MODERN SCIENCE ACADEMY
CHATHA BAKHTAWAR, ISLAMABAD

10. "SIMPLE HARMONIC MOTION & WAVES"

Sr.	Statements	A	B	C	D
1	Which of the following is an example of simple harmonic motion?	motion of simple pendulum	motion of ceiling fan	spinning of Earth	bouncing ball on floor
2	If the mass of bob of pendulum is increased by a factor of 3, then period of pendulum's motion will:	be increased by a factor of 2	remains the same	be deceased by a factor of 2	be decreased by factor of 4
3	Which of the following devices can be used to produce both transverse and longitudinal waves?	a string	a ripple tank	a helical spring (slinky)	a tuning fork
4	Waves transfer:	energy	frequency	wavelength	velocity
5	Which of following is a method of energy transfer?	conduction	radiation	wave motion	all of these
6	In a vacuum, all electromagnetic waves have same:	speed	frequency	amplitude	wavelength
7	A large ripple tank with a vibrator working at a frequency of 30 Hz produces 25 complete waves in a distance of 50 cm. The velocity of wave is:	53 cms^{-1}	60 cms^{-1}	750 cms^{-1}	1500 cms^{-1}
8	Which of the following characteristics of a wave is independent of others?	speed	frequency	amplitude	wavelength
9	The relation between **v**, ***f***, **λ** of the wave is:	v f= λ	f λ=v	v λ=f	v= λ/f
10	When a body moves to and fro about a point, its motion is:	random	vibratory	rotatory	linear
11	The equation of Hooke's law is:	**F**= -k**x**	**x**= -**F**k	k= - **x/F**	**F**= **x**/k
12	A transverse wave on a string has an amplitude **A**, a tiny spot on the string is colored **black**. As one cycle of the wave passes by, what is the total distance travelled by black spot?	A	2 A	0.5 A	4 A
13	If the length of simple pendulum is doubled, its time period will be:	$\sqrt{2}$ T	$\frac{T}{\sqrt{2}}$	2 T	$\frac{T}{2}$
14	Formula for time period of mass attached to a spring is:	$T = 2\pi\sqrt{\frac{k}{m}}$	$T = 2\pi\sqrt{\frac{m}{k}}$	$T = 2\pi\sqrt{\frac{l}{m}}$	$T = 4\pi\sqrt{\frac{k}{m}}$
15	Formula for time period of simple pendulum is:	$T = 2\pi\sqrt{\frac{k}{m}}$	$T = 2\pi\sqrt{\frac{l}{g}}$	$T = 2\pi\sqrt{\frac{g}{l}}$	$T = 2\pi\sqrt{\frac{m}{g}}$
16	S.I. unit of amplitude is:	s	Hz	m	cm
17	K.E of mass spring system is maximum at:	extreme position	mean position	both A and B	none of these
18	S.I. unit of frequency is:	Hz	N	m	s
19	If the length of a pendulum is one meter on Earth, then its time period will be:	1.99 s	10 s	1 s	6 s
20	In simple pendulum motion, restoring force is provided by:	air resistance	tension in the string	inertia	weight of the body
21	Number of vibrations in one second is called:	frequency	amplitude	displacement	time period
22	The example of shock absorbers of the vehicle are:	SHM	vibratory motion	damped motion	linear motion
23	A certain pendulum has an iron bob. When the iron bob is replaced with lead ball of same size, its time period will:	stays the same	decrease	increase	be zero
24	Example of mechanical wave is:	radio waves	X-rays	sound waves	light waves
25	Which waves don't require medium for their propagation?	sound waves	mechanical waves	electromagnetic waves	all of these
26	Time period is reciprocal of:	focal length	wavelength	frequency	distance
27	The product of frequency and wave length is:	time period	amplitude	wave speed	energy

