PHYSICS 1(ELEMENTARY MECHANICS)

PRE-REQUISITE: FSc Level Physics

INTRODUCATION: CREDITE HOURS: 3

This course is one part of four that constitute the Introductory Physics program for Physics Majors. It is a stepping stone to all the upper-level Physics courses providing fundamental knowledge, mathematical techniques and laboratory practices. Many of the concepts in mechanics introduced in this course will be encountered again & expanded upon in later courses.

COURSE OBJECTIVE:

The main objective of this course is to understand the different motions of objects on a macroscopic scale and to develop simple mathematical formalisms to analyze such motions. This is a calculus-based introductory course with maximum emphasis on applying the acquired knowledge to solving problems.

COURSE OUTLINE:

Basic Concepts: Units and Dimensions, SI Units, Changing Units, Scalars and Vectors, Adding **Vectors:** Graphical as well as Component Method, Multiplying Vectors: Dot and Cross Products.

Dynamics: Motion in One, Two and Three Dimensions: Position & Displacement, Velocity and Acceleration, Motion under Constant Acceleration, Projectile Motion, Uniform Circular Motion, Relative Velocity and Acceleration in One and Two Dimensions, Inertial and Non-Inertial Reference Frames.

Newton's Laws: Newton's Laws of Motion and their Applications involving some particular forces including Weight, Normal Force, Tension, Friction, and Centripetal Force, Newton's Law of Gravitation, Gravitational Potential Energy, Escape Velocity, Kepler's Laws, Satellite Orbits & Energy.

Work and Kinetic Energy: Work done by Constant and Variable Forces: Gravitational and Spring Forces, Power, Conservative and Non-conservative Forces, Work and Potential Energy, Isolated Systems and Conservation of Mechanical Energy, Work Done by External Forces including Friction and Conservation of Energy.

System of Particles: Motion of a System of Particles and Extended Rigid Bodies, Center of Mass and Newton's Laws for a System of Particles, Linear Momentum,

Impulse, Momentum & Kinetic Energy in One and Two Dimensional Elastic and Inelastic Collisions.

Rotational Motion: Rotation about a Fixed Axis, Angular Position, Angular Displacement, Angular Velocity and Angular Acceleration, Rotation under Constant Angular Acceleration, relationship between Linear and Angular Variables, Rotational Inertia, Parallel-axis Theorem, Torque and Newton's Law for Rotation, Work and Rotational Kinetic Energy, Power, Rolling Motion,

Angular Momentum: Angular Momentum for a single Particle and a System of Particles, Conservation of Angular Momentum, Precession of a Gyroscope, Static Equilibrium involving Forces and Torques, Determination of moment of inertia of various shapes i.e. for disc, bar and solid sphere. Angular Momentum: Angular Velocity, Conservation of angular momentum, effects of Torque and its relation with angular momentum.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

REFERENCE BOOKS:

1. Physics Vol. I & II (extended) by Resnick, Halliday and Krane, 4th Edition, John Wiley and Sons Inc, New York, 1992.
2. Physics Vol. I & II by Resnick, Halliday and Krane, 5th Edition, John Wiley and Sons Inc, New York, 2002.
3. Fundamental of Physics by Halliday Resnick and Krane, 5th Edition, John Wiley and Sons Inc, New York, 1999.
4. University Physics 8th Edition by Sears, Zemansky and Young, Addison-Wesley, Reading (MA), USA, 2000.
5. Physics by Alonso and Finn: Addison-Wesley, Reading (MA), USA, 1999.

PHYSICS LAB-I (GENERAL PHYSICS-I)

1. To determine height of an inaccessible object by sextant
2. Time Measurement - The Simple Pendulum
3. To Find the Value of G by Free Fall Method
4. Verification of law of moment by using Bell Crank lever
5. To determine the frequency of A.C supply by Meld's apparatus
6. Study the Compound Pendulum and Determine the Value of g
7. To determine the modulus of rigidity of a wire by a spiral spring
8. To Determine the Young's Modulus of wire
9. To Determine the Modulus of Rigidity of Wire by Dynamic Method
10. To determine the modulus of rigidity of wire by Maxwell needle

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
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