



Bangladesh University of Engineering & Technology

Department of Physics

Course Code: PHY 125 (MME)

Teacher's name: Dr. Mehnaz Sharmin

### Course Objectives:

Waves and oscillations is a branch of physics that is related to almost every sphere of our everyday life. It covers a wide area of knowledge extending from microscopic systems (Example: vibrations of atoms in a solid, motion of an electron in an atom, etc.) to macroscopic systems (Example: motion of a fan or a wheel, human body, solar system, etc.). The objective of this course is to clarify the basic knowledge of different type of waves and oscillations and to present some real- life examples of the applications of this subject.

### Lecture Plan for Waves and Oscillations:

Lectures	Topics
1-5	Differential equation of a simple harmonic oscillator, Total energy and average energy, Combination of simple harmonic oscillations, Lissajous figures, Spring-mass system, Calculation of time period of torsional pendulum, Two-body oscillations, Reduced mass.
6-8	Damped oscillation, Determination of damping co-efficient, Forced oscillation, Resonance.
9-12	Differential equation of a progressive wave, Power and intensity of wave motion, Stationary wave, Group velocity and phase velocity.
13-14	Architectural acoustics, Reverberation and Sabine's formula.

### References:

1. Physics – David Halliday, Robert Resnick, and Jearls Walker (6<sup>th</sup> Ed.)
2. Vibrations and Waves- A. P. French
3. Physics for Engineers (Part-1) - Dr. Gias Uddin Ahmad
4. Waves and Oscillation – Brij Lal and N. Subramaniam

### Learning Outcomes:

After finishing this course a student will be able to-

1. Solve the equation of motion for different types of oscillatory systems.
2. Analyse the Lissajous figures using the principle of superposition.
3. Distinguish different types of waves and the phenomena related to them.
4. Analysing problems related to wave motion.
5. Explain Reverberation in terms of Sabine's formula.