28	The part of a wave where the particles of medium are lowest from the mean position is called:	crest	wave front	trough	wavelength
29	The part of a wave where the particles of medium are highest from the mean position is called:	crest	wave front	trough	wavelength
30	Which is an example of longitudinal waves?	sound waves	light waves	radio waves	water waves
31	Ripple tank is a device which is used to study the characteristics of:	mechanical waves	light waves	electromagnetic waves	gravitational waves
32	When water waves enter the region of shallow water, their wavelength:	decreases	increases	becomes zero	remains same
33	The bending of waves around the corners is called:	reflection	refraction	diffraction	interference
	A mass spring system has mass m attached to spring. What will be effect on its time period if its mass is increased four times?	becomes double	becomes half	becomes four times	remains same
34	A spring is stretched 5 cm by 20 N force, what is its spring constant k?	100 N/m	400 N/m	40 N/m	4 N/m
35	If amplitude of simple pendulum is doubled, what happens to its time period?	becomes double	becomes half	becomes four times	remains same
36	Time period of simple pendulum will be smallest at:	murree	poles	moon	equator
37	If a body performing SHM completes one vibration in 2 seconds, its frequency of vibration is:	2 Hz	1 Hz	0.5 Hz	10 Hz
38	360 waves are passing through a point in a river in one hour, time period of the wave is:	0.1 s	1 s	10 s	100 s
39	Time period of electrical vibrator of ripple tank is 0.5 s, water waves in ripple tank has speed of 10 ms^{-1} and amplitude of 5 cm. The frequency of waves is:	50 Hz	0.5 Hz	200 Hz	2 Hz
40	When water waves enter from deep water to shallow water:	f increases	T decreases	v decreases	λ increases
41	Listening to radio transmission in deep valleys of mountain areas is due to:	reflection of waves	refraction of waves	interference of waves	diffraction of waves

"Important Short Questions"

1) Define vibratory motion and spring constant of spring.
2) What is SHM? What are necessary conditions for a body to execute SHM?
3) Give an example of vibratory motion which is not SHM. Give reason of your selection.
4) Write down the characteristics of SHM.
5) At extreme position, velocity is zero but acceleration is maximum in SHM. How can you theoretically explain it?
6) What will happen to the acceleration of mass spring system is its mass is doubled?
7) A simple pendulum has time period T. What will happen to its time period if its thread length is shorten to half?
8) A simple pendulum has time period of 4 seconds. Will its time period remain same or change, if its steel bob is replaced by wood bob of same size?
9) State Hooke's law. Also write its expression.
10) Is the restoring force on a mass attached to spring in SHM ever zero? If so, where?
11) A thin rope hangs from dark high tower so that its upper end is not visible. How can the length of rope be determined?
12) Same masses are attached to different springs, one is vibrating faster. Why?
13) A simple pendulum has time period "T" in Murree. In Karachi, it has different time period. What would you do to make its time period same as it was in Murree?
14) Define restoring force and time period.
15) Define amplitude and frequency.
16) What are damped oscillations? How damping progressively reduces the amplitude of oscillation?
17) Define wave. Write the difference between mechanical and electromagnetic waves.

18) Distinguish between longitudinal and transverse waves.
19) Define compression and rarefaction.
20) Differentiate between crest and trough.
21) What is meant by wavelength?
22) Derive the wave equation.
23) A wave moves on a slinky spring with frequency of 4 Hz and wavelength of 0.4 m. Calculate its speed.
24) Define ripple tank, reflection, refraction and diffraction.
25) What will happen to the frequency of waves in a ripple tank if time period of electrical vibrator is decreased? What will happen to the wave speed?
26) Under what conditions are the waves diffracted most?
27) How waves are produced at surface of ripple tank?

"Important Long Questions"

1) What is SHM? Prove that mass attached to spring is executing simple harmonic motion. Also derive expressions for its time period and frequency.
2) What is simple pendulum? Prove that motion of simple pendulum is simple harmonic motion. Also derive expressions for its time period and frequency.
3) Define mechanical waves. Explain longitudinal waves.
4) Define mechanical waves. Explain transverse waves.
5) What is ripple tank? Discuss its construction and explain properties of waves with reference to ripple tank.