GOVT. POST GRADUATE NEHRU COLLEGE, JHAJJAR

Department of Physics (2025-26)

LESSON PLAN (ODD SEM)

CLASS: - B.Sc. (Physics) **SEMESTER:- 3rd Sem (2025-2026)**

Name: - Dr. Parveen Kumar **Designation: Assistant Professor**

Paper: 25PHY403MI01: Elements of Modern Physics

Time Period	Syllabus to be covered
August, 2025	Unit 1: Foundations of Quantum Physics: Planck's quantum hypothesis and the concept of photons. Photoelectric effect: Qualitative explanation and applications. Compton scattering: Basic understanding. De Broglie wavelength and matter waves, Davisson-Germer experiment: Experimental verification of matter waves.
September, 2025	Unit 2: Atomic Structure and Wave-Particle Duality: Limitations of Rutherford's model: Atomic instability and discrete spectra. Bohr's quantization rule and energy levels of hydrogen-like atoms (qualitative only). Wave-particle duality and Heisenberg uncertainty principle: Simple examples and applications. Energy-time uncertainty principle
October, 2025	Unit 3: Basics of Quantum Mechanics: Two-slit interference experiment with photons and particles, Introduction to Schrödinger equation, Physical interpretation of the wave-function and probability concepts. One-dimensional infinitely rigid box: Energy levels and relevance in quantum dots. Tunnelling effect, Step potential (qualitative only) and applications.
November, 2025	Unit 4: Nuclear Physics and Applications: Basic structure of the nucleus: Size, atomic weight, and binding energy. Radioactivity: Stability of nucleus, laws of decay, and half-life. Overview of α decay, β decay (neutrino hypothesis), and γ-ray emission. Introduction to nuclear fission and fusion: Energy generation, mass deficit, and thermonuclear reactions. Applications of nuclear energy: Brief on nuclear reactors and their principles.

Signature

GOVT. POST GRADUATE NEHRU COLLEGE, JHAJJAR

Department of Physics (2025-26)

LESSON PLAN (ODD SEM)

CLASS: - B.Sc. (Physics) **SEMESTER:- 3rd Sem (2025-2026)**

Name: - Dr. Parveen Kumar **Designation: Assistant Professor**

Paper: 25PHY403SE01: Workshop Skills in Physics

Time Period	Syllabus to be covered
August, 2025	Unit 1: Introduction: Measuring units. Conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.
September, 2025	Unit 2: Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer Theorem
October, 2025	Unit 3: Power Supplies: Basics of Power Supplies, AC Power Supplies: Characteristics, use in basic circuits. DC Power Supplies: Fixed voltage vs. variable voltage supplies. Components of power supplies: Transformers, rectifiers (half-wave, full-wave), filters, and regulators. Voltage Regulation and Ripple Reduction, Concepts of regulation, ripple, and stability. Use of capacitors, Zener diodes, and IC voltage regulators (e.g., LM317).
November, 2025	Unit 4: Cathode Ray Oscilloscope (C.R.O.): Introduction to C.R.O., Basic structure and working of a C.R.O. Electron gun, deflection system, and phosphor screen. Block diagram and function of each component. Operating a C.R.O. Adjusting controls: Time base, volts/div, focus, intensity, and trigger. Connecting probes and setting ground reference. Applications of C.R.O. Measurement of voltage, frequency, and phase difference. Observation of waveforms: Sine, square, and triangular waves. Troubleshooting electrical circuits.

Signature

GOVT. POST GRADUATE NEHRU COLLEGE, JHAJJAR

Department of Physics (2025-26)

LESSON PLAN (ODD SEM)

CLASS: - B.Sc. (Physics) **SEMESTER:- 1st Sem (2025-2026)**

Name : - Dr. Parveen Kumar **Designation: Assistant Professor**

Paper: 24PHY401SE01: Electrical Circuit & Instrumentation Skills

Time Period	Syllabus to be covered
August, 2025	Unit 1: Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. 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. Electronic Voltmeter: Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. AC milli-voltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier-amplifier. Block diagram ac milli-voltmeter, specifications and their significance.
September, 2025	Unit 2: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. (6 Lectures) Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.
October, 2025	Unit 3: Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter. (3 Lectures) Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution. Voltmeter. (3 Lectures) Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution.
November, 2025	Unit 4: Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers. Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor.

Signature