Summary of Lesson Plan of College Faculty

Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25 **Name of Asstt./Assoc. Prof :Ajay mann**

Program: M.Sc.Physics **Course Name: Computational Physics**

Semester: IV **Course Code: 23PHY23DB2**

WEEKS	SYLLABUS
Week 1	Random numbers: Random number generators, Mid-square methods, Multiplicative congruential method, mixed multiplicative congruential methods,
Week 2	modelling of radioactive decay. Hit and Miss Monte-Carlo methods, Monte-Carlo calculation of π, Monte-Carlo evaluation of integration,
Week 3	Evaluation of multidimensional integrals, chaotic dynamics: Some definitions, the simple pendulum,
Week 4	Potential energy of a dynamical system, Un-damped motion, Damped motion, Driven and damped oscillator. Unit test
Week 5	Numerical solution of Radial Schrodinger equation for Hydrogen atom using Forth-order Runge-Kutta method(when Eigen value is given),
Week 6	Algorithms to simulate interference and diffraction of light, Simulation of charging and discharging of a capacitor,
Week 7	current in LR and LCR circuits, Computer models of LR and LCR circuits driven by sine and square functions,
Week 8	Simulation of Planetary motion, Simulation of projectile motion **Test/Assignment of Unit - II**
Week 9	MATLAB – I: Introduction, working with arrays, creating and printing plots,
Week 10	Interacting Computations: Matrices and Vectors, Matrices and Array Operations, built in functions,
Week 11	plotting simple graphs Programming in MATLAB: Script files, function files,
Week 12	Compiled files, p-code, variables, loops, branches, and control flow, Input/ Output, structures, cells
Week 13	MATLAB – II: Linear Algebra; solving a linear system, Gaussian elimination, finding eigenvalues and Eigen vectors,
Week 14	matrix factorization, Curve fitting and Interpolation; polynomial curve fitting, least square curve fitting, interpolation,

Week 15	Data analysis and statistics, Numerical integration; double integration,
Week 16	Ordinary differential equation; first order linear ODE, second order nonlinear ODE, tolerance, ODE suite

Summary of Lesson Plan of College Faculty

Name of College: Pt. N. R. S. G. C., Rohtak, Academic Session 2024-2025 Semester: Even
Name of Associate Prof :**Jasbir Singh**

Class: M.Sc. 4th sem Physics Name of Subject: Physics of Nanomaterials 23 PHY 24C2

LESSON PLAN

WEEKS	SYLLABUS
Week 1	Introduction and scope of the course, Introduction to Nanomaterials: Introduction to nanoscience, nanotechnology, nanomaterials. Why nano? What's so special about nanomaterials? Interesting facts about nanomaterials and overview of the course.
Week 2	Free electron theory (qualitative idea) and its features, Idea of band structure, Metals, insulators and semiconductors, Concept of effective Mass, Density of States in Bands
Week 3	Variation of Density of States with Energy, Variation of Density of States and Band Gap with Size of Crystal, Electronic Structure From Bulk to Quantum Dot,
Week 4	Electronic States in Direct and Indirect Semiconductor Nano-crystals, Excitions in Direct and Indirect Band Gap Semiconductors**. Revision, Assignment and Test**
Week 5	Physics of Reduced Dimensional Systems and Devices: Quantum Confinement, Electron confinement in One, Two and Three Dimensional Infinitely Deep Square Well Potentials, Various Low Dimensional Systems: Quantum Well Structure
Week 6	Idea of Quantum Well Structure, Electron Wave Function and Energy in Quantum Well Structure (Infinite Well Approximation), Density of States and Optical Absorption in Quantum Well,
Week 7	Quantum wires, Electron Wave Function and Energy, Density of States, Quantum Dots, Electron Wave Function and Energy, Density of States, Idea of Hetero-junction LED, Quantum Well Laser
Week 8	Quantum Dot Laser, Coulomb Blockade and Single Electron Transistor **Revision, Assignment and Test**
Week 9	Characterization of Nanomaterials/Nanostructures: Effect of Particle Size and Strain on Width of XRD Peaks of Nanomaterials, Determination of Crystallite/Particle Size and Strain in Nanomaterials Using Debye Scherrer's Formula and Williamson–Hall's Plot
Week 10	Transmission Electron Microscopy: Basic principle, Brief Idea of Set up, Sample Preparation, Imaging Modes (Dark & Bright Field), Selected Area Electron Diffraction Photoluminescence (PL) Spectroscopy: Basic Principle and idea of Instrumentation, Shift in PL Peaks with Particle Size
Week 11	Determination of Alloy Composition in Thin Films of Compound Semiconductors, Estimation For Width of Quantum Wells, Raman Spectroscopy: Basic Principle and idea of Instrumentation, Variations in Raman spectra of Nanomaterials with Particle Size
Week 12	Study of Raman Spectra of Carbon Nanotubes and Graphene **Revision, Assignment and Test** Synthesis/Fabrication of Nanomaterials/Nanostructures: Bottom up and Top down

