

# Department of Physics

## Course Outcomes

### Class: F.Y.B. Sc. Physics : Semester I

#### Course (Paper) Name and No.:

#### Classical Physics, Basic Electrodynamics, Thermodynamics, Physics 1

- CO1 Understand Newton's laws and apply them in calculations of the motion of simple systems.
- CO2 Use the free body diagrams to analyse the forces on the object.
- CO3 Understand the basic mathematical concepts and applications of them in physical situations
- CO4 Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process
- CO5 Understand the elasticity and fluid dynamics concepts and its applications in practical life

#### Course (Paper) Name and No.:

#### Nuclear Physics & Analog Electronics, Physics 2

- CO1 Learners will get detailed knowledge about the discovery of the nucleus and learn all the properties of the nucleus.
- CO2 Learners will understand the phenomenon of Radioactivity, Radioactive elements, laws of Radioactive Decay and their applications to various fields of science.
- CO3 Learners will understand various kinds of Nuclear Reactions, Various laws related to Nuclear Reactions and how Nuclear Energy is produced.
- CO4 Learners will understand the Principles, Construction and Working of various types of Nuclear Detectors.
- CO5 Learners will understand the response of Resistor, Capacitor and Inductor to an Alternating Current (AC)
- CO6 Learners will understand various kinds of AC Bridges and their Operation.

## **Course Name and No.: Practicals**

- CO1 Learners will get hands-on training on various measuring devices such as Digital Multimeter, Vernier Caliper, Micrometer Screw Gauge, Travelling Microscope and other such devices.
- CO2 Learners will understand various methods for finding different mechanical properties of Solids like the Moment of Inertia, Modulus of Elasticity and the Young's Modulus.
- CO3 Learners will understand various methods for finding different mechanical properties of liquids like the Coefficient of Viscosity, Surface Tension & Angle of Contact.
- CO4 Learners will understand the Thermoelectric Characteristics of Thermistor and be able use it as a temperature sensor.
- CO5 Learners will understand the proper way of connecting various electrical components like Resistors, Inductors, Capacitors, Voltmeter, Ammeter, etc in different types of circuits.
- CO6 Learners will practically understand the response of Resistor, Capacitor and Inductance to an Alternating Current. Also the learners will get Hands-On Training for handling such electrical components.

## **Class: F.Y.B. Sc. Physics : Semester II**

### **Course (Paper) Name and No.:**

#### **Optics, Mathematical physics, Wave Motion, Physics 1**

- CO1 Able to explain natural physical processes related to light waves
- CO2 Use of understanding application of basic differential equation in various circuits
- CO3 Able to differentiate the transverse and spherical waves
- CO4 Able to apply superposition principle for various harmonic oscillations
- CO5 Able to differentiate the different aberrations of light and understands the various methods to eliminate it

### **Course (Paper) Name and No.:**

#### **Modern Physics, DC Circuits & Digital Electronics, Electrostatics, Magnetostatics, Geophysics, Physics 2**

- CO1 After the completion of the course learners will get knowledge about Quantum Physics, Geophysics, and Electrodynamics
- CO2 This course will also develop the skills among the learners to handle D.C. circuits and Digital Circuits
- CO3 Learners will be able to do the circuit analysis using various network theorems.
- CO4 Learners will understand the concept of Electrostatic field in detail.
- CO5 Learners will understand the concept of Magnetic fields in detail.

## **Course Name and No.: Practicals**

- CO1 Learners will get demonstration of various Phenomenons such as LASER Beam Diversion, Charging & Discharging of Capacitor, Conservation of Angular Momentum, etc.
- CO2 Learners will understand how to use various Optical Instruments such as the Spectrometer, Prism, Lenses, etc.
- CO3 Learners will be able to determine Optical properties like the Refractive Index of the material of the Prism by observing the Spectrum emitted by different sources of light.
- CO4 Learners will get hands-on training on how lenses are used and how to find various properties of the lens systems.
- CO5 Learners will be able to use Diodes for the purpose of Voltage Regulations and for converting an AC signal into a DC signal (Rectification).
- CO6 Learners will get hands-on training of Digital Electronic Circuits and study their Applications.

## Class: S.Y.B. Sc. Physics: Semester III

### Course (Paper) Name and No.:

#### Classical Mechanics & Thermodynamics, Physics-1

- CO1 Learners will understand the Laws of Conservation Linear Momentum, Angular Momentum & Energy and be able to apply the laws to study the Dynamics of System of Particles.
- CO2 Learners will be able to understand the Simple Harmonic Oscillations of Simple Pendulum & Compound Pendulum and write their equations.
- CO3 Learners will understand the Simple Harmonic Motion and the effect of Damping forces on such motions and equation of motion related to particles performing Damped Simple Harmonic Motion.
- CO4 Learners will understand the Forced Damped Simple Harmonic Motion and Resonance.
- CO5 Learners will understand various Laws of Thermodynamics and their implications in daily life.
- CO6 Learners will understand various Thermodynamic Processes and various Thermodynamic Cycles (P-V graph).
- CO7 Learners will understand the Construction & Working of different types of Heat Engines and the Thermodynamical Processes inside the heat engines.

