AHMEDNAGAR JILHA MARATHA VIDYA PRASARAK SAMAJ'S

SHRI MULIKADEVI MAHAVIDYALAYA, NIGHOJ

TAL.PARNER DIST.AHMEDNAGAR

Department of Physics

Course Outcomes (2019 CBCS Pattern)

Programs offered

Sr. No.	Program	Program Objectives	Program Specific Objectives
1	B. Sc. Physics	.To provide in depth knowledge of scientific and technological aspects of Physics · To familiarize with current and recent scientific and technological development · To enrich knowledge through problem solving, hand on activities, study visits, Projects etc. · To train students in skills related to research, education, industry, and market. · To create foundation for research and development in Electronics · To develop analytical abilities towards real world problems · To help students build-up a progressive and successful career in Physics	1. After completion of program, students will be able to have in-depth knowledge of basic concepts in Physics. 2. Students will be able to apply the laws of Physics in real life situations to solve the problems. 3. Students develop aptitude of doing research through undertaking small projects. 4. Student will have set his foundation to pursue higher education in Physics. 5. After completing the program student will have developed interdisciplinary approach and can pursue higher studies in subjects other than Physics

Courses offered

Sr. No.	Course	Course Outcomes
1	**F. Y. B. Sc.** 1. Mechanics and Properties of Matter	1. Demonstrate an understanding of Newton's laws and applying them in calculations of the motion of simple systems. 2. Use the free body diagrams to analyse the forces on the object. 3. Understand the concepts of energy, work, power, the concepts of conservation of energy and be able to perform calculations using them. 4. Understand the concepts of elasticity and be able to perform calculations using them. 5. Understand the concepts of surface tension and viscosity and be able to perform calculations using them. 6. Use of Bernoulli's theorem in real life problems. 7. Demonstrate quantitative problem solving skills in all the topics covered.
	2.. Physics Principles and Applications	1. To demonstrate an understanding of electromagnetic waves and its spectrum. 2. Understand the types and sources of electromagnetic waves and applications. 3. To understand the general structure of atom, spectrum of hydrogen atom. 4. To understand the atomic excitation and LASER principles. 5. To understand the bonding mechanism in molecules and rotational and vibrational energy levels of diatomic molecules. 6. To demonstrate quantitative problem solving skills in all the topics covered.

	3.Physics Laboratory-IA	1. Acquire technical and manipulative skills in using laboratory equipment, tools,and materials. 2. Demonstrate an ability to collect data through observation and/orexperimentation and interpreting data. 3. Demonstrate an understanding of laboratory procedures including safety, andscientific methods. 4. Demonstrate a deeper understanding of abstract concepts and theoriesgained by experiencing and visualizing them as authentic phenomena. 5. Acquire the complementary skills of collaborative learning and teamwork inlaboratory settings.
	4. Heat and Thermodynamics	1. Describe the properties of and relationships between the thermodynamic properties of a pure substance. 2. Describe the ideal gas equation and its limitations. 3. Describe the real gas equation. 4. Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process. 5. Analyze the heat engines and calculate thermal efficiency. 6. Analyze the refrigerators, heat pumps and calculate coefficient of performance. 7. Understand property 'entropy' and derive some thermo dynamical relations using entropy concept. 8. Understand the types of thermometers and their usage.

	5.Electricity and Magnetism	1. Demonstrate an understanding of the electric force, field and potential, and related concepts, for stationary charges. 2. Calculate electrostatic field and potential of simple charge distributions using Coulomb's law and Gauss's law. 3. Demonstrate an understanding of the dielectric and effect on dielectric due to electric field. 4. Demonstrate an understanding of the magnetic field for steady currents using Biot-Savart and Ampere's laws. 5. Demonstrate an understanding of magnetization of materials. 6. Demonstrate quantitative problem solving skills in all the topics covered.
	6.Physics Laboratory-IB	1. Acquire technical and manipulative skills in using laboratory equipment, tools, and materials. 2. Demonstrate an ability to collect data through observation and/or experimentation and interpreting data. 3. Demonstrate an understanding of laboratory procedures including safety, and scientific methods. 4. Demonstrate a deeper understanding of abstract concepts and theories gained by experiencing and visualizing them as authentic phenomena. 5. Acquire the complementary skills of collaborative learning and teamwork in laboratory settings.
2	**S. Y. B. Sc.** 1. Mathematical Methods in Physics I	After the completion of this course students will be able to 1.Understand the complex algebra useful in physics courses 2.Understand the concept of partial differentiation. 3.Understand the role of partial differential equations in physics. 4.Understand vector algebra useful in mathematics and physics

