GOVT. COLLEGE, PALWAL

TEACHING PLAN 2023-24 (ODD SEMESTER)

(July 2023 to November 2023)

Name: Sh. Om Prakash
Class: B.Sc. (Pass)
Subject: Physics
Paper I: Mechanics
Paper Code: PHY-101
Semester: 1st
Department: Physics

July
Unit-I
Mechanics of single and system of particles, conservation of laws of linear momentum,

August
Angular momentum and mechanical energy. Centre of mass and equation of motion, constrained motion, and degrees of freedom.
Unit – II
Generalised coordinates, displacement, velocity, acceleration, momentum, force and potential. Hamilton's variational principle ,

September
Lagrange's equation of motion from Hamilton's Principle, Linear Harmonic oscillator, simple pendulum, Atwood's machine
Unit – III
Rotation of Rigid body, moment of inertia, torque, angular momentum, kinetic energy of rotation.

October
Theorem of perpendicular axes with proof, Theorem of parallel axes with proof, Moment of inertia of solid sphere, hollow sphere, spherical shell and solid cylinder.

November
Moment of inertia of hollow cylinder and solid bar of rectangular cross-section. Acceleration of a body rolling down on an inclined plane.

Signature

GOVT. COLLEGE, PALWAL

TEACHING PLAN 2023-24 (ODD SEMESTER)

(July 2023 to November 2023)

Name: Sh. Om Prakash
Class: B.Sc. (Pass)
Subject: Physics
Paper II: ELECTRICITY AND MAGNETISM
Paper Code: PHY-102
Semester: 1st
Department: Physics

July
Unit-I
Mathematical Background: Scalars and Vectors, dot and cross product, Triple vector product, Scalar and Vector fields, Differentiation of a vector,

August
Unit II
Gradient of a scalar and its physical significance, Integration of a vector (line, surface and volume integral and their physical significance), Gauss's divergence theorem and Stocks theorem. **Electrostatic Field:** Derivation of field E from potential as gradient,

September
Derivation of Laplace and Poisson equations, 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

October
Unit II
Magneto-statistics: Magnetic Induction, magnetic flux, solenoidal nature of Vector field of induction. Properties of B (i) .B = 0 (ii) xB= J. Electronic theory of dia and para magnetism (Langevin's theory). Domain theory of ferromagnetism. Cycle of Magnetization - Hysteresis (Energy dissipation, Hysteresis loss and importance of Hysteresis curve).

November
Unit III
Electromagnetic Theory: Maxwell equation and their derivations, Displacement Current. Vector and scalar potentials, boundary conditions at interface between two different media, Propagation of electromagnetic wave (Basic idea, no derivation). Poynting vector and Poynting theorem.

Signature

DR. B. R. AMBEDKAR GOVT. P. G. COLLEGE, PALWAL

LESSION PLAN 2023-2024 (Odd SEMESTER)

(July 2023 to November 2023)

Name: Dr. Yogesh Kumar
Class: B.Sc.
Semester: 3rd Semester
Subject: Physics, Paper I- PHY 301: Computer Programming, Thermodynamics
Department: Physics

July
Unit-I Computer Programming: Computer organization, Binary representation.

August
Unit-1- 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.

September
Unit-II- 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

October
Unit-II- Liquefication of gases. Air pollution due to internal combustion Engine. **Unit-III-** Thermodynamics-II Derivation of Clausius-Claperyron latent heat equation. Phase diagram and triple point of a substance. Development of Maxwell thermodynamical relations. Application of Maxwell relations in the derivation of relations between entropy, specific heats and thermodynamic variables.

November
Unit-III- Thermodynamic functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs. **Revision**

Teacher Signature

DR. B. R. AMBEDKAR GOVT. P. G. COLLEGE, PALWAL

LESSION PLAN 2023-2024 (Odd SEMESTER)

(July 2023 to November 2023)

Name: Dr. Yogesh Kumar
Class: B.Sc.
Semester: 3rd Semester
Subject: Physics, Paper-II PHY 302 Optics– I
Department: Physics

July
Unit-I- Fourier Analysis and Fourier Transforms: Speed of transverse waves on a uniform string. Speed of longitudinal waves in a fluid, superposition of waves (physical idea),

August
Unit-I- Fourier Analysis of complex waves and its application for the solution of triangular and rectangular waves, half and full wave rectifier out puts. Fourier transforms and its properties. Application of Fourier transform to following function. $f(x) = e^{-x2}/2$ $f(x) = I\ [x] < a$ $0\ [x] > a$ **Unit-II-** Geometrical Optics: Matrix methods in paraxial optics.

