Physics Department-Lesson Plan

(Even Semester April 2022 to mid July 2022)

B.Sc. I (Non-Med)

Weeks	Dates	(Dr. Vidhi Mann) Paper – I (Properties of Matter and kinetic Theory of Gases) and Paper – II (Semiconductor Devices)
Week 1	**11-16 April**	***Paper 1*** **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 (with proof), Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder.
Week 2	**18- 23 April**	Moment of inertia of 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. Numerical Practice. Class Test **Unit II:** Elasticity - Elasticity, Stress and Strain, Hook's law, Elasticity, Stress and Strain, Hooke's law.
Week 3	**25-30 April**	Elastic constant and their relations, Poisson's ratio, Torsion of cylinder and twisting couple, Determination of coefficient of modulus of rigidity - Maxwell's needle, Bending of beam (Bending moment and its magnitude), Cantilever and Centrally loaded beam, Determination of Young's modulus for the material of the beam.
Week 4	**02-07 May**	Elastic constants for the material of the wire by Searle's method, Numerical Practice. ***Paper 2*** **Unit I**: Energy bands in solid, intrinsic and extrinsic semiconductors, carrier mobility and electrical resistivity of semiconductors, Hall effect.
Week 5	**09-14 May**	P-N Junction diode and their Characteristics, Zener and Avalanche breakdown, Zener Diode, Light Emitting diode (LED), Photoconduction in semiconductors, Photodiode, Solar Cell, P-N Junction as a rectifier, half wave and full wave rectifier (with derivation), filters (basic), filters (Series inductor, Shunt capacitance, L- Section of choke, π and R.C. filter circuits), Numerical Practice**,** Assignment
Week 6	**16-21 May**	**Unit –II**: Transistors:- Junction transistors, Working of NPN and PNP transistors, Three configurations of transistors (C-B, C-E, C-C modes), Common Base , Common Emitter characteristics of transistors, Common collector characteristics of transistors, Constant of a transistor and their relation, Advantages and disadvantages of C-E configuration, D.C. load line, Transistor biasing.
Week 7	**23-28 May**	Various methods of transistor biasing and stabilization. Numerical Practice, Class test **Unit-III**: Transistor Amplifiers introduction, Classification of amplifiers ,common base amplifier, common emitter amplifiers, coupling of amplifiers, RC coupled amplifier (two stage concept of bandwidth, no derivation),
Week 8	**30 May – 04 June**	Feedback in amplifiers, Advantages of negative feedback, emitter follower, distortion in amplifiers. , Numerical Practice, Test **Unit –IV:** Oscillators, Principle of oscillation, classification of oscillators, Condition for self sustained oscillation: Barkhausen criterion for oscillation.
Week 9	**06-11 June**	Tuned collector common emitter oscillator, Hartley oscillator, C.R.O. Principle and working, Numerical practice

Week 10	**13-18 June**	***Paper 1*** **Unit III:** Assumption of Kinetic theory of gases, pressure of an ideal gas (with derivation), Kinetic interpretation of Temperature, Ideal Gas equation, Degree of freedom, Law of Equipartition of energy and its application for specific heat of gas, Real gases equation.
Week 11	**20-25 June**	Vander wall's equation, Brownian motion(Qualitative) , Numerical practice, Assignment **Unit IV**: Maxwell's distribution of speed and velocities Maxwell's law of speed distribution: most probable speed
Week 12	**27-02 July**	Average and r.m.s. speed, Mean free path, Transport of energy and momentum, Diffusion of gases, Numerical Practice, Test
Week 13	**04-09 July**	Paper- I Revision and Test
Week 14	**11-16 July**	Paper- II Revision and Test

Physics Department-Lesson Plan

(Even Semester April 2022 to mid July 2022)

B.Sc. II (Non-Med)

