Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part I, SEMISER- I
PHYSICS (PAPER-I)
DSC-A1 MECHANICS I

Course Outcomes

In this course students will understand the basic principles and laws in the physics. Basically, in this paper student will able to understand and able to analyze the science behind the day today experiences. Student will also able to analyze the complicated physical phenomenon such as how velocity, momentum and kinetic energy fundamentally work.

Course Outcomes:-

After going through the course, the student should be able to

CO1: Understand the role of vectors and their physical significance in the physics.
CO2: Write the expression for the moment of inertia for different uniform mass distributions.
CO3: Calculate the Moment of Inertia about the given axis of symmetry by means of parallel and perpendicular theorem.
CO4: Explain the conservation of linear and angular momentum and apply them to the day today life.
CO5: Understand the analogy between translational and rotational motion.

Skills to be learned:-

- Learn basic mathematics like vectors.
- Learn basic ideas about arithmetic of vectors.
- Acquire basic knowledge of translational and rotational motion.
- Learn basics of Moment of inertia and rotational dynamics.

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part I, SEMISER- I
PHYSICS (PAPER-II)
DSC-A2 MECHANICS II

Course Outcomes

In this course, student will understand the basic physics behind the celestial phenomenon such as law of Gravitation, Newton's law of motion, Keplar's laws of planetary motion, the geosynchronous orbit, weightlessness, also the motion of satellite in circular orbit and expression for velocity and time period satellite. Student should understand the various applications of GPS and to know various applications of GPS in industrial, navigation and military areas, basic concepts of SHM, free oscillations and forced oscillations, damped and forced oscillations in real life.

Course Outcomes:-

After going through the course, the student should be able to
CO1: Apply Kepler's law to describe the motion of planets and satellite in circular orbit, through the study of law of Gravitation.
CO2: Explain the phenomena of simple harmonic motion and the properties of systems executing such motions.
CO2: Describe how fictitious forces arise in a non-inertial frame, e.g., why a person sitting in a merry-go-round experiences an outward pull.
CO3: understand the concept of angle of contact, wettability, different applications of surface tension in everyday life and solve the examples based on surface tensions.
CO4: In the laboratory course, the student shall perform experiments related to mechanics (compound pendulum), rotational dynamics (Flywheel), elastic properties (Young Modulus and Modulus of Rigidity) and fluid dynamics (Searle method) etc.

Skills to be learned:-

- Learn basics of Newtonian gravitation theory and central force problem.
- Learn basic ideas about mechanical oscillators.
- Learn elasticity and elastic constants of material and perform experiments to study them.
- Acquire basic knowledge of Surface tension of fluids.

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part I, SEMISER-II
PHYSICS (PAPER-III)
DSC-1B ELECTRICITY AND MAGNETISM - I

Course Outcomes

This course gives quick introduction to Electricity and magnetism. This course gives an overview and understanding of basic physics. It provides a basis for further study of vectors, electricity and magnetism. Content will include: Gradient of scalar field, divergence of vector field, curl of the vector field, Line, Surface and volume integral of vector field, Gauss' diversion theorem and their physical significance, Electric flux, electric dipole, capacitance of isolated spherical conductor, capacitance of parallel plate condenser, polarization, parallel plate capacitor with completely filled dielectric.

Course Outcomes:-

After going through the course, the student should be able to
CO1: Understand the principles of vector analysis and concepts of electrostatics.
CO2: Understand the ideas regarding to electric field as containing energy and capacitanceof a parallel plate capacitor, capacitance of spherical and cylindrical condensers.
CO3: Apply methodologies vector analysis while solving problems.
CO4: Use mathematical and vectorial operations to quantify and analyze the nature ofelectric forces and field.
CO5: Solve problems involving combinations of electric force, electric field and electric potential quantities.