	Approaches for Synthesis of Nano Materials,
Week 13	Synthesis of Zero-Dimensional Nanostructures ,Nanoparticles : Sol-Gel Process Epitaxial Core-Shell Nanoparticles, Ball Milling, One-Dimensional Nanostructures (Nanowires, Nanorods Nanotubes): Vapor (or solution)-liquid-solid (VLS or SLS) growth and Size Control
Week 14	Electrochemical deposition, Lithography, Two-Dimensional Nanostructures (Thin Films & Quantum Wells): Molecular Beam Epitaxy (MBE), MOCVD
Week 15	Cluster Beam Evaporation, Ion Beam Deposition, Chemical Bath Deposition Technique
Week 16	**Revision, Assignment and Test**

Name of the Assistant/Associate Professor: Munish Sahni
Class and Section: M.Sc. Physics (F)
Subject: Electronics-II
Paper: 19PHY24DA2
Week 1 **Chapter: unit 1**
Assignments: **difference between analog and digital electronics.**
Week 1: Binary numbers, Octal numbers, Hexadecimal numbers, Inter-conversions of numbers. Binary addition, subtraction, multiplication, *division, Hexadecimal addition, subtraction , Octal addition, subtraction signed numbers, 1's complement* arithmetic
Week 1 **Chapter: unit 1**
Assignments: hexadecimal addition and subtraction
Week 1: 2's complement arithmetic, 9's complement arithmetic, BCD code and arithmetic, Gray code, excess-3 code.
Week 2 **Chapter: unit 2**
Assignments: **gray code and excess 3 code**
Week 2: Positive and negative logic designations, OR gate, AND gate, NOT gate, NAND gate, NOR gate, XOR gate, Circuits and Boolean identities associated with gates, Boolean algebra, De-morgans Laws, Sum of products and product of sums expressions, Minterm, Maxterm, K-maps, don't care condition, deriving SOP and POS expressions from truth tables
Week 3 **Chapter: unit 2**
Assignments: **k-map problems**
Week 3: , Combinational Digital circuits: Binary adders: half adders & full adders, Decoders, multiplexer, Demultiplexer, Encoders, ROM and its application (binary, BCD, Excess-3 Code, Gray Code & BCD to seven segment)
Week 4 **Chapter: units 2**

Assignments: **: ROM and its applications**
Week 4: Digital comparator, Parity checker and generator, Sequential Digital Circuits: 1-bit memory, Flip-Flops- RS, JK
Week 5: master slave JK, T-type and D-type flip flops, Shift-register and applications, Asynchronous counters and Synchronous counters
Week 1 **Chapter: unit 3**
Assignments: counter applications
Week 1: Sessional Test I, Metal oxide semiconductor field effect transistors, enhancement mode transistor, depletion mode transistor
Week 2 **unit -3**
Assignments: **MOS applications**
Week 2: explain enhancement and depletion mode transistor, dynamic inverter, two phase inverter, MOS NAND gates
Week-3 **Unit-3**
Assignment: explain enhancement and depletion mode transistor
Week 3: **MOS NAND gates, NOR gates, complementary MOSFET technology**
Week4: ***Assignments: NAND and NOR gate applications***
CMOS inverter, CMOS NOR gates and NAND gates, MOS shift register and RAM
Week 1 **Chapter: unit 4**
Assignment: introduction of modulation
Week 1: Fundamentals of modulation, Frequency spectra in AM modulation, power in AM modulated class C amplifier
Week 2 **Chapter: unit 4**
Assignments: **need of modulation**
Week 2: Efficiency modulation, frequency conversion, SSB system
Week 3 **Chapter: unit 4**
Assignments: design SSB system
Week 3: Balanced modulation, filtering the signal for SSB, phase shift method
Week 4 **Chapter: unit 4**
Assignments: microwave applications
Week 4: product detector, Pulse modulation, Microwave Devices: Resonant Cavity
Week5 **Unit4**
Assignment: note on resonant cavity
Week5: Klystrons and Magnetron, revision

Summary of Lesson Plan of College Faculty

Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25 **Name of Asstt./Assoc. Prof : Parveen**

