Department of Physics Govt. College Ateli

Lesson Plan of B.Sc 6th Sem. Physics

Paper – II

Session: 2023-2024 Name – Dr. Annu

January

Paper – II (Nuclear Physics)

UNIT – I

Nuclear mass and binding energy, systematic nuclear binding energy, nuclear stability, Nuclear size, spin, parity, statistics, magnetic dipole moment, quadruple 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.

Assignment & problem & Test

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), Energetic of alpha-decay, Range and straggling of alpha particles, Geiger-Nuttall law. Introduction of light charged particles (Beta-particle), Origin of continuous beta-spectrum (neutrino hypothesis),

March

UNIT – II

Types of beta decay and energetic of beta decay, Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles, Interaction of Gamma Ray, Nature of gamma rays, Energetic of gamma rays, Passage of Gamma radiations through matter (photoelectric, Compton and pair production effect), electron position annihilation, Absorption of Gamma rays (Mass attenuation coefficient) and its application.

Assignment & problem & Test

April

UNIT – III

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

May

UNIT – III

Betatron accelerators, Ionization chamber, proportional counter, G.M. counter detailed study, scintillation cou
semiconductor detector,

Assignment & problem & Test

Revision

Session : 2

Sr.no	
1	

Lession Plan of B.Sc 2nd Sem Physics Paper -I

Session : 2023-24 Name – Dr. Annu

Sr.no	Month	Week	Topic / Activity
1	Jan	II	Basic lecture about elasticity , Hooks law ,
		III	Poission ratio , energy stored by a elastic body
		IV	Relation between Young Modulus, Presentation
2	Feb	I	, Bulk Modulus and poission ratio, Relation between Young Modulus, Modulus of rigidity and poission ratio
		II	Limiting values of poission ratio, Torsion ofcylinder and twisting couple , Bending of beams, Cantilever loaded at the free end
		III	Cantilever loaded at free end having some its own weight, Assignment -1
		IV	Centrally loaded beam and depression by its own weight , numerical problems , 1st class test
3	March	I	Problems of unit 1st, introduction of unit 2nd ,Assumption of kinetic theory of gases
		II	Expression for pressure of gas , phase space , Assignment-2, Law of equipartition of energy,specific heat,
		III	Speed distribution law, velocity distribution law, Experimental verification of Maxwell law of speed
		IV	distribution ,most probable speed , average and rms speed , mean free path, Assignment-3, Transport phenomenon: viscosity,
		V	Thermal conduction in gases, diffusion Brownian motion , real gases, vanderwall equation, 2nd class test
4	April	I	Introduction of theory of relativity, reference system , inertial frames Galilean invariance and conservation laws ,Newtonian relativity, principle , Assignment-4
		II	Michelson morley experiment ,Lorentz transformations, length contraction and time dilution ,numerical
		III	Velocity addition formula , variation of mass with velocity and mass energy equivalence , Assignment-5
		IV	Class test 3rd , problems

Department of Physics Govt. College Ateli

Lesson Plan of B.Sc 3rd Sem. Physics

Paper – I & II

Session: 2023-2024

Name – Dr. Annu

July

Unit-I

Computer Programming : Computer organisation, Binary representation, Algorithm development, flow charts and their interpretation.

August

Unit-I

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.

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.

September

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. Thermodynamic functions : Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them.

Problems, Assignment -1, Unit Test -1, Revision

October

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). 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.

1) $f(x) = \exp(-x^2/2)$
2) $f(x) = 1 \; |x| \leq a$

$0 \; |x| \geq a$

Unit-II

Geometrical Optics : 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,

November

Chromatic, spherical coma, astigmatism and distortion aberrations and their remedies. Physical Optics

Unit-III

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, Lioyd's mirror, phase change on reflection.

Problems, Assignment -2, Unit Test -2, Revision

Department of Physics Govt. College Ateli

Lesson Plan of B.Sc 5th Sem. Physics

Paper – I & II

Session: 2023-2024

Name – Dr. Annu

July

Paper –I (Solid State Physics)

Unit-I

Crystalline and gallssy forms, liquid crystals. Crystal structure.

August

Unit-I

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

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.

September

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. Einstein's theory of specific heat, Debye model of specific heat of solids.

Problems, Assignment -1, Unit Test -1, Revision

Paper –II (Quantum Mechanics)

Unit-I

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

October

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.

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.

November

Unit-III

Application of Schrodinger equation in the solution of the following one-dimensional problems:

1. 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).
2. One-dimensional potential barrie E>V0 (Reflection and Transmission coefficient.
3. One-dimensional potential barrier, E>V0 (Reflection Coefficient, penetration of leakage coefficient, penetration depth).

Problems, Assignment -2, Unit Test -2, Revision

Department of Physics

Lesson Plan of B.Sc 1st Sem. Physics

Paper – I & II

Session: 2023-2024 Name – Suraj Kumar

July

Unit I

Mechanics of single and system of particles, conservation of laws of linear momentum,

August

Unit I

Conservation of laws of Angular momentum and mechanical energy, Centre of mass and equation of motion, constrained motion, degrees of freedom.

