# PHYSICS

| COURSE CODE | COURSE NAME | PROGRAMME SPECIFIC OUTCOMES |
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| **C-1** | **MATHEMATICAL PHYSICS** | • Knowledge about Vector calculus, Bessel Functions, Legendre Differential equations, complex variable, Laplace transforms, Fourier Series etc and their physical significance is learnt by students. These mathematical concepts are widely used in various physics derivations.<br>• Many times, students come across the terms like divergence, curl and gradient but they don't understand their physical significance. From this course they will learn the concepts to a depth.<br>• Students can understand the use of the concept of partial differentiation in solving Physics situations which have more than one variable.<br>• Students can also understand the need of complex numbers in solving mathematical equations in different branches of Physics like Electricity and Magnetism, Fluid Dynamics and quantum mechanics. |
| **C-2** | **MECHANICS** | • The LaGrange and Hamiltonian approaches in classical mechanics.<br>• The classical background of Quantum mechanics and get familiarized with Poisson brackets and Hamilton -Jacobi equation. |
| **C-3** | **ELECTRICITY AND MAGNETISM** | • Students will be able to understand the concept of the electric force, electric field and electric potential for stationary charges. They are able to calculate electric potential and electric field by using Gauss's law.<br>• Student will understand the dielectric phenomenon and effect of electric field on dielectric.<br>• Study the concept of magnetic field, magnetic field for steady currents using Biot-Savart's and Ampere's Circuital laws.<br>• Student will learn magnetic materials and its properties. |
| **C-4** | **WAVES AND OPTICS** | • Learn how does a body oscillate without damping amplitude and what are the necessary conditions for it.<br>• Learn how we can set any object in the forced oscillations that is in continuous motion. |

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| | | • Doppler Effect and its use in in day-to-day life. Using this concept students can get idea of expanding universe.<br>• Studying sound concept, we can understand why the sound of male and female are different and the reason behind it.<br>• Image formation related to geometrical optics, Deviation, Magnification, Concept for Equivalent lens and Cardinal Points.<br>• Different types of monochromatic and chromatic aberrations and Achromatism in lenses.<br>• Construction and working of Simple Microscope, Compound Microscope, Ramsden's Eyepiece and Huygen's Eyepiece CO4: Interference and diffraction of light, Formation of fringes, Resolution.<br>• Concept of Polarization, Double refraction, Construction and working of Nicol Prism |
| **C-5** | **MATHEMATICAL PHYSICS-2** | • The three commonly used co-ordinate systems and general curvilinear co-ordinate system.<br>• Concept of relativity, length contraction, relativistic mass, time dilation and twin paradox.<br>• Various methods to solve different differential equations.<br>• Properties of Legendre polynomials, Hermite polynomials and Bessel function. These are useful to solve the problem of linear simple harmonic oscillator in quantum mechanics. |
| **C-6** | **THERMAL PHYSICS** | • Understand the process of thermal conductivity, viscosity and diffusion in gases.<br>• Understand the efficiency of Carnot's engine and the significance of first law and second of thermodynamics and implications of the second law of thermodynamics and limitations placed by the second law on the performance of thermodynamic systems.<br>• To understand the interrelationship between thermodynamic functions and ability to use such relationships to solve practical problems. |
| **C-7** | **ANALOG SYSTEMS AND APPLICATIONS** | • Able to acquaint with electronic devices such as Semiconductor Diodes: Bipolar Junction transistors, Amplifiers: Sinusoidal Oscillators: & Capable of designing various circuits of electronic devices. |
| **C-8** | **MATHEMATICAL PHYSICS-3** | • To improve scientific attitude to solve the research-oriented problems, problems of interacting systems. To practice the problems on Complex Analysis: Calculus of Residues: Integrals Transforms: and their applications using scilab. |

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| **C-9** | **ELEMENTS OF MODERN PHYSIS** | • Gain knowledge about Quantum mechanics, Atomic Spectra and Models, Wave Particle Duality, Nuclear Physics, Radioactivity and handling the sophisticated modern instruments. |
| **C-10** | **DIGITAL SYSTEMS AND APLLICATIONS** | • Able to get a thorough knowledge about Integrated Circuits, Digital Circuits: , Boolean algebra: ,C R O, Data processing circuits: , Arithmetic Circuits: , Timers: , Computer Organization, Shift registers:, Counters(4 bits): and be able to gain practical knowledge about Digital Electronics. |
| **C-11** | **QUANTUM MECGHANICS AND APPLICATIONS** | • Able to be acquainted with various Schrodinger equations, and solutions of different potential problems, to analyse behaviour of atoms in electric & magnetic field, solving the quantum mechanics problem using scilab. |
| **C-12** | **SOLID STATE PHYSICS** | • Gained a thorough knowledge about Crystal Structure, Lattice Dynamics, Magnetic & Dielectric Properties of Matter, Lasers, band theory, Superconductivity and handling the equipments to measure various physical constants. |
| **C-13** | **ELECTRO MAGNETIC THEORY** | • Able to verify different laws of Electromagnetic Waves: & to determine various constants using polarimeter and modern instruments, also to have clear idea about Maxwell Equations, EM Wave Propagation in Unbounded Media, EM Wave in Bounded Media, Optical Fibres, Polarization of Electromagnetic Waves, Rotatory Polarization: |
| **C-14** | **STATISTICAL MECHANICS** | • Gained knowledge about Classical Statistics, Quantum Statistics, Radiation and the laws & able to plot graphs to explain the radiation laws |
| **DSE-1** | **CLASSICAL DYNAMICS** | • Students are to be examined on the basis of problems, seen and unseen On Classical Mechanics of Point Particles, Special Theory of Relativity, Relativistic kinematics. |
| **DSE-2** | **NUCLEAR AND PARTICLE PHYSICS** | • Students are to be examined on the basis of problems, seen and unseen on General Properties of Nuclei, Nuclear Models, Radioactivity decay & Nuclear Reactions, Detector for Nuclear Radiations & Particle Accelerators, Particle physics. |
| **DSE-3** | **NANO MATERIAL AND APPLICATIONS** | • Gained knowledge about this course which is based on applications in solving problems of interest to physicists on Nanoscale Systems, Synthesis Of Nanostructure Materials, Characterization:, Applications of nanoparticles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells) |
| **DSE-4** | **PROJECT(COMPULSORY)** | Students have to prepare and submit any short project in consultation with the Guide Teacher. |