SARAT CENTENARY COLLEGE

Department of Physics

Course Outcomes (CBCS)

Physics General

SEM-I

CC- 1A: Mechanics

After successfully completing this course, the student will be able to:

1. Solve ordinary differential equations of second order and some vector problems that are common in the physical sciences.
2. Demonstrate an intermediate knowledge of Newton's Laws and the equations of motion of some systems.
3. Understanding with central force and idea about various satellite system in Earth gravitational field.
4. Apply the concepts of elasticity to real world problems
5. Explain the fundamental principles of the special theory of relativity CO6: Understand rigorously all theory by all practical.

SEM-II

CC-1B: Electricity and Magnetism

After successfully completing this course, the student will be able to:

1. Define the basic terms such as electric field, electric potential, magnetic intensity, magnetic induction, magnetic susceptibility, and electric and magnetic flux.
2. Solve numerical problems using Coulombs Law, Gauss's law, Biot-Savart's law, Ampere circuital law and Faraday's law.
3. Derive the relation between three magnetic vectors and compare different types of magnetic material.
4. Explain the concept of various type of capacitor.
5. Understand the Maxwell's equations and electromagnetic waves.

6. Understand rigorously all theory by all practical.

SEM-III

CC-1C: Thermal Physics and Statistical Mechanics

After successfully completing this course, the student will be able to:

1. Define laws of thermodynamics, entropy, thermodynamic processes etc.
2. Describe and derive expression of Heat engine & Carnot engine, entropy, latent heat equation and various thermodynamic potentials.
3. Explain the maxwell's distribution law of gas particles, concept of equipartition of energy and transport phenomena of gases.
4. Derive the Plank's law, Wine's distribution law, Rayleigh-Jeans Law, Stefan Boltzmann Law, and Wien's displacement law for Black body radiation.
5. Understand the concept of phase space, macro & micro state and able to explain & compare all three types of statistics.
6. Understand rigorously all theory by all practical.

CC-1D: Renewable Energy and Energy Harvesting

After successfully completing this course, the student will be able to:

1. Understand the Fossil fuels and about the alternate sources of energy.
2. Explain solar energy, its uses and describe solar cell and photovoltaic cell.
3. Explain and application of various type renewable energy sources as wind energy, solar energy, ocean energy, geothermal energy and hydro energy.
4. Understand the piezoelectric and electromagnetic energy harvesting. CO6: Understand rigorously all theory by all demonstration.

SEM-IV

CC-2D: Waves and Optics

After successfully completing this course, the student will be able to:

1. Define periodic and oscillatory motion, setup and solve differential equations of motion for simple harmonic, damped, and forced oscillators, set and solve differential equation for wave motion for longitudinal and transverse waves and also understanding the Sabine's formula of acoustics of buildings.
2. Describe the superposition of two collinear and perpendicular harmonic oscillator with graphical and analytical method and also understand the concept of Lissajous figure and its application.

3. Define the surface tension and its application to various type of liquid or air drops also about the Poiseuille's formula, define the coefficient of viscosity and types of pump system which creating low pressure and some type of gauge for measuring low pressure.
4. Explain the wave front of light and its propagation, also can describe the interference of light by various measurements like Young's Double Slit experiment, Newton's Ring experiment, etc.
5. Determine the wavelength, refractive index, etc. by Michelson's Interferometer experiment.
6. Understand about the Fraunhofer and Fresnel diffraction of light with some experiment and also explain the plane, circular and elliptical polarization of light.
7. Understand rigorously all theory by all practical.

SEC -2: Weather Forecasting

After successfully completing this course, the student will be able to:

1. Understand the basic idea about atmosphere and weather.
2. Determine how to produce wind also measuring its speed and direction and also understand about the humidity clouds and rainfall.
3. Describe the global wind system, thunderstorm and tropical cyclones also define the climate, its change due to global warming and pollution.
4. Forecast of weather by various analysis.
5. Understand rigorously all theory by all demonstration.