Skills to be learned:-

- Training in calculus will prepare the student to solve various mathematical problems.
- Student shall develop an understanding of how to formulate a physics problem and solve given mathematical equation risen out of it.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part I, SEMISER-II
PHYSICS (PAPER-IV)
DSC-2B ELECTRICITY AND MAGNETISM - II

Course Outcomes

This course develops concepts in electricity and magnetism such that the behavior of the physical universe can be understood from a fundamental point of view. It provides a basis for further study of current electricity. Content will include: Complex numbers, Admittance and susceptance of A. C Circuit, Owen's Bridge, Biot–Savarts law, Amperes Circuital law ,Magnetic properties of the material, Faraday's law of electromagnetic induction, Lenz's law, Energy stored in magnetic field, Equation of continuity of current, Maxwell's equations, Electromagnetic wave propagation through vacuum, Electromagnetic wave propagation in isotropic dielectric medium etc.

Course Outcomes: -

After going through the course, the student should be able to

CO1: Understand the A.C series L.C.R. circuit and resonance in series L.C.R. circuit.

CO2: Develop skill in computing Maxwell's equation problems and A.C circuit.

CO3: Apply law such as Biot-Savart's and Lenz's law for selected problems in electricity and magnetism.

CO4: Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.

Skills to be learned:-

- This course will help in understanding basic concepts of electricity and magnetism and their applications.
- Basic course in electrostatics will equips the student with required prerequisites to understand electrodynamics phenomena.
- Acquire the knowledge of Maxwell's equations and understand electricals and magnetical phenomenon deeply.

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part II, SEMISER-III
PHYSICS (PAPER-V)
DSC-C1 THERMAL PHYSICS & STATISTICAL MECHANICS - I

Course Outcomes

Thermodynamics is a course that explores the concepts of heat and how it can be converted to power, and covers all aspects of energy and energy transfer including power production, refrigeration and property relation of substances. This course has a history of being labeled as one of tough courses. Therefore, it is a challenge for any lecturer who teaches thermodynamics to convince and make students understand the basics concepts of thermodynamics especially the concepts of entropy and Second Law of Thermodynamics which seems to student as abstract things.

Course Outcomes:-

After going through the course, the student should be able to

CO1: Ability to understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.

CO2: Ability to conduct experiments regarding the measurement and calibration of temperatures and pressures in groups.

CO3: Analyzing the thermal efficiencies of heat engines such as Carnot Heat engine and coefficients of performance for refrigerators.

CO4: Ability to define energy transfer through mass, heat and work for closed and control volume systems.

CO5: Ability to apply the first Law of Thermodynamics on closed and control volume systems.

CO6: Ability to apply Second Law of Thermodynamics and entropy concepts.

Skills to be learned:-

- This basic course in thermodynamics will enable the student to understand various thermo dynamical concepts, principles.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part II, SEMISER-III
PHYSICS (PAPER-VI)
DSC-C2 WAVE AND OPTICS - I

Course Outcomes

Waves & optics I paper has S.H.M of waves at different frequencies, coupled oscillator, normal modes of oscillator, wave motion & ultrasonic waves are useful in research students can understand briefly by knowing piezoelectric effect. To know the acoustic of buildings for problem solving in applied physics. For gaining material structure to know viscosity & pressure at low physics.

Course Outcomes:-

After going through the course, the student should be able to

CO1: Analyze the phenomena of wave propagation in the unbounded, bounded, vacuum, Dielectric, guided and unguided media.

CO2: Understand the laws of reflection and refraction and to calculate the reflection and Transmission coefficients at plane interface in bounded media.

CO3: Understand the linear, circular and elliptical polarizations of Electromagnetic waves.

CO4: In the laboratory course, the student gets an opportunity to perform experiments such as dispersion of light.

Skills to be learned:-

- Derive and understand associated with the properties, EM wave passing through the interface between two media like (i) Reflection, (ii) Refraction, (iii) Refraction, (iv) Interference and Polarization etc.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part II, SEMISER-IV
PHYSICS (PAPER-VII)
DSC-D1 THERMAL PHYSICS & STATISTICAL MECHANICS - II

Course Outcomes

This course develops concepts in classical laws of thermodynamics and their application, postulates of statistical mechanics, statistical interpretation of thermodynamics, Micro canonical, Canonical and Grant canonical ensembles; the methods of statistical mechanics are used to develop the statistics for Bose-Einstein, Fermi-Dirac and photon gases; selected topics from low temperature physics and electrical and thermal properties of matter are discussed.

