Model Question Paper 3

Oscillations 3

11th Standard

Physics

Reg.No. : | | | | | | |

Answer all the Questions

Time : 01:00:00 Hrs

Total Marks : 50

Part A

8 x 1 = 8

1) The restoring force that tends to bring back the particle to the mean position is given by.....

   (a) F=ma (b) $F = m\omega^2 y$ (c) $F = -m\omega^2 y$ (d) $F = m\omega^2$

2) The velocity amplitude of the vibrating particle is.....

   (a) $a\omega$ (b) $\frac{\omega}{a}$ (c) $a\omega^2$ (d) $\omega^2 a^2$

3) The restoring force of a system of mass m executing SHM is 4N. Its displacement is 0.04 m, then force constant is.....

   (a) 100 Nm^{-1} (b) $\frac{1}{100} Nm^{-1}$ (c) 0.16 Nm^{-1} (d) 1000 Nm^{-1}

4) If two vibrating particles cross their respective mean positions at the same time in the opposite direction, then the phase difference between them is.....radian.

   (a) 0 (b) $\frac{\pi}{2}$ (c) $\frac{3\pi}{2}$ (d) π

5) The time period T in terms of force constant 'k' is T=.....

   (a) $\frac{1}{2\pi}\sqrt{\frac{m}{k}}$ (b) $\frac{1}{2\pi}\sqrt{\frac{k}{m}}$ (c) $2\pi\sqrt{\frac{m}{k}}$ (d) $2\pi\sqrt{\frac{k}{m}}$

6) The unit of torque constant is.....

   (a) Nm (b) N/rad (c) Nm rad^{-1} (d) Nm^2 rad^{-1}

7) The period of angular harmonic oscillator is T=.....

   (a) $\frac{1}{2\pi}\sqrt{\frac{m}{k}}$ (b) $2\pi\sqrt{\frac{C}{I}}$ (c) $2\pi\sqrt{\frac{I}{C}}$ (d) $\frac{1}{2\pi}\sqrt{\frac{C}{I}}$

8) The time period of a vertically loaded spring is T=.....

   (a) $2\pi\sqrt{\frac{dl}{g}}$ (b) $2\pi\sqrt{\frac{g}{dl}}$ (c) $\frac{1}{2\pi}\sqrt{\frac{g}{dl}}$ (d) $\frac{1}{2\pi}\sqrt{\frac{dl}{g}}$

Part B

6 x 2 = 12

9) What is a spring factor?

10) The bob of a simple pendulum is a hollow sphere filled with water. How does the period of oscillation change if the water begins to drain out of the sphere?

11) Why does the oscillation of a simple pendulum eventually stop?

12) What will happen to the time period of a simple pendulum if its length is doubled?

13) On what factors the natural frequency of a body depend on?

14) What are the advantages of resonance?

Part C

5 x 3 = 15

15) What is forced vibration? Give an example.

16) What forces keep the simple pendulum in SHM?

17) Illustrate an example to show that resonance is disastrous sometimes?

18) Explain the oscillations of a mass attached to a horizontal spring. Hence deduce an expression for its time period.

19) If two springs are connected in parallel, what is its equivalent spring constant?

Part D

3 x 5 = 15

20) Compare the acceleration due to gravity at two places if the time for 100 oscillations of a simple pendulum are 8 minutes 2 seconds and 8 minutes 20 seconds respectively of two places.

21) A particle of mass 0.2 kg executes SHM of amplitude 2 cm and time period 6 s. Calculate (i) the total energy, (ii) kinetic and potential energy when displacement is 1cm from the mean position.

22) The length of a seconds pendulum in a clock is increased by 2%. How many seconds will it lose or gain in a day?

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