### Course (Paper) Name and No.:

#### Vector Calculus, Analog Electronics, Physics 2

CO1	Understand learners the basic concepts of Mathematical physics and their applications in physical situations
CO2	Understand the basics of transistor biasing, Op-Amp and their applications
CO3	Understand different types of oscillator and find its frequency.
CO4	Evaluate line and surface integrals

CO5	Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals
CO6	Design basic amplifier circuits using Opamp

### **Course (Paper) Name and No.:**

### **Acoustics, Laser, Fibre optics, Crystal Physics, Material Physics, Geophysics, Physics-3**

- CO1 After the completion of the course learners will understand the Factors affecting Acoustics and use of fibre in optical communication
- CO2 learners will also understand the different types of crystal structures
- CO3 Learners will understand propagation of light through Optical Fiber, Different types of fibre and Application of Optical Fiber
- CO4 Learners will understand working of Laser and also application of Laser in Holography
- CO5 Learners will understand the Electrical and Magnetic properties of the materials
- CO6 Learners will understand the concepts of Continental drift, Plate tectonics and cause of Earthquake

### **Course Name and No.: Practicals**

- CO1 Learners will understand to test electronic components like resistor, capacitor, diode, transistor etc.
- CO2 learners will understand how to connect electronic circuit using Breadboard
- CO3 Learners will understand how to use Cathode ray oscilloscope (CRO) to measure time period and amplitude of different waveforms
- CO4 Learners will develop the skill to use transistor as an amplifier in common emitter mode (CE mode)
- CO5 Learners will understand the working of passive filter like RC Low Pass Filter, RC Low Pass Filter, RC Band Pass Filter using Breadboard
- CO6 Learners will develop the skill to use IC 741 (Op-Amp) as a Inverting amplifier, Non-inverting amplifier, Differential amplifier and Voltage follower

- CO7 Learners will develop the skill to determine Young's modulus, Thermal conductivity, Moment of inertia, Surface tension and Acceleration due to gravity (g)
- CO8 Learners will understand Brewster's Law using Polarisation by reflection method
- CO9 Learners will understand how to determine Charge to the mass ratio ( $e/m$ ) of an electron by J. J. Thomson's method

## Class: S.Y.B. Sc. Physics :Semester IV

### Course (Paper) Name and No.:

#### Optics, Physics-1

- CO1 Learners will understand various natural phenomenon related to light like Interference, Diffraction, Polarization, etc.
- CO2 Learners will understand the Phenomenon of Interference in details.
- CO3 Learners will understand the Principle, Construction and Working Michelson's Interferometer & Febry-Perot Interferometer.
- CO4 Learners will be able to differentiate between the Fresnel & Fraunhofer class of Diffraction.
- CO5 Learners will understand Fresnel and Fraunhofer class of Diffraction at various obstacles or slits.
- CO6 Learners will understand the phenomenon of Polarization in details and various ways of Polarizing the Light and the applications of Polarized light in daily life.

### Course (Paper) Name and No.:

#### Quantum Mechanics, Physics 2

CO1	Able to understand the postulate of Quantum Mechanics
CO2	Use of Quantum Mechanics , its relevance in explaining significant phenomena in Physics
CO3	Gained knowledge about basic non-relativistic quantum mechanics, the time-dependent and time-independent Schrödinger equation for simple potentials like for instance the harmonic oscillator and hydrogen like atoms
CO4	Solve the time-independent Schrodinger equation as an intermediate step to solve the time-dependent Schrodinger equation.
CO5	apply boundary conditions to constraint the set of possible states.
CO6	Find the transmission and reflection coefficients for one-dimensional barriers

## **Course (Paper) Name and No.:**

### **Digital Electronics, Radio Communication, Physics-3**

- CO1 Learners will understand the different types of Number systems like Binary, Octal, Hexadecimal
- CO2 After the completion of the course learners will develop the skill of programming using microprocessor 8085
- CO3 Learners will also understand the various modulation techniques used in the communication system
- CO4 Learners will understand different types of Flip-Flops
- CO5 Learners will understand the working of shift registers and counters
- CO6 Learners will understand different types of Addressing modes used in microprocessor 8085

### **Course Name and No.: Practicals**

- CO1 Learners will get the demonstration of Waveform generator using Op-amp
- CO2 Learners will develop the skill of Error analysis of Physics experiments
- CO3 Learners will be able to determine the Resolving power of telescope, Resolving power of grating
- CO4 Learners will understand the working of MS-JK flip flop (IC 7476), Latch (IC 7400/IC 7402)
- CO5 Learners will be able to do Programming using 8085 microprocessor
- CO6 Learners will understand the working of Op-amp as a Differentiator and Integrator
- CO7 Learners will understand the working of 8:3 Priority Encoder (IC 74LS148) and 3:8 Decoder (IC 74LS138)
- CO8 Learners will be able to determine the wavelength of the monochromatic light using Cylindrical obstacle and Fresnel's biprism
- CO9 Learners will understand the working of Half adder and full adder using EX-OR gate