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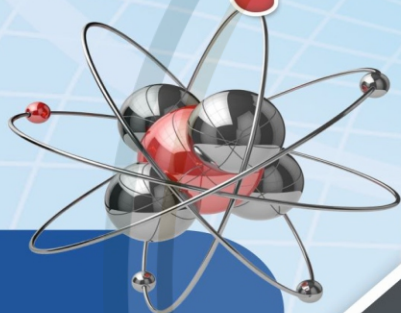
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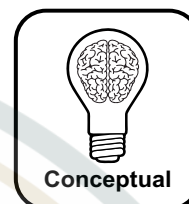


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Unit 10: Simple Harmonic Motion and Waves

Boards' Topic Wise Multiple Choice Questions Classified Precisely According to the
New Examination Techniques of Education Department
(Knowledge, Understanding, Application, Analytical & Conceptual)

10.1 Simple Harmonic Motion (SHM)

- The formula of Hooke's law is: [SGD-I-23] (Knowledge)
 A $F = kx$ B $F = -kx$ C $k = \frac{x}{F}$ D $x = -Fk$
- The unit of spring constant is: [SWL-II-25] [RWP-I-23] (Knowledge)
 A $\frac{N}{m^2}$ B $\frac{N}{m}$ C $\frac{N}{C}$ D $\frac{m^2}{N}$
- The equation to find the time period of a mass attached to a spring is: [LHR-II,RWP-II,GUJ-II/III-18] (Knowledge)
 A $T = 2\pi\sqrt{\frac{\ell}{g}}$ B $T = 2\pi\sqrt{\frac{g}{\ell}}$ C $T = 2\pi\sqrt{\frac{m}{k}}$ D $T = 2\pi\sqrt{\frac{k}{m}}$
- Time period formula for simple pendulum: [FSD-II-23] (Knowledge)
 A $T = 2\pi\sqrt{\frac{g}{\ell}}$ B $T = 2\pi\sqrt{\frac{\ell}{g}}$ C $T = 2\pi\sqrt{\frac{m}{k}}$ D $T = 2\pi\sqrt{\frac{k}{m}}$
- When did Christian Huygens invent the pendulum clock? (Knowledge)
 [SGD-I,MTN-I-23]
 A 1656 B 1756 C 1856 D 1956
- The number of vibrations per second of a vibrating body is called: [RWP-II-23] (Knowledge)
 A Frequency B Amplitude C Vibration D Displacement
- If the time period is given then frequency is calculated as: [FSD-II-23] (Knowledge)
 A $f = 1/T$ B $f = 2/T$ C $f = 3/T$ D $f = 4/T$
- The product of frequency and time period is: (Knowledge)
 A 4 B 3 C 1 D 2
- The time period of a simple pendulum of length one meter is: [LHR-I,FSD-I,SGD-I,MTN-II] (Understanding)
 A 1.99s B 2.11s C 1.89s D 1.88s
- If the length of simple pendulum is doubled then its time period will be: [SGD-I-24] [GUJ-II,MTN-I,SGD-II] (Application)
 A $\sqrt{2}T$ B $\frac{T}{\sqrt{2}}$ C $2T$ D $\frac{T}{2}$

10.2 Damped Oscillations

- Shock absorbers vehicle are examples of: [LHR-I,FSD-I,SGD-I,MTN-II] (Application)
 A Simple harmonic motion B Vibratory motion
 C Damped motion D Linear motion
- The shock absorbers damp the vibrations and converts their energy into _____ of coil. [FSD-I-22] (Application)
 A K.E B P.E C Heat energy D Sound energy

10.3 Wave Motion

13. Radio waves are: [RWP-II,FSD-II,DGK-II,BWP-I/II,SWL-I] (Application)
 A Infrared B X-ray C Electromagnetic D Mechanical
14. X-ray waves are: (Application)
 A Mechanical B Compressional C Longitudinal D Electromagnetic
15. Oscillation of electric and magnetic field in electromagnetic waves is at an angle of: (SGD-II-23)
 A 100° B 90° C 45° D 180°