Weeks	Dates	(Mrs. Anuradha Gandhi) Paper – I (Statistical Physics) and Paper – II (Optics)
Week 1	**04 - 09 April**	**Paper II : Unit II**- 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 Fourier series of functions f(x) between (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 waves, solution of rectangular waves , half wave rectifier,
Week 2	**11-16 April**	full wave rectifier outputs, Fourier integrals, Numerical Practice **Unit III**-Fourier transforms Fourier transforms and its properties, Application of Fourier transform (i) for evaluation of integrals
Week 3	**18- 23 April**	(ii) for solution of ordinary differential equations, f(x)= e- x2/2;|X|<a ;f(x) = 0 |X |>a f(x)= e- x2/2;|X|<a ;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, Numerical Practice, Assignment
Week 4	**25-30 April**	**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
Week 5	**02-07 May**	Applications, Fiber optic Communication, Advantages, Numerical Practice **Paper I: Unit - I** Microscopic and Macroscopic systems, Probability, statistical probability, A-priori probability Tossing of 2,3 and any number of Coins, Permutations and combinations, distributions of N distinguishable particles in two boxes of equal size, distributions of N indistinguishable particles in two boxes of equal size
Week 6	**09-14 May**	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 (Boltzmann's relation). Numerical Practice
Week 7	**16-21 May**	**Unit –II**: Statistical Physics II Postulates of statistical physics, Phase space, Division of Phase space into cells, three kinds of statistics, M. B. statistics applied to an ideal gas in equilibrium- energy distribution law, speed distribution law , velocity distribution law, Expression for average speed, r.m.s. speed,
Week 8	**23-28 May**	Expression for average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution Numerical Practice, Test

		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
Week 9	**30 May – 04 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
Week 10	**06-11 June**	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.
Week 11	**13-18 June**	Comparison of three statistics, Numerical Practice, Assignment **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, Debye model of specific heat of solids, success and shortcomings of Debye theory
Week 12	**20-25 June**	Comparison of Einstein and Debye theories., Numerical Practice **Paper II Unit I**: Polarization by reflection, refraction and scattering, malu's law, Double refraction, Huygens's Theory, analysis of polarized light, Nicol prism
Week 13	**27-02 July**	Quarter wave plate, half wave plate, Plane, circularly and elliptically polarized light, Optical activity, Fresnel's theory of optical rotation, Specific rotation and polarimeters, Numerical Practice, Assignment
Week 14	**04-09 July**	Paper- I Revision and Test
Week 15	**11-16 July**	Paper- II Revision and Test

Physics Department-Lesson Plan

(Even Semester April 2022 to mid July 2022)

B.Sc. III (Non-Med)

Weeks	Dates	Teacher's Name - Dr. Saroj Rani Paper II (Atomic and Molecular Physics
Week 1	**04 - 09 April**	**Unit I :** Atomic Spectroscopy -introduction, emission and absorption spectra, Bohr's Atomic Model spectra of hydrogen atom, complete explanation of spectra, Rydberg constant mass shortcoming of Bohr's model, Wilson sommerfieid quantization rule, Bohr's corresponding model
Week 2	**11-16 April**	shortcoming of this model, vector atom model, various quantum no. associated with vector model shortcoming of this model, Numerical Practice
Week 3	**18- 23 April**	**Unit II:** Vector Atom Model (single Valence electron)- Introduction Orbital and magnetic dipole moment, Larmor's precession and theorem, Penetrating and non penetrating model. Quantum defect and spin orbit interaction energy, Hydrogen fine spectra, Main feature of alkali spectra, Absorption spectra of alkali atom intensity rule for doublets
Week 4	**25-30 April**	Comparison of alkali and hydrogen spectra, Numerical Practice, Assignment, TEST **Unit III**: Vector atom model for two valence electron LS Coupling and Interaction Energy in LS coupling
Week 5	**02-07 May**	JJ coupling and Interaction Energy in JJ coupling, Comparison of spectral terms in LS and JJ coupling Hyperfine structure of spectral line and its origin, Nuclear Spin
Week 6	**09-14 May**	Numerical Practice **Unit IV** Atom in external field (Introduction) Normal Zeeman effect. Anomalous Zeeman Effect, Paschen –Back effect of a single valence electron system. Weak Field Stark Effect, Numerical Practice and Test
Week 7	**16-21 May**	**Unit I :** Crystalline and glassy forms, liquid crystal, crystal structure, periodicity, translation vector and axes, unit cell, primitive cell, Wienger sietz primitive cell symmetry operation for a two dimensional crystal, Bravis lattice for two dimension, Bravis lattice for three

		dimension, crystal plane and miller indices, Inter planar spacing,
Paper-I (Solid State Physics and Nanotechnology)		
Week 8	**23-28 May**	crystal structures Numerical Practice **Unit II :** X-ray Diffraction, Bragg Diffraction K –spacing Reciprocal lattice and its physical significance, reciprocal lattice to a simple cubic lattice, reciprocal lattice to a body centered cubic Reciprocal lattice to a face centered cubic
Week 9	**30 May – 04 June**	**Unit III**: Survey of superconductivity, high Tc superconductor, isotopic effect, critical magenetic field, Miessner effect, London and pippard's equation, classfication of superconductor, BCS Theory and flux quantization BCS Theory and flux quantization, Josephon effect, application and limitation of superconductivity, Numerical Practice
Week 10	**06-11 June**	**Unit IV**: Nanophysics definition, length scale, importance of Nanoscale and technology, history, benefits and challenge in molecular manufacturing Molecular assembler concept, vision and objective of nanotechnology, Application of nanotechnology in different fields. Numerical Practice and Assignment
Week 11	**13-16 June**	**Paper II- Unit IV** Rotational spectra and vibrational spectra, Rotator Model, Raman effect and Electronic Spectra, Assignment and Test

