GOVERNMENT COLLEGE BAHADURGARH
LESSON PLAN FOR SESSION 2023-24

Subject name with code and semester:- Nuclear Physics, PH06

Teacher Name:- Jagriti

Months	Topics
Jan.15- Feb.15	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.
Feb.16- Mar.15	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 particles (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-particles.. 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 annilation. Absorption of Gamma rays (Mass attenuation coefficient) and its application
Mar.16- April20	Nuclear reactions, Elastic scattering, Inelastic scattering, Nuclear disintegration, photonuclear 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.

GOVERNMENT COLLEGE BAHADURGARH
LESSON PLAN FOR SESSION 2023-24

Subject name with code and semester:- Atomic, Molecular and Laser Physics
Teacher Name:- Arun Kumar PH06

Months	Topics
Jan.15- Feb.15	Vector atom model, quantum numbers associated with vector atom model, penetrating and non-penetrating orbits (qualitative 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 interaction energies for tS and jj.coupling required).
Feb.16- Mar.15	Zeeman effect (normal and Anormalous), Zeeman pattern of D, and Dlines of Na-atom, Paschen, Back effect of a single valence electron system. Weak field Strak effect of Hydrogen atoms. Discrete set of electronic energies of molecules, quantisation of Vibrational and rotational energies. Raman effect (Quantitative description), Stokes and anti-Stokes lines.
Mar.16- April20	Main features of a laser: Directionality, high intensity, high degree of coherenece, spatial and temporal coherenece, Einstein's coefficients and possibility of amplification, momentum transfer, lifetime 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 lasers in the field of medicine and industry.

GOVERNMENT COLLEGE BAHADURGARH
LESSON PLAN FOR SESSION 2023-24

Subject name with code and semester:-PROPERTIES OF MATTER, KINETIC THEORY AND RELATIVITY, PH02

Teacher Name:- Jagriti

Months	Topics
Jan.15- Feb.15	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.
Feb.16- Mar.15	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, 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.
Mar.16- April20	Theory of Relativity : Reference systems, inertial frames, Gallilean invariance and 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.

GOVERNMENT COLLEGE BAHADURGARH
LESSON PLAN FOR SESSION 2023-24

Subject name with code and semester:-ELECTRO MAGNETIC INDUCTION AND ELECTRONIC DEVICES
Teacher Name:- Himanshu Dhingra, PH02

Months	Topics
Jan.15- Feb.15	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).
Feb.16- Mar.15	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. 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).
Mar.16- April20	Transistor Amplifers : Transistor biasing, methods of Transistor biasing and stabilization. D.C. load line. Common-base and common-emitter transistor biasing. Common-base, common-emitteer 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 : 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.

GOVERNMENT COLLEGE BAHADURGARH
LESSON PLAN FOR SESSION 2023-24

Subject name with code and semester:- Statistical Mechanics

Teacher Name:- Arun Kumar, PH04

Months	Topics
Jan.15- Feb.15	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.
Feb.16- Mar.15	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. Evaluation of A and b. Bose-Einstein statistics, Application of B.E. Statistics to Plancks's radiation law, B.E. gas.
Mar.16- April20	Fermi-Dirac statistics, 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.

GOVERNMENT COLLEGE BAHADURGARH
LESSON PLAN FOR SESSION 2023-24

Subject name with code and semester:- Optics – II

Teacher Name:- JAGRITI, PH04

Months	Topics
Jan.15- Feb.15	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, diffraction at a straight edge, rectangular slit and circular apperture..
Feb.16- Mar.15	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, resolving power of telescope and a grating.
Mar.16- April20	Polarization :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 : 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).