NEET PHYSICS

Topic: Simple Harmonic Motion

Q.1 The maximum K.E. of a oscillating spring is 5 joules and its amplitude 10 cms. The force constant of the spring is:

(1) 100 Newton/m (2) 1000 Newton-m

(3) 1000 Newton/m (4) 1000 watts

Q.2 A particle executes SHM with a frequency f. The frequency of its P.E. will be:

(1) f/2 (2) f

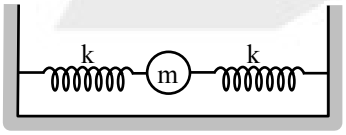
(3) 2f (4) 4f

Q.3 The force acting on a 4 gm mass in the potential field $U = 8x^2$ at $x = -2$ cm is:

(1) 8 dyne (2) 4 dyne

(3) 16 dyne (4) 32 dyne

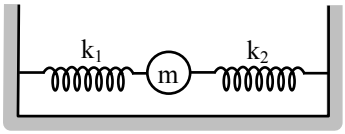
Q.4 On suspending a mass m from a spring of force constant k, frequency of vibration f is obtained. If a second spring as shown in the figure, is arranged then the frequency will be:



(1) $f\sqrt{2}$ (2) $f/\sqrt{2}$

(3) 2f (4) f

Q.5 In the adjoining figure the frequency of oscillation for a mass m will be proportional to:



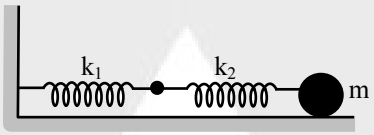
(1) k_1k_2 (2) $k_1 + k_2$

(3) $\sqrt{k_1 + k_2}$ (4) $\sqrt{1/(k_1 + k_2)}$

Q.6 An object of mass m is suspended from a spring and it executes S.H.M. with frequency ν. If the mass is increased 4 times, the new frequency will be:

(1) 2ν (2) $\nu/2$ (3) ν (4) $\nu/4$

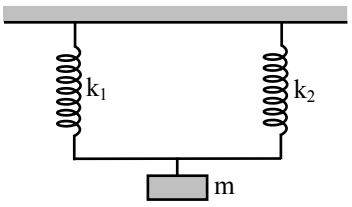
Q.7 A shown in the figure, two light springs of force constant k_1 and k_2 oscillate a block of mass m. Its effective force constant will be:



(1) k_1k_2 (2) $k_1 + k_2$

(3) $\frac{1}{k_1} + \frac{1}{k_2}$ (4) $\frac{k_1k_2}{k_1 + k_2}$

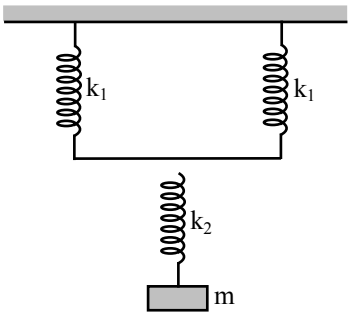
Q.8 The spring constant of two springs of same length are k_1 and k_2 as shown in figure. If an object of mass m is suspended and set vibration, the time period will be:



(1) $2\pi\sqrt{\frac{mk_1}{k_2}}$ (2) $2\pi\sqrt{\frac{m}{k_1k_2}}$

(3) $2\pi\sqrt{\frac{m}{k_1 - k_2}}$ (4) $2\pi\sqrt{m/(k_1 + k_2)}$

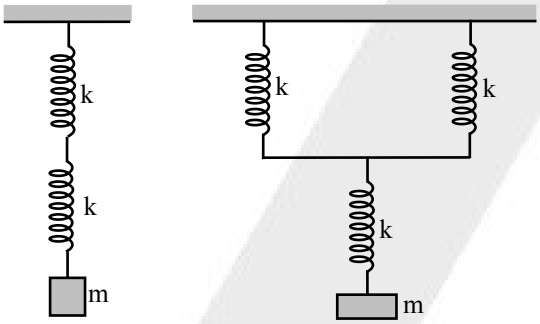
Q.9 The total spring constant of the system as shown in the figure will be:



(1) $\frac{k_1}{2}+k_2$ (2) $\left[\frac{1}{2k_1}+\frac{1}{k_2}\right]^{-1}$

(3) $\frac{1}{2k_1}+\frac{1}{k_2}$ (4) $\left[\frac{2}{k_1}+\frac{1}{k_2}\right]^{-1}$

Q.10 Some springs are combined in series and parallel arrangement as shown in the figure and a mass m is suspended from them. The ratio of their frequencies will be:



(1) 1 : 1 (2) 2 : 1

(3) $\sqrt{3}:2$ (4) 4 : 1

Q.11 The force constant of a spring is k. The amount of work done in expanding it from ℓ_1 to ℓ_2 will be:

(1) k($\ell_2 - \ell_1$) (2) $k\left(\frac{\ell_1+\ell_2}{2}\right)$

(3) $k(\ell_2^2-\ell_1^2)$ (4) $\frac{k}{2}(\ell_2^2-\ell_1^2)$

Q.12 A spring is made to oscillate after suspending a mass m from one of its ends. The time period obtained is 2 seconds. On increasing the mass by 2 kg, the period of oscillation is increased by 1 second. The initial mass m will be:

(1) 2 kg (2) 1 kg

(3) 0.5 kg (4) 1.6 kg

Q.13 The force constant of spring A is greater than that of spring B. If their lengths are elongated by same amount, which of the following statement is correct ?

