Lesson Plan: BSC -VI Sem (NM CS)

Solid State & Nano Physics

Dr. Manoj Kumar

Assistant Professor of Physics

GCW JIND

Month : April 2022

Unit I: Crystal Structure I

Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice andnbasis, 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.

Month : May 2022

Unit II: Crystal Structure II

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.

Month : June 2022

Unit III: Super conductivity

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.

Month : July 2022

Unit IV: Introduction to Nano Physics

Definition, Length scale, Importance of Nano-scale and technology, History of Nantechnology, 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.

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2021-22) EVEN SEMESTER

Name of Teacher: Dr. Manju Sharma
Designation: Assistant Professor
Subject: PHYSICS
Class: B.Sc. Final (6th Sem)

Subject/Paper : Sr. No. ATOMIC AND MOLECULAR PHYSICS	Months	Topics to be covered	Remarks if any,
1	April	Introduction of early observations, emission and absorption spectra, atomic spectra, wave number, spectrum of Hydrogen atom in Balmer series, Bohr atomic model (Bohr's postulates), spectra of Hydrogen atom , explanation of spectral series in H-atom, un-quantized states and continuous spectra, spectral series in absorption spectra, effect of nuclear motion on line spectra (correction of finite nuclear mass), variation in Rydberg constant due to finite mass, shortcomings of Bohr's theory, Wilson Sommerfeld quantization rule, de-Broglie interpretation of Bohr quantization law, Bohr's corresponding principle, Sommerfeld's extension of Bohr's model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory, Vector atom model; space quantization, electron spin, coupling of orbital and spin angular momentum, spectroscopic terms and their notation, quantum numbers associated with vector atom model, transition probability and selection rules.	Videos of the related topics will be shown on smart board. Class Test/Quiz shall be conducted after the completion of the unit.
2	May	Orbital magnetic dipole moment (Bohr magneton), behavior of magnetic dipole in external magnetic field; Larmor's precession and theorem; Penetrating and Non-penetrating orbits, Penetrating orbits on the classical model; Quantum defect, spin orbit interaction energy of the single valance electron, spin orbit interaction for penetrating and non penetrating orbits, quantum mechanical relativity correction, Hydrogen fine spectra, Main features of Alkali Spectra and their theoretical interpretation, term series and limits, Rydberg-Ritz combination principle, Absorption spectra of Alkali atoms. observed doublet fine structure in the spectra of alkali metals and its Interpretation, Intensity rules for doublets, comparison of Alkali spectra and H- spectrum.	
3	June	Essential features of spectra of Alkaline-earth elements, Vector model for two valance electron atom: application of spectra. Coupling Schemes; LS or Russell – Saunders Coupling Scheme and JJ coupling scheme, Interaction energy in L-S	

		coupling (sp, pd configuration), Lande interval rule, Pauli principle and periodic classification of the elements. Interaction energy in JJ Coupling (sp, pd configuration), equivalent and non-equivalent electrons, Two valance electron system-spectral terms of non-equivalent and equivalent electrons, comparison of spectral terms in L-S And J-J coupling. Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin.	
4	July	Zeeman Effect (normal and Anomalous),Experimental set-up for studying Zeeman effect, Explanation of normal Zeeman effect(classical and quantum mechanical), Explanation of anomalous Zeeman effect (Lande g-factor), Zeeman pattern of D1 and D2 lines of Na-atom, Paschen-Back effect of a single valence electron system. Weak field Stark effect of H- atom. Molecular Physics: General Considerations, Electronic States of Diatomic Molecules, Rotational Spectra (Far IR and Microwave Region), Vibrational Spectra (IR Region), Rotator Model of Diatomic Molecule, Raman Effect, Electronic Spectra.	

*Vacation as per university calendar

- Assignment and unit test will be taken as per schedule.

Manji Sharma

Asstt. Prof. (Physics)

Lesson Plan: BSC -II (NM CS)

Waves and Optics

Semester IV

Dr. Ramesh Kumar

Assistant Professor of Physics

GCW JIND

Month : April 2022

Unit-1: Polarization

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).

Month : May 2022

Unit-II: Fourier analysis

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.

Month : June 2022

Unit III: Fourier transforms

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 1 |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.

Month : July 2022

Unit-IV: 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.

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2021-22) EVEN SEMESTER

Name of Teacher: Ankita
Designation: Ass. Professor
Subject: Physics
Class: B.Sc 1 Non Med. [4th Sem.]

