Lesson Plan(session 2023-24)

Sandeep (Physics)

B.Sc Ist year (ELECTRICITY AND MAGNETISM)

Sr.No	Date	Syllabus
1.	July-Aug. 2023	Scalar and vectors , dot and cross product , triple vector product, scalar and vector fields, differentiation of a vector , Gradient of a scalar and its physical significance ,
2.	Sep. 2023	Integration of a vector , Gauss's divergence and stoke's theorem ,Derivation of field from potential as gradient , derivation of laplace and poisson equation , electric flux , Guass's law and its applications to spherical shell ,
3.	Oct. 2023	Uniformly charged infinite plane and uniformly charge straight wire, mechanical force of charged surface, energy per unit volume Magnetic induction, magnetic flux, solenoidal nature of vector of induction Properties of magnetic field, electronic theory of Dia and para-magnetism,
4.	Nov.2023	Domain theory of ferromagnetism, cycle of magnetization – Hysteresis, hysteresis loss and importance of hysteresis curve.Maxwell equation the their derivations, derivations, displacement current, vector and scalar potential, boundary condition at interface between two different media, propagation of EMW, Poynting vector and Poynting Revision and test

Name – Sandeep lesson plan B.Sc 2nd sem.

Sr. No	Date	Syllabus
1.	Jan.2024	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. AC circuit analysis using complex variables with (a) capacitance and resistance, (b) resistance and inductance (c) capacitance and inductance (d) capacitance, inductance and resistance Series and parallel resonant circuit. Quality factor (Sharpness of resonance).
2.	Feb.2024	Energy bands in solids. Intrinsic and extrinsic semiconductor, Hall effect, P-N junction diode and their V-I characteristics. Zener and avalanche breakdown. Resistance of a diode, Light Emitting diodes (LED). Photo conduction in semiconductors, photodiode, Solar Cell, P-N junction half wave and full wave rectifier. Types of filter circuits (L and - with theory). Zener diode as voltage regulator, simple regulated power supply.
3.	March 2024	Junction Transistors, Bipolar transistors, working of NPN and PNP transistors, Transistor connections (C-B, C-E, C-C mode), constants of transistor. Transistor characteristic curves (excluding h parameter analysis), advantage of C-B configuration. C.R. O. (Principle, construction and working in detail).
4.	April 2024	Transistor biasing, methods of Transistor biasing and stabilization. D.C. load line. Common-base and common-emitter transistor biasing. Common-base, commonemitteer amplifers. Classification of amplifers. Resistance-capacitance (R-C) coupled amplifer (two stage; concept of band width, no derivation). Feed-back in amplifers, advantage of negative feedback Emitter follower Oscillators, Principle of Oscillation, Classification of Oscillator. Condition for self sustained oscillation.

Name – sandeep lesson plan B.Sc 3rd sem

Sr. No	Date	Syllabus
1.	Aug. 2023	Speed of transverse waves on a uniform string. Speed of longitudinal waves in a fluid, superposition of waves (physical idea), Fourier Analysis of complex waves and its application for the solution of triangular and rectangular waves, half and full wave rectifier out puts.
2.	Sep. 2023	Fourier transforms and its properties. Application of fourier transform to following function. (I) f(x) = e -x2/2 (II) f(x) = I [x]a Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes,
3.	Oct. 2023	system of thin lenses, Chromatic, spherical coma, astigmatism and distortion aberrations and their remedies. Physical Optics Interference by Division of Wave front: Fresnel's Biprism and its applications.
4.	Nov. 2023	to determination of wave length of sodium light and thickness of a mica sheet, Lioyd's mirror, phase change on reflection Revision and test

Name – Sandeep lesson plan B.Sc 4th sem.

Sr.No	Date	Syllabus
1.	Jan.2024	Colour of thin, films, wedge shaped film, Newton's rings. Interferometers: Michelson's interferometer and its application to (I) Standardisation of a meter (II) determination of wave length. Fresuel's Diffraction: Fresnel's half period zones, zone plate, diffraction at a straight edge, rectangular slit and circular apperture.
2.	Feb.2024	One slit diffraction, Two slit diffraction N-slit diffraction, Plane transmission granting spectrum, Dispersive power of a grating , Limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating.
3.	March 2024	Polarisation and Double Refraction: Polarisation by reflection, Polarisation by scattering, Malus law, Phenomenon of double refraction, Huytgen's wave theory of double refraction (Normal and oblique incidence), Analysis of Palorised light :
4.	April 2024	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 rotation, Specific rotation, Polarimeters (half shade and Biquartz).Revision and test