Program: M.Sc.Physics **Course Name: Solid State Physics**

Semester: II **Course Code: 24PHY202DS04**

WEEKS	SYLLABUS
Week 1	Crystalline solids, Lattice, The basis, Lattice translation vectors, Direct lattice, Two and three dimensional Bravais lattice
Week 2	Conventional units cells of FCC, BCC, NaCl, CsCl, Diamond and cubic ZnS, Primitive lattice cell of FCC, BCC and HCP, Packing fraction: Simple Cubic, BCC, FCC, HCP and diamond structures,
Week 3	Interaction of x-rays with matter, Absorption of x-rays, elastic scattering from a perfect lattice, The reciprocal lattice and its application to diffraction techniques, Ewald's construction
Week 4	The Laue, Powder and rotating crystal methods, Atomic form factor, Crystal structure factor and intensity of diffraction maxima, Crystal structure factors of BCC, FCC, monatomic diamond lattice, polyatomic CuZn. Unit test
Week 5	Vibration of one-dimensional mono and diatomic chains, Phonon momentum, Density of normal modes in one and three dimensions,
Week 6	Quantization of lattice vibrations, Measurement of phonon dispersion using inelastic neutron scattering
Week 7	Point defects, Line defects and planer (stacking) faults, Fundamental ideas of the role of dislocation in plastic deformation and crystal growth,
Week 8	Observation of imperfection in crystals, X-rays and electron microscopic techniques. **Test/Assignment of Unit - II**
Week 9	Electron in periodic lattice, Block theorem, Kronig-Penny model and band theory, Classification of solids, Effective mass
Week 10	Weak-binding method and its application to linear lattice, Tight-binding method and its application to Simple cubic, BCC and FCC crystals, Concepts of holes,

Week 11	Fermi surface: Construction of Fermi surface in two-dimension
Week 12	de Hass van Alfen effect, Cyclotron resonance, Magneto-resistance. Unit test
Week 13	Weiss Theory of Ferromagnetism Heisenberg model and molecular field theory of ferromagnetism of spin waves and Magnons,
Week 14	Curie-Weiss law for susceptibility. Ferri and Anti Ferro-magnetic order, Domains and Block wall energy,
Week 15	Occurrence of superconductivity, Meissner effect, Type-I and Type-II superconductors, Heat capacity, Energy gap, Isotope effect, London equation, Coherence length,
Week 16	Postulates of BCS theory of superconductivity, BCS ground state, Persistent current. High temperature oxide super conductors (introduction and discovery). Unit test

Summary of Lesson Plan of College Faculty
Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25
Program: M.Sc. Physics
Program Code: PHY2
Semester: Even

Name of Asstt./Assoc. Prof : Ms. Himani Ghai
Course Name: Quantum Mechanics-II
Course Code: 24PHY202DS02

January 2025 to April 2025	
Month (Jan. - Feb.)	
9th Jan – 11th Jan.	Introduction of Unit-I: Time dependent perturbation theory
13th Jan – 18th Jan.	Constant perturbation, Harmonic perturbation, Fermi's golden rule
20th Jan. – 25th Jan.	Adiabatic and sudden approximation
27th Jan. – 01st Feb.	Variational methods: Ground state of Helium by both variational and perturbation methods
Month (Feb. – Mar.)	
03rd Feb. – 08th Feb.	The hydrogen molecule; WKB approximation and associated Numerical problems
10th Feb. – 15th Feb.	Unit-II: Semi-classical theory of radiation: Transition probability for absorption and induced emission; Electric dipole transition and selection rules
17th Feb. – 22nd Feb.	Magnetic dipole transitions; Forbidden transitions; Higher order transitions; Einstein's coefficients, Unit-I Test (Sessional)
24th Feb. – 01st Mar.	Assignment-I, Discussion PYQs of Unit-II, Introduction of Unit-IV.
Month (Mar. – Apr.)	
03rd Mar. – 08th Mar.	Unit-IV: Identical particles: The principle of indistinguishability; Symmetric and antisymmetric wave functions
09th Mar. – 16th Mar.	**Holi Vacations**
17th Mar. – 22nd Mar.	Unit-II Test(Sessional) Spin and statistics of identical particles; The Slater determinant; The Pauli exclusion principle, Spin states of a two-electron system, States of the helium atom
24th Mar. – 29th Mar.	Collision of identical particles
31st Mar. – 05th Apr.	Introduction of Unit-III: Collision in 3D and scattering: Laboratory and C.M. reference frames Scattering amplitude Differential Scattering cross section and total scattering cross section;
Month (Apr. - May)	
07th Apr. – 12th Apr.	The optical theorem, Scattering by spherically symmetric potentials, Partial waves and phase shifts, Unit-IV Test
14th Apr. – 19th Apr.	Scattering by a perfectly rigid sphere and by square well potential, Complex potential and absorption, The Born approximation (contd.)
21st Apr. – 26th Apr.	The Born Approximation and Numerical Problems
28th Apr. – 30th Apr.	Discussion of PYQs, Sessional Test
01st May onwards	University Examination.

