

DEPARTMENT OF PHYSICS
MAHARAJA'S COLLEGE, ERNAKULAM

PSO (Program Specific Outcomes)- B.Sc. physics

- ▶ PSO1: Understand the mathematical basis of physics and apply the knowledge to certain specific problems of physics.
- ▶ PSO2: Understand how a theory is developed/should be developed through the example of evolution of Special relativity and Quantum mechanics.
- ▶ PSO3: Understand the errors in measurements and learn to calculate the error.
- ▶ PSO4: Understand the sources of knowledge in physics and how to communicate physics.
- ▶ PSO5: Understand the mechanical, electric, magnetic and thermodynamic properties of matter, the principles of electronics and the theoretical basis of classical and quantum mechanics, relativity, electrodynamics, optics, astrophysics and statistical physics, nuclear and particle physics and to apply the knowledge for analysing and solving problems.
- ▶ PSO6: Understand the fundamentals of Programming to apply it for numerical solution.
- ▶ PSO7: Apply and verify the theoretical concepts and facts by laboratory experiments.

CO (COURSE OUTCOMES)

Core Courses (B.Sc. physics)

PHY1COR01- Methods of Physics

CO1: Understand the basic mathematical tools of physics and apply the knowledge to problems of mechanics and electricity. PSO1, CL-U, Ap, KC-C

CO2: Understand development of Special relativity and Quantum mechanics. PSO2, CL-U, KC-F

CO3: Understand the errors in physical measurements and learn to calculate the error. PSO3, CL-U, Ap, An, KC-C

CO4: Understand the sources of knowledge in physics and how to communicate physics. PSO4, CL-U, KC-F

PHY2COR02- Properties of Matter

CO1: Understand the principles of elasticity and the strength of solid materials. PSO5, CL-U, Ap, KC-C, F

CO2: Understand the basic properties of liquids and gases and its physics. PSO5, CL-U, KC-C, F

CO3: Understand the techniques of low-pressure creation and low pressure-measurement.
 PSO5, CL-U, Ap, KC-C

PHY3COR03 - Basic Electronics

		P O	CL	K L
CO 1	distinguish between digital and analog circuits and applications of Norton's and Thevenin's theorems to troubleshoot analog circuits	5	U, AP	C, F
CO 2	Understanding basic diode theory to solve problems and hence to analyze wave shaping circuits	5	U, AP, An	C, F
CO 3	realize different transistor characteristics, transistor testing under various biasings and troubleshooting techniques	5	U, AP, An	C, F
CO 4	understand different forms of power amplifiers and its applications	5	U, AP	C, F
CO 5	acquire basic ideas of OP-AMPS and its operational modes and hence its implementation in different circuits	5	U, AP, An	C, F
CO 6	understanding number system, logic gates, Boolean algebra and applications of Boolean algebra to solve digital circuits	5	U, AP, An	C, F

PHY4COR04 - Electricity, Magnetism & Electrodynamics

CO1: Understand vectors and vector calculus necessary for learning electrodynamics.
 PSO1, CL-U, Ap, An, KC-C

CO2: Understand the fundamentals of electrodynamics. PSO5, CL-U, KC-C

CO3: Understand the behaviour of transient currents and alternating currents in LCR circuit. PSO5, CL-U, Ap, KC-C, P

PHY5COR05 - Classical Mechanics

CO 1	Understand the different frames of reference and the Newtonian mechanics of a single particle and system of particles.	PS0 5	CL - U, Ap	KC - F, C
CO 2	Understand and apply Lagrange's formalism with special emphasis on generalised co-ordinates.	PS0 5	CL - U, Ap	KC - C, P
CO 3	Examine the link between symmetry properties and conservation laws.	PS0 5	CL - An, Ap	KC - C

C0 4	Understand the concept of central forces and examine the features of planetary motion	PS0 5	CL – U, Ap, An	KC – C, P
C0 5	Analyse and apply the characteristics and dynamical equations of systems of rigid body motion.	PS0 5	CL – An, Ap	KC – C

