# Lesson Plan: (2023-2024)

Name of Assistant/Associate Professor: **Dr. Preeti Chhokkar**

Class and Section: **B. SC II** Subject: **PH- 401Statistical Physics**

| Dates | Lesson Plan |
|---|---|
| WEEK1 | PH-401 Unit –I: Statistical Physics I<br>Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent. Probability, statistical probability, A- priori Probability and relation between them, probability theorems. |
| WEEK-2 | some probability considerations, combinations possessing maximum probability, combination possessing minimum probability, Tossing of 2,3 and any number of Coins, Permutations and combinations. |
| WEEK-3 | distributions of N (for N= 2,3,4) distinguishable and indistinguishable particles in two boxes of equal size, Micro and Macro states, Thermodynamical probability, Constraints and Accessible states, Statistical fluctuations. |
| WEEK-4 | General distribution of distinguishable particles in compartments of different sizes, Condition of equilibrium between two systems in thermal contact-- $\beta$ parameter, Entropy and Probability (Boltzmann's relation). |
| WEEK -5 | PH-401 Unit –II: Statistical Physics II<br>Postulates of statistical physics, Phase space, Division of Phase space into cells, three kinds of statistics, basic approach in three statistics. M. B. statistics applied to an ideal gas in equilibrium- energy distribution law (including evaluation of $\sigma$ and $\beta$). |
| WEEK-6 | Speed distribution law & velocity distribution law. Expression for average speed, r.m.s. speed, average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution. |
| WEEK -7 | PH-401 Unit-III: Quantum Statistics<br>Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas, Degeneracy and B.E. Condensation. |
| WEEK-8 | Fermi-Dirac energy distribution law, F.D. gas and Degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law, Fermi Dirac gas and degeneracy. |
| WEEK- 9 | Fermi energy and Fermi temperature, Fermi Dirac energy distribution law for electron gas in metals |
| WEEK 10 | Specific heat anomaly of metals and its solution. M.B. distribution as a limiting case of B.E. and F.D. distributions, Comparison of three statistics. |
| WEEK-11 | Zero-point energy, Zero-point pressure and average speed (at 0 K) of electron gas. |
| WEEK-12 | Unit-IV: Theory of Specific Heat of Solids<br>Dulong and Petit law. |
| WEEK-13 | Derivation of Dulong andPetit law from classical physics. Specific heat at low temperature |
| WEEK-14 | Einstein theory of specific heat, Criticism of Einstein theory |
| WEEK-15 | Debye model of specific heat of solids, success and shortcomings of Debye theory, comparison of Einstein and Debye theories |
| WEEK-16 | Revision |
| WEEK-17 | Revision |

(Dr. Preeti Chhokkar)
Asstt. Prof. in Physics

# Lesson Plan: (2023-2024)

Name of Assistant/Associate Professor: **Dr. Preeti Chhokkar**

Class and Section: **B. SC III** Subject: **Physics- PH-601(Solid State and Nano Physics)**

| Dates | **Lesson Plan** |
|---|---|
| WEEK1 | **Unit I: Crystal Structure I**<br>Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis, crystal translational vectors and axes. |
| WEEK-2 | Unit cell and Primitive Cell, Winger Seitz primitive Cell. |
| WEEK-3 | Symmetry operations for a two-dimensional crystal, Bravais lattices in two and three dimensions. |
| WEEK-4 | Crystal planes and Miller indices, Interplanar spacing, Crystal structures of Zinc Sulphide, Sodium Chloride and Diamond. |
| WEEK -5 | **Unit II: Crystal Structure II**<br>X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods |
| WEEK-6 | K-space and reciprocal lattice and its physical significance. |
| WEEK -7 | Reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c. |
| WEEK-8 | **Unit III: Super conductivity**<br>Historical introduction, Survey of superconductivity, Super conducting systems, High Tc Super conductors, Isotopic Effect, Critical Magnetic Field |
| WEEK- 9 | Meissner Effect, London Theory and Pippards' equation, Classification of Superconductors (type I and Type II) |
| WEEK 10 | BCS Theory of Superconductivity |
| WEEK-11 | Flux quantization, Josephson Effect (AC and DC), |
| WEEK-12 | Practical Applications of superconductivity and their limitations, power application of superconductors |
| WEEK 13 | **Unit IV: Introduction to Nano Physics**<br>Definition, Length scale, Importance of Nano-scale and technology, History of Nan-technology, Benefits and challenges in molecular manufacturing. |
| WEEK 14 | Molecular assembler concept, Understanding advanced capabilities. Vision and objective of Nano-technology |
| WEEK 15 | Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology, Materials, Medicine |
| WEEK 16 | REVISION |
| WEEK 17 | REVISION |

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# Lesson Plan: (2023-2024)

Name of Assistant/Associate Professor: **Dr. Preeti Chhokkar**
Class and Section: **B. A/B.COM** Subject: **B23-PHY-204, MDC PHYSICS**
**Max. Marks:75**
**Internal Assessment Marks: 20**
**End Term Exam Marks: 55**

| Dates | Lesson Plan |
|---|---|
| WEEK1 | Light and optics-Nature and properties of light, its speed, frequency and wavelength; Reflection of light-types of reflection and their importance in daily life. |
| WEEK-2 | Laws of reflection, multiple reflection by mirrors and their applications. Refraction of light- laws of refraction, refractive index, refraction of light through prism (dispersion of light). |
| WEEK-3 | Formation Rainbow, twinkling of stars, advance Sunrise and delayed Sunset; Scattering of light and blue colour of the sky; apparent depth, total internal reflection and its important applications. |
| WEEK-4 | Image formation through reflection-images formed by plane mirrors, multiple images formed by two flat mirrors and optical illusions. |
| WEEK -5 | Images formed by parabolic mirrors and spherical mirrors- Concave and convex mirrors, ray diagrams, mirror equation and magnification; applications of plane and curved mirrors in daily life. |
| WEEK-6 | Image formation through refraction- images by convex and concave lenses, ray diagrams and lens equation. |
| WEEK -7 | Optical instruments- Camera, eye, telescope and microscope. |
| WEEK-8 | Electricity- electric charge, types of charges, unit of charge, frictional electricity, electricity by conduction and electric current, units of electric current, measurement of current. |
| WEEK- 9 | Conductors and insulators; resistance, resistivity and Ohm's law, electric potential and potential difference, emf; Electric circuit- resistor, capacitor, battery, ammeter and voltmeter. |

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|---|---|
| WEEK 10 | Series and parallel combinations of resistors, electrical wiring in houses and electrical safety (fuse, hot wire, neutral, ground and short circuit), electric power and electric power transmission; Heating effect of current and its practical applications. |
| WEEK-11 | Magnetic effect of electric current- Magnetic field and field lines, bar magnet, magnetic field and direction of field due to a current- through straight conductor and through a circular loop; solenoid, electromagnet. |
| WEEK-12 | Structure of an atom- Rutherford's model of an atom, Bohr's model of an atom and composition of the atom-electron, proton and neutron. |
| WEEK 13 | orbits or shells (energy levels in an atom), distribution of electrons in different shells of the atom, atomic number and atomic mass of an atom |
| WEEK 14 | core shell and outer shell, valency of an atom, excitation and ionization of the atom, meaning of atomic transitions; Discovery of X-rays, Generation of X-rays, their characteristics, applications and harmful effects |
| WEEK 15 | Composition of nucleus, meaning of nuclear transitions and properties of α-, β- and γ-rays |
| WEEK 16 | Revision |
| WEEK 17 | Revision |

(Dr. Preeti Chhokkar)