compton Effect using quantum theory of radiation.</p> <p>CO3: Understand Rutherford, Bohr atom models and concept of energy and angular momentum quantization.</p> <p>CO4: Understand de-Broglie hypothesis, concept of wave nature of matter and Heisenberg uncertainty principle.</p> <p>CO5: Determine probability of finding a particle and expectation values of variable using its wave function</p> <p>CO6: Write and solve Schrodinger equation for simple quantum mechanical systems.</p> <p>CO7: State and explain Pauli's exclusion principle.</p>
7.	<p>5B07PHY ELECTROSTATICS AND MAGNETOSTATICS</p>	<p>CO1: Understand the concept of Electric field, electric potential, magnetic field and magnetic potentials.</p> <p>CO2: Use the principle of superposition and law of Gauss to calculate electric field Intensity.</p> <p>CO3: Determine Electric potential of charge distributions and hence specify electric field intensity.</p> <p>CO4: Understand the basic properties of conductors and capacitors.</p> <p>CO5: Calculate the magnetic fields due to currents using Biot-Savart and Ampere laws.</p> <p>CO6: Compare Magnetostatics and Electrostatics.</p>

		CO7: Understand Diamagnets, Paramagnets and Ferro magnets.
8.	5B08PHY THERMODYNAMICS AND STATISTICAL MECHANICS	<p>CO1: Understand the concept of temperature, the thermodynamic state and equilibrium.</p> <p>CO2: Explain the first law of thermodynamics through work and heat and its Mathematical Formulation.</p> <p>CO3: Understand the ideal gas equation and kinetic theory of gases.</p> <p>CO4: Understand the second law of thermodynamics and thermodynamic temperature scale.</p> <p>CO5: Define entropy and thermodynamic potentials.</p> <p>CO6: Understand the basic concepts of Statistical mechanics.</p>
9.	5B09PHY ELECTRONICS II	<p>CO1: Understand the AC analysis of BJT circuits and CE amplifiers.</p> <p>CO2: Understand the feedback circuits, oscillators and power amplifiers.</p> <p>CO3: Understand OPAMP basics and different OPAMP circuits.</p> <p>CO4: Understand the standard forms Boolean Expressions, Functions of Combinational Logic and K map simplifications.</p>
10.	6B10PHY SOLID STATE PHYSICS & SPECTROSCOPY	<p>CO1: Understand basic crystal structure and compare various crystal systems.</p> <p>CO2: State and prove Bragg's law.</p> <p>CO3: Explain X-ray diffraction and various methods to obtain diffraction pattern.</p> <p>CO4: Understand basic properties of semiconductors and band structure of solids.</p> <p>CO5: Discuss Hall Effect and list its applications.</p> <p>CO6: Describe various regions of EM spectrum.</p> <p>CO7: Distinguish between microwave and infrared spectroscopy.</p> <p>CO8: Define Raman Effect and explain its quantum theory.</p>
11.	6B11PHY OPTICS &PHOTONICS	<p>CO1: Understand the concept of interference and diffraction.</p> <p>CO2: Distinguish between Fresnel and Fraunhofer diffraction.</p> <p>CO3: Analyze mathematically diffraction pattern due to slits and apertures.</p>

		<p>CO4: Understand the concept of polarization and double refraction.</p> <p>CO5: Understand the basic principle and working of lasers.</p> <p>CO6: Explain different types of lasers.</p> <p>CO7: Understand the principle of holography and its applications.</p> <p>CO8: Understand the principle of total internal reflection and propagation of light through optical fibres.</p> <p>CO9: Compare different types of optical fibres and their applications Optics and Photonics.</p>
12.	6B12 PHY NUCLEAR, PARTICLE & ASTROPHYSICS	<p>CO1: Understand the structure nucleus and nuclear constituents.</p> <p>CO2: Define nuclear forces and nuclear reactions.</p> <p>CO3: Familiarize elementary particles and their properties.</p> <p>CO4: Understand stellar classifications.</p> <p>CO5: Understand basic concepts of birth of the star.</p> <p>CO6: Identify different stars in HR diagram.</p> <p>CO7: Understand the theory of death of the star.</p> <p>CO8: Define white dwarf, neutron star and black hole.</p>
13.	6B13PHY ELECTRODYNAMICS AND CIRCUIT THEORY	<p>CO1: Understand the basic concepts of Electrodynamics.</p> <p>CO2: Explain the mathematical theory of Electromagnetic waves.</p> <p>CO3: Understand different Network theorems.</p> <p>CO4: Understand the basic concepts of Transient currents.</p>
DISCIPLINE SPECIFIC ELECTIVE		
14.	6B14PHY(1) PYTHON PROGRAMMING	<p>CO1: Develop skills in creating program sketches of scientific problems</p> <p>CO2: Develop basic skills in logical thinking and programming.</p> <p>CO3: To make real-life scientific problems easier on a computer with user interaction and graphics</p>
15.	6B14PHY(2) NANOSCIENCE	<p>CO1: Understand the basic concepts of Nanoscience.</p> <p>CO2: Understand the properties of materials in the nano range.</p> <p>CO3: Identify different techniques for the production of nanomaterials.</p>

