# GDC Memorial College

## Bahal (Bhiwani)-127028

**NAAC Accredited Grade "B" (Second Cycle) and Recognized under the Sections 2(f) & 12B of the UGC Act, 1956**

**Affiliated to Ch. Bansi Lal University, Bhiwani**

**Lesson Plan- January to April 2026**

**Name - Dr. Sanjay** **Department - Physics**
**Class - M.Sc. Physics** **Subject - Nuclear and Particle Physics**
**Semester- 2nd** **Subject Code - 25-PN-PHY- 201**

| | UNIT-1 |
|---|---|
| **Week-1** | |
| 27-Jan-26 | Two nucleon problem and nuclear forces:The deuteron |
| 28-Jan-26 | Do |
| 29-Jan-26 | binding energy, dipole moment quadrupole moment and the evidence of non-central (Tensor) force |
| 30-Jan-26 | Do |
| **Week-2** | |
| 2-Feb-26 | spin dependence of nuclear force |
| 3-Feb-26 | Nucleon-nucleon scattering; s-wave effective range theory |
| 04-Feb-26 | Do |
| 05-Feb-26 | charge independence and charge symmetry of nuclear forces |
| 06-Feb-26 | Do |
| **Week-3** | |
| 09-Feb-26 | iso-spin formalism |
| 10-Feb-26 | Do |
| 11-Feb-26 | Revision |
| 12-Feb-26 | Revision |
| 13-Feb-26 | Test |
| **Week-4** | **UNIT II** |
| 16-Feb-26 | Types of nuclear reactions: compound and direct nuclear reactions, |
| 17-Feb-26 | Reaction cross – section, Balance of mass and energy in nuclear reactions |
| 18-Feb-26 | Do |
| 19-Feb-26 | Q equation and its solution |
| 20-Feb-26 | Liquid drop model: Similarities between liquid drop and nucleus |
| **Week-5** | |
| 23-Feb-26 | semi-empirical mass formula, Bohr-Wheeler theory of fission |
| 24-Feb-26 | Do |
| 25-Feb-26 | Merits and limitations of Liquid drop model |
| 26-Feb-26 | Shell model: Experiment evidences for shell effect |
| 27-Feb-26 | Magic numbers, Main assumptions of single particle shell model |

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| **Week-6** | |
| 2-Mar-26 | Spin-orbit coupling in single particle shell model |
| 5-Mar-26 | Estimation of spin, parities and magnetic moments of nuclei by single particle shell model. |
| 6-Mar-26 | Do |
| **Week-7** | |
| 9-Mar-26 | Do |
| 10-Mar-26 | Revision |
| 11-Mar-26 | Revision |
| 12-Mar-26 | Test |
| **Week-8** | **UNIT III** |
| 16-Mar-26 | Nuclear Decays: Alpha (α) decay, α- disintegration energy |
| 17-Mar-26 | Do |
| 18-Mar-26 | Range of α-particles, Range – energy relationship for α-particles and Geiger – Nuttall law |
| 19-Mar-26 | Do |
| 20-Mar-26 | Beta decay, Pauli's neutrino hypothesis |
| **Week-9** | |
| 23-Mar-26 | Do |
| 24-Mar-26 | Fermi theory of beta decay, Kurie plot |
| 25-Mar-26 | selection rules for beta decay |
| 26-Mar-26 | Fermi and Gamow-Teller Transitions |
| 27-Mar-26 | Parity non-conservation in beta decay |
| **Week-10** | |
| 30-Mar-26 | Detection and properties of neutrino |
| 31-Mar-26 | Gamma decay, Multipole transitions in nuclei |
| 01-Apr-26 | Angular momentum and parity selection rules; Internal conversion |
| 02-Apr-26 | Nuclear isomerism |
| 03-Apr-26 | Test |
| **Week-11** | **UNIT IV** |
| 06-Apr-26 | Units in high energy physics; Classification of particles- fermions and bosons |
| 07-Apr-26 | Do |
| 08-Apr-26 | particles and antiparticles; Strange particles |
| 09-Apr-26 | Basic idea of different fundamental types of interactions with suitable examples |
| 10-Apr-26 | Do |
| **Week-12** | |
| 13-Apr-26 | Quark flavors and their quantum numbers |
| 14-Apr-26 | Quarks as constituents of Hadrons, Qualitative idea of Quark confinement and asymptotic freedom |
| 15-Apr-26 | Do |
| 16-Apr-26 | necessity of introducing colour quantum number |
| 17-Apr-26 | Unitary groups; classification of elementary particles |
| **Week-13** | |
| 20-Apr-26 | Do |
| 21-Apr-26 | charge conjugation |
| 22-Apr-26 | Time reversal. Higg's boson |
| 23-Apr-26 | dark matter (Basic) |
| 24-Apr-26 | Revision |
| **Week-14** | |

