## Lesson Plan 2022-2023

## (EVEN SEMESTER)

**SUBJECT: SEMICONDUCTOR PHYSICS CLASS: B.Sc. 2th Sem**

**Assistant Professor: Dr. Gurpreet Kaur**

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| **DURATION** | **SYLLABUS TO BE COVERED** |
| **1st Feb- 25th feb** | Energy bands in solids, Intrinsic and extrinsic semiconductors, carrier mobility and  electrical resistivity of semiconductors, Hall effect, p-n junction diode and their  Characteristics, Zener and Avalanche breakdown, Zener diode, Zener diode as a voltage regulator. Light emitting diodes (LED), Photoconduction in semiconductors, Photodiode, Solar Cell, p-n junction as a rectifier, half wave and full wave rectifiers, filters (series inductor, shunt capacitance, L-section or choke, п and R.C. filter circuits). |
| **27th Feb- 25th March** | Junction transistors, Working of NPN and PNP transistors, Three configurations of  transistor (C-B, C-E, C-C modes),Common base, common emitter and common  collector characteristics of transistor, Constants of a transistor and their relation,  Advantages and disadvantages of C-E configuration. D.C. load line. Transistor biasing; various methods of transistor biasing and stabilization. |
| **27th March –**  **22nd April** | Amplifiers, Classification of amplifiers, common base and common emitter amplifiers, coupling of amplifiers, various methods of coupling, Resistance- Capacitance (RC) coupled amplifier (two stage, concept of band width, no derivation), Feedback in amplifiers, advantages of negative feedback, emitter follower, distortion in amplifiers. |
| **24th April – 15th May** | Oscillators, Principle of oscillation, classification of oscillators, Condition for self  sustained oscillation: Barkhausen criterion for oscillation, Tuned collector common  Emitter oscillator, Hartley oscillator, C.R.O. (Principle and Working). |

## Lesson Plan 2022-2023

## (EVEN SEMESTER)

**SUBJECT: WAVE & OPTICS II CLASS: B.Sc. 4th Sem**

**Assistant Professor: Dr. Gurpreet Kaur**

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| **DURATION** | **SYLLABUS TO BE COVERED** |
| **1st Feb- 25th feb** | Polarization: Polarisation by reflection, refraction and scattering, Malus Law,  Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz). |
| **27th Feb- 25th March** | Fourier theorem and Fourier series, evaluation of Fourier coefficient, importance and limitations of Fourier theorem, even and odd functions, Fourier series of functions f(x) between (i) 0 to 2pi, (ii) –pi to pi, (iii) 0 to pi, (iv) –L to L, complex form of Fourier series, Application of Fourier theorem for analysis of complex waves: solution of triangular and rectangular waves, half and full wave rectifier outputs, Parseval identity for Fourier Series, Fourier integrals. |
| **27th March –**  **22nd April** | Fourier transforms and its properties, Application of Fourier transform (i) for evaluation of integrals, (ii) for solution of ordinary differential equations, (iii) to the following functions:  1. f(x)= e- x2/2 |X|<a  2. f(x) = 0 |X |>a  Geometrical Optics I  Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses. |
| **24th April – 15th May** | Geometrical Optics I  Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses.  Geometrical Optics II  Chromatic, spherical, coma, astigmatism and distortion aberrations and their remedies.  Fiber Optics  Optical fiber, Critical angle of propagation, Mode of Propagation, Acceptance angle, Fractional refractive index change, Numerical aperture, Types of optics fiber, Normalized frequency, Pulse dispersion, Attenuation, Applications, Fiber optic Communication, Advantages. |

## Lesson Plan 2022-2023

## (EVEN SEMESTER)

**SUBJECT: SOLID STATE AND NANO PHYSICS CLASS:B.Sc. 6th Sem**

**Assistant Professor: Dr. Gurpreet Kaur**

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| **DURATION** | **SYLLABUS TO BE COVERED** |
| **1st Feb- 25th feb** | Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and  basis, crystal translational vectors and axes. Unit cell and Primitive Cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions. Crystal planes and Miller indices, Interplaner spacing, Crystal structures of Zinc Sulphide, Sodium Chloride and Diamond. |
| **27th Feb- 25th March** | X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods. K-space and reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c. |
| **27th March –**  **22nd April** | Historical introduction, Survey of superconductivity, Super conducting systems, High Tc Super conductors, Isotopic Effect, Critical Magnetic Field, Meissner Effect, London Theory and Pippards’ equation, Classification of Superconductors (type I and Type II), BCS Theory of Superconductivity, Flux quantization, Josephson Effect (AC and DC), Practical Applications of superconductivity and their limitations, power application of superconductors. |
| **24th April – 15th May** | Definition, Length scale, Importance of Nano-scale and technology, History of Nano technology, Benefits and challenges in molecular manufacturing. Molecular assembler concept, Understanding advanced capabilities. Vision and objective of Nano-technology, Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology, Materials, Medicine. |