PHY5COR06 - Thermal & Statistical Physics

	COURSE OUTCOME	PSO	CL	K C	CLASS/SESSIONS ALOTTED
CO 1	To understand the concept of heat , zeroth and first law of thermodynamics to get knowledge of various thermodynamic processes and thermal conductivity.	PSO 5	U, An, Ap	C, F	18
CO 2	To understand, analyse and apply the concepts and facts about the basic ideas behind different heat engines	PSO 5	U, An, Ap	C, F	10
CO 3	To understand, analyse and apply the concepts and facts of entropy, thermodynamic potentials, maxwell's thermodynamic relations and phase transitions.	PSO 5	U, An, Ap	C, F	14
CO 4	To understand and analyse some of the basic concepts of statistical physics.	PSO 5	U, An,Ap	C, F	12

PHY5COR07 – Quantum Mechanics and Spectroscopy

CO 1	understanding the various experimental techniques to realize dual nature of light and matter and its applications to solve problems	2, 5	U, AP	C, F
CO 2	get basic ideas of quantum mechanics to solve fundamental problems in quantum mechanics	5	U, AP	C, F
CO 3	Application of quantum mechanics to realize various atomic spectroscopic	5	U, AP	C, F
CO 4	Application of the quantum mechanics to solve molecular spectroscopy	5	U, AP	C, F

CO 5	Understand the theory of rotational vibrational spectroscopy and apply them to find out material properties	5	U, AP,An	C, F
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PHY5COR08 – Advanced Electronics

	COURSE OUTCOME	PSO	CL	K C	CLASS/SESSIONS ALOTTED
CO 1	Understand and distinguish the working of semiconductor devices like JFET, MOSFET, Varactor diodes, Tunnel diodes, photo diodes, photo conductive cells, IR emitters, solar cells, thermistors etc.	PSO 5	U, An, Ap, ,C	F, P	15
CO 2	Apply the basic ideas of transistor in the construction of different types of feedback amplifiers and oscillators. Distinguish between modulation, angle modulation and demodulation.	PSO 5	U, An, Ap, C	F, P	8
CO 3	Understand the working of combinational logic circuits like half adder, full adder, decoder, encoder, multiplexer and demultiplexer. Understand the working of sequential logic circuits like different flipflops, different asynchronous counters, synchronous counter and shift register etc.	PSO 5	U, An, Ap, ,C	F, P	12
CO 4	Understand and compare the memory and storage devices, magnetic and optical storage devices and integrated circuit technologies TTL and CMOS.	PSO 5	U, An, Ap, ,C	F, P	12

PHY6COR09 - Nuclear & Particle Physics

CO	COURSE OUTCOME	PS O	CL	KC
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CO 1	To understand the structure of nucleus, various properties and their measurements and to study different nuclear models	PSO 5	U, Ap, An	C, F, P
CO 2	To study transformations of nuclei and the phenomenon of radioactivity, nuclear transformations leading to fission, fusion and the design of nuclear reactors.	PSO 5	U, An, Ap	C, F, P
CO 3	To study the purpose and design of radiation detectors and particle accelerators	PSO 5	U, An, Ap	C, F, P
CO 4	To study the interactions between elementary particles and quark model	PSO 5	U, An, An	C, F
CO 5	To study about cosmic rays and different effects of cosmic rays	PSO 5	U, An, An	C, F, P

PHY6COR10 – Numerical methods & Computational Physics

CO 1	Understand flowcharts and algorithms and utilize them in solving different problem	6	U, AP	C,F
CO 2	realize various modes of errors in computations and familiarize to minimize them	1, 6	U, AP	C,F
CO 3	Learn about various numerical methods to solve problems numerically	1, 6	U, AP	C,F
CO 4	learn basic python programming techniques and application to of python programs to analyze different problems	6	U, AP,An	C,F, P
CO 5	solution to various mathematical problems by numerical methods using pHython programming	6	U, AP,An	C,F, P

PHY6COR11 - Condensed Matter Physics

	COURSE OUTCOME	PSO	CL	KC	CLASS/SESSIONS ALOTTED
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CO 1.	Understand basics concepts in and different crystal lattices and distinguish the crystal structures. Procedure behind the construction of reciprocal lattice is understood and applied the same in explaining the diffraction patterns.	PSO 5	U, Ap, An	C,P	14
CO 2	Basic theory behind the electrical and thermal conduction is understood. Identify and distinguish the situations where classical explanation and quantum explanation is needed. Knowledge in quantum mechanics is applied to understand the band structure in material.	PSO 5	U,An, Ap	F,C	15
CO 3	Identify and classify the different types of polar materials, understand the different theories in explaining the dielectric and magnetic properties of materials. Understand the application of piezoelectric, ferroelectric and dielectric materials.	PSO 5	U, An,Ap	C,F, P	17
CO 4	Understanding the fundamental theory of superconductivity, classification of superconductors and their applications in various fields.	PSO 5	U, An	C,F	17

