Maratha Vidya Prasarak Samaj's Nashik

K.P.G Arts, Commerce & Science College, Igatpuri.

Department of Physics

Academic Year 2024-25

Programme Outcomes (PO)

(2024 Pattern)

PO-01	Role of Physics : The students will develop awareness and appreciation for the significant role played by physics in current societal and global issues.
PO-02	Physical Principles : Understand and apply fundamental physics principles to analyze and solve problems in various contexts.
PO-03	Research Skills : The course provides an opportunity to students to hone their research and innovation skills through internship/Academic-Project.
PO-04	Scientific inquiry : Design, conduct and present experiments to answer scientific questions and test hypotheses.
PO-05	Laboratory Skills : Comprehensive laboratory exercises will provide analytical, computational and instrumentation skills.
PO-06	Problem-solving : Apply physical principles and analytical tools to solve complex roblems in physics.
PO-07	In-depth disciplinary knowledge : The student will acquire comprehensive knowledge in vatious branches of physics.
PO-08	Interdisciplinary approach : Apply physical principles to understand and address challenges in other physics related disciplines.
PO-09	Critical and lateral thinking : This programme will develop the ability to apply the underlying concepts beyond classrooms to real life applications

Programme Outcomes (PO)

(2019 Pattern)

PO -01	Programme Outcome of Physics deals with a wide variety of systems, certain theories are used by all physicists.
PO-02	The science stream endeavors the spirit of scientific inquiry and analytical thinking among the students.
PO-03	It also provides opportunities to learn experimental concepts related with life science.
PO-04	Acquired the knowledge with facts and figures related to various subjects in pure sciences such as Physics.
PO-05	Understood the basic concepts, fundamental principles, and the scientific

	theories related to various scientific phenomena and their relevancies in the day-to-day life.
PO-06	Each of these theories were experimentally tested numerous times and found to be an adequate approximation of nature.
PO-07	Physics uses mathematics to organize and formulate experimental results.
PO-08	From those results, precise or estimated solutions, quantitative results from which new predictions can be made and experimentally confirmed or negated.
PO-09	The results from physics experiments are numerical measurements.

Programme Specific Outcomes (PSO)

(2024 Pattern)

PSO -01	To endeavour towards creating a basic appreciation for the physical world around us.
PSO-02	To inculcate the spirit of inquiry and inquisitiveness for the phenomena occurring in the physical world.
PSO-03	To develop a habit of logical thinking towards a technical problem being faced.
PSO-04	To understand the basic concepts of Physics which are the foundations of various physical and technological phenomena which are encountered in daily life.
PSO-05	To apply the concepts of Physics in tackling basic and advanced problems in the field of science and technology.
PSO-06	To develop a strong foundation for research in Physics.
PSO-07	To train students in skills related to research, education, industry, and market.

Programme Specific Outcomes (PSO)

(2019 Pattern)

PSO-01	To foster scientific attitude, provide in-depth knowledge of scientific and technological concepts of Physics.

PSO-02	To enrich knowledge through problem solving, minor/major projects, seminars, tutorials, review of research articles/papers, participation in scientific events, study visits.
PSO-03	To familiarize with recent scientific and technological developments.
PSO-04	To create foundation for research and development in Physics.
PSO-05	To help students to learn various experimental and computational tools thereby developing analytical abilities to address real world problems.
PSO-06	To train students in skills related to research, education, industry, and market.
PSO-07	To help students to build-up a progressive and successful career in Physics.

COURSE OUTCOMES

(2024 Pattern)

SN	Class	Sem	Subject With Code	COURSE OUTCOMES
1	F.Y.B.Sc	I	Fundamentals of Physics-I PHY-101-T	• To understand how to apply the principle of conservation of mechanical energy to solve real life problems. • To understand concept of center of mass and find out center of mass of systems of particles and continuous distribution of matter. • To understand how to calculate rotational inertias of objects with sufficient symmetry by summing or integrating. • To understand relation between pressure and force; calculate pressure as a function of depth in liquids and use the continuity equation and Bernoulli's equation to solve problems involving fluid dynamics.
2	F.Y.B.Sc	I	General Physics Lab-I PHY-102-P	• To understand the method to determine acceleration due to gravity "g" by using Bar Pendulum. • To understand the method to determine the moment of inertia of Disc by Torsional oscillations.