Course Outcomes:-

After going through the course, the student should be able to

CO1: Understand how statistics of the microscopic world can be used to explain the thermalfeatures of the macroscopic world.
CO2: Be able to use thermal and statistical principles in a wide range of applications.
CO3: Learn a variety of mathematical and computer techniques.
CO4: Understand the logical consequences of the postulates of statistical mechanics.
CO5: Apply the principles of statistical mechanics to selected problems.
CO6: apply techniques from statistical mechanics to a range of situations
CO7: Use the tools, methodologies, language and conventions of physics to test andcommunicate ideas and explanations.

Skills to be learned:-

- This basic course in thermodynamics will enable the student to understand various thermo dynamical and statistical concepts, principles.
- Learn fundamental of Distribution functions and its algebra and their role in Statistical Mechanics.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part II, SEMISER - IV
PHYSICS (PAPER-VIII)
DSC-D2 WAVE AND OPTICS - II

Course Outcomes

In this paper, student will ale to understand and know about the different optical instruments and optical phenomenon such as Refraction, Diffraction, Polarization, Double Refractions and many more.

Course Outcomes:-

After going through the course, the student should be able to

CO1: Understand the cardinal points in optical instrument, and knowledge about the graphical representation of points.
CO2: Acquire the knowledge about the resolving power ofinstruments.
CO3: Understand the physics behind various phenomenons in wave and optics.
CO4: Understand various phenomenons and the cause or origin of them.
CO5: Explain the relationship in between various optical phenomenons.
CO6: Understand the concept of polarization of light.
CO7: Be able to apply the principle of optics and its applications in the different field of science & Technology.

Skills to be learned:-

- This course will help in understanding about the lasers and detectors, Holography, Optical fiber and their applications such as Telescope, Microscope etc.

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B. Sc. Part III, SEMISER-V
PHYSICS (PAPER-IX)
DSE-E1 MATHEMATICAL PHYSICS

Course Outcomes

The purpose of the course is to introduce students to methods of mathematical physics and to develop required mathematical skills to solve problems in quantum mechanics, electrodynamics and other fields of theoretical physics.

Course Outcomes:-

After successful completion of the course, the student is expected to

CO1: know the orthogonal curvilinear Co-ordinate system from three different co-ordinate systems.

CO2: Able to apply differential equations of variations to diverse problems in physics including isoperimetric problems.

CO3: Familiar with the method of separation of variables to solve linear differential equations with inhomogeneous term.

CO4: Learn the fundamental differences between Classical and Quantum Statistics and learnabout quantum statistical distribution laws.

CO5: Learn the Beta, Gamma and the Error functions and their applications in doing integrations.

CO6: Learn about the special functions, such as the “Hermite polynomial”, “Legendre Polynomial”, “Laguerre polynomial” and “Bessel functions” and their differential mechanics which they will learn in future courses in detail.

Skills to be learned:-

- Training in mathematical tools like calculus, integration, series solution approach, special function will prepare the student to solve ODE, PDEs which model physical phenomena.
- Student shall develop an understanding of how to model a given physical phenomena such as pendulum motion, rocket motion, stretched string, etc., into set of Ordinary Differential Equations, Partial Differential Equations and solve them.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part III, SEMISER-V
PHYSICS (PAPER-X)
DSE-E2 QUANTUM MECHANICS

Course Outcomes

The Quantum Mechanics will able to help to understand the wired and strange behavior of sub-atomic particles. It provides a basis for further study of quantum mechanics. Content will include: Review of the Schrodinger equation, operators, Eigen functions, compatible observables, infinite well in one and three dimensions, degeneracy, scalar products of wave functions, completeness relations, matrix mechanics; harmonic oscillator in one and three dimensions; sudden approximation; central potentials, quantization of angular momentum, separation of radial and angular variables, spherical harmonics, hydrogen atom, spin.

Course Outcomes:-

After successful completion of the course, the student is expected to

CO1: This course develops concepts in quantum mechanics such that the behavior of the physical universe can be understood from a fundamental point of view.

CO2: Understand historical background and development of the quantum mechanics.

CO3: Understand and explain the major differences between classical and quantum mechanics.

CO4: Understand the central concepts and principles in quantum mechanics, such as the Schrodinger equation, the wave function and its statistical interpretation, the uncertainty principle, stationary and non-stationary states.