SEM-V

DSE-1A: Elements of Modern Physics

After successfully completing this course, the student will be able to:

1. Explain the Plank's constant, photo electric effect and Compton scattering and also describe the wave particle duality by Davisson-Germer and double slit experiment.
2. Describe the Rutherford and Bohr's atomic model and from it define the energy spectra of hydrogen atom and also describe the uncertainty principle by thought experiment.
3. Define the Schrodinger wave equation for non-relativistic particles its application on one dimensional box and understand about the momentum operator, energy operator, eigen value, eigen function and also about the normalization of wavefunction.
4. Describe the quantum mechanical scattering and tunnelling across various potential barrier.
5. Understanding about the atomic nucleus its relation with atomic weight also describes the nuclear forces and binding energy from semi-empirical mass formula.
6. Define the various type of radioactive decay, law of decay, fission and fusion, and about nuclear reactor.
7. Understand rigorously all theory by all practical.

OR

DSE-1A: Nuclear and Particle Physics

After successfully completing this course, the student will be able to:

1. Describe the general properties of nuclei
2. Understanding about the various existing nuclear models like liquid drop model, Fermi gas model and shell model.
3. Define three types of radioactive decay i.e., alpha, beta and gamma decay and also describe the nuclear reaction.
4. Explain the interaction of nuclear radiation with matter and also describe the various type of detector for nuclear radiation i.e., gas detectors, scintillation detectors and semiconductor detectors.
5. know the particle accelerator facility available in India and also describe the basic particle physics.

SEC-3: Computational Physics Skills

After successfully completing this course, the student will be able to:

1. Use of computational methods to solve physical problems
2. Use of various computer languages like FORTAN, Linux.
3. Control of various statements and understand of introductory level of LaTeX and its uses.
4. Understand rigorously all theory by all hands-on exercise.

SEM-VI

DSE-1B: Quantum Mechanics

After successfully completing this course, the student will be able to:

1. Describe time dependent and independent Schrodinger equation for non-relativistic particles and its application and also understand about the momentum operator, energy operator, eigen value, eigen function and also about the normalization of wavefunction.
2. Define the bound state in an arbitrary potential like square well potential and simple harmonic oscillator.
3. Apply quantum theory to hydrogen like atoms and using the Frobenius method and also understand about orbital angular momentum quantum numbers.
4. Understand about electron angular momentum, spin, spin angular momentum and spin magnetic moment and also understand about the Zeeman effect, Gyromagnetic ratio and Bohr Magneton.
5. Describe the Pauli's Exclusion principle, total angular momentum and vector model of Spin orbit coupling.
6. Understand rigorously all theory by all practical.

OR

DSE – 1B: Digital, Analog and Instrumentation

After successfully completing this course, the student will be able to:

1. Using the logic circuit and Boolean algebra and also understand the Binary numbers.
2. Understanding the various type of semiconductor diodes and bipolar junction transistors.
3. Understanding about the Operational amplifiers and Sinusoidal oscillators.
4. Understand about various measuring instruments like CRO, Power Supply, Rectifiers, capacitor filter, Zener Diode and also about Timer IC.
5. Understand rigorously all theory by all practical.

SEC – 4: Electrical Circuits and Network Skills

After successfully completing this course, the student will be able to:

1. Understand the basic principles of electricity and electrical circuits.
2. Define electrical drawing and symbols and understanding about electric motors, generators, and transformers.
3. Describe about various solid-state devices electrical protection and electrical wirings.

Name of the Department: Physics
Programme Outcome

The study of science has always been a demystifying experience. The ability to ask critical questions and follow them up with a systematic plan of inquiry seeking right answers advances scientific thoughts. Physics is a branch of science based on experimental observation. The acquaintance with physics helps to realize the working principles of many of our daily appliances. The beauty of physics lies in the simplicity of the fundamental physical theories.

Physics has a profound effect on all scientific developments. It is the present-day equivalent to "natural philosophy" from which most of our modern sciences arose. Being a description of nature, physics has been our best friend from the very day of human existence. The basic aim of Physics teaching is to let the students know and understand the principles and their applications in real life.

➤ An ability to apply knowledge of Physics in their specific branches.
➤ Apply and demonstrate knowledge of concepts of physics, to analyze a variety of physical phenomena

- Demonstrate the learned laboratory skills, enabling them to take measurements in a physics laboratory and analyse the measurements to draw valid conclusions.
- Capable of oral and written scientific communication, and will prove that they can think critically and work independently.
- Use and apply professional software for scientific data analysis and presentation.
- Respond effectively to unfamiliar problems in scientific contexts.