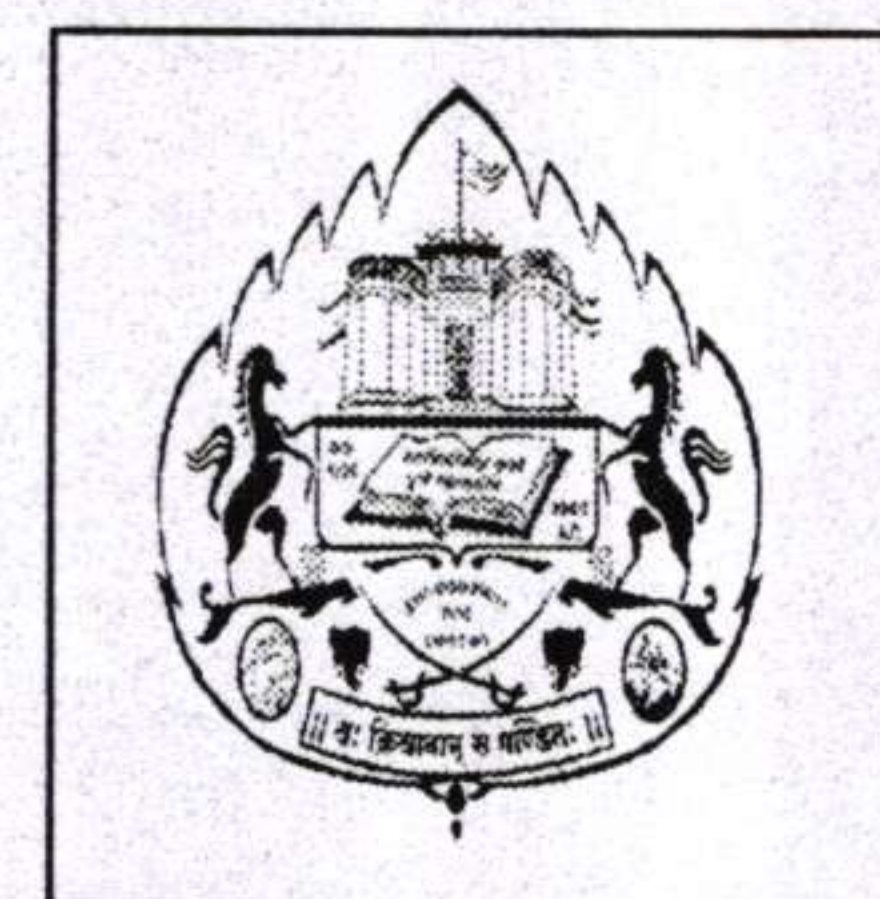




Maratha Vidya Prasarak Samaj's Nashik
K.P.G Arts, Commerce & Science College, Igatpuri.



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 problems in physics.
PO-07	In-depth disciplinary knowledge : The student will acquire comprehensive knowledge in various 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.
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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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.

				<ul style="list-style-type: none"> To understand the method to determine Planck's Constant.
3	F.Y.B.Sc	I	Experimental Skills in Physics SEC-101-PHY-P	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> To understand the Coefficient of Thermal Conductivity by Lee's Method. To determine the specific heat of graphite.

				<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> To develop an awareness of 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Understand the complex algebra useful in physics courses Understand the concept of partial differentiation.
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				<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Student will get information about various co-ordinate systems for solving physics • Student will be able to explain different problems between Newtonian & Einstein relativity. • Student can solve physics problems using differential equations. • Student will know the importance of Special function in physics & their solutions.
8	T.Y.B.Sc.	V	Electrodynamics PHY-352	<ul style="list-style-type: none"> • Student will be able to solve problems on electric intensity &

				<p>potentials using law of electrostatics.</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Student will use conservation of energy & linear as well as angular momentum to solve dynamic problems. • Student will be 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	<ul style="list-style-type: none"> • Student will explain various atomic models & their assumption as well as applications. • Student can get idea of different types of coupling. • Student will be 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.