September
Unit-II- Effects of translation and refraction, derivation of thin lens and thick lens formulae. Unit plane, nodal planes, system of thin lenses. Chromatic, spherical coma, astigmatism and distortion aberrations and their remedies.

October
Unit-III- Physical Optics, Interference: Interference by Division of Wavefront, Fresnel's Biprism and its applications to determination of wave length of sodium light and thickness of a mica sheet,

November
Unit-III- Lioyd's mirror, phase change on reflection. **Revision**

Teacher Signature

DR. B. R. AMBEDKAR GOVT. P. G. COLLEGE, PALWAL
LESSION PLAN 2023-2024 (Odd SEMESTER)
(July 2023 to November 2023)

Name: Mr. Anil
Class: B.Sc.
Semester: 5th Semester
Subject: Physics, Paper I- PHY 501 : SOLID STATE PHYSICS
Department: Physics

July
Unit-I Crystalline and gallssy forms, liquid crystals.

August
Unit-1- 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.

September
Unit-II- 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.

October
Unit-III- 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 : Specific heat of solids,

November
Unit-III- Einstein's theory of specific heat, Debye model of specific heat of solids. **Revision**

Teacher Signature

DR. B. R. AMBEDKAR GOVT. P. G. COLLEGE, PALWAL

LESSION PLAN 2023-2024 (Odd SEMESTER)

(July 2023 to November 2023)

Name: Mr. Anil
Class: B.Sc.
Semester: 5th Semester
Subject: Physics, Paper II- PHY 502: QUANTUM MECHANICS
Department: Physics

July
Unit-I- Failure of (Classical) E.M. Theory. Quantum theory of radiatio (old quantum theory).

August
Unit-I- 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, position uncertainty Uncertainty principle from de-Broglie wave, (wave-partice duality). Gamma Ray Maciroscope, Electron diffraction from a slit.

September
Unit-II- Derivation of time dependent Schrodinger wave equation. Eigen values, eigen functions, 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.

October
Unit-III- 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).

November
Unit-III- i) One-dimensional potential barrie E>V0 (Reflection and Transmission coefficient. ii) One-dimensional potential barrier, E>V0 (Reflection Coefficient, penetration of leakage coefficient, penetration depth). **Revision**

Teacher Signature

GOVT. COLLEGE, PALWAL

TEACHING PLAN 2023-24 (EVEN SEMESTER)

(JAN 2024 to April 2024)

Name: Sh. Om Prakash
Class: B.Sc. (Pass)
Subject: Physics
Paper I: Properties of Matter, Kinetic Theory and Relativity
Paper Code: PHY-201
Semester: 2nd
Department: Physics

January
Unit-I
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.

February
Unit – II
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), Experimental verification of Maxwell's Law of speed distribution : most probable speed,

March
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.
Unit – III
Theory of Relativity: Reference systems, inertial frames, Gallilean invariance and Conservation laws, Newtonian relativity principle,

April
Michelson - Morley experiment: Search for ether. Lorentz transformations length contraction, time dilation, velocity addition theorem, variation of mass with velocity and mass energy equivalence.

Signature

GOVT. COLLEGE, PALWAL

TEACHING PLAN 2023-24 (EVEN SEMESTER)

(JAN 2024 to April 2024)

Name: Sh. Om Prakash
Class: B.Sc. (Pass)
Subject: Physics
Paper II: ELECTRO MAGNETIC INDUCTION AND ELECTRONIC DEVICES
Paper Code: PHY-202
Semester: 2nd
Department: Physics

January
Unit-I
Electromagnetic Induction: 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).

February
Unit II
Semiconductor Diodes: 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. **Diode Rectifiers:** 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

March
Transistors: 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).
Unit III
Transistor Amplifiers: Transistor biasing, methods of Transistor biasing and stabilization. D.C. load line. Common-base and common-emitter transistor biasing. Common-base, common- emitter amplifiers. Classification of amplifiers. Resistance-capacitance (R-C) coupled amplifier (two stage; concept of band width, no derivation).

