Government College for Women Ateli (Mahendergarh)

Lesson Plan (Physics-Nuclear Physics)

BSc. 6th sem. (Even Sem.)

Week	Topic Covered
1st Week	Introduction, Rutherford α scattering experiment and determination of nuclear size, constituents of nuclei, Nuclear Properties
2nd Week	Mass defect and binding energy of a nucleus, importance of binding energy curve, Nuclear stability
3rd Week	Determination of nuclear mass: Bain Bridge mass spectrograph, Bain Bridge and Jordan Double focusing mass Spectrograph
4th Week	X- Ray Spectra: Origin of continuous spectra, Origin of characteristics X- Ray Spectra, Moseley's Law and Determination of nuclear charge
5th Week	Interaction of charge particles with matter: Introduction, Interaction of light charged particles i.e $\beta - particles$, interaction of positron with matter
6th Week	Interaction of heavy charged particles; Bohr's Stopping power formula, range and Straggling of charged particles, Interaction of γ rays with matter
7th Week	Photoelectric effect, Compton Scattering, Pair Production, Absorption of γ rays and its application
8th Week	Range of α particles, Geiger- Nuttal Law, Alpha α Disintegration and its theory, Energetics of α Decay
9th class	$\beta\ Decay\ and\ its\ types$, Energetics of $\beta\ Decay$, Difference b/n positron emission and electron Capture
10th Week	β particles Spectrometer, Neutrino theory of continuous Beta Spectrum
11th Week	Nuclear reaction and its types, Conservation laws in Nuclear Reaction, Q value of Nuclear reaction
12th Week	Exothermic and Endothermic Nuclear reaction and their Q- values, Nuclear fission, Nuclear chain reaction
13th week	Nuclear Reactor: Principle, Construction, working and uses, General Aspects of nuclear reactor Design
14th Week	Nuclear Fusion: A thermonuclear process, Controlled thermonuclear reaction and possibility of fusion reactor
15th Week	Van De Graaff accelerator, Tandem Accelerator, Linear accelerator: Principle ,construction and working
16th Week	Cyclotron, Betatron : Principle, construction and working
17th Week	Gas filled detector, ionization chamber, proportion counter
18th Week	G.M counter, Scintillation counter
19th Week	Semiconductor Detector: Diffused junction detector,

	Surface barrier detector, Lithium Drifted Detector
20th Week	**Last Year Question Paper Solution**
21th Week	**Revision of Unit -1**
22th Week	**Revision of Unit-2**
23th Week	**Revision of Unit-3**

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Lesson Plan

(Physics-Quantum Mechanics)

B.Sc. 5th sem. (Odd Sem.)

Week	Topic Covered
1st Week	Failure of classical E.M. Theory, Planck's Quantum Theory of Radiation, Characteristics of Photons
2nd Week	Photoelectric Effect and failure of classical E.M. Theory to explain to Explain Photo Electric Effect, Einstein's Equation of Photoelectric Effect
3rd Week	Compton Effect & theory of Compton Scattering, Experimental Study of Compton Effect, Relation B/n angle of scattering Photon and Recoiling electron
4th Week	Energy of recoiling electron, K.E of recoiling electron in term of angle of scattering, Energy of scattered photon, Compton effect with visible and UV light, Limitation of old Quantum Theory
5th Week	De-Broglie Hypothesis and matter wave, alternative method, de –Broglie wavelength of accelerated electrons experimental verification of wave particle dualism
6th Week	Wave Packet and Wave function , Group and phase velocity of a wave packet and their relation
7th Week	Heisenberg Uncertainty Principle, Examples of position momentum uncertainty, application of uncertainty Principle
8th Week	Derivation of 1-D time dependent Schrodinger Wave Equation and its extension to 3-Dand Effect of external Force
9th class	Derivation of time independent Schrodinger wave equation, Eigen values and Eigen functions, Physical significance of Eigen function and its Normalization
10th Week	Operators and Observables, expectation values of dynamic quantities, Probability current density
11th Week	Hands on Practice of numerical Problems of unit-1
12th Week	Application of Quantum mechanics: A particle in one dimensional box, Derivation of Eigen function Eigen values and position of Nodes and Antinodes
13th week	One dimensional potential step: wave function Probability current density for transmitted and reflected waves
14th Week	One dimensional potential barrier: Derivation for Transmission coefficients and reflection coefficients and quantum Mechanical tunneling
15th Week	One dimensional linear harmonic oscillators: Derivation for energy Eigen values, Eigen function, Zero point energy and their graphical representation
16th Week	Hands on practice of Numerical Problems
17th Week	Revision of important question of unit-1
18th Week	Revision of important question of unit-2
19th Week	Revision of important question of unit-3
20th Week	Preparation for House

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Lesson Plan (Physics-Optics 2nd)

BSc. 4th sem(Even sem.)