CO5: understanding of wave mechanics in three dimensions.

Skills to be learned:-

- Apply techniques such as differential methods and ladder operators for selected problems in quantum mechanics.
- Comprehend the failure of classical physics and need for quantum physics.
- Grasp the basic foundation of various experiments establishing the quantum physics by doing the experiments in laboratory and interpreting them.
- Formulate the basic theoretical problems in one, two and three dimensional physics and solve them.

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part III, SEMISER-V
PHYSICS (PAPER-XI)
DSE-E3 CLASSICAL MECHANICS AND CLASSICAL ELECTRODYNAMICS

Course Outcomes

This course develops concepts in Classical mechanics such that the behavior of the physical universe can be understood from a fundamental point of view. It provides a basis for further study of Classical mechanics. Content will include: Motion in central force field, Degrees of freedom, Moving co-ordinate system, generalized Co-ordinates, D' Alembert's principle, Coupled oscillation, Coriolise force, Motion of rigid body, Lagrange's and Hamilton's equation, symmetries and laws of conservation.

Course Outcomes:-

After successful completion of the course, the student is expected to:

CO1: understand Motion in central force field and D' Alembert's principle.

CO2: develop skill in computing Degrees of freedom and generalized coordinate.

C03: develop a qualitative understanding of Coupled oscillation.

CO4: Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.

CO5: Revise the knowledge of the Newtonian, the Lagrangian and the Hamiltonian formulations of classical mechanics and their applications in appropriate physical problems.

Skills to be learned:-

- Learn to define generalized coordinates, generalized velocities, generalized force and write Lagrangian for mechanical system in terms of generalized coordinates.
- Learn to derive Euler-Lagrange equation of motion.
- Learn to write Hamiltonian for mechanical systems and derive and solve Hamilton's equation of motion for simple mechanical systems.
- Formulate the problem of small amplitude oscillation and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part III, SEMISER-V
PHYSICS (PAPER-XII)
DSE-E4 DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTATION

Course Outcomes

In this course student will able to understand the basic of electronics. The students will know the different electronic circuit and their application in practice. Analog Circuits and Digital Circuits is a classic way of differentiating between two types of electronic circuits based on the signals they process. To put it in simple words, Analog Circuits deals with continuous analog signals whereas Digital Circuits deals with discrete digital signals.

Course Outcomes:-

After successful completion of the course, the student is expected to:

CO1: Identify relevant information to supplement to the Analog Electronic Circuit EC (EE) 301 course.

CO2: Set up testing strategies and select proper instruments to evaluate performance characteristics of electronic circuit.

CO3: Choose testing and experimental procedures on different types of electronic circuit and analyze their operation different operating conditions.

CO4: Evaluate possible causes of discrepancy in practical experimental observations in comparison to theory.

CO5: Practice different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.

CO6: Prepare professional quality textual and graphical presentations of laboratory data and Computational results.

Skills to be learned:-

- To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive parameters.
- To evaluate the use of computer based analysis tools to review performance of Semiconductor device circuit.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part III, SEMISER-VI
PHYSICS (PAPER- XIII)
DSE-F1 NUCLEAR AND PARTICLE PHYSICS

Course Outcomes

Graduate students will have knowledge of how modern science tries to answer the big questions about the universe. In addition to this, students will have learned about how new ideas go from fundamental research to actual utilization in everyday life, in the way that nuclear physics is used in medicine. In elementary particle physics we research the smallest building blocks of the universe to understand unanswered questions about dark matter, antimatter and the origin and evolution of the universe. Within Astro-particle physics there is the study of elementary particles in the universe by use of telescopes, to understand and explain unsolved phenomena. In high energy nuclear physics we research the behavior of nuclei under extreme conditions, especially the quark-gluon plasma that existed for about one microsecond after the Big Bang.

Course Outcomes:-

CO1: Revise or learn the basic aspects of the atomic and nuclear Physics, specially the Radiations that originate from the atom and the nucleus.

CO2: Develop and communicate analytical skills in subatomic physics.

CO3: Expected to understand the Characteristics of Geiger Muller (GM) Counter experiments.

