**PHYSICS**

**MID – 1 SYLLABUS**

**SEMESTER – I**

**PHYSICS**

**PAPER I: MECHANICS& PROPERTIES OF MATTER**

UNIT-I

1. Vector Analysis

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence

and curl of a vector field with derivations and physical interpretation. Vector integration

(line, surface and volume), Statement and proof of Gauss and Stokes theorems.

UNIT-II

2. Mechanics of particles

Laws of motion, motion of variable mass system, Equation of motion of a rocket.

Conservation of energy and momentum, Collisions in two and three dimensions, Concept of

impact parameter, scattering cross-section, Rutherford scattering-derivation.

UNIT – III

3. Mechanics of Rigid bodies

Definition Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum, Euler equations and its applications precession of a top, Gyroscope, prerecession of the equinoxes.

**SEMESTER - III**

**PHYSICS**

**WAVE OPTICS**

UNIT-I

1. Aberrations:

Introduction – monochromatic aberrations, spherical aberration, methods of minimizing

spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic

aberration-the achromatic doublet. Achromatism for two lenses (i)in contact and (ii)

separated by a distance.

UNIT-II

2. Interference

Principle of superposition – coherence-temporal coherence and spatial coherence-conditions

for interference of light. Fresnel’s biprism-determination of wavelength of light – change of

phase on reflection. Oblique incidence of a plane wave on a thin film due to reflected and

transmitted light (cosine law) – colors of thin filmsInterference

by a film with two non-parallel reflecting surfaces (Wedge shaped film).

Determination of diameter of wire, Newton’s rings in reflected light. Michelson

interferometer, Determination of wavelength of monochromatic light using Newton’s rings

and Michelson Interferometer.

UNIT-III

3. Diffraction

Introduction, distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction

–Diffraction due to single slit- Fraunhoffer diffraction due to double slit- Fraunhoffer

diffraction pattern with N slits (diffraction grating).Resolving power of grating, Determination of wavelength of light in normal incidence and minimum deviation methods using diffraction grating,

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**SEMESTER – V**

**III B.Sc.: Physics Semester V- Paper V**

Electricity, Magnetism and Electronics

**UNIT-I**

1. Electric field intensity and potential:

Gauss’s law statement and its proof- Electric field intensity due to (1) Uniformly

charged sphere and (2) an infinite conducting sheet of charge. Electrical potential –

equipotential surfaces- potential due to i) a point charge, ii) charged spherical shell .

2. Dielectrics:

Electric dipole moment and molecular polarizability- Electric displacement D,

electric polarization P –relation between D, E and P- Dielectric constant and

susceptibility. Boundary conditions at the dielectric surface.

**UNIT-II**

3. Electric and magnetic fields

Biot-Savart’s law, explanation and calculation of B due to long straight wire, a

circular current loop and solenoid – Hall effect – determination of Hall coefficient

and applications.

4. Electromagnetic induction

Faraday’s law-Lenz’s law- Self and mutual inductance, coefficient of coupling,

calculation of self inductance of a long solenoid, energy stored in magnetic field.

Transformer - energy losses - efficiency.

**III B.Sc : Physics Paper VI Semester-V**

**UNIT-I**

1. Atomic and molecular physics

Introduction –Drawbacks of Bohr’s atomic model. Vector atom model and Stern Gerlach

experiment - quantum numbers associated with it. L-S and j- j coupling

schemes. Zeeman effect(Definition only) -Raman effect, hypothesis, Stokes and

Anti Stokes lines. Quantum theory of Raman effect. Experimental arrangement –

Applications of Raman effect.

**UNIT-II**

2. Matter waves & Uncertainty Principle

Matter waves, de Broglie’s hypothesis - wavelength of matter waves, Properties of

matter waves - Davisson and Germer experiment – Heisenberg’s uncertainty

principle for position and momentum (x and p) & Energy and time (E and t).

**UNIT-III**

3. Quantum (wave) mechanics

Basic postulates of quantum mechanics-Schrodinger time independent and time

dependent wave equations-derivations. Physical interpretation of wave function.

Eigen functions, Eigen values. Application of Schrodinger wave equation to particle

in one dimensional infinite box.