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| 27-Apr-26 | Revision |
| 28-Apr-26 | Unit Test |
| 29-Apr-26 | Discussion of Previous year question papers |
| 30-Apr-26 | Pre-University Examination |

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### Lesson Plan- January to April 2026

**Name - Dr. Sanjay** **Department - Physics**
**Class - M.Sc. Physics** **Subject - Solid State Physics**
**Semester- 2nd** **Subject Code - 25-PN-PHY- 202**

| **Week-1** | **UNIT-I** |
|---|---|
| 27-Jan-26 | Bravais Lattices and Primitive vectors |
| 28-Jan-26 | Primitive, Translational and Wigner-Seitz Unit Cell |
| 29-Jan-26 | Packing Fraction and Packing Fraction of SC, BCC, HCP and FCC unit Cells |
| 30-Jan-26 | Structure of Diamond |
| 31-Jan-26 | Structure of ZnS, NaCl |
| **Week-2** | |
| 3-Feb-26 | Determination of Crystal Structure |
| 04-Feb-26 | Reciprocal Lattice to SC, BCC and FCC lattices |
| 05-Feb-26 | Do |
| 06-Feb-26 | Bragg's and Laue Formulations of X-ray Diffraction |
| 07-Feb-26 | Laue Equations |
| **Week-3** | |
| 10-Feb-26 | Ewald Construction |
| 11-Feb-26 | Brillioun Interpretations |
| 12-Feb-26 | Crystal and Atomic Structure of BCC and FCC |
| 13-Feb-26 | Unit Test |
| 14-Feb-26 | Discussion of unit test |
| **Week-4** | **UNIT-II** |
| 17-Feb-26 | Inter-atomic forces: Introduction |
| 18-Feb-26 | Forces between atoms |
| 19-Feb-26 | Cohesion of atoms and cohesive energy |
| 20-Feb-26 | Calculation of cohesive energy |
| 21-Feb-26 | |
| **Week-5** | Qualitetive Idea of bonds:Metallic bond, intermolecular bond |
| 24-Feb-26 | Dispersive bond, dipole bond, Hydrogen bonds, coveaent bonds and Ionic bonds |
| 25-Feb-26 | Classical Theory of Lattice Vibration |
| 26-Feb-26 | Vibration of Crystals with monoatomic basis: Dispersion relation, 1st BZ |
| 27-Feb-26 | Two atoms per primitive basis |
| 28-Feb-26 | Quantization of lattice vibration: phonon, phonon momemtum |
| **Week-6** | |
| 5-Mar-26 | Inelastic scattering of Neutrons by Phonons |
| 6-Mar-26 | Imperfections in Solids (Qualitative) |
| 7-Mar-26 | Do |
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| 10-Mar-26 | Points defects, line defects, surface defects and volume defects |
| 11-Mar-26 | Do |
| 12-Mar-26 | Revision |
| 13-Mar-26 | Discussion of Student's Problems |
| 14-Mar-26 | Unit Test |
| **Week-8** | **UNIT-III** |
| 17-Mar-26 | Free Electron gas model in 3 diemntions |
| 18-Mar-26 | Density of states, Fermi Energy, Effect of Temperature |
| 19-Mar-26 | Heat capacity of electron gas |
| 20-Mar-26 | Heat capacity of metals |
| 21-Mar-26 | Thermal Effective mass, Electrical conductivity and Ohm's law |
| **Week-9** | |
| 24-Mar-26 | Motion in Mag. Field and Hall Effect |
| 25-Mar-26 | Failure of Free Electron Theory and Band Theory of Solids |
| 27-Mar-26 | Periodic Function and Block Theorem, Effective mass in crystal and its physical Interpretations |
| 28-Mar-26 | Kronig-Penney Model |
| **Week-10** | |
| 31-Mar-26 | Periodic,Extended and Reduced Zone schemes of Energy Bands repersentation |
| 01-Apr-26 | Numbers of Orbitals in a band |
| 02-Apr-26 | Classification in Metals, Insulators and Semiconductors |
| 03-Apr-26 | Tight Binding Method and Its applications to SC and BCC structure |
| 04-Apr-26 | Unit Test |
| **Week-11** | |
| 07-Apr-26 | Experomental Survey: Superconductivity and its occurrence |
| 08-Apr-26 | Destruction of superconductivity by magnetic fields |
| 09-Apr-26 | Meissner's Effect |
| 10-Apr-26 | Type-I and Type-II Superconductors, Isotopic effect |
| 11-Apr-26 | Teoretical Survey: Thermodynamics of the superconducting transitions |
| **Week-12** | **UNIT-IV** |
| 14-Apr-26 | London Equations and Coherence length |
| 15-Apr-26 | Do |
| 16-Apr-26 | Microscopic Theory: Qualitative features and predictions of BCS Theory |
| 17-Apr-26 | BCS Ground state |
| 18-Apr-26 | Flux Quantization in a superconducting ring |
| **Week-13** | |
| 21-Apr-26 | DC and AC Josephson Effect |
| 22-Apr-26 | High Tc Superconductors |
| 23-Apr-26 | Revision |
| 24-Apr-26 | Revision |
| 25-Apr-26 | Unit Test |
| **Week-14** | |
| 28-Apr-26 | Discussion of Previous year question papers |
| 29-Apr-26 | Pre-University Examination |
| 30-Apr-26 | Result Discussion |

