

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Dr SANGITA GUPTA

Subject: PHYSICS

Class: B.Sc.3rd Semester PHYSICAL SCIENCES

Paper: OPTICS

1 st week	Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determine the Wavelength of sodium light and thickness of a mica sheet.
2 nd week	Phase change on reflection. Interference by Division of Amplitude: Plane parallel thin film, production of colours in thin Films, Classification of fringes in films.
3 rd week	Interference due to transmitted light and reflected light, wedge shaped film, Newton's rings.
4 th week	Fresnel's diffraction: Huygens-Fresnel's theory, Fresnel's assumptions, rectilinear propagation of light,
5 th week	Diffraction at a straight edge, rectangular slit and diffraction at a circular aperture.
6 th week	Fraunhofer diffraction: Single slit diffraction, double slit diffraction, plane transmission grating spectrum,
7 th week	Dispersive power of grating, limit of resolution, Rayleigh's criterion
8 th week	Resolving power of telescope and a grating.
9 th week	Polarisation by reflection, refraction and scattering, Malus Law,
10 th week	Phenomenon of double refraction, Huygens's wave theory of double refraction (Normal and oblique incidence),
11 th week	Analysis of polarized Light. NICOL prism, Quarter wave plate and half wave plate,
12 th week	Production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light.
13 th week	Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz)
14 th week	Basic concept of absorption and emission of radiations, amplification and population inversion, Main components of lasers: (i) Active Medium (ii) Pumping (iii) Optical Resonator
15 th week	Properties of laser beam: Monochromaticity, Directionality, Intensity, Coherence (Spatial & Temporal coherence); Metastable state, Excitation mechanism and Types of Lasers (He-Ne Laser & Ruby Laser), Applications of Lasers.
16 th week	Optical fibres and their properties, Principal of light propagation through an optical fibre,
17 th week	Acceptance angle and numerical aperture, Types of optical fibres: Single mode and multimode fibres, Advantages and Disadvantages of optical fibres.
18 th week	Revision of syllabus

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher:Dr. Sangita Gupta

Subject:Physics

Class:B.Sc.3rd sem. Life Sciences

Paper: Elements of ModernPhysics

1 st week	Foundations of Quantum Physics: Planck's quantum hypothesis and the concept of photons. Photoelectric effect: Qualitative explanation and applications.
2 nd week	Compton scattering: Basic understanding., De Broglie wavelength and matter waves,
3 rd week	Davisson-Germer experiment: Experimental verification of matter waves.
4 th week	Atomic Structure and Wave-Particle Duality: Limitations of Rutherford's model:
5 th week	Atomic instability and discrete spectra. Bohr's quantization rule and energy levels of hydrogen-like atoms (qualitative only).
6 th week	Wave-particle duality and Heisenberg uncertainty principle: Simple examples and applications. Energy-time uncertainty principle
7 th week	Heisenberg uncertainty principle: Simple applications. Energy-time uncertainty principle
8 th week	Basics of Quantum Mechanics: Two-slit interference experiment with photons and particles
9 th week	Introduction to Schrödinger equation, Physical interpretation of the wave-function and probability concepts.
10 th week	One-dimensional infinitely rigid box: Energy levels and relevance in quantum dots..
11 th week	Tunnelling effect, Step potential (qualitative only) and applications
12 th week	Nuclear Physics and Applications: Basic structure of the nucleus: Size, atomic weight, and binding energy.
13 th week	Radioactivity: Stability of nucleus, laws of decay, and half-life. Overview of α decay,
14 th week	β decay (neutrino hypothesis), and γ -ray emission.
15 th week	Introduction to nuclear fission and fusion: Energy generation, mass deficit, and thermonuclear reactions.
16 th week	Applications of nuclear energy: Brief on nuclear reactors and their principles.
17 th week	Revision
18 th week	Revision