Week	Topic Covered
1st Week	Interference by Division of amplitude, Interference in thin film due to reflected light and transmitted light,
2nd Week	Intensity Distribution in interference bands due to thin film, Need of Extended source, Production of colours in thin films
3rd Week	Non Reflecting Glass, application of non reflecting films, reflectivity in terms of wavelength and refractive index
4th Week	Increasing reflecting powers by thin film deposition, Interference by wedge shape film
5th Week	Newton ring formation due to reflected light and transmitted light, application of newton rings
6th Week	Michelson Interferometer and its application
7th Week	Classification of Diffraction: Fresnel's diffraction and Fraunhoffer's Diffraction, Fresnel's half period zone
8th Week	Zone Plate-its principle, construction and working, Zone plate as a convex lens, comparison b/n a zone plate and convex lens
9th class	Diffraction at a straight edge and its application of determination of wavelength, Diffraction at a rectangular slit and circular aperture
10th Week	Fraunhoffer Diffraction at single slit and intensity variation in diffraction of single slit, Fraunhoffer diffraction at circular slit
11th Week	Fraunhoffer Diffration at double slit and intensity variation of diffraction pattern due to slit, missing orders in diffraction pattern of double slit
12th Week	Plane diffraction grating, theory of grating, absent spectra in a diffraction grating, overlapping of different spectral line
13th week	Dispersive power of diffraction grating, resolving power of a grating and their relation, resolving power of telescpoe
14th Week	Polarization and its demonstration, representation of light vibrations, analysis of polarized light, Malus law
15th Week	Method for production of polarized light, Detection of polarized reflected light-Biot's polariscope
16th Week	Brewster's law, Polarization by transmission through a pile of plates, polarization by Scattering, polarization by selective absorption
17th Week	Polarization by double Refraction, types of crystals and

	their characteristics
18th Week	**Production of Polarized light by double refraction- Huygen's experiment and its physical explanation**
19th Week	**Nicol Prism- Principle, constru, working and its limitation, use of a nicol prism**
20th Week	**Huygen's theory of double refraction, refractive indices for uniaxial crystals, determination of refractive indices**
21th Week	**Elliptically and circularly polarized light theory, Polarised and analysis of different types of polarized light**
22th Week	**Optical rotation, Degree of optical rotation, rotatory Dispersion, Fresnel's Explanation of optical rotation**
23th Week	**Laurent Half Shade Polarimeter and its working, Biquartz Polarimeter and its working**

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Lesson Plan

(Physics-Optics-I)

B.Sc. 3rd sem.(Odd sem.)

Week	Topic Covered
1st Week	Transverse wave in a string, Speed of transverse wave in string, Speed of longitudinal waves in a fluid
2nd Week	Superposition of waves, Fourier's Theorem , Dirichlet's condition , evaluation of Fourier coefficients
3rd Week	Cosine series for even function and Sine series for odd function, Fourier series for the interval $(0,2\pi)$
4th Week	Complex for of a Fourier series, application of Fourier series for rectangular square wave, Triangular wave
5th Week	Analysis of output of half wave rectifier and full wave rectifier, analysis of saw tooth waves, Fourier series in interval (-L,L)
6th Week	Numerical Practice on application of Fourier series an Fourier integrals , Fourier integral for even and odd function an complex form of Fourier integral
7th Week	Fourier Transforms, Fourier Sine Transforms, Fourier Cosine Transforms Properties of Fourier Transforms
8th Week	Application of Fourier Transforms: Fourier Transform of Gaussian Function and Single step Function
9th class	Basic of Matrices and Use of Matrices in Paraxial Optics, sign conventions
10th Week	Coordinates of paraxial ray, Effect of Translation and Translational Matrices, Effect of Refraction and Refraction Matrices
11th Week	Position of an image plane and magnification of an optical system, System Matrix for thick lens and derivation of le s maker formula for thin lens
12th Week	Concept of Unit Plane and derivation of Lens' Maker formula for a thick lens, Nodal plane and show that anodal plane coincide with unit plane
13th week	Aberrations and their types, Chromatic Aberration in a Lens, Achromatic Combination of two thin lens in contact
14th Week	Achromatic Combination of two coaxial lens held apart, Spherical aberration in a lens, Longitudinal aberration in thin Lens and method for their reduction
15th Week	Coma and Method of removal of Coma, Astigmatism and Curvature of Field and their Removal
16th Week	Distortion and removal of distortion and Practices of Numerical problems
17th Week	Interference of waves, Types of interference, Coherent sources, condition for sustained interference, Analytical treatment of Young double slit interference
18th Week	Expression for fringe width, Fresnel's Biprism and determination of wavelength of Sodium light
19th Week	Determination of thickness of transparent sheet using Fresnel's biprism, Lloyd's mirror Comparison b/n Fresnel's biprism an Lloyd's mirror interference pattern s
20th Week	Stoke's Treatment and Achromatic fringe with white light
21th Week	Revision of important question of unit-1
22th Week	Revision of important question of unit-2
23th Week	Revision of important question of unit-3

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Lesson Plan

(Physics-Properties of matter, K.T of gases & Theory of Relativity)

BSc. 2nd sem.(Even sem.)