Unit II

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.

September

Unit III

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, 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.

Problems, Assignment -1, Unit Test -1, Revision

Unit I

Mathematical Background : Scalars 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, Integration of a vector (line, surface and volume integral and their physical significance)

October

Unit I

Gauss's divergence theorem and Stocks theorem. Electrostatic Field : Derivation of field E from potential as gradient, derivation of Laplace and Poisson equations. Elecotric 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.

Assignment -2

Magnetostatistics : Magnetic Induction, magetic 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. Unit III

Electromagnetic Theory : Maxwell equation and their derivations, Displacement Current.

November

Unit II

Cycle of Magnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance of Hysteresis curve).

Unit III

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.

Problems, Assignment -3, Unit Test -2, Revision

Lession Plan of B.Sc 4th Sem Physics Paper -II

Session : 2023-24

Name - Suraj Kumar

Sr.no	Month	Week	Topic / Activity
1	Jan	II	Introduction of paper ,Basic of Interference
		III	Basic of Diffraction, interference by thin parallel film, Numerical
		IV	wedge shape film, Non Reflecting Film, Expression of Reflectivity in term of wavelength & Refractive Index
2	Feb	I	Problemsand numerical , newtons ring, Question on newtons ring
		II	Michelson interferometer and its application , problems , Assignment - 1
		III	Diffraction , Fresnel diffraction , half periodic zone , zone plate
		IV	Diffraction at sharp edge , rectangular slit and circular aperture , 1st class test Assignment – 2
3	March	I	Fraunhoffer diffraction : single slit diffraction ,two slit diffraction ,
		II	N slit diffraction , dispersive power of grating , limit of resolution , Rayleighs criteria , Assignment – 3
		III	Resolving power of telescope and grating , problems of unit 2nd , class test 2nd
		IV	Introduction to Polarization , Methods to polarize light, double refraction
		V	Huygen theory of double refraction , polarization by double refraction , nicol prism , Assignment – 4
4	April	I	Quarter wave plate , half wave plate , production and detection of : plane polarized light ,circular polarized light , elliptical polarised light
		II	Optical activity , Fresnel theory of rotation , specific rotation , Assignment – 5
		III	Polarimeters , problems of unit 3rd , class test 3rd
		IV	Revision

Department of Physics Govt. College Ateli

Lesson Plan of B.Sc 6th Sem. Physics

Paper – I (Atomic & Molecular Physics)

Name - Suraj Kumar

Session: 2023-2024

January

Paper – I (Atomic & Molecular Physics)

UNIT – I

Introduction to Atomic & Molecular Physics, Rutherford scattering, Bohr Model, Bohr Somerfield Model, Quantum Treatment of H Atom, Vector atom model, quantum numbers associated with vector atom model,

February

UNIT – I

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 LS and jj coupling required). Assignment & Numerical problem

March

UNIT – II

Zeeman effect (normal and Anomalous), Zeeman pattern of D_1 and D_2 lines of Na-atom, Paschen Back effect of a single valence electron system. Problems on Normal and Zeeman Effect, Weak field Stark effect of Hydrogen atom.

Assignment & problem & Test

March

Paper – I (Atomic & Molecular Physics)

UNIT – II

Discrete set of electronic energies of molecules, Quantization of Vibrational and rotational energies. Raman Effect (Quantitative description), Stokes and anti-Stokes lines. Assignment & Numerical problem, Main features of a laser: Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients and possibility of amplification,

April

UNIT – III

momentum transfer, 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.

Assignment & problem & Test

Department of Physics Govt. College Ateli

Lesson Plan of B.Sc 6th Sem. Physics

Paper – II

Session: 2023-2024 Name – Dr. Annu

January

Paper – II (Nuclear Physics)

UNIT – I

Nuclear mass and binding energy, systematic nuclear binding energy, nuclear stability, Nuclear size, spin, parity, statistics magnetic dipole moment, quadruple 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.

Assignment & problem & Test

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), Energetic of alpha-decay, Range and straggling of alpha particles, Geiger-Nuttall law. Introduction of light charged particles (Beta-particle), Origin of continuous beta-spectrum (neutrino hypothesis), Types of beta decay and energetic of beta decay, Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles, Interaction of Gamma Ray, Nature of gamma rays, Energetic of gamma rays,

March

Passage of Gamma radiations through matter (photoelectric, Compton and pair production effect), electron position annihilation. Absorption of Gamma rays (Mass attenuation coefficient) and its application.

UNIT – III

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,

Assignment & problem & Test

April

Nuclear Reactors, General aspects of Reactor design, Nuclear fission and fusion reactors (Principles, construction, working and use), Linear accelerator, Tendem accelerator, Cyclotron and

UNIT – III

Betatron accelerators, Ionization chamber, proportional counter, G.M. counter detailed study, scintillation counter and semiconductor detector,

Assignment & problem & Test

Revision