Subject Matter : Vibration and Wave

Code/Credit : FIC 326/3

Prerequisite : -

Competences : After completing this course, student should have ability and be able to understand, analyze and to achieve concepts of vibration and waves in daily activities.

Description : This course will give fundamental concepts about mechanical vibrations and waves, coupled oscillators, and electro-magnetic radiation.

References:

King, George C. 2009. Vibration and Wave. New York: John Willey and Sons

French, A. P. 1971. *Vibrations and Waves*. New York, N.Y.: W.W. Norton & Company.

Akira Hirose, 1985. The Wave Phenomena. New York: John Willey and Sons.

Learning Activities

Day	Section	Part	Activities
1,2	Introduction: Simple Harmonic Motion	a. Physical Characteristics of Simple Harmonic Motion b. A Mass on a Spring c. The Pendulum d. Oscillation in Electrical Circuits: Similarities in Physics	Discussion, assignments and test
3,4	The Damped Harmonic Oscillator	a. Physical Characteristics of the Damped Harmonic Oscillator b. The Equation of Motion for a Damped Harmonic Oscillator c. Rate of Energy Loss in a Damped Harmonic Oscillator d. Damped Electrical Oscillations	Discussion, assignments and test
5	Forced Oscillations	a. Characteristics of Forced Harmonic Motion b. The Equation of Motion of	Discussion, assignments and test

		a Forced Harmonic Oscillator c. Power Absorbed During Forced Oscillations d. Resonance in Electrical Circuits e. Transient Phenomena f. The Complex Representation of Oscillatory Motion	
6,7	Coupled Oscillators	a. Physical Characteristics of Coupled Oscillators b. Normal Modes of Oscillation c. Superposition of Normal Modes d. Oscillating Masses Coupled by Springs e. Forced Oscillations of Coupled Oscillators f. Transverse Oscillations	Discussion, assignments and test
8	Midtest		
9,10,11	Travelling Waves	a. Physical Characteristics of Waves b. Travelling Waves c. Travelling sinusoidal waves d. The Wave Equation e. The Equation of a Vibrating String f. The Energy in a Wave g. The Transport of Energy by a Wave h. Waves at Discontinuities i. Waves in Two and Three Dimensions	Discussion, assignments and test
12,13	Standing Waves	a. Standing Waves on a String b. Standing Waves as the Superposition of Two Travelling Waves c. The Energy in a Standing Wave d. Standing Waves as Normal Modes of a Vibrating String	Discussion, assignments and test
14,15	Interference And Diffraction Of Waves	a. Interference and Huygen's Principle b. Diffraction	Discussion, assignments and test

16	The Dispersion of Waves	a. The Superposition of Waves in Non-Dispersive Media b. The Dispersion of Waves c. The Dispersion Relation d. Wave Packets	Discussion, assignments and test

Evaluation:

Components	**Portion (%)**
Assignments	20%
Attendance	10%
Participation	20%
Midterm examination	25%
Final Examination	25%