Summary of Lesson Plan of College Faculty
Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25
Program: M.Sc. Physics
Program Code: PHY2
Semester: Even

Name of Asstt./Assoc. Prof : Mr. Deepak
Course Name: Atomic and Molecular Physics
Course Code: 24PHY202DS03

January 2025 to April 2025	
Month (Jan. - Feb.)	
9th Jan – 11th Jan.	Course Discussion; Unit-I: Various atomic models; Merits and their Demerits
13th Jan – 18th Jan.	Bohr's Model of H-atom, Bohr-Sommerfield Model, Hydrogen spectrum and spectral series
20th Jan. – 25th Jan.	Quantum states of Hydrogen atom, atomic orbitals, Complete Spectra of H-atom
27th Jan. – 01st Feb.	Orbital Magnetic Moments, Larmor Precession, Space Quantization, Electron Spin
Month (Feb. – Mar.)	
03rd Feb. – 08th Feb.	Vector Model of atom, Pauli principle, Spectroscopic terms symbols, Selection and Intensity rules
10th Feb. – 15th Feb.	Spin orbit interaction in H-atom, Spectra of alkali elements and spectral series with fine structure
17th Feb. – 22nd Feb.	Types of coupling, Spectra of He atom with spectral series and its fine structure
24th Feb. – 01st Mar.	Equivalent & Non-Equivalent electrons: spectroscopic terms in LS and JJ-coupling (Breit Scheme)
Month (Mar. – Apr.)	
03rd Mar. – 08th Mar.	Unit-II: Interaction energies in various coupling schemes (LS and JJ-coupling), Influence of External fields: Zeeman effect, Paschen Back effect and Stark Effect
09th Mar. – 16th Mar.	**Holi Vacations**
17th Mar. – 22nd Mar.	Weak field effect: Normal and Anomalous Zeeman effect, Polarization and intensity rules, Strong field effect: Paschen-Back effect, Assignment-I
24th Mar. – 29th Mar.	Stark effect, Hyperfine Structure (Magnetic and Electric), Line Broadening, Unit Test
31st Mar. – 05th Apr.	Assignment-II, Unit-III: Types of molecules, Rotational spectra of diatomic molecules as a rigid rotator, Intensity of rotational lines, Unit Test
Month (Apr. - May)	
07th Apr. – 12th Apr.	Energy levels and spectra of non-rigid rotor, Unit-IV: Vibrational energy of diatomic molecule, Diatomic molecules as a simple harmonic oscillator, Energy levels and spectrum
14th Apr. – 19th Apr.	Morse potential energy curve, Molecules as vibrating rotator, vibration spectrum of diatomic molecules
21st Apr. – 26th Apr.	PQR Branches, Sessional Exam and Revision of the course
28th Apr. – 30th Apr.	Doubt Clearance Session.
01st May onwards	University Examination.

Name of the Teacher : Dr. Anand Kumar
Class and Section: M.Sc. (Physics) First Year
Subject: Physics
Paper: M.Sc. Physics Semester II Statisstical Mechanics 24PHY202DS01
January 2025
Week 4: Phase space, Ensembles, Liouville theorem, conservation of extension, Equation of motion, Equal a priori probability, Statistical equilibrium, Microcanonical ensemble
Week 5 Quantization of phase space, classical limit, symmetry of wave functions effect of symmetry on counting
February 2025
Week 1 Various distributions using micro canonical ensemble Entropy of an ideal gas, Equilibrium Conditions, Quasi – Static Process, Entropy of an ideal gas using Microcanonical Ensemble
Week 2 Gibbs paradox, Sackur-Tetrode equation, Probability distribution and entropy of a two level system.
Week 3 Entropy of a system in contact with a reservoir, Canonical ensemble, Ideal gas in a canonical ensemble
Week 4 Equipartition of energy, Third law of thermodynamics, Photons
March 2025
Week 1 Grand canonical ensemble, Ideal gas in Gran Canonical ensemble
Week 2 Holy Holidays (9-16 March)
Week 3 Comparison of various ensembles, Quantum distribution using other ensembles
Week 4 Transition from classical statistical mechanics to quantum statistical mechanics, Indistinguishability and quantum statistics
April 2025
Week 1 Identical particles and symmetry requirements, Bose Einstein statistics, Fermi Dirac statistics, Maxwell Boltzmann statistics
Week 2 Bose Einstein Condensation, Thermal properties of B.E. gas, liquid Helium, Energy and pressure of F-D gas
Week 3 Electrons in metals, Thermionic Emission, Saha Theory of Thermal Ionization
Week 4 Cluster expansion for a classical gas, Virial equation of state