Physics Department-Lesson Plan

(Even Semester April 2022 to mid July 2022)

B.Sc. III (Non-Med)

Weeks	Dates	Teacher's Name (Dr. Saroj Rani)	Dates	(Dr. Vidhi Mann) Paper-I (Solid State Physics and Nanotechnology)
Week 1	**04 - 06 April**	**Unit I :** Atomic Spectroscopy -introduction, emission and absorption spectra, Bohr's Atomic Model spectra of hydrogen atom, complete explanation of spectra	**07-09 April**	**Unit I :** Crystalline and glassy forms, liquid crystal, crystal structure, periodicity, translation vector and axes, unit cell, primitive cell, Wienger sietz primitive cell
Week 2	**11-13 April**	Rydberg constant mass shortcoming of Bohr's model, Wilson sommerfieid quantization rule, Bohr's corresponding model	**14-16 April**	symmetry operation for a two dimensional crystal, Bravis lattice for two dimension, Bravis lattice for three dimension, crystal plane and miller indices
Week 3	**18- 20 April**	shortcoming of this model, vector atom model, various quantum no. associated with vector model	**21-23 April**	Inter planar spacing, crystal structures Numerical Practice
Week 4	**25-27 April**	shortcoming of this model, Numerical Practice	**28-30 April**	**Unit II :** X-ray Diffraction, Bragg Diffraction K –spacing
Week 5	**02-04 May**	**Unit II:** Vector Atom Model (single Valence electron)-Introduction Orbital and magnetic dipole moment, Larmor's precession and theorem, Penetrating and non penetrating	**05-07 May**	Reciprocal lattice and its physical significance, reciprocal lattice to a simple cubic lattice, reciprocal lattice to a body centered cubic

		model		
Week 6	**09-11 May**	Quantum defect and spin orbit interaction energy, Hydrogen fine spectra, Main feature of alkali spectra, Absorption spectra of alkali atom intensity rule for doublets	**12-14 May**	Reciprocal lattice to a face centered cubic Numerical Practice, Assignment
Week 7	**16-18 May**	Comparison of alkali and hydrogen spectra, Numerical Practice, Assignment	**19-21 May**	**Unit III**: Survey of superconductivity, high Tc superconductor, isotopic effect, critical magenetic field, Miessner effect
Week 8	**23-25 May**	**Unit III**: Vector atom model for two valence electron LS Coupling and Interaction Energy in LS coupling	**26-28 May**	London and pippard's equation, classfication of superconductor, BCS Theory and flux quantization
Week 9	**30 May – 01 June**	JJ coupling and Interaction Energy in JJ coupling, Comparison of spectral terms in LS and JJ coupling	**02-04 June**	BCS Theory and flux quantization, Josephon effect, application and limitation of superconductivity, Numerical Practice
Week 10	**06-08 June**	Hyperfine structure of spectral line and its origin, Nuclear Spin	**09-11 June**	**Unit IV**: Nanophysics definition, length scale, importance of Nanoscale and technology, history, benefits and challenge in molecular manufacturing
Week 11	**13-15 June**	Numerical Practice **Unit IV** Atom in external field (Introduction) Normal Zeeman effect	**16-18 June**	Molecular assembler concept, vision and objective of nanotechnology, Application of nanotechnology in different fields.
Week 12	**20-22 June**	Anomalous Zeeman Effect, Paschen –Back effect of a single valence electron system	**23-25 June**	Numerical Practice and Assignment **Paper II- Unit IV** Rotational spectra and vibrational spectra
Week 13	**27-29 June**	Weak Field Stark Effect, Numerical Practice and Test	**30 June-02 July**	Rotator Model, Raman effect and Electronic Spectra
Week 14	**04-06 July**	Unit- I and Unit- II Revision and Test	**07-09 July**	Unit- I and Unit- II Revision and Test
Week 15	**11-13 July**	Unit- III and Unit- IV Revision and Test	**14 – 16 July**	Unit- III and Unit- IV Revision and Test