# Lesson Plan (2022 -2023)

**Name: Dr. Kavita**

**Subject: Physics**

**Paper: Electrostatics & Magnetism**

**Class: B.Sc Ist Non-Medical & B.Sc Ist Non-Medical with Computer Science**

**September 2022**

Electrostaticts: Electrostatic Field, Electric Flux, Gauss's Theorem of Electrostatic, Application of Gauss Theorem, Divergence and curl of Electrostatic field and their physical significance, Electric Potential as line integral of electric field, Calculation of electric field from potential, Energy stored in electrostatic field per unit volume.

**October 2022**

Application of Electrostatic: Laplace and Poisson's equation for the electrostatic field, Multi-pole expansion of potential due to arbitrary charge distribution, Dielectric medium, Polarization, Bound charges in a polarizesd dielectric and their physical interpretation, Electric displacement, Gauss's theorem in dielectrics, Parallel plate capacitor completely filled with dielectric, Susceptibility, Permittivity and dielectric constants.

Unit Test 1 & Assignment 1

**November 2022**

Magnetism: Lorentz force law, Magnetic forces, Magneto statics, Biot-Savarts's law & its applications:(1) straight conductor (2) circular coil (3) solenoid carrying current, Divergence and curl of magnetic field, Ampere's circuital law and it's application for simple current configuration, Magnetic vector potential. Magnetization: The field of a magnetized object, bound currents, physical interpretation of bound currents, Ampere's law of magnetized objects, The Auxiliary field(H). Magnetic properties of materials, Permeability, Magnetic susceptibility, diamagnetism, Para-magnetism and ferromagnetism, B-H Curve, Currie point.

Kavita

# Lesson Plan

**Session 2022-23**

**Name of Extension Lecturer : Ms. Manisha kumari**

**Class : B.Sc.- I(N.M. &C.S.)** **Subject: MECHANICS-I(CPL-102)**

| Month | Topics Covered |
|---|---|
| September | Scalar & vector fields,Divergence & curl of a vector field,Laplacian operator,Line ,surface & volume integral of a vector field, gauss & stoke theorem & their applications<br>**ASSIGNMENT -I** |
| October | Time derivative of vector with examples,concept of cartesian, polar & spherical coordinates, motion in plane polar coordinate,velocity,acceleration in polar coordinates<br>Momentum & energy,centre of mass and coordinates with example, Motion of rockets,conservation of energy & momentum.<br>**TEST-I**<br>Elastic & inelastic collision in particles,angular velocity & angular momentum,parallel & perpendicular axes theorem,moment of inertia of different rigid bodies<br>**ASSIGNMENT-II** |
| November | Torque,coriolis force & its effect on motion<br>Basic properties of central force,two body problem equivalent to one body problem,motion of particle in cental force field,kepler's law,hooke,s law,poisson ratio,relation between elastic constants, bending moments, bending of cantilever & centrally loaded beams.<br>**TEST-II** |
| December | **Revision** |

Manisha
2/09/22

# Physics Lesson Plan 3rd Semester (2022-23)

**Class : B.Sc.II C.S. by Ms. Poonam and B.Sc. II N.M. by Dr. Monika**

| Month | Topics To Be Covered | Topics To Be Covered |
|---|---|---|
| Paper | **Heat and Thermodynamics : (CPL-302)** | **Semiconductor Devices (CPL-303)** |
| August | **Unit- I**<br>Zeroth and First Law of Thermodynamics: Extensive and intensive thermodynamic variables, Thermodynamic equilibrium, Zeroth law and Concept of Temperature, Work and heat, State functions, First law of thermodynamics, Internal energy, Applications of first law, General relation between Cp and Cv, Work done during isothermal and adiabatic Processes . Second Law of Thermodynamics: Reversible and Irreversible process with examples, Conversion of Work into Heat and Heat into Work, Heat Engines, Carnot's Cycle, Carnot engine & efficiency, Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence, Carnot's Theorem | **UNIT-I**<br>Semiconductor Diodes and applications: p and n type semiconductors. Barrier Formation in PN Junction Diode, Drift and Diffusion Currents, Current flow mechanism in Forward and Reverse biased PN Junction Diodes mentioning the roles of drift and diffusion currents, V-I characteristics of PN Junction Diode, Static and Dynamic Resistance, Applications of PN Junction Diode as Half-wave rectifier, Full-wave Rectifier (both center-tapped and bridge FWR),Calculation of ripple factor and rectification efficiency, Zener Diode, Applications of Zener Diode as DC voltage Regulator, Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell. |
| September | **Unit- II**<br>Entropy and Third law of Thermodynamics: Concept of entropy, Clausius theorem, Clausius Inequality,Second Law of Thermodynamics in terms of Entropy, Entropy of a Perfect Gas and Universe, Entropy Changes in Reversible and Irreversible Processes, Principle of Increase of Entropy, Third Law of Thermodynamics, T-S Diagrams, Phase Change, Classification of Phase Changes. | **Unit- II**<br>Semiconductor Transistors: Bipolar Junction transistors: n-p-n and p-n-p Transistors, Biasing of transistors in Active, Cutoff, and Saturation Modes, Circuit configurations of CB ,CE and CC transistors, characteristics of transistors in CB,CE and CC, Current gains α and β. Relations between α and β, Current gain and power gain, DC Load line and Q- point |
| October | **Unit- III**<br>Thermodynamic Potentials :- Extensive and Intensive Thermodynamic Variables, Internal Energy, Enthalpy, Gibbs, Helmholtz function and Their Definitions, Properties and Applications. Maxwell's Thermodynamic Relations: - Derivations of Maxwell's Relations. Applications of Maxwell's Relations: (1) ClausiusClapeyron equation, (2) Values of CP – CV, (3) Energy equations (4) Change of temperature during adiabatic process | **UNIT-III**<br>Amplifiers and Their Biasing: Voltage Divider Bias Circuit for CE Amplifier, bias stabilization, Class-A, B&C amplifiers, RC coupled amplifiers and its frequency response, Feedback in amplifiers, positive and negative feedback in amplifiers, Advantages of negative feedback in amplifiers, Sinusoidal Oscillators: Barkhausen's Criterion for Self-sustained oscillations, Circuit and working of Hartley oscillator, Circuit and working of Colpit's oscillator, Uses of oscillator. |
| November | **Unit – IV**<br>Real gases: - Behaviour of Real Gases, Deviations from the Ideal Gas Equation. The Virial Equation, Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas, Boyle Temperature, Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves, p-V Diagrams, Joule's Experiment, Free Adiabatic Expansion of a Perfect Gas. | **UNIT-IV**<br>Operational Amplifiers (Black Box approach): Qualitative idea of differential amplifier, CMRR, Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop& Closed-loop Gain. concept of Virtual ground, Applications of Op-Amps as Inverting Amplifier, Noninverting Amplifier, Differentiator, Integrator. |
| December | Revision & Tests. | Revision & Tests. |

