Lesson Plan 13

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| **Title**: **Chapter 15: Oscillations**  Book: Fundamentals of Physics (10th edition, Extended) by David Halliday, Robert Resnick and Jearl Walker (John Wiley & Sons) | | **Ref. No**: Week 8,  Day 1 | | |
| **Target Group/Population**: B. Sc students (CS, EEE and IPE) | | **Duration**: 90 min | | |
| **Aims/Rationale**: To give the students basic concepts of simple harmonic motion, the velocity of SHM, the acceleration of SHM, the force law for simple harmonic motion | | | | |
| **Learning Outcomes**: At the end of the session, the students will be able to understand and analyze above topics and apply those to solve related problems. | | | | |
| **Contents:** 15-1: Simple harmonic motion (simple harmonic motion, the velocity of SHM, the acceleration of SHM, the force law for simple harmonic motion) | Method or  Technique | | Resource  or Aid | Time |
| **Introduction**:   * Welcome address * Rapport building * Pre-assessment of student’s knowledge * description of the course | Lecture  QA | | WB  MMP | 15 min |
| **Development**:  1. In simple harmonic motion, the displacement *x(t)* of a particle from its equilibrium position is described by the equation *x = xm cos (ωt + φ*). (i) Derive equations for the particle’s velocity and acceleration as functions of time. (ii) Hence find the maximum displacement, the maximum velocity and the maximum acceleration. (iii) Sketch a graph of an oscillator’s displacement versus time, velocity versus time and acceleration versus time.  2. In simple harmonic motion, the displacement *x(t)* of a particle from its equilibrium position is described by the equation *x = xm cos(ωt + φ*). From this, prove that the time period of a simple harmonic oscillator is T . | Lecture Discussion QA  Problem Solving | | WB  MMP | 60 min |
| **Conclusion**:   * Quick recap/summary * Feedback from the students * References * Forward planning |  | | WB  MMP | 15 min |
| Problems:  3. What is the maximum acceleration of a platform that oscillates at amplitude 2.20 cm and frequency 6.60 Hz?  13. An oscillator consists of a block of mass 0.500 kg connected to a spring. When set into oscillation with amplitude 35.0 cm, the oscillator repeats its motion every 0.500 s. Find the (a) period, (b) frequency, (c) angular frequency, (d) spring constant, (e) maximum speed, and (f) magnitude of the maximum force on the block from the spring. | | | | |