10.4 Types of Mechanical Waves

10.5 Waves as carries of Energy

16. Longitudinal waves move faster in: [SGD-II-23] (Understanding)
 A In gases B In liquids C Both A and B D In solids
17. An example of longitudinal waves is: [BWP-II-25] [FSD-II-24] [LHR-II-24] (Application)
 A Sound wave B Light wave C Radio wave D Water wave
18. The unit of wavelength is equal to ...: [GUJ-I,MTN-I,DGK-I,SWL-I-23] (Understanding)
 A Time B Frequency C Speed D Distance
19. When water waves enters the region of shallow water their wave length. [LHR-I-23] (Conceptual)
 A remains the same B becomes zero C Increases D Decreases
20. Earthquake produces waves through the crust of the earth in the form of: [LHR-II,GUJ-II,SGD-I,FSD-I] (Knowledge)
 A Seismic waves B Sound waves C Light waves D Radio waves
21. The relation between time, speed and distance is: (Knowledge)
 [GUJ-I,MTN-II,DGK-I,SWL-I]
 A $v = \frac{d}{t}$ B $v = dt$ C $v = \frac{t^2}{d}$ D $v = \frac{d^2}{t}$
22. What does the energy of a wave depend on? (Analytical)
 A Frequency B Time period C Amplitude D Distance

10.6 Ripple Tank

23. The bending of waves around obstacles or sharp edges is called: [GUJ-I,SGD-II,MTN-II,RWP-I/II,DGK-II] (Knowledge)
 A Reflection B Refraction C Wave motion D Diffraction
24. Which of the following quantities does not change during refraction of light? [FSD-II-24] [LHR-II-24] [BWP-II-25] [DGK-I-25] [LHR-I,II-25] (Understanding)
 A Its speed B Its direction C Its frequency D Its wavelength

Answers Key

1.	B	2.	B	3.	C	4.	B	5.	A	6.	A	7.	A	8.	C	9.	A	10.	A	11.	C
12.	C	13.	C	14.	D	15.	B	16.	D	17.	A	18.	D	19.	D	20.	A	21.	A	22.	C
23.	D	24.	C																		

Boards' Topic Wise OPEN ENDED Questions Classified Precisely According to the
 New Examination Techniques of Education Department
 (Knowledge, Understanding, Application, Analytical & Conceptual)

10.1 Simple Harmonic Motion (SHM)

1. Explain Hooke's law. [DGK-II-25] [FSD-I-24] [FSD-II,SWL-II,SGD-II,MTN-II] (Knowledge)
- Ans: If the spring is stretched or compressed through a small displacement x from its mean position, it exerts a force F on the mass. According to Hooke's law this force is directly

proportional to the change in length x of the spring i.e.

$$F \propto -x$$

$$F = -kx$$

2. Write two characteristics of simple harmonic motion. [SWL-I-25] [GUJ-II-25] [LHR-I-25] (Analytical)

Ans: (i) In simple harmonic motion a body always moves about a mean position.

(ii) Its acceleration is always act towards the mean position.

3. Define restoring force. Or define the restoring force in a mass-spring system.

[GUJ-II-24] [RWP-II-25] [GUJ-I-25] [RWP-II,MTN-II,RWP-I] (Knowledge)

Ans: Restoring force: The force which always pushes or pulls the object performing oscillatory motion towards or away from its mean position is called restoring force.

$$F \propto -x$$

$$F = -kx$$

The magnitude of the restoring force decreases as the distance from the mean position decreases and becomes zero at the mean position.

4. Define simple pendulum and write its time period formula. (Knowledge)

[LHR-II,DGK-I,RWP-I/II]

Ans: Simple Pendulum: A simple pendulum consists of a small ball (Bob) suspended from a frictionless support by a fine but strong thread. If the length of the simple pendulum is ℓ , the equation for the time period of the simple pendulum will be:

$$T = 2\pi\sqrt{\frac{\ell}{g}}$$

5. Define simple harmonic motion. [RWP-II-25] [FSD-II-25] [MTN-I-25] [DGK-I-25] [LHR-II-24] (Knowledge)

Ans: In simple harmonic motion, the net force is directly proportional to the displacement from the mean position and its direction is always towards the mean position.

6. Define vibration.

[BWP-I-25] [SWL-I-24] (Understanding)

Ans: One complete round trip of a vibrating body about its mean position is called one vibration.

7. What is the reciprocal of time? Define it.

[GUJ-II,FSD-II,SWL-I] (Knowledge)

Ans: The reciprocal of time period is frequency. It is denoted by f .

$$f = \frac{1}{T}$$

Frequency: The number of vibration or cycles of a vibrating body in one second is called its frequency.

