<table>
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<th>Section</th>
<th>Course Designation</th>
<th>Year/ Semester</th>
<th>Course No.</th>
<th>Course Title</th>
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<td>First Year</td>
<td>BPH-101</td>
<td>Applied Physics-I</td>
<td>Theory</td>
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**Course Assessment Method**

1. Assignments, Oral Quizzes and Class Work-------- (5 Marks)
2. Mid-Semester Examination------------------------ (10 Marks) – 1 Hour
3. End-Semester Examination------------------------ (35 Marks) – 2 Hours

**Course Objectives**

1. To impart knowledge of basic Physics relevant to the Diploma in Engineering.
2. To explain how physics applies to phenomena in the world around them.
3. To enhance the thinking capabilities in line with the modern trends in engineering and technology.
4. To enthusiastically engage in learning what is known about our world.

**Course Outcomes**

After the completion of the course, the learner would be able to:

1. Demonstrate understanding of principles of physics in general, and mechanics, thermal physics, properties of matter, and optics in particular.
2. Apply this knowledge to analyze a variety of physical phenomena.
3. Recognize how and when physics methods and principles can help address problems in their major and then apply those methods and principles to solve them.
4. Solve diverse problems by using experimental, and/or theoretical methods and applying the relevant laws to the problem.
5. Develop a passion for participating in pushing the bounds of our knowledge even further.

**Topics to be covered**

**Unit-I**

Scalar and vector quantities, Type of vectors: zero vector, unit vector, equal vectors. Resolution of vectors, Vectors expressed in terms of position vectors, Multiplication of a vector by a scalar. Scalar and vector products of two vectors. Applications of scalar and vector products in mechanics and electrodynamics. Rigid body, rotational motion of a rigid body, moment of inertia and radius of gyration, kinetic energy of a rotating body, theorems of moment of inertia, calculation of moment of inertia of a thin uniform rod and a circular disc.


**Unit-II**

Molecular structure of material, elasticity, stress, strain, Hooke’s law, Young’s modulus of elasticity, Bulk modulus, modulus of rigidity, Poisson’s ratio, relation between elastic constants (without proof). Torsional rigidity. Determination of Young’s modulus of elasticity in laboratory.

**Unit-III**


**Text Books and/or Reference Books**

3. NCERT “Physics for class XI”

**Additional Learning Source**

https://www.khanacademy.org/science
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<th>Section</th>
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**Course Assessment Method**

4. Course Work------------------------------------- (30 Marks)
5. Mid-Semester Examination ---------------
6. End-Semester Examination------------------ (20 Marks) – 2 Hours

**Course Objectives**

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
3. To use the different measuring devices and meters to record the data with precision.
4. Apply the analytical techniques and graphical analysis to the experimental data.
5. Apply the mathematical concepts/equations to obtain quantitative results.
6. To develop basic communication skills through working in groups in performing the laboratory experiments.

**Course Outcomes**

After the completion of the course, the learner would be able to:
1. Fully appreciate the Physics theory due to enhanced understanding.
2. Recognize the correct number of significant figures in a measurement or in the results of a computation.
3. Use various scientific instruments and take measurements from them.
4. Plot graphs from a series of data points and draw conclusions by studying them.
5. Apply mathematical equations/knowledge.
6. Work effectively as part of a team and pool knowledge and skills.

**Experiments to be performed**

1. To determine the volume of the material contained in a given cylinder by Vernier Callipers.
2. To determine the density of the material of the given wire by screw gauge and physical balance.
3. To find the weight of a given body using the law of parallelogram of vectors.
4. To determine the moment of inertia of an irregular body with the help of inertia table.
5. To verify the Boyle’s law and plot a graph between P and 1/V.
6. To study the variation of time period (T) with length (L) of a simple pendulum and hence to determine the value of g at Aligarh by plotting L-T² graph.
7. To determine the value of Young’s modulus of elasticity of the material of given wire by Searle’s Apparatus.
8. To determine the refractive index of the glass with the help of travelling microscope.

