CHAPTER = 11 OSCILLATIONS
MULTIPLE CHOICE QUESTIONS (BOOK XI)

1. Two simple pendulums A and B with the same lengths, and equal amplitude of vibrations, but the mass of A is twice the mass of B, their period are TA and Ts and energies are E_A and E_s respectively. Choose the correct statement.
   a) $T_A = Ts$ and $E_A > Es$ b) $T_A < Ts$ and $E_A > Es$
   c) $T_A > Ts$ and $E_A < Es$ d) $TA = Ts$ and $E_A < Es$
2. In order to double the period of a simple pendulum:
   a) Its length should be doubled **b) Its length should be quadrupled**
   c) The mass should be doubled d) The mass should be quadrupled
3. A simple harmonic oscillator has amplitude A and time period t. Its maximum speed is:
   a) $\frac{4A}{T}$ b) $\frac{2A}{T}$ c) $\frac{4\pi A}{T}$ **d) $\frac{2\pi A}{T}$**
4. A spring attached by a load of weight W is vibrating with a period T. If the spring is divided into four equal parts and the same load is suspended from one of these parts, the new period is:
   a) $\frac{T}{4}$ b) 2T **c) $\frac{T}{2}$** d) 4T
5. The total energy of a particle executing simple harmonic motion is proportional to:
   a) frequency of oscillation b) maximum velocity of motion
   c) amplitude of motion **d) square of amplitude of motion**
6. A child swinging on a swing in sitting position, stands up, then the time period of the swing will:
   a) Increase
   b) decrease
   c) remains the same
   d) increases if the child is long and decreases if the child is short
7. If a body oscillates at the angular frequency ω_d of the driving force, then the oscillations are called:
   a) Forced oscillations b) Coupled oscillations
   c) Free oscillations d) Maintained oscillations
8. A simple harmonic oscillator with a natural frequency ω_N is force to oscillate with a driving frequency ω_dt. The Resonance occurred when:
   a) $\omega_N > \omega_d$ b) $\omega_N < \omega_d$
   c) $\omega_N = \omega_d$ d) $\omega_N \approx \omega_d$
9. In vehicles, shock absorber reduced the jerks:
   a) The shock absorber is the application of damped oscillations.
   b) Damping effect is due to the fractional loss of energy
   c) **Shock absorbers in vehicles reduced jerk**
   d) All of these
10. A heavily damped system has a fairly flat resonance curve in:
    a) An acceleration time graph b) **An amplitude frequency graph**
    c) Velocity time graph d) Distance-time graph

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EXAMS PRACTICE MULTIPLE CHOICE QUESTIONS

1. The frequency of a simple pendulum is given by:

   a) $f = 2\pi\sqrt{\frac{g}{L}}$ b) $f = 2\pi\sqrt{\frac{L}{g}}$

   c) $f = \frac{1}{2\pi}\sqrt{\frac{L}{g}}$ d) **$f = \frac{1}{2\pi}\sqrt{\frac{g}{L}}$**

2. If the mass of a body suspended from spring is increases to 4 times, the period of vibration of the body will be:

   a) 4 times **b) 2 times**

   c) $\sqrt{2}$ times d) same as before

3. Which of the following variables has zero value at the extreme position in SHM?

   a) Acceleration **b) Speed**

   c) Displacement d) Angular frequency

4. A particle is undergoing SHM with amplitude 10cm. The maximum speed it achieves is 1m/s. Find the time it takes to reach from the mean position to half the amplitude.