CO4: Know about the units of radiations and their safety limits, the devises to detect and Measure radiation, such as the Geiger-Mueller counter and scintillation counter.

Skills to be learned:-

- General concepts of nuclei, nuclear forces and atomic physics are studied.
- Basic knowledge about nuclear radiation types and radiation detectors.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part III, SEMISER-VI
PHYSICS (PAPER-XIV)
DSE-F2 SOLID STATE PHYSICS

Course Outcomes

Course Outcomes:-

After successful completion of the course, the student is expected to:

CO1: Analyze different types of matter depending on nature ofchemical bonds and their properties.

CO2: Able to analyze crystal structures by applying crystallographicparameters.

CO3: Able to determine the crystal structure by analysis of XRD data.

CO4: Able to evaluate and analyze the chemical and optical properties ofsolids.

CO5: Analyze electron transport and energy related problems byapplying quantum mechanical principles.

CO6: A brief idea about crystalline and amorphous substances, about lattice, unit cell, miller indices, reciprocal lattice, concept of Brillion zones and diffraction of X-rays by crystalline materials.

CO7: At knowledge of different types of magnetism from diamagnetism to ferromagnetism and hysteresis loops and energy loss.

Skills to be learned:-

- Learn basics of crystal structure and physics of lattice dynamics
- Learn the physics of different types of material like magnetic materials, dielectric materials, metals and their properties.
- Understand the physics of insulators, semiconductor and conductors with special emphasis on the elementary band theory of semiconductors.
- Comprehend the basic theory of superconductors. Type I and II superconductors, their properties and physical concept of BCS theory.

"□□□□□, □□□□□□□ □□□ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□"
□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ .

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part III, SEMISER-VI
PHYSICS (PAPER-XV)
DSE-F3 ATOMIC AND MOLECULAR PHYSICS AND ASTROPHYSICS

Course Outcomes

The aim of this course is for awareness and understanding regarding radiation hazards and safety. The list of laboratory skills and experiments listed below the course are to be done in continuation of the topics.

Course Outcomes:-

After successful completion of the course, the student is expected to

CO1: Ability to comprehend astronomical scales and understand basic concepts of positional astronomy like astronomical coordinate system and measurement of distances, time and temperature and radius of star.

CO2: Understand basic parameters of stars like brightness, radiant flux, luminosity, magnitude, orbits, spectral classification. H-R diagram

CO3: Know about different atom model and will be able to differentiate different atomic systems, different coupling schemes and their interactions with magnetic and electric fields.

CO4: gained ability to apply the techniques of microwave and infrared spectroscopyto elucidate the structure of molecules

CO5: able to apply the principle of Raman spectroscopy and its applications in the different field of science & Technology.

CO6: familiar with different resonance spectroscopic techniques and itsapplications.

CO7: Understanding Physics of stars and sun. Role of gravitation in Astro-Physics, Newton Vs Einstein, viral theorem and thermodynamic equilibrium.

Skills to be learned:-

- Skills to learn and operate astronomical instruments to perform observations related to the positional astronomy measurement.
- Learn to describe solar parameters, solar atmosphere, origin of solar system, solar and extra-solar planets, planetary rings.
- Acquire basic knowledge of Milky Way and Galaxies, their properties and structure.
- Skills for understanding basics of large scale structures and expending universe.

Shri Swami Vivekanand Shikshan Sanstha's
Dattajirao Kadam Arts, Science & Commerce College, Ichalkaranji
B.Sc. Part III, SEMISER-VI
PHYSICS (PAPER-XVI)
DSE-F4 ENERGY STUDIES AND MATERIALS SCIENCE

Course Outcomes

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible.

Course Outcomes:-

After successful completion of the course, the student is expected to:

CO1: Describe theories explaining the structure of atoms and the origin of the atomicdisorder in material.

CO2: Able to understand resources of renewable energy, solar energy.

CO3: Able to gain the research methods of nanotechnology in material science. Also to known what is the phenomenon of nanotechnology.

CO4: Know the conductivity of material & superconductivity of material this is usefulin research area.

CO5: Able to apply the principle of nanotechnology and its applications in the different field of science & Technology

CO6: Apply the principle of renewable energy sources and its applications inthe different field of science & Technology.

Skills to be learned:-