Module Code:	Phy - 101
Module title:	Physics-I (**Mechanics & Optics**)
Name of Scheme:	BS Chemistry (4 Years)
Semester :	1st
Module Type:	General
Module Rating:	2 Credits

1. **Introduction of the course:**
   This course is to provide the student a clear and a logical presentation of the basic concepts and principles of mechanics. Another aim of this course is associating the real world with physics to improve a better understanding of its concepts and principles, specially with the set of physical laws describing the motion of bodies under the action of a system of forces, the motion of macroscopic objects, from projectiles to parts of machinery, as well as astronomical objects, such as spacecraft, planets, stars and galaxies.

2. **Course Objectives:**
   In this course, we study the physics of motion from the ground up – learning the basic principles of physical laws and their application to the behavior of objects. Mechanics studies statics, kinematics (motion), dynamics (forces), energy, and momentum developed prior to the 1900 from the physics of Galileo and Isaac Newton.

3. **Course Contents**
   Mechanics Vector Operations

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Vector in 3 dimensions; Vector derivatives and operation; Gradient, Divergence and Curl of a vector; Divergence Theorem; Stokes Theorem.

Particle Dynamic

Advanced application of Newton's laws Dynamics of Uniform motion; Equations of motion; Time dependent forces; Effect of drag forces on motion; Non inertial frames and pseudo forces; Non inertial frames and Pseudo forces; Limitations of Newton's Laws.

Work, Energy and Power

Work done by a constant force, work done by a variable force (1-dimensions); Work done by a variable (2-dimension) Work energy theorem, General proof of work energy theorem. Power: Reference Frames.

Conservation of Energy

Conservative, and non conservative forces; One dimensional conservative system; 2,3 dimensional conservative system; Conservation of energy in a system of particles system two practical system. Center of mass of solid object; Momentum changes in system of variable mass.

Collisions

Inelastic collision conservation of momentum during collision in center of Mass reference frame.

Rotational Dynamics

Angular momentum; angular velocity; Overview of rotational Dynamics; Parallel axis theorem; Determination of momentum of interstice of various shapes; Rotational dynamics of rigid bodies; combined rotational and transitional motion. Stability of spinning objects, the spinning Top.

Gravitation

Review of basic concepts of gravitation. Gravitational effect of a spherical mass distribution; Gravitational Potential Energy; Gravitational field & potential; Universal Gravitational Law.

Bulk Properties of Matters

Elastic Properties of Matter; Fluid Statistics; Fluid Dynamics; Bernoulli Equation; Viscosity.

Optic Topic

Nature of light; Light as an Electro magnetic wave; Interference; Adding of Electromagnetic wave using phasors; Interference from thin films; Michelson Interferometer; Fresnel Biprism and its use; Diffraction; Diffraction from multiple slits; Diffraction grating; Holography; Polarization; Description of polarization states; Rotation of plane of polarization.

4. **Teaching-learning Strategies**
    1. Lectures
    2. Group Discussion
    3. Laboratory work
    4. Seminar/ Workshop

5. **Learning Outcome:**
    1. Relative motion. Inertial and non inertial reference frames.
    2. Parameters defining the motion of mechanical systems and their degrees of freedom.
    3. Study of the interaction of forces between solids in mechanical systems.
    4. Centre of mass and inertia tensor of mechanical systems.
    5. Application of the vector theorems of mechanics and interpretation of their results.
    6. Newton's laws of motion and conservation principles.
    7. Introduction to analytical mechanics as a systematic tool for problem solving.

6. **Assessment Strategies**:
    1. Lecture Based Examination (Objective and Subjective)
    2. Assignments
    3. Class discussion
    4. Quiz
    5. Tests

7. **Recommended Readings:**
    1. Physics Vol. I & II (extended) by Resnick, Halliday and Karne, 4th and Sons Inc, New York.
    2. Fundamentals of Physics by Halliday Resnick and Krane, John Wiley and Sons Inc, New York.
    3. University Physics 8th Edition by Sears, Zemansky and Young, Addison – Wesley, Reading (MA), USA
    4. Physics by Alonso and Finn; Addison-Wesley, Reading (MA) USA.
    5. Physics for scientist and engineers by Serway and Jewelt, 6th Edition, Thomson Brooks/cole, 2004.

Module Code: Phy - 102

BS (Chemistry) 4Year Program

Module title:	Physics – I (Physics Lab)
Name of Scheme:	BS Chemistry (4 Years)
Semester :	1st
Module Type:	General
Module Rating:	1 Credits

1. Introduction of the course:

This course is to provide the student a clear and a logical presentation of the basic concepts and principles of mechanics. Another aim of this course is associating the real world with physics to improve a better understanding of its concepts and principles, specially with the set of physical laws describing the motion of bodies under the action of a system of forces, the motion of macroscopic objects, from projectiles to parts of machinery, as well as astronomical objects, such as spacecraft, planets, stars and galaxies.

2. Course Objectives:

1. To Study of bending behavior of beams and analyze the expression for young's modulus
2. To understand the surface tension and viscosity of fluid
3. To understand the dynamics and gravitation
4. To Study the behavior of rigid body dynamics
5. To understand the negative result of Michelson Morley experiment, Galilean and Lorentz transformation.

3. Course Contents:

1. Surface tension by capillary rise.
2. Study of compound pendulum and estimate of value of 'g'
3. Elastic constants by spiral spring
4. Modulus of rigidity by dynamic method and static method of Maxwell's Needle.
5. Spring Constant by static and dynamic method.
6. Modulus of rigidity by dynamic method.

4. Teaching-learning Strategies

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

5. Learning Outcome:

The students would be able

1. to explain bending behavior of beams and analyze the expression for young's modulus
2. to describe the surface tension and viscosity of fluid
3. to understand the dynamics and gravitation
4. to explain the behavior of rigid body dynamics
5. to understand the negative result of Michelson Morley experiment, Galilean and Lorentz transformation.
6. to understand the definition for centre of gravity.

6. Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

7. <u>Recommended Readings</u>:

1. Physics Vol. I & II (extended) by Resnick, Halliday and Karne, 4th and Sons Inc, New York.
2. Fundamentals of Physics by Halliday Resnick and Krane, John Wiley and Sons Inc, New York.
3. University Physics 8th Edition by Sears, Zemansky and Young, Addison – Wesley, Reading (MA), USA
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