Week	Topic Covered
1st Week	Introduction, Stress-Strain, Hook's law, Stress –Strain Curve, types of Elasticity, Poisson's Ratio, Energies of Strained body
2nd Week	Bulk modulus relation(Relation B/n Y,K and σ), Relation b/n Shearing strain and Extension strain and compression strain, Shearing stress, extension stress and compression stress
3rd Week	Relation b/n elastic constants, Limiting value of Poisson's ratio, Twisting of Cylinder and twisting couple
4th Week	Bending of beam, Limitation of simple theory of bending , Cantilever loaded at free end, Transverse vibration of loaded cantilever
5th Week	Depression of centrally loaded beam supported its end, Depression of uniformly loaded beam at its middle point, Stiffness resilience of beam
6th Week	Assumptions of K.T of gases, expression of pressure of gases, Kinetic interpretation of temp.,
7th Week	Phase space, Division of phase space, microstate and macrostates, Postulates of statistical mechanics
8th Week	Deduction of Maxwell- Boltzmann velocity Distribution law, Deduction of Maxwell- Boltzmann speed Distribution law , Discussion of Maxwell- Boltzmann speed Distribution law
9th class	Most probable speed, average or mean speed and RMS speed and their relation, Maxwell Boltzmann energy –wise Distribution law and experimental verification of Maxwell Distribution law of speed
10th Week	Degree of Freedom, Law of equipartition of energy, Specific heat of gases, variation of molar specific heat,
11th Week	Mean free path and its derivation , Probability of a particle to travel a distance without collision, transport phenomenon
12th Week	Viscosity(Transport of momentum), Thermal Conduction(Transport of energy), Diffusion (Transport of mass)
13th week	Brownian motion and factor affecting it, Einstein's theory of translational Brownian motion Deviation of real gases behavior from ideal gases

14th Week	**Results of Andrew's Experiment , Vander wall's equation of state of real gases, Vander Wall's isotherm**
15th Week	**Limitation of Vander Wall's equation, Explanation of Vander Wall's Equation**
16th Week	**Frame of reference, Inertial frame of reference, Galilean Transformation , Galilean invariance and Newtonian relativity**
17th Week	**Conservation Law according to Galilean Transformation, Search of universal frame, Michalson and Morley experiment**
18th Week	**Special theory of relativity, Lorentz transformation, Consequences of Lorentz Transformation; Relativity of Space, Relativity of time, Twin Paradox,**
19th Week	**Relativity of simultaneity, Composition of Velocities, Relativity of mass, Mass energy equivalence,**
20th Week	**Relativistic momentum and energy, Experimental evidence for spatial theory of relativity**
21th Week	**Revision of important question of unit-1**
22th Week	**Revision of important question of unit-2**
23th Week	**Revision of important question of unit-3**

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Lesson Plan

(Physics-Electricity and Magnetism)

B.Sc. 1st sem. (odd sem)

Week	Topic Covered
1st Week	Scalars and vectors, dot and cross product, Triple scalar and vector product, Differentiation of a vector
2nd Week	Gradient of a scalar and its physical significance, integration of a vector(line, surface and volume integral and their physical significance)
3rd Week	Divergence of a vector field and its physical significance, Gauss Divergence theorem, Solenoidal field
4th Week	Curl of a vector field: physical significance, Curl in Cartesian coordinates,
5th Week	Stokes theorem, irrotational or conservative field, Numerical problems
6th Week	Derivation of E from potential as gradient, Derivation of Laplace and Poisson Equation, Electric Flux,
7th Week	Gauss law and its applications to spherical shell, uniformly charged infinite plane and uniformly charged straight wire
8th Week	Mechanical force of charged surface, Energy per unit volume
9th class	Magnetic induction, Magnetic flux ,Gauss law in magneto statics, Ampere circuital law and its proof Some basic terms related to magnetism
10th Week	Solenoidal nature of magnetic induction, Properties of $\overrightarrow{B}$ (i) $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$ (ii) $\vec{\nabla}.\vec{B} = 0$
11th Week	Modern Electronic theory of diamagnetism and Langevin's theory of para magnetism,
12th Week	Cycle of magnetization, Hysteresis loop(Energy dissipation , Hysteresis loss and importance of Hysteresis)
13th week	Concept of displacement current, Maxwell's equations in integral form and their physical significance, Derivations of Maxwell's equations
14th Week	Scalar and vector potentials , E.M. waves, Wave equation in free space
15th Week	3- Dimensional wave equation in a dielectric, Wave equation for a plane polarized e. m. wave
16th Week	Transverse nature of e. m. waves, Characteristics of electromagnetic waves
17th Week	Poynting Vector, Poynting Theorem and equation of continuity
18th Week	Boundary condition s at the interface between different media
19th Week	Numerical Problems of the unit
20th Week	Revision of important question of unit-1
21th Week	Revision of important question of unit-2
22th Week	Revision of important question of unit-3