		5.Understand the singular points of differential equation.
	2. Electronics I	1.Apply laws of electrical circuits to different circuits. 2.Understand the relations in electricity 3.Understand the properties and working of transistors. 4.Understand the functions of operational amplifiers. 5.Design circuits using transistors and operational amplifiers. 6.Understand the Boolean algebra and logic circuits.
	3.Physics Laboratory-2A	Whatever the students learned in their theory course of electronics. They need to verify the concept. This course will help to student to verify the concept from theory.
	4 Oscillations, Waves and Sound	1.Solve the equations of motion for simple harmonic, damped, and forcedoscillators. Understand the physics and mathematics of oscillations. 2.Formulate these equations and understand their physical content in a varietyof applications, 3.Describe oscillatory motion with graphs and equations, and use thesedescriptions to solve problems of oscillatory motion. 4.Explain oscillation in terms of energy exchange, giving various examples. 5.Solve problems relating to undamped, damped and force oscillators andsuperposition of oscillations. 6.Understand the mathematical description of travelling and standing waves.

		7.Recognise the one-dimensional classical wave equation and solutions to it. 8.Calculate the phase velocity of a travelling wave. 9.Explain the Doppler effect, and predict in qualitative terms the frequency
	5 Optics	1. Acquire the basic concepts of wave optics. 2. Describe how light can constructively and destructively interfere. 3. Explain why a light beam spreads out after passing through an aperture. 4. Summarize the polarization characteristics of electromagnetic waves. 5. Appreciate the operation of many modern optical devices that utilize wave optics. 6. Understand optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model. 8. Analyze simple examples of interference and diffraction phenomena. 9. Be familiar with a range of equipment used in modern optics.
	6. Physics Laboratory-2B	Whatever the students learned in their theory courses such as waves oscillations and sound and optics. They need to verify this concept. This course will help to student to verify the concept from theory.

3.	**T. Y. B. Sc.** 1.Mathematical Methods in Physics II	There are following four modules in this course: 1. Curvilinear Co-ordinates 2. The Special Theory of Relativity 3. Differential equations 4. Special functions This course acts as a foundation for other courses taught in Physics. Under this course the basic and advanced mathematical background required for other courses such as; classical mechanics, quantum mechanics, statistical physics, electrodynamics etc. are taught to the students. After successfully completing this course students get thorough knowledge of basics of curvilinear co-ordinate system, differential equations, special functions and special theory of relativity.
	2.Electrodynamics	After completion of course students should 1. Be able to use method of images in electrostatics to solve the boundary value problems. 2. Should have understood the basic laws in magneto statics like Biot-Savart's law, Ampere's law etc. 3. have understood the concept of magnetic vector potential. 4. Have understood Maxwell's laws of electrodynamics. Be able to solve Maxwell's equations in free space and write equation of plane e-m waves

	3.Classical Mechanics	All the classical concepts are useful and applicable to day today life.
	4.Atomic and Molecular Physics	The study of atoms and molecules has played a major role in the development of physics and in the development of our understanding of the structures of matter as it is encountered in everyday life. On successful completion of this course students will be able to understand about- 1. Development of Atomic structures starts from Rutherford's atomic model up to Vector atomic model. 2. Concept of atomic absorption and emission spectra, spectra associated with hydrogen atom 3. Pauli Exclusion Principle, Spectral notation for quantum states. 4. The concepts of space quantization, Spectra of sodium atom 5. LS and jj coupling schemes associated with two valence electron system. 6. The splitting of atomic energy levels and associated spectral lines when atoms are placed in external magnetic and electric field: Zeeman Effect, Stark Effect. 7. The idea about x-ray spectroscopy, molecular spectroscopy. 8. Details about the Raman Effect and Applications.

	5.Computational Physics	For T.Y.B.Sc., Computational Physics course is a foundation course. In this course, student will learn basic concepts of algorithms and flowcharts, programming in C language, errors in computations and various numerical analysis methods such as, obtaining roots of a function, finding integration. Also, students will get practice of programming through small programs like sorting array, graphics, finding factorial, using functions and pointers etc.
	6.Elements of Materials Science	1To know the general information regarding the properties of materials. 2.be aware of the social, safety and environmental consequences materials 3To solve concepts in Materials Science to solve engineering problems. 4.It is easy to select materials for design and construction for various purposes. 5.Able to identify smart materials and use of them in day today life.
	Physics Laborotory-3A	Whatever the students learned in their theory courses such as electrodynamics, atomic and molecular physics, and classical mechanics. They need to verify this concept. This course will help to student to verify the concept from theory. They have to developed skills to plan experiments for studying the properties of matter like viscosity, Young's modulus and Thermal conductivity.
	Physics Laborotory-3B	Whatever the students learned in their theory course ofcomputational physics. They need to verify this concept. This course will help to student to verify the concept from theory. They able to write and execute simple programs in C language.

