Government PG College Ambala Cantt

Session: 2023-2024 (Odd semester)

Name of Assistant Professor: Dr. Samiksha Kumari

Class: B.A. Ist year (Sem-I) Section-E

Subject: Physics (Paper: Physics Fundamentals –I, PHY-104)

SYLLABUS

Max. Marks:75

Internal Assessment Marks:20

End Term Exam Marks: 55

Time: 3 hours

Note: Nine questions will be set in total. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks. 20% numerical problems are to be set. Use of scientific (non-programmable) calculator is allowed.

Unit - I

Physics-Nature, scope & excitement, Major discoveries in physics, major contribution by Indian Physicists, Fundamental physical constants, Physics in relation to other sciences, impact of physics on society and on latest development in science & technology. System of Measuring Units-Need for measurement, measuring process, concept of mass, length, time; Fundamental and derive units, system of units, concepts of error, types of error (only definition), Accuracy and precision in measurement, least count and applications of measuring instruments -Vernier caliper, Screw Gauge.

Unit - II

Motion of objects in one dimension- position of the object, origin/reference point, frame of reference, definitions and examples of motion in one, two and three dimension, Scalar and Vector quantities, description of motion along a straight line- distance and displacement, uniform motion and nonuniform motion, average and instantaneous speed, average and instantaneous velocity, acceleration; graphical analysis of straight line motion- distance- time graph, velocity-time graph, equation of motions and their applications.

Unit - III

Causes of motion- concept of force, Newton’s Ist law of motion, inertia and mass; Newton’s 2 nd law of motion, momentum and force; 3 rd law of motion, daily life applications of Newton’s laws of motion. Universal law of gravitation and its importance, acceleration due to gravity and free fall of a body; mass and weight of an object on earth and moon, concept of thrust and pressure and importance in daily life, buoyancy and Archimedes principle-the physics behind floating of objects on water.

Unit - IV

Work, energy, types of energy-Kinetic energy and Potential energy, P.E. of an object at a height; law of conservation of energy and its applications. Conservation of linear and angular momentum, collision (elastic and inelastic) and conservation laws in collisions- importance in daily life; concepts of center of mass-Physics behind cycling, rock climbing and skating.

Recommended Books/e-resources/LMS:

1. Essential University Physics, Vol.-1 &2 by Richard Wolfson, Pearson Education, Patparganj, Delhi, India.

2. Concept of Physics by H.C. Verma, Bharti Bhawan, Ansari Road, Daryaganj, New Delhi, India.

3. Modern Physics (2nd edition), by S.L. Kakani and Shubhra Kakani, Viva Books, New Delhi.

4. Physics for Scientists and Engineers with Modern Physics, 7 th edition, by Raymond A. Serway and John W. Jewett, Jr., Thomson Higher Education 10 Davis Drive Belmont, CA 94002-3098 USA.

5. Physics For You, Fifth Edition, by Keith Johnson, OUP Oxford; 5th edition (23 June 2016).

Course Outcomes:

1. To recognize the concepts of Physics and to relate them to various natural phenomena.
2. Able to differentiates between certain physical quantities; such as, between distance and displacement; speed and velocity; average, relative and instantaneous velocity and speed.
3. To learn how and where to use international system of units (SI Units), symbols, nomenclature of physical quantities and formulations such as newton, pascal, joule, watt, hertz etc.
4. Able to understand the need of accuracy, precision, errors and uncertainties in measurement.
5. Able to explain phenomena and laws of fundamental law of motion, friction, lubrication, conservation laws and about the forces in nature.
6. Able to understand the concept of velocity due to acceleration, acceleration due to gravity of earth, why a seasoned cricketer draws in her/his hands during a catch.
7. Able to analyses and interprets data, graphs, and figures, and draws conclusion; such as, motion in a plane.
8. Handles tools and laboratory apparatus properly; measures physical quantities using appropriate apparatus, instruments, and devices; such as, scales, vernier calipers, screw gauge, stop clock/watch etc.

Course Learning Outcomes:

After completing this course, the learner will be able to:

1. Have knowledge about the nature, scope and impact of physics on technological development of the society.

2. Understand and describe motion of an object in one dimension.

3. Understand and describe the laws of motion and their applications in daily life.

4. Understand and appreciate the importance of laws of conservation of energy and momentum in daily life.

5. Learn to present observations, results, analysis and different concepts related to experiments of Physics Fundamentals –I.

Lesson Plan

MDC (Two classes in a week i.e. on Friday & Saturday)

Session Started: 24 July 2023

Session Ended: 30 November 2023

Diwali Break: 10 -16 Nov 2023

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| **Week** | **Topic** |
| **1** | **Unit 1:** Physics-Nature, scope & excitement, Major discoveries in physics, major contribution by Indian Physicists, Fundamental physical constants, Physics in relation to other sciences, |
| **2** | impact of physics on society and on latest development in science & technology. System of Measuring Units-Need for measurement, measuring process, concept of mass, length, time; |
| **3** | Fundamental and derive units, system of units, concepts of error, types of error (only definition),  |
| **4** | Accuracy and precision in measurement, least count and applications of measuring instruments -Vernier caliper, Screw Gauge, **Revision** |
| **5** | **Unit 2**: Motion of objects in one dimension- position of the object, origin/reference point, frame of reference, definitions and examples of motion in one, two and three dimensions, |
| **6** | Scalar and Vector quantities, description of motion along a straight line- distance and displacement, |
| **7** | uniform motion and non-uniform motion, average and instantaneous speed, average and instantaneous velocity,  |
| **8** | acceleration; graphical analysis of straight-line motion- distance- time graph, velocity-time graph, equation of motions and their applications. **Revision** |
| **9** | **Unit 3:** Causes of motion- concept of force, Newton’s Ist law of motion, inertia and mass; Newton’s 2nd law of motion, momentum and force; 3rd law of motion, daily life applications of Newton’s laws of motion. |
| **10** | Universal law of gravitation and its importance, acceleration due to gravity and free fall of a body; mass and weight of an object on earth and moon,  |
| **11** | concept of thrust and pressure and importance in daily life, buoyancy and Archimedes principle-the physics behind floating of objects on water. **Revision** |
| **12** | **Unit 4: W**ork, energy, types of energy-Kinetic energy and Potential energy, P.E. of an object at a height; |
| **13** | law of conservation of energy and its applications |
| **14** | Conservation of linear and angular momentum, collision (elastic and inelastic) and conservation laws in collisions- |
| **15** | importance in daily life; concepts of center of mass-Physics behind cycling, rock climbing and skating. |
| **16** | **House exam, Revision & Tests** |
| **17** | **Revision & Tests** |