(1) The work done on A will be greater than that on B

(2) The work done on B will be greater than that on A

(3) Work done on both the springs will be equal, if their initial lengths are same

(4) Work done on both of them will be equal

Q.14 The time period of a spring pendulum on earth is T. If it is taken on the moon, and made to oscillate, the period of vibration will be :

(1) Less than T (2) Equal to T

(3) More than T (4) None of these

Q.15 The length of a spring becomes 10 cm on suspending a mass of 20 kg in a vertical plane and 12 cms on suspending 32 kg. What should be the weight suspended from it so as to cause the length to be 15 cms ($g = 10\ m/sec^2$):

(1) 40 kg (2) 50 kg

(3) 60 kg (4) 80 kg

Q.16 On loading a spring with bob, its period of oscillation in a vertical plane is T. If this spring pendulum is tied with one end to the a friction less table and made to oscillate in a horizontal plane, its period of oscillation will be-

(1) T

(2) 2T

(3) T/2

(4) will not execute S.H.M.

Q.17 In a winding (spring) watch, the energy is stored in the form of :

(1) Kinetic energy (2) Potential energy

(3) Electrical energy (4) None of these

Q.18 A and B are two similar springs, of which A is more rigid than B i.e. $k_A > k_B$. These are pulled through the same length. The work done in these cases is:

(1) More in spring A

(2) More in spring B

(3) Equal in spring A and B

(4) No definite information can be furnish in this connection

Q.19 In the previous question, on pulling the springs with equal force, the work done in spring A is:

(1) More than spring B

(2) Less than spring B

(3) Equal to spring B

(4) Nothing certain can be stated

Q.20 In an artificial satellite, the object used is:

(1) Spring watch

(2) Pendulum watch

(3) Watches of both spring and pendulum

(4) None of these

Q.21 The length of a spring is ℓ and its spring constant is k. It is cut into two parts of lengths ℓ_1 and ℓ_2 and $\ell_1 = n\ell_2$. The spring constant k_1 of the part ℓ_1 will be:

(1) k(1 + 1/n) (2) k(1 – 1/n)

(3) k(1 + 1/2n) (4) k(1 – 1/2n)

Q.22 An object of 4 kg mass, moving at 6m/sec velocity strikes a spring & compresses it by a distance x. If the force constant of the spring is 900 N/m. What is the value of x:

(1) 4 cm (2) 40 cm

(3) 20 cm (4) None of these

Q.23 The time period of an oscillating body executing SHM is 0.05 sec and its amplitude is 40 cm. The maximum velocity of particle is:

(1) 16π ms^{-1} (2) $2\pi ms^{-1}$

(3) 3.1 ms^{-1} (4) 4π ms^{-1}

Q.24 The mass of a bob, suspended in a simple pendulum is halved from the initial mass, its time period will:

(1) Be less (2) Be more

(3) Remain unchanged (4) None of these

Q.25 The length of a simple pendulum is $39.2/\pi^2$ m. If g = 9.8 m/sec^2, the value of time period is:

(1) 4 sec (2) 8 sec

(3) 2 sec (4) 3 sec

Q.26 The length of a simple pendulum is increased four times of its initial value, its time period with respect to its previous value will:

(1) Become twice (2) Not be different

(3) Be halved (4) Be $\sqrt{2}$ times

Q.27 Water is filled in a hollow metallic sphere and it is suspended from a long string. A fine hole is made at the bottom of the sphere through which water tickles. The sphere is set into oscillations. Its period of oscillation will:

(1) Remain constant

(2) Decrease continuously

(3) Increase continuously

(4) First increase then decrease

Q.28 The time taken for a second pendulum from one extreme point to another is:

(1) 1 sec. (2) 2 sec.

(3) 1/2 sec. (4) 4 sec.

Q.29 The length of a seconds pendulum is (approximately):

(1) 1 m (2) 1 cm

(3) 2 m (4) 2 cm

Q.30 The acceleration due to gravity at height R above the surface of the earth is g/4. The periodic time of a simple pendulum in an artificial satellite at this height will be:

(1) $T = 2\pi\sqrt{2\ell / g}$ (2) $T = 2\pi\sqrt{\ell / 2g}$

(3) Zero (4) Infinity

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	3	3	4	1	3	2	4	4	2	3
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	4	4	1	2	2	1	2	1	2	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	1	2	1	3	1	1	4	1	1	4