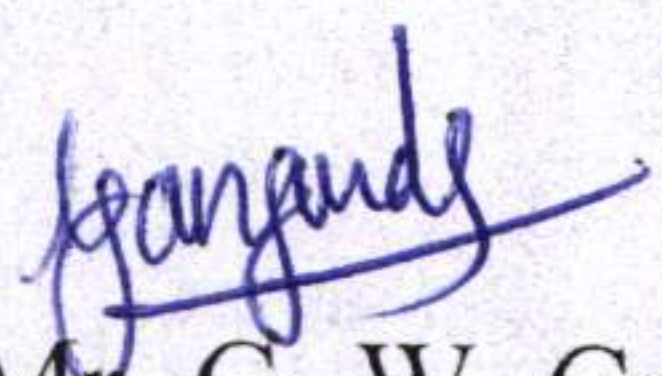
				<ul style="list-style-type: none"> Students become successful entrepreneurs in the energy field. Students strive to make the regions where they live.
14	T.Y.B.Sc.	V	Physics Work shop Skill PHY-3511K	<ul style="list-style-type: none"> This course is to get exposure with various aspects of instruments and their usage through hands-on mode. After completion of this course students will be able to handle and test various instruments.
15	T.Y.B.Sc.	V	Physics Lab-3A PHY-357	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.

				<ul style="list-style-type: none"> • Student can solve different properties of commutator operators. • Student will get idea of parity of functions. • Student can obtain eigen value & eigen functions.
20	T.Y.B.Sc.	VI	Thermodynamics & Statistical Physics PHY-363	<ul style="list-style-type: none"> • 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 statistics. • 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	<ul style="list-style-type: none"> • 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 be able to demonstrate A knowledge and broad understanding of nuclear physics.

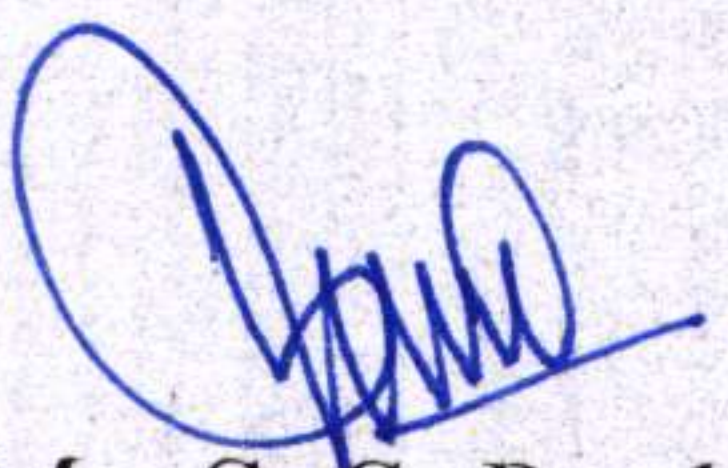
22	T.Y.B.Sc.	VI	Electronics-II PHY-365	<ul style="list-style-type: none"> • Student will explain different types of diode and their applications. • Student will classify amplifiers and able to design different types of amplifiers. • Student will know applications of Op-Amp. Such as integrator, differentiator, 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 low 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Student will get knowledge by verifying law's of physics after

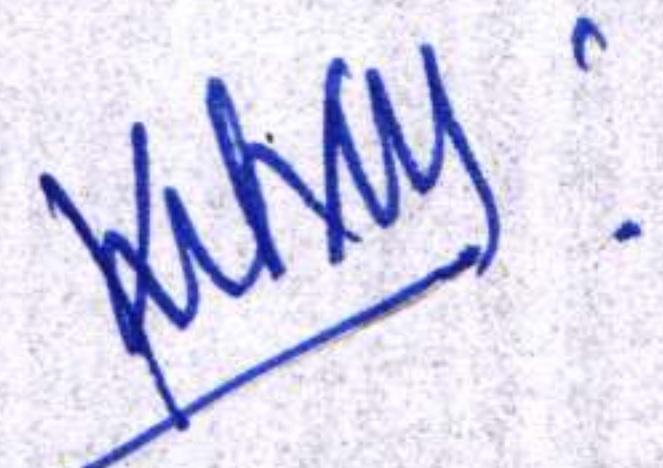
				performing experiment in the laboratory. <ul style="list-style-type: none"> • Understand the basic and advanced electronics experiments with details. • Understand the acoustics and lasers experiments with details.
28	T.Y.B.Sc.	VI	Project-II PHY-369	<ul style="list-style-type: none"> • Student will get idea of research work by completing project in the laboratory and can draw the conclusion of the project.


 Mr. G. W. Gangurde
 HEAD of Dept.

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