May 2025
Week 1 Van der Waals gas, Phase transition of second kind, Ising Mode
Week 2 Bragg Williams Approximation, Ising Model in one and two dimensions, fluctuations in ensembles
Week 3 Energy fluctuation in quantum statistics, Concentration fluctuation in quantum statistics, One dimensional random walk, Brownian motion
Week 4 Revision

LESSON PLAN
Session: 2024-25 (Even SEM)

Name of Teacher- Prince Kumar
Class- B.sc (H) 6th semester
Subject- Mathematical Physics (Phy-601)

WEEKS	SYLLABUS
Week 1	Transformation of co-ordinates. Tensorial character of physical quantities
Week 2	Symmetric and anti-symmetric lasers
Week 3	Contraction and differentiation
Week 4	Pseudotensors, Kronecker and attemating tensors
Week 5	Step function and Diract delta function
Week 6	Fourier transform
Week 7	Fourier integral theorem
Week 8	Sine and cosine transforms
Week 9	Convolution theorem, Solution of one dimensional diffusion and wave equations
Week 10	Heat flow in an infinite and semi-in-finite rod
Week 11	Laplace transform, Transform of elementary functions
Week 12	Derivatives and integrals, Unit step function, Periodic function
Week 13	Translation substitution and convolution theorem
Week 14	Solution of first and second order ordinary differential

	equations
Week 15	Solution of partial differential equations
Week 16	Evaluation of integrals using transforms

LESSON PLAN
Session: 2024-25 (Even SEM)

Name of Teacher- Prince Kumar
Class- B.sc (H) 6th semester
Subject- Physics of Materials (Phy-604)

WEEKS	**SYLLABUS**
Week 1	Polarization
Week 2	Local electric field at an atom
Week 3	Depolarization field
Week 4	Lorentz fields of dipoles inside a cavity
Week 5	Dielectric constant and polrizability: Electric susceptibility
Week 6	Polarizability, Clausius-Mosotti equation
Week 7	Qualitative discussion of ferroelectric properties of materials
Week 8	P-E hysteresis loop
Week 9	Qualitative description of free electron theory and its inadequacies with reference to Hall effect
Week 10	Specific heat of electrons in a metal
Week 11	Elementary band theory-Bloch theorem
Week 12	Kronig-Penney model, effective mass of electron, concept of hole
Week 13	Band gaps, difference between conductors
Week 14	Semiconductors and insulators, intrinsic and action
Week 15	Conductivity in semiconductors
Week 16	Mobility of carriers (lattice & semiconductors (qualitative)

Name of the Assistant/Associate Professor: Munish Sahni
Class and Section: B.Sc. Physics hon.4th semester
Subject: Computer Fundamentals and Programming-2
Paper: 406
January unit1
Truncation and round-off errors, floating point computation, overflow and underflow, single and double precision arithmetic, iterative process, Solution of nonlinear equations: bisection, secant and Newton-Raphson methods. Comparison and error, estimation. Program for finding zeros of a given function.
Assignment: Single and double precision arithmetic exercise examples.
February **unit-1-2**
Solution of simultaneous linear equations : Gauss elimination and iterative (Gauss-Seidel) method. Computation of eigenvalues and eigenvectors of matrices using iterative, process. Program for finding solution of a given system of three coupled linear-equations. Interpolation (Newton forward and backward formulas). Program for (a) Interpolating data points and (b) first and second derivative of a given function/data.
Assignment: Exercise Examples of Gauss Elimination and Newton-Raphson Method
March, Unit2
Integration: General quadrature formula, trapezoidal and Simpson's rule, Gauss, quadrature formulas: Gauss-Hermite, Gauss-Legendre. Program for Integrating a given function using Simpson and Gauss-Legendre methods.
Assignment: Exercise examples of Newton Forward and Backward Methods.
April, Unit2
Solution of ordinary differential equations : Euler method and Runge-Kutta method of second order with error estimation, idea of predictor-corrector method. Program for solving initial value problem for a first order differential equation using Runge-Kutta method.
Assignment: Exercise examples of Gauss-Hermite methods

