Lesson Plan 20

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| **Title**: **Chapter 16: Waves—I** | | **Ref. No**: Week 11,  Day 2 | | |
| **Target Group/Population**: B. Sc students (CS, EEE and IPE) | | **Duration**: 90 min | | |
| **Aims/Rationale**: To give the students basic concepts of standing waves | | | | |
| **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:** 16-7: Standing waves | Method or  Technique | | Resource  or Aid | Time |
| **Introduction**:   * Welcome address * Rapport building * Review the main topics of last lecture * Importance/bridging the topic * Pre-assessment of student’s knowledge | Lecture QA | | WB  MMP | 15 min |
| **Development**:  1. Two sinusoidal waves traveling in the opposite directions along a stretched string are given by  *y1 (x,t) = ym sin (kx-ωt)* and *y2 (x,t) = ym sin (kx+ωt)*. Using the principle of superposition, find the resultant standing wave. Find the positions of nodes and antinodes of the resulting standing wave. Sketch the figures when the waves are in phase and out of phase. | 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:  53. A string oscillate according to the equation y′ = (0.50 cm) sin [(π/3 cm-1)x] cos [(40π s-1)t]. What are (a) the amplitude and (b) the speed of the two waves (identical except for direction of travel) whose superposition gives this oscillation? (c) What is the distance between nodes? (d) What is the speed of a particle of the string at the position x = 1.5 cm when t = 9/8 s?  76. A standing wave results from the sum of two transverse traveling waves given by *y1 = 0.050 cos(πx - 4πt)* and *y2 = 0.050 cos(πx + 4πt),* where x, y1,and y2 are in meters and t is in seconds. (a) What is the smallest positive value of x that corresponds to a node? Beginning at t = 0, what is the value of the (b) first,(c) second, and (d) third time the particle at x = 0 has zero velocity? | | | | |