Name – Sandeep **Lesson plan** **B.Sc 5th sem.**

Sr.No	Date	Syllabus
1.	Aug. 2023	Crystalline and gallssy 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 tattices in two and three dimensions.
2.	Sep. 2023	Crystal planes and Miller indices, Interplanner spacing, Crystal structures of Zinc sulphide, Sodium Chloride and diamond, X-ray diffraction, Bragg's Law and experimental x-ray diffraction methods, K-space.
3.	Oct. 2023	Reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c and f.c.c. Specific heat:
4.	Nov. 2023	Specific heat of solids, Einstein's theory of specific heat, Debye model of specific heat of solids. Revision and test

Name – Sandeep **Lesson plan** **B.Sc 6th sem**

Sr.No	Date	Syllabus
1.	Jan. 2024	Vector atom model, quantum numbers associated with vector atom model, penetrating and non penetrating orbits (qualitiative description), spectral lines in different series of alkali spectra, spin orbit interaction and doublet term separation LS or Russel-Saunder Coupling jj coupling (expressions for inteaction energies for LS and jj coupling required).
2.	Feb.2024	Zeeman effect (normal and Anormalous) Zeeman pattern of D1 and D2 lines of Na-atom, Paschen, Back effect of a single valence electron system. Weak field Stark effect of Hydrogen atom. Diseete set of electronic energies of molecules. quantisation of Vibrational and rotational energies Raman effect (Quantitative description) Stoke's and anti Stoke's lines
3.	**March 2024**	Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients and possibility of amplification, momentum transfer,
4.	April 2024	life time of a level, kinetics of optical absorption. Threshold condition for laser emission, Laser pumping, He-Ne laser and RUBY laser (Principle, Construction and Working). Applications of laser in the field of medicine and industry. Revision and test

Lesson Plan (session 2023-24)

Dr. Pawan Kumar (Physics)

B.Sc Ist year (MECHANICS)

Sr.No	Date	Syllabus
1.	July-Aug. 2023	Mechanics of single and system of particles, conservation of laws of linear momentum, angular momentum and mechanical energy, Centre of mass and equation of motion, constrained motion, degrees of freedom.,
2.	Sep. 2023	Generalised coordinates, displacement, velocity, acceleration, momentum, force and potential. Hamilton's variational principle , Lagrange's equation of motion from Hamilton's Principle. Linear Harmonic oscillator, simple pendulum, Atwood's machine.
3.	Oct. 2023	Rotation of Rigid body, noment of inertia, torque, angular momentum, kinetic energy of rotation. Theorems of perpendicular and parallel axes with proof. Moment of inertia of solid sphere,
4.	Nov.2023	hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross-section. Acceleration of a body rolling down on an inclined plane.

Name – Dr. Pawan Kumar lesson plan B.Sc 2nd sem.

Sr. No	Date	Syllabus
1.	Jan.2024	**Properties of Matter (Elasticity) :** Elasticity, Hooke's law, Elastic constants and their relations, Poisson's ratio, torsion of cylinder and twisting couple. Bending of beam (bending moment and its magnitude) cantilevers, Centrally loaded beam.
2.	Feb.2024	**Kinetic Theory of Gases :** Assumptions of Kinetic Theory of gases, Law of equipartition of energy and its applications for specific heats of gases. Maxwell distribution of speeds and velocities (derivation required), Experiomental verification of Maxwell's Law of speed distribution : most probable speed,
3.	March 2024	average and r.m.s. speed, mean free path. Transport of energy and momentum, diffusion of gases. Brownian motion (qualitative), Real gases, Van der Waal's equation. Reference systems, inertial frames, Gallilean invariance
4.	April 2024	Conservation laws, Newtonian relativity principle, Michelson - Morley experiment : Search for ether. Lorentz transformations length contraction, time dilation, velocity addition theorem, variation of mass with velocity and mass energy equivalence. .

Name Dr. Pawan Kumar lesson plan B.Sc 3rd sem

Sr. No	Date	Syllabus
1.	Aug. 2023	Computer Programming : Computer organisation, Binary representation, Algorithm development, flow charts and their interpretation. Fortran Preliminaries; Integer and floating point arithmetic expression, built in functions executable and non-executable statements, input and output statements, Formats, I.F. DO and GO TO statements, Dimesion arrays statement function and function subprogram. .
2.	Sep. 2023	Thermodynamics-I : Second law of thermodynamics, Carnot theorem, Absolute scale of temperature, Absolute Zero, Entropy, show that dQ/T=O, T-S diagram Nernst heat law, Joule's free expansion, Joule Thomson (Porous plug) experiment. Joule - Thomson effect.
3.	Oct. 2023	Liquefication of gases. Air pollution due to internal combustion Engine , Thermodynamics-II : Derivation of Clausius - Claperyron latent heat equation. Phase diagram and triple point of a substance. Development of Maxwell thermodynamical relations.
4.	Nov. 2023	to determination of wave length of sodium light and thickness of a mica sheet, Lioyd's mirror, phase change on reflection Application of Maxwell relations in the derivation of relations between entropy, specific heats and thermodynamic variables. Thermodynamic functions : Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them. Revision and test

Name Dr. Pawan Kumar lesson plan B.Sc 4th sem.