				• To understand the method to determine Planck's Constant.
3	F.Y.B.Sc	I	Experimental Skills in Physics SEC-101-PHY-P	• To understand working principles of various measuring instruments. • To acquire the scientific information of various physical and electrical instruments used in physics practical. • To understand and identify the errors in instruments and analyze them.
4	F.Y.B.Sc	I	Physics of Daily Life OE-101-PHY-T	• To understand physics on a deeper level and to use basic physics concepts to navigate regular life. • To understand essential scientific knowledge and skills for life-long learning. • To understand earth's atmosphere and related phenomena. • To solve simple physics related problems.
5.	F.Y.B.Sc	I	Environment Education–I VEC–101-T	• To describe how human activities impact the environment. • To understand the principles of sustainable development and resource management. • To analyze local, regional, and global environmental issues and their effects. • To evaluate different strategies for conserving biodiversity and ecosystems.
6	F.Y.B.Sc	II	Fundamentals of Physics-II PHY-151-T	• To understand the basic outcomes of Thermodynamics and laws of thermodynamics. • To identify different states of the system and their dependence on various thermodynamic variables. • To understand different thermodynamic processes and their applications. • To understand concept of electricity and magnetism.
7	F.Y.B.Sc	II	General Physics Lab-II PHY-152-P	• To understand the Coefficient of Thermal Conductivity by Lee's Method. • To determine the specific heat of graphite.

				• To study Kirchoff's current and voltage law. • To understand the I-V characteristics of p-n junction and zener diode.
8	F.Y.B.Sc	II	Basic Lab Electric Devices and Circuits SEC-154-PHY-P	• To understand the basic concepts of electric elements and their functions. • To provide adequate knowledge about the industrial applications of electric instruments. • To understand about devices and systems that use electricity and magnetism and their design and application.
9	F.Y.B.Sc	II	Maintenance and Repairing of Physics Lab Equipment OE-152-PHY-P	• To develop an awareness pf Lab equipment and Electronic Components. • To understand basic principles of physical instruments. • To apply the above knowledge for the repair of instruments. • To identify the importance of electronic waste management.
10	F.Y.B.Sc	II	Environment Education-II VEC-151-T	• To identify various types of environmental pollution and their impacts on health. • To understand the basic concepts of climate change, including its causes and effects. • To evaluate various environmental management practices and their effectiveness. • To apply the principles of key environmental treaties and legislation to case studies.

COURSE OUTCOMES

(2019 Pattern)

1	S.Y.B.Sc.	III	Mathematical Methods in Physics I PHY-231	• Understand the complex algebra useful in physics courses • Understand the concept of partial differentiation.

				• Understand the role of partial differential equations in physics • Understand vector algebra useful in mathematics and physics • Understand the singular points of differential equation.
2	S.Y.B.Sc.	III	Electronics II PHY-232	• Apply laws of electrical circuits to different circuits. • Understand the properties and working of transistors. • Understand the functions of operational amplifiers. • Design circuits using transistors and operational amplifiers. • Understand the Boolean algebra and logic circuits.
3	S.Y.B.Sc.	III	Physics Lab-2A PHY-233	• Study of BAR pendulum, Compound pendulum with instruments. • Use various instruments and equipment. Design experiments to test a hypothesis and/or determine the value of an unknown quantity. • Design and understanding of LCR circuits.
4	S.Y.B.Sc.	IV	Oscillations, Waves and Sound PHY-241	• Understand the physics and mathematics of oscillations. • Solve the equations of motion for simple harmonic, damped, and forced oscillators. • Formulate these equations and understand their physical content in a variety of applications, Describe oscillatory motion with graphs and equations, and use these descriptions to solve problems of oscillatory motion. • Explain oscillation in terms of energy exchange, giving various examples. Solve problems relating to undamped, damped and force oscillators and superposition of oscillations. • Understand the mathematical description of travelling and standing waves. Recognize the one-dimensional classical wave equation and solutions to it.