**Text Books and/or Reference Books**


**Additional Learning Source**

http://www.ncert.nic.in/exemplar/labmanuals.html
Course Assessment Method

7. Assignments, Oral Quizzes and Class Work--------- (5 Marks)
8. Mid-Semester Examination------------------------ (10 Marks) – 1 Hour
9. End-Semester Examination------------------------ (35 Marks) – 2 Hours

Course Objectives

1. To impart knowledge of basic Physics relevant to the Diploma in Engineering.
2. To explain how physics applies to phenomena in the world around them.
3. To enhance the thinking capabilities in line with the modern trends in engineering and technology.
4. To enthusiastically engage in learning what is known about our world.

Course Outcomes

After the completion of the course, the learner would be able to:
1. Demonstrate understanding of principles of physics in general, and Electromagnetism, Condensed Matter Physics, Nuclear Physics, and Modern Physics in particular.
2. Apply this knowledge to analyze a variety of physical phenomena.
3. Recognize how and when physics methods and principles can help address problems in their major and then apply those methods and principles to solve them.
4. Solve diverse problems by using experimental, and/or theoretical methods and applying the relevant laws to the problem.
5. Develop a passion for participating in pushing the bounds of our knowledge even further.

Topics to be covered

**Unit-I**
Matter and charge, conservation of charges, quantization of charge, Coulomb law. Electric field \( \mathbf{E} \) (definition, units and representations by lines of forces), \( \mathbf{E} \) due to an isolated charge. Flux of electric field. Gauss’s law of electrostatics, derivation of Coulomb’s law from Gauss’s law. Determination of \( \mathbf{E} \) due to an infinite line of charges using Gauss’s law. Electric dipole. Definition of electric potentials \( V \) and its derivation at a point due to an isolated charge, general relation between \( \mathbf{E} \) and \( V \), electrical potential energy.

Electromagnetism. Definition of magnetic flux, flux of magnetic induction, Magnetic field \( \mathbf{B} \) and its unit, Bio-Savart Law, Magnetic field due to a straight current carrying conductor, Force between two parallel current carrying conductors, Definition of Ampere, Magnetic field of a flat circular coil. Ampere’s law (\( \oint \mathbf{B} \cdot d\ell = \mu_0 I \)), Lorentz force \( \mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B}) \). Magnetic moment of a magnet and Tangent law.

**Unit-II**
Rutherford atomic model, Failure of Rutherford atomic model. Bohr’s theory of hydrogen atom, expression for energy of electron in different states. Excitation and ionization energies and potentials. Structure of solids, crystalline and amorphous solids, idea of lattice, packing in crystals (calculations of packing factor for sc, bcc, fcc structures), conductors, insulators, semi-conductors. p and n type semi conductors, superconductors. Mechanism of production of X-rays, continuous and characteristics X-rays, Duane and Hunt rule. Applications of X-rays.

**Unit-III**

**Text Books and/or Reference Books**
6. NCERT “Physics for class XII”

**Additional Learning Source**
https://www.khanacademy.org/science
Course Assessment Method

10. Course Work------------------------------------- (30 Marks)
11. Mid-Semester Examination -------------------
12. End-Semester Examination--------------------- (20 Marks) – 2 Hours

Course Objectives

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. To use different measuring devices and meters to record the data with precision.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. Apply the mathematical concepts/equations to obtain quantitative results.
5. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Course Outcomes

After the completion of the course, the learner would be able to:
1. Fully appreciate the Physics theory due to enhanced understanding.
2. Use various scientific instruments and take measurements from them.
3. Interpret the results of the experimental findings.
4. Apply mathematical skills/knowledge.
5. Refine his understanding through discussion and explanation.

Experiments to be performed

1. To find the radius of curvature of a concave mirror by Spherometer.
2. To determine the coefficient of friction between wood and glass and to plot a graph between frictional force (F) and normal reaction(R).
3. To determine the refractive index of the material of the prism by angle of minimum deviation method.
4. To determine the focal length of a convex lens by two pin method.
5. To determine the frequency of the tuning fork by sonometer.
6. To compare the e.m.f. of two cells by potentiometer.
7. To determine the specific resistance of the material of given wire using post office box.
8. To study the variation of resistance with temperature of the given semiconductor.

Text Books and/or Reference Books


Additional Learning Source

http://www.ncert.nic.in/exemplar/labmanuals.html