

# Department of Physics, GC Narnaund, Hisar

## Lesson Plan

Name of Assistant Professor : **Dr. Parveen Jain**

Class : **B.Sc. (Non medical and computer Science)**

Semester : **1<sup>st</sup>**

Subject : **Physics (Paper 1(Mechanics –I) and Paper 2 (ELECTRICITY AND MAGNETISM-I))**

Lesson Plan : **From November 2020 to March 2021**

**02.11.2020-15.11.2020 : Mechanics I**:- **Unit I** Vectors Calculus, Gradient of a scalar field and its geometrical interpretation, Divergence and curl of a vector field, Laplacian operator, Vector identities, Line, surface and volume integrals of Vector fields, Flux of a vector field, Gauss's divergence theorem, Stokes Theorem and their applications.

**Week 1** 16.11.2020-23.11.2020 : **Mechanics I**:- **Unit II** Ordinary Differential Equations: First Order Differential Equations and Integrating Factor, 1st order homogeneous differential equations, 2nd order homogeneous differential equations with constant coefficients, Particular Integral,

**Week 2** 24.11.2020-1.12.2020 : **EMT-I**:- **Unit I** Electrostatics: Coulomb's law, Electrostatic Field, Electric flux, Gauss's theorem of electrostatics. Applications of Gauss's theorem (1) Electric field due to point charge, infinite line of charge (2) due to uniformly charged spherical shell and solid sphere, (3) due to plane charged sheet (4) due to charged conductor, Divergence and curl of electrostatic field, Electric potential as line integral of electric field, Potential due to (1) a point charge (2) electrical dipole (3) uniformly charged spherical shell (4) solid sphere, Calculation of electric field from potential.

**Week 3** 2.12.2020-9.12.2020 : Electric field due to (4) due to charged conductor, Divergence and curl of electrostatic field, Electric potential as line integral of electric field, Potential due to (1) a point charge (2) electrical dipole (3) uniformly charged spherical shell (4) solid sphere, Calculation of electric field from potential.

**Week 4** 10.12.2020-17.12.2020 : **EMT-I**:- **Unit II** Application of Electrostatics: Capacitance of (1) an isolated spherical conductor (2) Parallel plate (3) spherical and cylindrical condenser, Energy per unit volume in electrostatic field, Laplace and Poisson's equations for the electrostatic field.

**Week 5** 18.12.2020-25.12.2020 : Multipole expansion of potential due to arbitrary charge distribution, Dielectric medium, Polarization, Bound charges in a polarized dielectric and their physical interpretation, Electric displacement, Gauss's theorem in dielectrics,

**Week 6** 26.12.2020-2.1.2021 : Parallel plate capacitor completely filled with dielectric, Susceptibility, Permittivity and dielectric constant

**Week 7** 4.1.2021-11.1.2021 : **EMT-I**:- **Unit III** Magnetism: Lorentz force law, magnetic

forces, Magnetostatics: Biot-Savart's law & its applications (1) straight conductor (2) circular coil (3) solenoid carrying current, Divergence and curl of magnetic field,
<b>Week 8</b> 12.1.2021-19.1.2021 : Magnetic vector potential, Ampere's circuital law and it's applications for simple current configurations, Magnetic vector potential.
<b>Week 9</b> 20.1.2021-27.1.2021 : : <b>EMT-I:- Unit IV</b> Magnetization: The field of a magnetized object, bound currents, physical interpretation of bound currents, Ampere's law for magnetized objects, The Auxiliary field (H),
<b>Week 10</b> 28.1.2021-4.2.2021 : Magnetic properties of materials, Permeability, Magnetic susceptibility, diamagnetism, paramagnetism and ferromagnetism, B-H Curve, Currie point
<b>Week 11.</b> 5.2.2021-12.2.2021 : <b>Mechanics I Unit III:</b> Momentum and Energy, Dynamics of a system of particles, Rotational Motion: Coriolis forces and its effect on motion
<b>Week 12</b> 13.2.2021-20.2.2021 : <b>Mechanics I Unit IV</b> Gravitation: Newton's Law of Gravitation, Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant), Kepler's Laws, Satellite in circular orbit and applications, Geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS).
<b>Week 13</b> 22.2.2021-27.2.2021 : Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants

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## Lesson Plan

Name of Assistant Professor : **Dr. Parveen Jain**

Class : **B.Sc. (Non medical and computer Science)**

Semester : **5<sup>th</sup>**

Subject : **Physics (Paper I(Nuclear Physics))**

Lesson Plan : **From November 2020 to March 2021 (Only two days in a week)**

<b>02.11.2020-15.11.2020</b> : <b>Unit I</b> Basic Properties of Nuclei: composition, mass, size, spin, dipole moment, binding energy per nucleon,
<b>Week 1</b> 16.11.2020-23.11.2020 : Radioactivity, Law of radioactive decay, half life, radioactive series
<b>Week 2</b> 24.11.2020-1.12.2020 : alpha, beta and gamma decay, GN law, energy spectrum, orogin of gamma rays.
<b>Week 3</b> 2.12.2020-9.12.2020 : <b>Unit II</b> :- Nuclear models and nuclear forces, nuclear matter and liquid drop model.
<b>Week 4</b> 10.12.2020-17.12.2020 : Semi classic mass formula, limitations of models, magic numbers
<b>Week 5</b> 18.12.2020-25.12.2020 : experimental signature of shell structure in nuclei, nuclear shell model, meson theory of nuclear forces.
<b>Week 6</b> 26.12.2020-2.1.2021 : Parallel plate capacitor completely filled with dielectric, Susceptibility, Permittivity and dielectric constant
<b>Week 7</b> 4.1.2021-11.1.2021 : <b>Unit III</b> Radiation interaction of heavy charged particles, energy loss, range of alpha particles.
<b>Week 8</b> 12.1.2021-19.1.2021 : interaction of light charged particles, interaction of gamma rays, gamma rays through matter,
<b>Week 9</b> 20.1.2021-27.1.2021 : : Photoelectric effect, Compton effect and pair production, mass attenuation coefficient
<b>Week 10</b> 28.1.2021-4.2.2021 : Types of nuclear reactions, concept of reaction cross section, concept of compound and direct reactions.
<b>Week 11.</b> 5.2.2021-12.2.2021 : <b>Unit IV</b> : Nuclear radiation detectors, Gas filled counters, ionization chamber, propotional chamber
<b>Week 12</b> 13.2.2021-20.2.2021 : GM counter, scintillation counter and semiconductor detectors.
<b>Week 13</b> 22.2.2021-27.2.2021 : General aspects of reactor design, nuclear fission reactor, particle accelerator, cyclotron and synchrotron.

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