5	S.Y.B.Sc.	IV	Optics PHY-242	• Acquire the basic concepts of wave optics. • Describe how light can constructively and destructively interfere. Explain why a light beam spreads out after passing through an aperture. • Summarize the polarization characteristics of electromagnetic waves. Appreciate the operation of many modern optical devices that utilize wave optics . • Understand optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model. • Analyze simple examples of interference and diffraction phenomena. Be familiar with a range of equipment used in modern optics.
6	S.Y.B.Sc.	IV	Physics Lab-2B PHY-243	• Use various instruments and equipment. Design experiments to test a hypothesis and/or determine the value of an unknown quantity. • Investigate the theoretical background to an experiment. Set up experimental equipment to implement an experimental approach. • Analyze data, plot appropriate graphs and reach conclusions from your data analysis. • Work in a group to plan, implement and report on a project/experiment. Keep a well-maintained and instructive laboratory logbook.
7	T.Y.B.Sc.	V	Mathematical Method in Physics-II PHY-351	• Student will get information about various co-ordinate systems for solving physics • Student will able to explain different problems between Newtonian & Einstein relativity. • Student can solve physics problems using differential equations. • Student will know the important of Special function in physics & their solutions.
8	T.Y.B.Sc.	V	Electrodynamics PHY-352	• Student will be able to solve problems on electric intensity &

				potentials using law of electrostatics. • Student will explain generation of magnetic field by electric currents. • Student will interpret the meaning of the Maxwell's equations in magnetic & dielectric media.
9	T.Y.B.Sc.	V	Classical Mechanics PHY-353	• Student will use conservation of energy & linear as well as angular momentum to solve dynamic problems. • Student will able to solve problems related to Newton's laws, Kepler's laws & their applications in planetary motion. • Student can explain types of scattering & get idea of canonical Transformation for solving problems in mechanics. • Student may apply Lagrangian & Hamiltonian equations to solve these problems.
10	T.Y.B.Sc.	V	Atomic and Molecular Physics PHY-354	• Student will explain various atomic models & their assumption as well as applications. • Student can get idea of different types of coupling. • Student will able to develop Zeeman effect set up. • Student will know idea of rotational & vibrational spectra. • Student can explain Raman spectroscopy & their applications.
11	T.Y.B.Sc.	V	C-Programming & Computational Physics PHY-355	• Student will know the basic idea of algorithm, flowchart, syntax of C-programming language reserve words constant, variables, operators, arrays, pointers, functions etc. • Student will solve problems in Physics using different Computation methods such as Newton Rhason method, Bisection method, Trapezoidal rule, Simpson's rule etc. • Student will know the basic graphic commands to draw different figures. • Student can write C-program for any

				problem in physics.
12	T.Y.B.Sc.	V	Elements of Material Science PHY-356 B	• The student will explain electric, mechanical & thermal properties of materials. • Student will study defect in solid like line, surface & volume defects. • Student will know diffusion mechanism according to Fick's law. • Student studies phases of metals & explain CRSS(Critical Resolved Shear stress), Plastic deformation. • Student will know polymerization process. • Student will know about ceramic materials by addition & condensation methods. • For phase diagram student will know lever rule & Gibb's phase rule & phases of substance. • Student will know about smart materials along with their properties & applications.
13	T.Y.B.Sc.	V	Energy Studies PHY-3510H	• Students become capable of conduction energy audits and give consultancy in that field. • Students can design different types of solar heaters for small domestic as well as large scale community level applications. • Students acquire skills to implement solar P-V systems at domestic levels as well as for office premises and educational institutions. Students become able to start their own enterprise in net metering. • Students get ideas and hence become self-employed in the field of design, production, commissioning and implementation of bio-mass energy sources , bio-gas plants, gasifiers, wind mills, hybrid systems etc. • Students can go for research in the fields of super-capacitors, battery technologies, fuel cells and material synthesis for implementation of these technologies.

				• Students become successful entrepreneurs in the energy field. Students strive to make the regions where they live.
14	T.Y.B.Sc.	V	Physics Work shop Skill PHY-3511K	• This course is to get exposure with various aspects of instruments and their usage through hands-on mode. • After completion of this course students will able to handle and test various instruments.
15	T.Y.B.Sc.	V	Physics Lab-3A PHY-357	• Student will get knowledge by verifying law's of physics after performing experiment in the laboratory.
16	T.Y.B.Sc.	V	Physics Lab-3B PHY-358	• Student will get knowledge by verifying law's of physics after performing experiment in the laboratory.
17	T.Y.B.Sc.	V	Project-I PHY-359	• Student will get idea of research work by completing project in the laboratory and can draw the conclusion of the project.
18	T.Y.B.Sc.	VI	Solid State Physics PHY-361	• Student will know various types of crystal structures & the properties. • X-ray diffractions techniques for analysis of materials. • Theoretical knowledge about band of metals, insulator & semiconductors. • Student will know different magnetic materials, their characteristics& uses.
19	T.Y.B.Sc.	VI	Quantum Mechanics PHY-362	• Student will get basic knowledge of classical & quantum mechanics & comparison of two. • Get idea of wave function & its normalization. • Student can derive Schrodinger's time dependent & time-independent equations & can apply them to solve problems in physics & get appropriate solutions. • Student will get the idea of uncertainty principle &application of it. • Student will know operators in quantum mechanics & their properties to find expectation values.