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**Lesson Plan- January to April 2026**

**Name - Dr Jyoti Kumari** **Department - Physics**

**Class - M.Sc. Physics** **Subject - Quantum Mechanics II**

**Semester - 2nd** **Subject Code - 25-PN-PHY-203**

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|---|---|
| **Week-1** | **UNIT-I** |
| 27-Jan-26 | Stationary Perturbation Theory- Introduction |
| 28-Jan-26 | Non-Degenerate Case:- 1st & 2nd Order Correction to Energy Eigen Values & Eigen Functions |
| 29-Jan-26 | Perturbation of Harmonic Oscillator |
| 30-Jan-26 | Perturbation of an Harmonic Oscillator |
| 31-Jan-26 | Ground State of Helium Atom |
| **Week-2** | |
| 3-Feb-26 | Removal of Gdegeneracy of 2nd Order |
| 4-Feb-26 | First Order Stark Effect in n=2 state of Hydrogen |
| 5-Feb-26 | Rayleigh-Ritz Vibrational Method |
| 6-Feb-26 | Do |
| **Week-3** | |
| 10-Feb-26 | Ground and Excited States |
| 11-Feb-26 | Application to ground state of Helium |
| 12-Feb-26 | Doubts |
| 13-Feb-26 | Doubts |
| 14-Feb-26 | Do |
| **Week-4** | **UNIT-II** |
| 17-Feb-26 | The WKB Approximation:- General Formalism |
| 18-Feb-26 | First Order Time Dependent Perturbation Theory |
| 19-Feb-26 | Transition Probability for constant and Harmonic Perturbation |
| 20-Feb-26 | Transition to a Group of Final States |
| **Week-5** | |
| 24-Feb-26 | The Fermi Golden Rule |
| 25-Feb-26 | Interaction of an Atom with Electromagnetic Radiations |
| 26-Feb-26 | Transition Probability for Induced Absorption and Emission |
| 27-Feb-26 | Electric Dipole Transition and Selection Rules |
| 28-Feb-26 | Magnetic Dipole Transitions |
| **Week-6** | |
| 5-Mar-26 | Forbidden Transitions |
| 6-Mar-26 | Higher Order Transitions |
| **Week-7** | **UNIT-III** |
| 10-Mar-26 | Scattering Experiments and Cross Sections |