April
Feed-back in amplifiers, advantage of negative feedback Emitter follower. **Oscillators :** Oscillators, Principle of Oscillation, Classification of Oscillator. Condition for self-sustained oscillation: Barkhousen Criterion for oscillations. Tuned collector common emitter oscillator. Hartley oscillator. Colpitt's oscillator

Signature

DR. B. R. AMBEDKAR GOVT. P. G. COLLEGE, PALWAL

LESSION PLAN 2023-2024 (EVEN SEMESTER)

(JAN 2024 to April 2024)

Name: Dr. Yogesh Kumar
Class: B.Sc.
Semester: 4th Semester
Subject: Physics, Paper I- PHY 401: Statistical Mechanics
Department: Physics

January
Unit-I- 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.

February
Unit-I- Statistical fluctuations constraints and accessible States Thermodynamical probability. **Unit-II-** Postulates of Statistical Physics. Division of Phase space into cells, Condition of equilibrium between two system in thermal contact. b-Parameter.

March
Unit-II- Entropy and Probability, Boltzman's distribution law. Evaluation of A and b. Bose-Einstein statistics, Application of B.E. Statistics to Plancks's radiation law, B.E. gas. **Unit-III-** Fermi-Dirac statistics, M.B. Law as limiting case of B.E.

April
Unit-III- Degeneracy and B.E., Condensation., F.D. Gas, electron gas in metals. Zero point energy. Specific heat of metals and its solution. Revision

Teacher Signature

DR. B. R. AMBEDKAR GOVT. P. G. COLLEGE, PALWAL

LESSION PLAN 2023-2024 (EVEN SEMESTER)

(JAN 2024 to April 2024)

Name: Dr. Yogesh Kumar
Class: B.Sc.
Semester: 4th Semester
Subject: Physics, Paper-II PHY 402 Optics– II
Department: Physics

January
Unit-I- Interference by Division of Amplitude: 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.

February
Unit-I- Diffraction at a straight edge, rectangular slit and circular apperture. **Unit-II-** Fraimhoffer diffraction : One slit diffraction, Two slit diffraction N-slit diffraction, Plane transmission granting spectrum, Dispersive power of a grating , Limit of resolution, Rayleigh's criterion.

March
Unit-II- Resolving power of telescope and a grating. **Unit-III-** Polarization: Polarisation and Double Refraction: Polarisation by reflection, Polarisation by scattering, Malus law, Phenomenon of double refraction.

April
Unit-III- Huytgen's wave theory of double refraction (Normal and oblique incidence), Analysis of Palorised 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 rotation, Specific rotation, Polarimeters (half shade and Biquartz). **Revision**

Teacher Signature

DR. B R AMBEDKAR GOVT. COLLEGE, PALWAL

TEACHING PLAN 2023-24 (EVEN SEMESTER)

(JAN 2024 to April 2024)

Name: Sh. Anil
Class: B.Sc. (Pass)
Subject: Physics
Paper I: ATOMIC MOLECULAR AND LASER PHYSICS
Paper Code: PHY-601
Semester: 6th
Department: Physics

January
Unit-I -Vector atom model, quantum numbers associated with vector atom model, penetrating and non- penetrating orbits (qualitiative description), spectral lines in different series of ailkali spectra, spin orbit interaction and doublet term seperation LS or Russel-Saunder Coupling jj coupling (expressions for inteaction energies for LS and jj coupling required).

February
Unit – II - Zeeman effect (normal and Anormalous) Zeeman pattern of D 1 and D2 lines of Na-atom, Paschen, Back effect of a single valence electron system. Weak field Strak effect of Hydrogen atom. Diseete set of electronic energies of molecules. quantisation of Vibrational and ratiational energies Raman effect (Quantitative description) Stoke's and anti Stoke's lines.

March
Unit-III -Main features of a laser: Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients and possibility of amplification, momentum transfer, life time of a level, kinetics of optical obsorption.

April
Unit-III-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

Teacher's Signature

DR. B R AMBEDKAR GOVT. COLLEGE, PALWAL

TEACHING PLAN 2023-24 (EVEN SEMESTER)

(JAN 2024 to April 2024)

Name: Sh. Anil
Class: B.Sc. (Pass)
Subject: Physics
Paper II: NUCLEAR PHYSICS
Paper Code: PHY-602
Semester: 6th
Department: Physics

January
Unit-I -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.

February
Unit II- 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 beta- particles (ionization), Range of electrons, absorption of beta particals.

March
Unit II- 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. **Unit III-** 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.

April
Unit-III-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. Revision

Teacher's Signature