				• Student can solve different properties of commutator operators. • Student will get idea of parity of functions. • Student can obtain eigen vale & eigen functions.
20	T.Y.B.Sc.	VI	Thermodynamics & Statistical Physics PHY-363	• Student will explain assumptions of Kinetic theory of gases. • Student will explain the physical significance of Maxwell's equations and get idea of statistical concepts for solving physics problems. • Student can calculate density states, probability using statistical laws. • Student will know different types of ensembles used in statistics. • Student will get idea of classical and quantum statics. • Student will get knowledge of skill to use statistical physics method • Understand the Boltzmann distribution, Gibb's distribution, Fermi Dirac and Bose Einstein distribution to solve Physics problem.
21	T.Y.B.Sc.	VI	Nuclear Physics PHY-364	• Student will get idea of nuclear and their properties. • Student will explain radioactivity & its applications. • Students will know the fundamental properties of nuclear forces, particle accelerators and detectors. • Student will get information about energy generation using nuclear reactions and can calculate the parameters of nuclear reaction such as packing fraction. • Student will able to demonstrate A knowledge and broad understanding of nuclear physics.

22	T.Y.B.Sc.	VI	Electronics-II PHY-365	• Student will explain different types of diode and their applications. • Student will classify amplifiers and able to design different types of amplifiers. • Student will know applications of Op-Amp. Such as integrator, differentiator, adder, subtractions. • Student will explain block diagram and applications of time 555. • Student can explain different types of power supply (723, 78XX, 79XX etc). • Design of law higher voltage power supplies. • Student can explain adder, subtractor, multiplexer, demultiplexer using logic gates, • Use of Flip-flops, counters and registers.
23	T.Y.B.Sc.	VI	Renewable Energy Sources-II PHY-366 T	• Students become capable of conduction energy audits and give consultancy in that field. • Students can design different types of solar heaters for small domestic as well as large scale community level applications. • Students acquire skills to implement solar P-V systems at domestic levels as well as for office premises and educational institutions. Students become able to start their own enterprise in net metering. • Students get ideas and hence become self-employed in the field of design, production, commissioning and implementation of bio-mass energy sources , bio-gas plants, gasifiers, wind mills, hybrid systems etc. • Students can go for research in the fields of super-capacitors, battery technologies, fuel cells and material synthesis for implementation of these technologies. • Students become successful entrepreneurs in the energy field. • Students strive to make the regions where they live and work self-

				sufficient in generating and fulfilling their own energy needs using different energy solutions.
24	T.Y.B.Sc.	VI	Solar PV System: Installation, Repairing and Maintenance PHY-3610 V	• In this skill oriented course, student will study basics of solar photovoltaic (PV)cells, modules, and system components. • Design and sizing of off-grid PV system for homes, apartments as well as commercial offices. • Understanding energy conversion from sunlight to electricity, and working with solar conversion equipment. • This Course will hands on experience needed to become self-employed. • Learn basics of light conversion in electricity. • Analyzed of MSEB electricity bill and design and sizing of off-grid PV system • Participants will learn about solar PV module and batteries used in solar PV plant.
25	T.Y.B.Sc.	VI	Instrumentation for Agriculture PHY-3611 Z	• To make students familiar with the constructions and working principle of microprocessor • To make students aware about microprocessor • After successful completion of this course students are supposed to develop their own applications/ mini/ tiny projects using microcontroller.
26	T.Y.B.Sc.	VI	Physics Lab-4A PHY-367	• Student will get knowledge by verifying law's of physics after performing experiment in the laboratory. • Understand the thermodynamics & statistical physics experiments with details. • Understand the nuclear physics experiments with details.
27	T.Y.B.Sc.	VI	Physics Lab-4B PHY-368	• Student will get knowledge by verifying law's of physics after

				performing experiment in the laboratory. • Understand the basic and advanced electronics experiments with details. • Understand the acoustics and lasers experiments with details.
28	T.Y.B.Sc.	VI	Project-II PHY-369	• Student will get idea of research work by completing project in the laboratory and can draw the conclusion of the project.

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