# Lesson Plan

## Session 2022-23

**Name of Extension Lecturer : Mr. Sushil Kumar**

**Class : B.Sc.- III(N.M. &C.S.)** **Subject: Nuclear Physics(CPL-502)**

| Month | Topics Covered |
|---|---|
| September | Basic Properties of Nuclei: Nuclear composition (p-e and p-n hypotheses), Nuclear properties; Nuclear mass, size, spin, parity, magnetic dipole moment, quadruple moment (shape concept) and binding energy, nuclear binding energy curve. Radioactivity: Law of Radioactive Decay, Half-life, Radioactive Series, α-decay: Range of α-particles, Geiger Nuttal law and α-particle Spectra, β-decay, Energy Spectra and Neutrino Hypothesis, γ-decay : Origin of γ-rays. |
| October | Nuclear Models and Nuclear Forces: Similarity between nuclear matter and liquid drop, Liquid Drop Model, Semi-classical Mass formula, Limitations of liquid drop model, Magic number, Experimental signature of shell structure in nuclei, Nuclear Shell Model (qualitative only) and its application, Meson Theory of Nuclear Forces. UNIT -III Radiation Interaction: Interaction of heavy charged particles (proton, Alpha particles etc.); Energy loss of heavy charged particle (Discussion of Bethe formula), Range of alpha particles. Interaction of light charged particle (Beta particle), Interaction of Gamma Ray; Passage of Gamma radiations through matter (Photoelectric, Compton and pair production effect), Absorption of Gamma rays (Mass attenuation coefficient), Nuclear Reactions: Types of nuclear reactions, Concept of reaction cross-section, Concept of Compound and direct reactions |
| November | Interaction of Gamma Ray; Passage of Gamma radiations through matter (Photoelectric, Compton and pair production effect), Absorption of Gamma rays (Mass attenuation coefficient), Nuclear Reactions: Types of nuclear reactions, Concept of reaction cross-section, Concept of Compound and direct reactions<br>Nuclear Radiation Detectors: Gas filled counters; Ionization chamber, proportional counter, G.M. Counter (detailed study), Basic principle of scintillation counter and semiconductor detectors. Nuclear Reactors: General aspects of reactor design, Nuclear fission reactor (Principle, construction, working and use) Particle Accelerators: Particle Accelerator facilities in India, Linear Accelerator, Cyclotron, Synchrotron |
| December | **Revision** |

5/9/22

# Lesson Plan

**Session 2022-23**

**Name of Extension Lecturer : Ms. Komal Rani**

**Class : B.Sc.- III(N.M. &C.S.)** **Subject:Elements of Modern Physics**

(CPL- 501)

| Month | Topics Covered |
|---|---|
| September | Introduction to Quantisation: Properties of Thermal Radiation, Spectral Distribution of Blackbody Radiation, Kirchhoff's Law, Stefan-Boltzmann Law and Wien's Distribution and Displacement law, Rayleigh-Jean's Law, Ultraviolet Catastrophe, Planck's Quantum Postulates, Planck's Law of Blackbody Radiation: Experimental Verification. Photo-electric effect and Compton scattering; Pair production and annihilation, Bremsstrahlung effect, Cherenkov radiation, Production of X-rays.<br>**ASSIGNMENT -I** |
| October | Bohr Model: Drawbacks of Rutherford model, Bohr atomic model; Bohr's quantization rule and atomic stability; Calculation of energy levels for hydrogen like atoms and their spectra, Effect of nuclear mass on spectra, Correspondence principle. Fundamentals of Wave Mechanics: De Broglie wavelength and matter waves; Wave-particle duality; Frank-Hertz, Davison and Germer experiment, phase velocity, group velocity and their relations.<br>**TEST-I**<br>Heisenberg Uncertainty Principle; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle, Properties of wave-function, Physical Interpretation of wave-function.<br>**ASSIGNMENT-II** |
| November | Schrodinger Equation: Momentum and Energy operators, Stationary states, Physical interpretation of a wave function, probabilities and normalization, Schrodinger Equation, Particle in1-dimention infinite potential well.<br>**TEST-II**<br>LASER: Absorption and emission of radiation (qualitative only); Basic features of LASER, Population inversion; Resonance cavity; laser pumping; threshold condition for laser emission; Einstein's Co-efficient, 3 level and 4 level system, Basic principle and working of He-Ne LASER and Ruby LASER, Applications of LASER. |
| December | **Revision** |

Komal 2/9/22