	Project-II	The student can learn the basics of the topic chosen for project, to learn how to do literature survey and set up the basic experimental/theoretical and computational techniques needed for the project.
	7.Skill Enhancement Course I- Smart Sensors and Transducer Technology 8.Skill Enhancement Course-II Acoustics Applications	To use concepts in common methods for converting a physical parameter into an electrical quantity To classify and explain with examples of transducers, including those for measurement of temperature, strain, motion, position and light To choose proper sensor comparing different standards and guidelines to make sensitive measurements of physical parameters like pressure, flow, acceleration, etc To predict correctly the expected performance of various sensors To locate different type of sensors used in real life applications and paraphrase their importance To set up testing strategies to evaluate performance characteristics of different types of sensors and transducers and develop professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system. After completion of this course the students will be able to use sound detection and characterization of sounds.
	9.Solid State Physics PH-342:	After completion of course students should 1. Have deep understanding of various types of crystal structures and should have understood the concept of reciprocal lattice. 2. Have clear idea of various characterization techniques like x-ray diffraction, UV-visible spectroscopy, SEM, TGA etc. 3. Have understood the free electron model, band formation and origin of band gap. 4. Be able to understand the theory of magnetism and phenomena like superconductivity.

	10.Quantum Mechanics	For T.Y.B.Sc., Quantum Mechanics course is a foundation course. In this course, student will learn the historical aspects of development of quantum mechanics, understand and explain the differences between classical and quantum mechanics, understand the idea of wave function and the uncertainty relations, solve Schroedinger equation for simple potentials. Also, students will gain a basic understanding of the formalism and 'language' of quantum mechanics especially commutation brackets, various quantum mechanical operators.
	11. Thermodynamics and Statistical Physics	Upon completion of this course, students clearly understand basic principles, be able to see relationships between ideas, and be able to use principles and ideas to calculate properties of simple statistical systems students will learnt assumptions of kinetic theory of gases, transport phenomenon.Thermodynamical functions and Maxwell Relations, Elementary concepts of Statistics such as probability, distribution functions, Gaussian Probability distribution etc. , Statistical distribution of system of particles , Different statistical ensembles: micro canonical, canonical and calculation of mean values in canonical ensembles, Maxwell-Boltzmann's, Bose Einstein , Fermi Dirac Statistics, comparison of the distribution. Problem solving on respective points.
	12.Nuclear Physics	The concepts and techniques may be used for both constructive as well as destructive purposes.
	13.Electronics-II	1. Able to design various circuits which can be used professionally. 2. Able to understand AC, DC current/voltages concept for safety measurements. 3. Able to design various types of power supply, which can be used professionally. 4. Able to design communication systems.

	14.Elective –II Laser	Upon completion of this course, students clearly understand the basic principle of laser, types and characteristics of lasers. They also learn the tremendous applications of lasers in various fields.
	15.Physics Laborotory-4A	Whatever the students learned in their theory courses such as solid state physics, thermodynamics and statistical physics, nuclear physics and quantum mechanics. This course will help to student to verify the concept from theory. They able to acquired necessary skills to design astable multivibrator circuit using IC-555.
	16.Physics Laborotory-4B	Whatever the students learned in their theory courses such as electronics and lasers. They need to verify this concept. This course will help to student to verify the concept from theory. They able to acquired necessary skills to perform experiments like verification of Stephan's Law, Determination of Plank's constant and Redberg's constant.
	17.Project-II	The student can learn the basics of the topic chosen for project, to learn how to do literature survey and set up the basic experimental/theoretical and computational techniques needed for the project
	18.Skill Enhancement Course III-Applications of Internet of Things (IOT)	Students should understand a)IOT concepts b) IOT Standards c) Components of IOT System. d) Relevance of IOT for the future. e) IOT Applications. f) IOT for smart cities (Case study Smart city Barcelona) g) IOT in Indian Scenario h) Challenges in IOT implementation.
	19.Skill Enhancement Course IV-Microcontroller	After successful completion of this course students are supposed to develop their own applications/ mini/ tiny projects using microcontroller.