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| 11-Mar-26 | Laboratory and Center of Mass System |
| 12-Mar-26 | Scattering Amplitude and Cross Sections |
| 13-Mar-26 | Method of partial Waves- Phase Shift |
| 14-Mar-26 | Differential and Total Cross-Sections |
| **Week-8** | |
| 17-Mar-26 | Relation b/w Phase Shift and Scattering Potential |
| 18-Mar-26 | Convergence of Partial waves Series |
| 19-Mar-26 | Scattering by a Finite Square Well |
| 20-Mar-26 | Do |
| **Week-9** | |
| 24-Mar-26 | Scattering by a Hard Sphere Potential |
| 25-Mar-26 | Born Series |
| 26-Mar-26 | First Born Approximation |
| 27-Mar-26 | Scattering of an Electron by a Screened Coulomb Potential in Born Approximation |
| 28-Mar-26 | Scattering of Two Identical Spinless Bosons and spin- 1/2 Fermions |
| **Week-10** | **UNIT-IV** |
| 31-Mar-26 | Many Particle Schrodinger Wave Equations |
| 1-Apr-26 | Identical Particles |
| 2-Apr-26 | Physical Meaning of Identity |
| 3-Apr-26 | Principle of Indistinguishability and its Consequences |
| **Week-11** | |
| 7-Mar-26 | Exchange Operator |
| 8-Mar-26 | Symmetric Wave Functions |
| 9-Mar-26 | Anti-symmetric Wave Function |
| 10-Mar-26 | Do |
| 11-Mar-26 | Symmetry and Statistics |
| **Week-12** | |
| 14-Mar-26 | Fermions and Bosons |
| 15-Mar-26 | Spin and Total Wave Functions for a System of two spin 1/2 particles |
| 16-Mar-26 | Do |
| 17-Mar-26 | Pauli Exclusion Principles |
| **Week-13** | |
| 21-Apr-26 | Application to the Electronic system of the Helium Atom |
| 22-Apr-26 | Do |
| 23-Apr-26 | Connection b/w spin |
| 24-Apr-26 | Slater Determinant |
| 25-Apr-26 | Do |
| **Week-14** | |
| 28-Apr-26 | Doubts |
| 29-Apr-26 | Revision |
| 30-Apr-26 | Test |
| 24-Apr-25 | Revision |
| 25-Apr-25 | Test |
| **Week-15** | |
| 28-Apr-26 | Doubts |
| 29-Apr-26 | Doubts |
| 30-Apr-26 | Doubts |

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## Lesson Plan- January to April 2026