Sr.No	Date	Syllabus
1.	Jan.2024	Probability, some probability considerations, combinations possessing maximum probability, combinations possessing minimum probability, distribution of molecules in two boxs. Case with weightage (general). Phase space, microstates and macrostates, statistical fluctuations constraints and accessible States Thermodynamical probability.
2.	Feb.2024	Postulates of Statistical Physics. Division of Phase space into cells, Condition of equilibrium between two system in thermal contact. b-Parameter. Entropy and Probability, Boltzman's distribution law
3.	March 2024	Evaluation of A and b. Bose-Einstein statistics, Application of B.E. Statistics to Plancks's radiation law, B.E. gas Fermi-Dirac statistics.
4.	April 2024	M.B. Law as limiting case of B.E. Degeneracy and B.E., Condensation. F.D. Gas, electron gas in metals. Zero point energy. Specific heat of metals and its solution. Revision and test

Name – Pawan Kumar Lesson plan B.Sc 5th sem.

Sr.No	Date	Syllabus
1.	Aug. 2023	Failure of (Classical) E.M. Theory. quantum theory of radiatio (old quantum theory), Photon, photoelectric effect and Einsteins photoelectric equation compton effect (theory and result). Inadequancy of old quantum theory, de-Broglie hypothesis. Davisson and Germer experiment. G.P. Thomson experiment. Phase velocity group velocity, Heisenberg's uncertainty principle. Time-energy and angular momentum .
2.	Sep. 2023	position uncertainty Uncertainty principle from de-Broglie wave, (wave-partice duality). Gamma Ray Maciroscope, Electron diffraction from a slit. Derivation of time dependent Schrodinger wave equation, eigen values, eigen functions,
3.	Oct. 2023	wave functions and its significance. Normalization of wave function, concept of observable and operator. Solution of Schrodinger equation for harmomic oscillator ground states and excited states.
4.	Nov. 2023	Application of Schrodinger equation in the solution of the following one-dimensional problems : Free particle in one dimensional box (solution of schrodinger wave equation, eigen function, eigen values, quantization of energy and momentum, nodes and antinodes, zero point energy). i) One-dimensional potential barrie $E>V_0$ (Reflection and Transmission coefficient. ii) One-dimensional potential barrier, $E>V_0$ (Reflection Coefficient, penetration of leakage coefficient, penetration depth). Revision and test

Name – Dr. Pawan Kumar Lesson plan B.Sc 6th sem

Sr.No	Date	Syllabus
1.	Jan. 2024	Nuclear mass and binding energy, systematics nuclear binding energy, nuclear stability, Nuclear size, spin, parity, statistics magnetic dipole moment, quadrupole moment (shape concept), Determination of mass by Bain-Bridge, Bain-Bride and Jordan mass spectrograph, Determination of charge by Mosley law Determination of size of nuclei by Rutherford Back Scattering
2.	Feb.2024	Interaction of heavy charged particles (Alpha particles), alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Energetics of alpha -decay, Range and straggling of alpha particles. Geiger-Nuttal law. Introduction of light charged particle (Beta-particle), Origin of continuous beta-spectrum (neutrino hypothesis) types of beta decay and energetics of beta decay, Energy loss of betaparticles (ionization), Range of electrons, absorption of beta-particles.
3.	**March 2024**	Interaction of Gamma Ray, Nature of gamma rays, Energetics of gamma rays, passage of Gamma radiations through matter (photoelectric, compton and pair production effect) electron position anhilation. Asborption of Gamma rays (Mass attenuation coefficient) and its application.
4.	April 2024	Nuclear reactions, Elastic scattering, Inelastic scatting, Nuclear disintegration, photoneclear reaction, Radiative capture, Direct reaction, heavy ion reactions and spallation Reactions, conservation laws. Q-value and reaction threshold. Nuclear Reactors General aspects of Reactor design. Nuclear fission and fusion reactors (Principles, construction, working and use) Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators. Ionization chamber, proportional counter, G.M. counter detailed study, scintillation counter and semiconductor detector