Name of the Assistant/Associate Professor: Munish Sahni
Class and Section: B.Sc. Physics hon.4th semester
Subject: Computer Fundamentals and Programming-2
Paper: 406
January unit1
Truncation and round-off errors, floating point computation, overflow and underflow, single and double precision arithmetic, iterative process, Solution of nonlinear equations: bisection, secant and Newton-Raphson methods. Comparison and error, estimation. Program for finding zeros of a given function.
Assignment: Single and double precision arithmetic exercise examples.
February

unit-1-2
Solution of simultaneous linear equations : Gauss elimination and iterative (Gauss-Seidel) method. Computation of eigenvalues and eigenvectors of matrices using iterative, process. Program for finding solution of a given system of three coupled linear-equations. Interpolation (Newton forward and backward formulas). Program for (a) Interpolating data points and (b) first and second derivative of a given function/data.
Assignment: Exercise Examples of Gauss Elimination and Newton-Raphson Method
March, Unit2 Integration: General quadrature formula, trapezoidal and Simpson's rule, Gauss, quadrature formulas: Gauss-Hermite, Gauss-Legendre. Program for Integrating a given function using Simpson and Gauss-Legendre methods.
Assignment: Exercise examples of Newton Forward and Backward Methods.
April, Unit2
Solution of ordinary differential equations : Euler method and Runge-Kutta method of second order with error estimation, idea of predictor-corrector method. Program for solving initial value problem for a first order differential equation using Runge-Kutta method.
Assignment: Exercise examples of Gauss-Hermite methods

LESSON PLAN
Session: 2024-25 (Even SEM)

Name of Teacher- Dr. Seema Redhu
Class- B.sc (H) 6th semester
Subject- Nano technology (Phy-606 (a))

WEEKS	SYLLABUS
Week 1	Determination of particle size
Week 2	Increase in width of XRD peaks of nanoparticle
Week 3	Shift in photoluminescence peaks
Week 4	Variations in Raman spectra of nano-materials
Week 5	Different methods of preparation of nanomaterial
Week 6	Bottom up technique
Week 7	Assignment
Week 8	Ion beam deposition
Week 9	Class test

Week 10	Cluster beam evaporation
Week 11	Different methods of preparation of nanomaterial
Week 12	Class test
Week 13	Chemical bath deposition
Week 14	Chemical bath deposition with capping technique
Week 15	Top down technique
Week 16	Ball Milling

Summary of Lesson Plan of College Faculty

Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25
Program: B.Sc. (Hons.) Physics
Semester: IV

Name of Asstt./Assoc. Prof : Dr. Susheel Kumar
Course Name: Vibrations and Wave Optics-II
Course Code: Phy-403

WEEKS	SYLLABUS
Week 1	Kirchhoff's integral theorem
Week 2	Fresnel-Kirchhoff integral formula and its application to diffraction problems.
Week 3	Fraunhofer diffraction: Single slit
Week 4	Rectangular and circular aperture
Week 5	Multiple slit, Plane diffraction grating
Week 6	Resolving power and depressive power of a plane diffraction grating
Week 7	**Test/Assignment of Unit - I**
Week 8	Fresnel diffraction
Week 9	Fresnel's integrals
Week 10	Cornu's spiral
Week 11	Fresnel diffraction patter at a straight edge, a slit and a wire (qualitatively using Cornu's spiral)
Week 12	Holography : Principle of holography
Week 13	recording and reconstruction method and its theory as interference between two plane waves
Week 14	**Test/Assignment of Unit - II**

Week 15	Revision and Problem Discussion
Week 16	Revision and Problem Discussion

Summary of Lesson Plan of College Faculty
Pt. Neki Ram Sharma Government College, Rohtak

Name of Asstt. / Assoc. Prof: . Dr. Jyoti **Academic Session:** 2024-25
Class: B.Sc. II Hons. (Physics), 4th Sem **Semester:** Even

Subject: Phy-404 (Semester-IV) Atomic and Nuclear Physics-IV

Days:

(1-2)

Weeks	**Syllabus**
Week 1	Introduction to Atomic Physics, Atoms in electric and magnetic fields
Week 2	Electron spin. Stern-Gerlach experiment, Orbital angular momentum
Week 3	Space quantization, Dipole moment and energy in magnetic field from classical view
Week 4	Zeeman effect, Spin-orbit coupling. Fine structure. Total angular momentum,
Week 5	Many-electron atoms: Pauli exclusion principle, Many particles in one- dimensional box, Symmetric ar antisymmetric wave functions
Week 6	Revision, Assignment and Test**,** Atomic shell model and periodic table
Week 7	Spectral notations for atomic states. Vector model, L-S and JJ coupling for two electron systems, Revisio
Week 8	Doublet Structure of alkali spectra, Empirical evidence of multiplets, Selection rules.
Week 9	Nuclear Properties: mass, size, angular momentum
Week 10	Constituents of nucleus, Binding energy, stability,
Week 11	Models: Liquid drop model, Mass formula, Revision,
Week 12	Shell model, Spin and parity of nucleons
Week 13	Radioactivity : Law of radioactive decay, time constant , problems
Week 14	Theory of successive radioactive transformations in detail
Week 15	Radioactive series (mentioning the series-diagram), Nuclear forces, Revision
Week 16	Revision, Assignment and Test