   a) π/60 s b) π/30 s

   c) π/15 s d) π/40 s

5. In SHM, what is the phase difference between velocity and acceleration?

   a) 0 b) π

   c) π/2 d) π/3

6. At resonance condition the amplitude of the driven harmonic oscillator is

   a) zero b) small but non-zero

   c) moderate **d) maximum**

7. Resonance will be a sharp pendulum with

   a) Pith Bob **b) Iron Bob**

   c) wood bob d) same for all bobs

8. Acceleration for the simple harmonic oscillator is zero at

   a) extreme position **b) mean position**

   c) both A and B d) none of the above

9. Acceleration for the driven harmonic oscillator is zero at

   a) extreme position b) mean position

   c) both A and B **d) none of the above**

10. Damping——— the period of the oscillator.

    a) increases b) decreases

    c) not effect b) may increase or decrease

11. To double the period of a simple pendulum, the length of the string should be

    a) halved b) doubled

    c) quadrupled d) ¼ of its length

12 The period of a simple pendulum is:

a) 1-second b) 2 seconds

c) 4 seconds d) 8 seconds

13 A pendulum bob is swinging with simple harmonic motion. Its potential energy is maximum at:

a) Extreme position b) Mean position

(c) At any other point along the path (c) All of these

14 The acceleration of free fall on the moon is 1/6 of that on the earth. What would be the period on the moon of a simple pendulum with a period of 1 sec on Earth?

a) 1/6 seconds b) $1/\sqrt{6}$ seconds

c) $\sqrt{6}$ ***seconds*** d) 6 seconds

15 The frequency of oscillation of a simple pendulum depends upon:

a) Mass of the bob b) Amplitude of vibration

c) Length of pendulum d) None of them

16 A spring-mass system performs simple harmonic motion with the period 'T'. If we double the mass of the bob, the new period will be:

a) T b) 2T

c) 1.414T d) 0.707T

17 An object is executing SHM. Its kinetic energy is maximum at its:

a) Mean position b) Extreme position

c) At any point along the path c) None of them

18 If the bob of a simple pendulum is replaced by another bob of double mass but of the same size, its period:

a) Increases b) Decreases

c) Remain the same d) Become infinity

19 The value of elastic restoring force in the case of a spring is:

a) Kx **b) –Kx**

c) 1/2 Kx d) $1/2\ Kx^2$

20. The frequency of a second's pendulum is:

a) 1 Hz b) 2 Hz

c) 0.5 Hz d) 4 Hz

21 If the mass of a body suspended from a spring is increased to 4 times, the period of vibration of the body will be:

a) 4 times b**) 2 times**

c) $\sqrt{2}$ times c) Same as above

22 A simple pendulum has period T. The bob is given a negative charge and the surface below it is given a positive charge. The new period will be

a) Less than T b) Greater than T

c) Equal to T d) Infinite

23 In a second pendulum, the mass of the bob is 30 gm. If it is replaced by 90 gm mass. Then its period will be

a) 1 sec **b) 2 sec**

c) 4 sec c) 3 sec

24 Two simple pendulums of length 5 m and 20 m respectively are given small linear displacement in one direction simultaneously. The period of both pendulums will be:

a) 5 sec and 20-sec **b) 4.5 sec and 9 sec**

c) 10 sec and 5-sec c) 3 sec and 5-sec

25 A simple pendulum of length **L** has a brass bob attached at its lower end. Its period is T. If a steel bob of the same size, having density **x** times that of brass, replaces the brass bob and its length is changed so that the period becomes **2T**, then the new length is

a) L b) 2L

c) 3 L **c) 4 L**

26 If the length of the second's pendulum is decreased by 2%, how many seconds it will lose per day

a) 3927 sec **b) 864 sec**

c) 3727 sec c) 3427 sec

27 As the amplitude of resonant vibrations decreases, the degree of damping

a) increases b) remains the same

c) decreases c) All of these

28 For a resonating system it should oscillate.

a) bound b) only for some time

c) freely c) for infinite time

29 What happens to the energy of a particle, in SHM, with time in the presence of damping forces?

a) Stays constant b) Decreases linearly

c) Decreases exponentially d) Decreases cubically

30 A particle is executing SHM and currently going towards the amplitude. If it is at A/2, what is the relation between the direction of velocity and acceleration?

a) Both vectors point towards the amplitude

b) Velocity is towards amplitude & acceleration is towards mean position

c) Velocity is towards the mean position & acceleration is towards the amplitude

d) Both vectors point towards the mean position