**Class - M.Sc. Physics** **Subject - Electronic Devices & Circuits-II**

**Semester- 2nd** **Subject Code - 25PN-PHY-204E**

| **Week-1** | **UNIT-1** |
|---|---|
| 27.01.2026 | Basic structure and operation of JFET |
| 28.01.2026 | Do |
| 29.01.2026 | calculation of pinch off voltage |
| 30.01.2026 | V-I characteristics of JFET |
| **Week-2** | |
| 02.02.2026 | The FET small signal model |
| 03.02.2026 | Do |
| 04.02.2026 | Metal oxide semiconductor field effect transistor (MOSFET) |
| 05.02.2026 | Do |
| 06.02.2026 | Physical structure, operation and characteristics |
| **Week-3** | |
| 09.02.2026 | Enhancement and depleted modes of operation |
| 10.02.2026 | Metal semiconductor field effect transistor (MESFET) |
| 11.02.2026 | Low frequency common source and common drain FET amplifiers |
| 12.02.2026 | FET biasing |
| 13.02.2026 | FET as a voltage variable resistor (VVR) |
| **Week-4** | |
| 16.02.2026 | Multivibrators: a fixed biased transistor |
| 17.02.2026 | Self-biased transistor and a direct connected bistablemultivibrator circuits |
| 18.02.2026 | Schmitt trigger circuit |
| 19.02.2026 | Triggering techniques for bistable multivibrators |
| 20.02.2026 | collector-coupled and emitter-coupled monostable |
| **Week-5** | |
| 23.02.2026 | Do |
| 24.02.2026 | Astablemultivibrators |
| 25.02.2026 | Test |
| | **UNIT-II** |
| 26.02.2026 | The basic OPAMP |
| 27.02.2026 | Inverting and non-inverting mode of operation of OPAMP |
| **Week-6** | |
| 02.03.2026 | Effect of negative feedback on input and output resistances of OPAMPs |
| 05.03.2026 | The differential amplifier and common mode rejection ratio (CMRR) |
| 06.03.2026 | The emitter coupled differential amplifier |
| **Week-7** | |
| 09.03.2026 | The transfer characteristics of a differential amplifier |

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| 10.03.2026 | IC OPAMP (MC-1530 Motorola) and its dc analysis |
| 11.03.2026 | Offset voltages and currents |
| 12.03.2026 | Universal balancing technique |
| 13.03.2026 | Measurement of OPAMP parameters; basic working principles |
| **Week-8** | |
| 16.03.2026 | Characteristics and applications of uni-junction transistor (UJT) |
| 17.03.2026 | Four layer diode (pnpndiode) |
| 18.03.2026 | Tunnel diode and silicon controlled rectifier |
| 19.03.2026 | Do |
| 20.03.2026 | Test |
| **Week-9** | **UNIT-III** |
| 24.02.2025 | Digital (binary) operation of a system |
| 25.02.2025 | Logic systems, OR gate, AND gate, NOT gate and exclusive OR gate |
| 27.02.2025 | Do |
| 28.02.2025 | De Morgan's laws |
| **Week-10** | |
| 23.03.2026 | Boolean algebra |
| 24.03.2026 | NAND and NOR diode-transistor gates |
| 25.03.2026 | Modified DTL gates |
| 27.03.2026 | fan-in and fan-out |
| **Week-11** | |
| 30.03.2026 | Wired logics and high threshold logic (HTL) gates |
| 31.03.2026 | Transistor- transistor logic (TTL) gates and output stages for TTL gates |
| 01.04.2026 | Resistance-transistor logic (RTL) gates |
| 02.04.2026 | Direct coupled transistor logic (DCTL) gates |
| 03.04.2026 | Emitter coupled logic (ECL) gates |
| **Week-12** | |
| 06.04.2026 | Digital MOSFET circuits |
| 07.04.2026 | Complementary MOS (CMOS) logic gates and comparison of logic families |
| 08.04.2026 | Karnaugh- map (K-map) up to four variable and its applications |
| 09.04.2026 | Do |
| 10.04.2026 | Test |
| **Week-13** | **UNIT-IV** |
| 13.04.2026 | Radiative and nonradiative transitions Basic construction and operation |
| 14.04.2026 | Characteristics and applications of solar cells |
| 15.04.2026 | Light dependent resistance (LDR) |
| 16.04.2026 | Photodiodes |
| 17.04.2026 | p-i-n diodes |
| **Week-14** | |
| 20.04.2026 | Metal semiconductor photodiodes |
| 21.04.2026 | Avalanche photodiodes |
| 22.04.2026 | Light emitting diodes (LEDs) |
| 23.04.2026 | Semiconductor diode lasers |
| 24.04.2026 | Photo transistors |
| **Week-15** | |
| 28.04.2026 | Resistance thermometers |

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| 29.04.2026 | Thermocouples and thermistors |
| 30.04.2026 | Test |