Lesson Plan EMT-2

BSc (Hons.) Physics
6th Sem
Session : 2024-25
Faculty : Sandeep Sharma

Sr. No.	Week	Syllabus
1	Week 1 8-9 Jan	Polarization of electromagnetic waves
2	Week 2 15-16 Jan	Description of linear circular and elliptically polarized light
3	Week 3 22-23 Jan	Propagation of EM wave in anisotropic medium
4	Week 4 29-30 Jan	Symmetric nature of dielectric Tensor
5	Week 5 5-6 Feb	Fresnal's formula
6	Week 6 12-13 Feb	Light propagation in uniaxial crystal
7	Week 7 19-20 Feb	Double refraction Nicol prism
8	Week 8 26-27 Feb	Production of circularly and elliptically polarised light
9	Week 9 5-6 March	Babinet compensator and analysis of polarization
10	Week 10 12-13 March	Wave guides, coaxial transmission line
11	Week 11 19-20 March	Modes in rectangular wave guide, energy flow and attenuation of waveguides
12	Week 12 26-27 March	Rectangular resonant caves
13	Week 13 2-3 April	Planar optical waveguides, planar dielectric waveguides, condition of continuity at interface
14	Week 14	Phase shift on total internal reflection, eigen value equations

	9-10 April	
15	Week 15 16-17 April	Phase and group velocity of waveguides
16	Week 16 23-24 April	Field Energy and Power Transmission

Summary of Lesson Plan of College Faculty

Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25 **Name of Extension lecturer.: Dr. karmvir singh**

Program: B.Sc. **Course Name: Electronics Devices : Physics and Applications-II**

Semester: 6 **Course Code:** Phy-605

WEEKS	SYLLABUS
Week 1	Amplifiers – Only bipolar junction transistor, CB, CE and CC configurations. Single stage
Week 2	CE amplifier (biasing and stabilization circuits, Q-point, equivalent circuit, input impedance, output impedance, voltage and current gain).
Week 3	Class A, B. C amplifiers (definitions)
Week 4	RC coupled amplifiers (frequency response, Boe plot, amplitude and phase)
Week 5	Class B push-pull amplifier.
Week 6	Feedback in amplifiers – Voltage feedback and current feedback
Week 7	Effect of negative voltage series feedback on input impedance,
Week 8	output impedance and gain,
Week 9	stability distortion and noise.
Week 10	Oscillators – barkhausen criterion,
Week 11	Colpitts, phase shift and crystal oscillators.
Week 12	Multivibrators and sweep circuits Basic circuits of astable
Week 13	bistable and monostable multivibrators,
Week 14	Details of astable multivibrators (Derivation of time period)
Week 15	Sweep circuit using transistor as a switch and UJT (derivation of time period)

Week 16	REVISION.

Summary of Lesson Plan of College Faculty

Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25 **Name of Extension lecturer.: Dr. karmvir singh**
Program: B.Sc. PH **Course Name:** Electronic devices and Applications
Semester: 2 **Course Code:** 24PHYS402DS02

WEEKS	SYLLABUS
Week 1	Semiconductors: Energy bands in solids, Intrinsic and extrinsic semiconductors, carrier mobility and electrical resistivity of semiconductors, p-n junction diode and their characteristics.
Week 2	Zener and Avalanche breakdown, Zener diode, Zener diode as a voltage regulator. Light emitting diodes (LED)
Week 3	Photoconduction in semiconductors,
Week 4	Photodiode, Solar Cell
Week 5	Transistors: Junction transistors, Working of NPN and PNP transistors, Three configurations of transistor (C-B, C-E, C-C modes),
Week 6	Common base, common emitter and common collector characteristics of transistor,
Week 7	Constants of a transistor and their relation, Advantages and disadvantages of C-E configuration.
Week 8	D.C. load line, Transistor biasing; various methods of transistor biasing and stabilization.
Week 9	Transistor Amplifiers: Amplifiers, common base and common emitter amplifiers, coupling of amplifiers,
Week 10	various methods of coupling, Resistance- Capacitance (RC) coupled amplifier (two stage, concept of band width, no derivation).
Week 11	Feedback in amplifiers, advantages of negative feedback, emitter follower
Week 12	P-N junction diode as a rectifier, half wave and full wave rectifiers (with derivation)
Week 13	filters (series inductor, shunt capacitance, L-section or choke),