PHY6COR12 - Special Theory of Relativity & Astrophysics

CO1: Understand and appreciate the concept of space-time and the relative character of the physical quantities. PSO5, CL-U, Ap, An, KC-C, F

CO2: Understand the terms and techniques of observational astronomy. PSO5, CL-U, Ap, KC-C, F

CO3: Understand the formation, equilibrium and evolution of stars. PSO5, CL-U, KC-C, F

Choice based courses (B.Sc. physics)

PHY5CBP01 - Choice based course I- Optics and Photonics

CO	COURSE OUTCOME	PSO	CL	KC
CO 1	To understand the nature of light - particle and wave nature of light on the basis if interference, diffraction, polarization, photoelectric effect, compton effect	PSO 5	U	C, F
CO 2	To study the characteristic properties of light using the phenomenon of interference	PSO 5	U, Ap, An	C, F, P
CO 3	To study the theory of diffraction and polarization of light and their applications in devising optical elements	PSO 5	U, Ap, An	C, F, P
CO 4	To understand the theory, construction and working of microscopes and telescopes	PSO 5	U, Ap, C	C, F, P
CO 5	To understand the theory of lasing and the construction and working of solid state lasers, gas lasers and semiconductor lasers	PSO 5	U, An	C, F
CO 6	To understand the theory and applications of holography, fiber optics and non linear optics	PSO 5	U, An, Ap	C, F
CO 7	To understand and analyse different optical elements using matrix method of optics	PSO 5	U, An	C, F
CO 8	To understand the major advances in optical phenomena like optical bistability and self-focusing of light	PSO 5	A, An	C, F

PHY6CBP01 - Choice based course II- Material Science & Nanotechnology

	COURSE OUTCOME	PSO	CL	K C

CO 1.	Understand and distinguish between various types of materials viz Metals, ceramics, polymers etc.	PSO2 & PSO 5	U,An,	C, F
CO 2	Understand and distinguish between crystalline, non crystalline and micro crystalline solids and various types crystals	PSO5	U, An	C, F
CO 3	Understand and distinguish between various types of crystal imperfections and to get knowledge about phase diagrams and laws of diffusion	PSO5	U, An, Ap	C, F
CO 4	Understand the various mechanisms of electrical conduction in solids and nanomaterials.	PSO2 & PSO5	U, An, Ap	C, F
CO 5	To get knowledge about formation of thin films	PSO5	U, An	C, F
CO 6	To understand , differentiate and analyze various methods for the preparation and characterization of thin films and nanomaterials	PSO2 & PSO5	U, An, Ap	C, F
CO 7	To analyse the reasons for the properties of nano materials using quantum mechanics.	PSO2 & PSO5	U, An, Ap	C, F

Practicals (B.Sc. physics)

PHY1COR01- Methods of Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY2COR02- Properties of Matter Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics, electricity and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY3COR03 - Basic Electronics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY4COR04 - Electricity, Magnetism & Electrodynamics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics, optics and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY5COR05 - Classical Mechanics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics, optics and electricity by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY5COR06 - Thermal & Statistical Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics, electricity, magnetism and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY5COR07 – Quantum Mechanics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics, electricity and digital electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY5COR08 – Advanced Electronics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics, electricity and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY6COR09 - Nuclear & Particle Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics, magnetism and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C,P

PHY6COR10 – Numerical methods & Computational Physics

CO1. Apply and verify the theoretical concepts and facts in optics and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C, P

PHY6COR11 - Condensed Matter Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics and electronics by laboratory experiments. PSO7, CL-Ap, C, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C, P

PHY6COR12 - Special Theory of Relativity & Astrophysics Practicals

CO1. Apply and verify the theoretical concepts and facts in electronics/digital electronics by laboratory experiments. PSO7, CL-Ap, C, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C, P