		CO4: Understand characterization techniques & applications of nanomaterial.
16.	6B14PHY(3) MATERIAL SCIENCE	CO1: Understand the basic concepts of material science. CO2: Understand the properties of materials. CO3: Identify different engineering materials & their properties. CO4: Understand the properties & characteristics of semiconducting, insulating & magnetic materials.
17.	6B14PHY(4): COSMOLOGY	CO1: Understand history of cosmology at different era. CO2: Explain general theory of relativity and curvature of space. CO3: Understand cosmological principle and Friedmann model. CO4: Explain expansion of universe based on Hubble's law and to state big bang theory.
18.	6B14PHYS(5) PLASMA PHYSICS	CO1: Define plasma and plasma parameters. CO2: Understand applications of plasma. CO3: Determine the behavior of plasma in various E and B Fields. CO4: Determine the nature of plasma as a fluid.
19.	6B15PHY PRACTICAL II GENERAL PHYSICS II	CO1: Familiarize with apparatus for mechanical, electrical, magnetic and optical experiments. CO2: Develop skill in setting up of apparatus for accurate measurement of physical quantities. CO3: Understand multiple experimental techniques for determining physical quantities. CO4: Develop skill in systematic way of measurements by minimizing possible errors. CO5: Develop skill to analyze by plotting graphs using software. CO6: Develop skill for systematic trouble shooting. CO7: Perform error analysis for experiments.
20.	6B16PHY PRACTICAL III ELECTRONICS	CO1: Familiarize active and passive electronic components. CO2: Familiarize multimeter, power supply, signal generator and cathode ray oscilloscope. CO3: Develop skill in soldering and use of breadboard. CO4: Develop skill in construction of rectifiers, voltage regulators, amplifiers and oscillators. CO5: Observe, measure and analyze electrical signals.

		<p>CO6: Develop skill for trouble shooting circuits and components.</p> <p>CO7: Develop skill to analyze by plotting graphs using software.</p>
GENERIC ELECTIVE COURSES		
21.	5D04PHY JOY OF STAR WATCHING	<p>CO1: Understand Our Universe and its origin.</p> <p>CO2: Understand simple constellations.</p> <p>CO3: Explain the stars in Kerala culture.</p> <p>CO4: Understand the techniques of star watching.</p>
22.	5D05PHY ELECTRICITY IN DAILY LIFE	<p>CO1: Understand the sources of electricity.</p> <p>CO2: Explain the production of electricity.</p> <p>CO3: Understand the basic concepts of electricity auditing.</p>
COMPLEMENTARY ELECTIVE COURSES		
23.	1C01PHY MECHANICS	<p>CO1: Understand the basic concepts of Properties of matter.</p> <p>CO2: Explain the dynamics of rigid bodies.</p> <p>CO3: Understand the basic concepts of wave motion and oscillations.</p>
24.	2C02PHY ELECTRICITY, MAGNETISM AND THERMODYNAMICS	<p>CO1: Understand the basic concepts of Magnetism & electricity.</p> <p>CO2: Explain the magnetic effects of electric currents.</p> <p>CO3: Understand the basic principles of Thermodynamics.</p>
25.	3C03PHY OPTICS AND PHOTONICS	<p>CO1: Understand the basic concepts of Interference.</p> <p>CO2: Understand the basic concepts of Diffraction.</p> <p>CO3: Understand the basic concepts of Polarization.</p> <p>CO4: Understand the basic concepts of Photonics and Fibre Optics.</p>
26.	4C04PHY ELECTRONICS AND MODERN PHYSICS	<p>CO1: Understand the basic concepts of Basic electronics.</p> <p>CO2: Understand the basic concepts of Digital electronics.</p> <p>CO3: Understand the basic concepts of Nuclear Physics.</p> <p>CO4: Understand the basic concepts of Particle physics and Astrophysics.</p>

27.	4C05PHY PHYSICS PRACTICAL	CO1: Familiarize with apparatus for experiments in mechanics, optics, electricity and magnetism and electronics and electronics experiments. CO2: Develop skill in setting up of apparatus for accurate measurement of physical quantities. CO3: Understand multiple experimental techniques for determining physical quantities. CO4: Develop skill in systematic way of measurements by minimizing possible errors.
-----	----------------------------------	--