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Dr. Sangita Gupta

Subject: Physics

Class: B.Sc. 1st sem. Life Sciences

Paper: PHYSICS IN EVERYDAY LIFE

1 st week	Every day activities related to Force
2 nd week	Every day activities related to weight, work and energy
3 rd week	Every day activities related to power and centrifuge
4 th week	(Fully and Semi)Washing machine.
5 th week	Variation of boiling point with pressure, pressure cooker, cooling by expansion
6 th week	Refrigerator
7 th week	Bernoulli principle
8 th week	Bunsen burner, aero-plane
9 th week	Air conditioner
10 th week	Sound waves, Doppler Effect,
11 th week	Power of lens, long sight and short Sight,
12 th week	Microscope, telescope
13 th week	Binocular camera, video camera.
14 th week	Working of the tube light and fan,
15 th week	kilowatt hour, fuse and heating elements,
16 th week	microwave oven
17 th week	Electric heater, photoelectric effect
18 th week	Revision

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Dr. Manisha

Subject: Physics- Major

Class: B. Sc. 1st sem. (Physical Sciences)

Paper: Mechanics and Theory of Relativity

1st week	Mechanics of single and system of particles, Conservation law of linear momentum, Angular momentum and mechanical energy for a particle and a system of particles.
2nd week	Centre of Mass and equation of motion, Constrained Motion. Work and Kinetic Energy Theorem. Conservative and nonconservative forces.
3rd week	Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy.
4th week	Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. Numerical Problems.
5th week	Degrees of freedom and Generalized coordinates (Generalized Displacement, Velocity, Acceleration, Momentum, Force and Potential) Transformation equations.
6th week	Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems
7th week	Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Linear Harmonic oscillator
8th week	Simple pendulum, Atwood's machine + Problems
9th week	Rotational Dynamics: Rotation of Rigid body, torque, angular momentum.
10th week	Moment of inertia, Radius of Gyration, Relation between Moment of inertia, torque, and angular momentum, kinetic energy of rotation. Theorems of perpendicular and parallel axes with proof.
11th week	Moment of inertia of solid sphere, hollow sphere, spherical shell, and solid bar of rectangular cross-section.
12th week	Moment of inertia of solid cylinder, hollow cylinder. Acceleration of a body rolling down on an inclined plane. Motion involving both translation and rotation.
13th week	Special Theory of Relativity: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and

	its applications. Lorentz contraction. Time dilation.
14th week	Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events.
15th week	Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles
16th week	Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector.
17th week	Revision + Problems + Test
18th week	Revision + Problems + Test

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Dr. Manisha

Subject: Physics- Skill Enhancement Course

Class: B. Sc. 1st sem. (Physical sciences)

Paper: Electrical Circuit & Instrumentation Skills

1st week	Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity.
2nd week	Familiarization with multimeter, voltmeter and ammeter, Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.
3rd week	Electronic Voltmeter: Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.
4th week	AC milli-voltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac milli-voltmeter, specifications and their significance.
5th week	Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment).
6th week	brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls.

7 th week	Specifications of a CRO and their significance. Use of CRO for the measurement of voltage, dc and ac frequency, time period. Special features of dual trace.
8 th week	Introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.
9 th week	Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter.
10 th week	Digital Multimeter: Block diagram and working of a digital multimeter.
11 th week	Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time- base stability, accuracy and resolution.
12 th week	Voltmeter. Working principles of digital voltmeter.
13 th week	Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt.
14 th week	Response of inductors and capacitors with DC or AC sources Generators and Transformers: DC Power sources. AC/DC generators.
15 th week	Inductance, capacitance, and impedance. Operation of transformers.
16 th week	Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor.
17 th week	Revision + Problems + Test
18 th week	Revision + Problems + Test

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Dr. Manisha

Subject: Physics- Skill Enhancement course

Class: B. Sc. 3rd sem. (Physical Sciences)

Paper: Workshop Skills in Physics

1 st week	Introduction: Measuring units. conversion to SI and CGS. Familiarization with meter scale.
2 nd week	Familiarization with Vernier calliper, Screw gauge and their utility.

