K25FY3397 Pages: 2 Reg No:.....
Name:.....

Third Semester FYUGP Degree Examination NOVEMBER 2025

KU3DSCPHY214 - OSCILLATIONS AND WAVES

2024 Admission onwards

Time : 1.5 hours Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. Plot the variation of displacement with time for a damped harmonic oscillator.
2. What is the difference between free and damped oscillations?
3. Differentiate between transverse wave and longitudinal wave.
4. Why transverse wave motion is not possible in gaseous medium?
5. Explain the physical significance of angular frequency.
6. What do you mean by zero point energy.
7. What is the velocity of a longitudinal wave in a thin rod, and how it is related to the material properties?
8. How stationary waves are produced.

Section B

Answer any 4 questions. Each carry 6 marks.

9. A particle executing simple harmonic motion has period 0.01s and amplitude 0.4cm. Find the acceleration and velocity when it is 0.2cm apart from its mean position. Also find out its maximum acceleration and maximum velocity.
10. A body executing simple harmonic motion makes 80 revolutions per minute. Its maximum velocity is 5m/s. What is the length of its path? What is its velocity when it covers one third of its total length?
11. Give the maximum and minimum time periods of the Compound pendulum from time period relation.
12. Derive the expression for the velocity of longitudinal waves in a gas?
13. A train of sound waves is propagated along a wide pipe and it is reflected from an open end. If the amplitude of the waves is 0.002 cm,the frequency 1000 Hz and wavelength 40 cm, find the amplitude of vibration at a point 10 cm from the open end inside the pipe.

14. A stretched string is observed to vibrate with a frequency 30 cps in the fundamental note when the length of string is 60 cm. The string has a mass per unit length of 0.5 g/cm. Find the velocity of propogation of the tranverse wave and compute the tension of the string.

Section C

Answer any 1 questions. Each carry 14 marks.

15. What are damped vibrations? Establish the differential equation of motion for a damped harmonic oscillator and obtain an expression for displacement. Discuss the case of over damping, and critical damping.

16. Define wave motion. Explain the different classificaions of waves in detail.