Subject/Paper: Sr. No.	Months	Topics to be covered	Remarks if any,
1	April	**Unit I: Moment of inertia** Rotation of rigid body, Moment of inertial, Torque, angular momentum, Kinetic Energy of rotation. Theorem of perpendicular and parallel axes , Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross–section, Fly wheel, Moment of inertia of an irregular body,Acceleration of a body rolling down on an inclined plane. **Unit 2: Elasticity** Elasticity, Stress and Strain, Hook's law, Elastic constant and their relations, Poisson's ratio, Torsion of cylinder and twisting couple, Determination of coefficient of modulusof rigidity for the material of wire by Maxwell's needle, Bending of beam,cantilever and Centrally loaded beam, Determination of Young's modulus for the material of the beam and Elastic constants for the material of the wire by Searle's method.	
2	May	**Unit 3: Kinetic theory of gases-I** Assumption of Kinetic theory of gases, pressure of an ideal gas , Kinetic interpretation of Temperature, Ideal Gas equation, Degree of freedom, Law of equipartition of energy and its application for specific heat of gases, Real gases, Vanderwall's equation, Brownian motion **Unit 4: Kinetic theory of gases-II**	

		Maxwell's distribution of speed and velocities, Experimental verification of Maxwell's law of speed distribution: most probable speed, average and r.m.s. speed, Mean free path, Transport of energy and momentum, Diffusion of gases.	
3	June	**Unit I: Semiconductors** 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. LED, Photoconduction in semiconductors, Photodiode,Solar Cell, p-n junction as a rectifier, half wave and full wave rectifiers, filters **Unit 2: Transistors** Junction transistors, Working of NPN and PNP transistors, Three configurations of transistor,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.	
4	July	**Unit 3: Transistor Amplifiers** Amplifiers, Classification of amplifiers, common base and common emitter amplifiers,coupling of amplifiers, various methods of coupling, Resistance-Capacitance (RC) coupled amplifier, Feedback in amplifiers, advantages of negative feedback, emitter follower, distortion in amplifiers. **Unit 4: Oscillators** Oscillators, Principle of oscillation, classification of oscillators, Condition for self sustained oscillation:	

		Barkhausen criterion for oscillation, Tuned collector commonemitter oscillator, Hartley oscillator, C.R.O.	

*Vacation as per university calendar

- 2 assignments and 01 unit test will be taken as per schedule.

Anketa

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2021-22) EVEN SEMESTER

Designation: Ass. Professor
Name of Teacher: Ankita
Subject: Physics
Class: B.Sc 1 C.S

Subject/Paper: Sr. No.	Months	Topics to be covered	Remarks if any,
1	April	**Unit I: Moment of inertia** Rotation of rigid body, Moment of inertial, Torque, angular momentum, Kinetic Energy of rotation. Theorem of perpendicular and parallel axes , Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross–section, Fly wheel, Moment of inertia of an irregular body,Acceleration of a body rolling down on an inclined plane.	
2	May	**Unit 2: Elasticity** Elasticity, Stress and Strain, Hook's law, Elastic constant and their relations, Poisson's ratio, Torsion of cylinder and twisting couple, Determination of coefficient of modulusof rigidity for the material of wire by Maxwell's needle, Bending of beam,cantilever and Centrally loaded beam, Determination of Young's modulus for the material of the beam and Elastic constants for the material of the wire by Searle's method.	
3	June	**Unit 3: Kinetic theory of gases-I** Assumption of Kinetic theory of gases, pressure of an ideal gas , Kinetic interpretation of Temperature, Ideal Gas equation, Degree of freedom, Law of	

		equipartition of energy and its application for specific heat of gases, Real gases, Vanderwall's equation, Brownian motion	
4	July	**Unit 4: Kinetic theory of gases-II** Maxwell's distribution of speed and velocities, Experimental verification of Maxwell's law of speed distribution: most probable speed, average and r.m.s. speed, Mean free path, Transport of energy and momentum, Diffusion of gases	

*Vacation as per university calendar

- 2 assignments and 01 unit test will be taken as per schedule.

Class - B.Sc. 2nd year

Subject- Statistical physics lesson plan

Name- Priyanka

Session - 2021-22

Designation- ass. Professor

Month – 1 april to 30 april

Unit –I: Statistical Physics I

Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent. Probability, statistical probability, A- priori Probability and relation between them, probability theorems, some probability considerations, combinations possessing maximum probability, combination possessing minimum probability, Tossing of 2,3 and any number of Coins, Permutations and combinations, 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, general distribution of distinguishable particles in compartments of different sizes, Condition of equilibrium between two systems in thermal contact-- β parameter, Entropy and Probability (Boltzman's relation). Unit –II: Statistical Physics II - Postulates of statistical physics, Phase space, Division of Phase space into cells

Month - 1 may to 31 may

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 σ and β) , 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. Unit-III: Quantum Statistics Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas,

Month – 1 june to 30 june

Degeneracy and B.E. Condensation, 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, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law for electron gas in metals, Zero point energy, Zero point pressure and average speed (at 0 K) of electron gas, 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. Unit-IV: Theory of Specific Heat of Solids Dulong and Petit law. Derivation of Dulong and Petit law from classical physics. Specific heat at low temperature, Einstein theory of specific heat, Criticism of Einstein theory

Month – july

Debye model of specific heat of solids, success and shortcomings of Debye theory, comparison of Einstein and Debye theories.

Revision for all syllabus

Note - 1 assignment and 1 unit test will be taken as per schedule.