Week 14	Oscillators: Oscillators, Principle of oscillation, classification of oscillators, Condition for self-sustained oscillation:
Week 15	Brakhasuen criterion for oscillation, Tuned collector common emitter oscillator, Hartley oscillator
Week 16	REVISION

Summary of Lesson Plan of College Faculty

Pt. Neki Ram Sharma Government College, Rohtak

Academic Session: 2024-25 **Name of Extension lecturer.: Dr. karmvir singh**

Program: B.Sc. DSC **Course Name:** Electricity andMagnetism

Semester: 2 **Course Code:** 24PHY402DS01

WEEKS	SYLLABUS
Week 1	Electric Field and Electric Potential: Scalars and Vectors, dot and cross product, Triple vector product, Scalar and Vector fields, Differentiation of a vector
Week 2	Gradient of a scalar and its physical significance, Integration of a vector (line, surface and volume integral and their physical significance)
Week 3	Gauss's divergence theorem and Stocks theorem. Derivation of field E from potential as gradient, derivation of Laplace and Poisson equations.
Week 4	Electric flux, Gauss's Law and its application to spherical shell, uniformly charged infinite plane and uniformity charged straight wire, mechanical force of charged surface, Energy per unit volume.
Week 5	Magnetic Field: Biot-Savart's Law and its simple applications. Ampere's Circuital Law and its application. Properties of B: curl and divergence. Vector Potential.
Week 6	Magnetic Properties of Matter: Force on a dipole in an external field, Electric currents in Atoms, Electron spin and Magnetic moment, types of magnetic materials,
Week 7	Magnetization vector (M), Magnetic

	Intensity (H), Magnetic Susceptibility and permeability, Relation between B, H and M, Electronic theory of dia and Para-magnetism,
Week 8	Domain theory of ferromagnetism (Langvein's theory), Cycle of Magnetization- B-H curve and hysteresis loop: Energy dissipation, Hysteresis loss and importance of Hysteresis Curve.
Week 9	Electromagnetic induction: Faraday's laws of induction and Lenz's Law, Self-inductance
Week 10	Mutual inductance, Energy stored in a Magnetic field, Maxwell equation and their derivations, Displacement Current.
Week 11	Vector and scalar potentials, boundary conditions at interface between two different media,
Week 12	Propagation of electromagnetic wave (Basic idea, no derivation). Poynting vector and Poynting theorem.
Week 13	DC current Circuits: Electric current and current density, Electrical conductivity and Ohm's law (Review), Applications to dc circuits
Week 14	Growth and decay of current in a circuit with (a) Capacitance and resistance (b) resistance and inductance (c) Capacitance and inductance (d) Capacitance resistance and inductance.
Week 15	Alternating Current Circuits: A resonance circuit, Phasor, Complex Reactance and Impedance, Analysis for RL, RC and LC Circuits, Series
Week 16	LCR Circuit: (1) Resonance, (2) Power Dissipation (3) Quality Factor and (4) Band Width, Parallel LCR Circuit

LESSON PLAN
Session: 2024-25 (Even SEM)

Name of Teacher- Dr. Seema Bisla
Class- B.sc (NM) 4th semester
Subject- Statistical Physics (PHY04)

WEEKS	SYLLABUS
Week 1	Probability, some probability considerations, combinations possessing maximum probability, combinations possessing minimum probability.

Week 2	Probability, some probability considerations, combinations possessing maximum probability, combinations possessing minimum probability Distribution of molecules in two boxs.
Week 3	Case with weightage (general) Phase space,microstates and macrostates.statistical fluctuations constraints and accessible
Week 4	Thermodynamical probability. Postulates of Statistical Physics.
Week 5	Division of Phase space into cells, Condition of equilibrium between two system in thermal contact.
Week 6	b-Parameter. Entropy and Probability, Boltzman's distribution law Evaluation of A and b. Limit of resolution,
Week 7	Rayleigh's criterion, resolving power of telescope and a grating.
Week 8	Bose-Einstein statistics, Application of B.E. Statistics to Plancks's radiation law
Week 9	B.E. gas, Fermi-Dirac statistic,
Week 10	M.B. Law as limiting case of B.E. Degeneracy and B.E.
Week 11	Condensation. F.D. Gas, electron gas in metals.
Week 12	Zero point energy. Specific heat of metals and its solution
Week 13	Revision 1^{st} unit
Week 14	Test 1^{st} unit
Week 15	Revision 2^{nd} and 3^{rd} unit
Week 16	Test 2^{nd} and 3^{rd} unit