Subject Title: Waves and Oscillations Prepared by: K. Ramya

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Unit - I: UNIT- I Fundamentals of vibrations

1. What is Simple Harmonic Oscillator. Derive the general differential equation of SHM with its solution.
2. What are the physical characteristics of SHM. Derive expressions for each of the following
   (i) Displacement (ii) Velocity (iii) Frequency (iv) Time Period (v) Phase
3. What is Compound Pendulum. Determine the measurement of 'g' using it.
4. What is Torsional Pendulum. Determine the Rigidity Modulus.
5. Explain combination of two mutually perpendicular S.H Vibrations of same frequency with Lissajous figures.
6. Explain combination of two mutually perpendicular S.H Vibrations of different frequency with Lissajous figures.

Unit - II: Damped & Forced Oscillations

7. What is Damped Harmonic Oscillator. Derive the general differential equation of DHO with its solution under different cases.
8. Explain Energy Considerations, Comparison with Undamped harmonic oscillator.
9. 1. Write brief note on,
   (i)Relaxation time (ii) Logarithmic Decrement (iii)Quality Factor
10. Derive the equation of motion of a Forced Oscillator. Obtain solution of it under different cases.
11. Explain about Amplitude Resonance and Velocity Resonance .
12. What are coupled oscillators. Discuss about two coupled pendulums.

Unit - III: Vibrating strings

13. What is Transverse wave propagation .Explain it along a stretched string. Obtain solution of wave equation and its significance.
14. What are modes of vibrations of a stretched string clamped at ends.
15. Write a short note on overtones.
16. Explain the concept of energy transport and obtain the necessary conditions for it.

17. Explain in detail about transverse impedance.

Unit - IV: Vibrations of Bars

18. Obtain the wave equation for Resonance longitudinal vibrations in bar.
19. Determine the general solution of longitudinal wave equation.
20. Explain about the longitudinal vibrations in a bar fixed at both ends& free at both ends.
21. Explain about the longitudinal vibrations in a bar fixed at mid point & in a fixed free bar.
22. Derive the wave equation for transverse vibrations along a stretched string.
23. Explain transverse vibrations in a clamped free bar.
24. Explain transverse vibrations in a bar fixed & free at both ends.
25. What is tuning fork ? How it is used as source of sound.