3rd week	Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet etc.
4th week	Use of Sextant to measure height of buildings, mountains, etc.
5th week	Electrical and Electronic Skill: Use of Multimeter.
6th week	Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB.
7th week	Network theorems: Superposition theorem, Thevenin's theorem. Numericals
8th week	Network theorems: Norton's theorem, Maximum Power Transfer Theorem. Numericals
9th week	Power Supplies: Basics of Power Supplies, AC Power Supplies: Characteristics, use in basic circuits. DC Power Supplies: Fixed voltage vs. variable voltage supplies.
10th week	Components of power supplies: Transformers, rectifiers (half-wave, full-wave), filters, and regulators.
11th week	Voltage Regulation and Ripple Reduction, Concepts of regulation, ripple, and stability.
12th week	Use of capacitors, Zener diodes, and IC voltage regulators (e.g., LM317).
13th week	Cathode Ray Oscilloscope (C.R.O.): Introduction to C.R.O., Basic structure and working of a C.R.O.
14th week	Electron gun, deflection system, and phosphor screen. Block diagram and function of each component
15th week	Operating a C.R.O. Adjusting controls: Time base, volts/div, focus, intensity, and trigger. Connecting probes and setting ground reference.
16th week	Applications of C.R.O. Measurement of voltage, frequency, and phase difference. Observation of waveforms: Sine, square, and triangular waves. Troubleshooting electrical circuits.
17th week	Revision + Problems + Test
18th week	Revision + Problems + Test

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Dr. Manisha

Subject: Physics

Class: B. Sc. 5th sem.

Paper: Solid State Physics.

1st week	Crystalline and glassy forms, Liquid Crystals, Crystal structure, periodicity, Lattice and basis,
2nd week	Crystal translational vectors and axes. Unit cell and primitive cell, Wingner - Seitz primitive cell

3rd week	Symmetry operations for a two-dimensional crystal, Bravais lattice in two and three dimensions.
4th week	Revision
5th week	Crystal Planes and Miller indices, Interplanar spacing,
6th week	crystal structures of zinc sulphide, sodium chloride and diamond.
7th week	X-ray diffraction, Bragg's law and experimental x-ray diffraction methods, K-space.
8th week	Numerical Problems
9th week	Reciprocal lattice and its physical significance. reciprocal Lattice vectors
10th week	Reciprocal Lattice to a simple cubic lattice, BCC and FCC.
11th week	Specific heat: specific heat of solids, Einstein's theory of specific heat
12th week	Debye model of specific heat of solids.
13th week	Numerical problems
14th week	Revision of unit 1
15th week	Revision of unit 2
16th week	Revision of unit 3
17th week	Revision + Problems + Test
18th week	Revision + Problems + Test

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Dr. Manisha

Subject: Physics

Class: B. Sc. 5th sem.

Paper: Quantum Mechanics

1st week	Failure of (classical) EM Theory, quantum theory of radiation, old quantum theory, Photon.
2nd week	Photoelectric effect and Einsteins photoelectric equation, Compton effect (theory and result).
3rd week	In adequacy of old quantum theory, de- Broglie hypothesis, Davisson and Germer experiment, G.P. Thomson experiment.
4th week	Phase velocity and group velocity. Heisenberg's uncertainty Principle. Time- Energy and angular momentum, position uncertainty.
5th week	Uncertainty principle from de- Broglie wave, (wave particle duality) Gamma Ray Microscope, Electron diffraction from a slit.

6th week	Problems
7th week	Derivation of time dependent Schrodinger wave equation, eigen values, eigen functions,
8th week	Wave functions and its significance, normalisation of wave function, concept of observable and operator
9th week	Solution of Schrodinger equation for harmonic oscillator, ground states, and excited states.
10th week	Harmonic Oscillator
11th week	Application of SCHRODINGER equation in the solution of free particle in one dimensional box (solution of SCHRODINGER wave equation, eigen function, eigen values, quantization of energy, and momentum, nodes and Anti nodes, zero-point energy).
12th week	Application of SCHRODINGER equation in one dimensional potential barrier $E > V_0$ (reflection, and transmission coefficient).
13th week	one dimensional Potential barrier
14th week	Application of SCHRODINGER equation in one dimensional potential step $E < V_0$ (reflection, coefficient, penetration of leakage, coefficient, penetration depth)
15th week	one dimensional potential step
16th week	Revision of unit 1
17th week	Revision of unit 2
18th week	Revision of unit 3