8. What is the relationship between frequency and time period?

(Analytical)

[BWP-I-24]

Ans: Frequency and time period are inversely proportional to each other i.e. if one increases then the other decreases or if one decreases then the other increases.

$$f = \frac{1}{T}$$

9. Define amplitude.

[DGK-I-25] [MTN-I-24] (Knowledge)

Ans: The maximum displacement of a vibrating body on either side from its mean position is called its amplitude.

10. If the time period of a simple pendulum is 1.99 seconds, find its frequency.

[FSD-II,SWL-II,SGD-II] (Application)

Solution: $T = 1.99 \text{ s}$

$$f = ?$$

$$f = \frac{1}{T} = \frac{1}{1.99} = 0.5 \text{ Hz}$$

11. If 100 waves pass through a point of a medium in 20 seconds, what is the frequency of the wave? [LHR-I-24] (Application)

Ans: Number of waves = $n = 100$

Time for 100 waves pass = $t = 20 \text{ sec}$

frequency = $f = ?$

$$\text{Frequency} = \frac{\text{Number of waves}}{\text{Time}} = \frac{n}{t} = \frac{100}{20} = 5 \text{ Hz}$$

12. What is meant by wavelength? Write its unit. (Knowledge)

Ans. Wavelength is the horizontal distance between two consecutive compression and rarefaction. The unit of wavelength is metre (m).

13. Find the time period of simple pendulum of 1m long on moon if $g_m = g_e/6$. (Application)

Ans.

$$\ell = 1\text{m}$$

$$g_e = 10\text{ms}^{-2}$$

$$g_m = \frac{g_e}{6} = \frac{10}{6}\text{ms}^{-2} = 1.67\text{ms}^{-2}$$

$$T = ?$$

$$T = 2\pi\sqrt{\frac{\ell}{g_m}}$$

$$T = 2 \times 3.14 \times \sqrt{\frac{1}{1.67}}$$

$$T = 4.9\text{sec}$$

14. What are the necessary condition for a body to execute simple harmonic motion?

(Understanding)

Ans. **Basic conditions to execute SHM:** Basic conditions to execute simple harmonic motion are as under: (i) There must be an elastic restoring force acting on the system.

(ii) The system must have inertia.

(iii) The acceleration of the system should be directly proportional to its displacement and is always directed to mean position i.e. $a \propto -x$

15. If $f = 2\text{Hz}$ and $\lambda = 0.2\text{m}$ then calculate the speed and time period?

(Application)

Ans.

$$f = 2\text{Hz}$$

$$\lambda = 0.2\text{m}$$

$$V = ?$$

$$T = ?$$

$$V = f\lambda = 2(0.2) = 0.4\text{ms}^{-1}$$

$$T = \frac{1}{f} = \frac{1}{2} = 0.5\text{sec}$$

10.2 Damped Oscillations

16. Define damped oscillations. Give an example from daily life.

(Application)

[LHR-II-25] [BWP-I-25] [FSD-II-24]

Ans. **Damped Oscillations:** Oscillations of a system in the presence of a resistive force are called damped oscillations.

Example: Shock absorbers in automobiles are a practical example of damped motion.

17. How damping progressively reduces the amplitude of oscillation? [MTN-II-24] [LHR-II-24]

Ans. Vibratory motion of ideal systems in the absence of any friction or resistance continues indefinitely under the action of a restoring force. Practically, in all system the force of friction retards the motion, so the system do not oscillate indefinitely. The friction reduced the mechanical energy of the system as time passes, and the motion is said to be damped. This damping progressively reduced the amplitude of motion.

18. How shock absorber damp vibration?

[BWP-II-24]

Ans. A shock absorber consists of a piston moving through liquid such as oil. The upper part of the shock absorber is firmly attached to the body of the car. When the car travel over a bump on the road, the car may vibrate violently. The shock absorbers damp these vibrations and convert their energy into heat energy of the oil.

10.3 Wave Motion

19. How can you define a wave?

[SGD-I/II, GUJ-II, MTN-I, DGK-I, SWL-II] (Understanding)

Ans. A wave is a disturbance in the medium which causes the particles of the medium to undergo vibratory motion about their mean position in equal intervals of time.

20. Define mechanical waves and name its types.

[BWP-II-25] (Knowledge)

Ans: Mechanical Waves: Waves which require any medium for their propagation are called mechanical waves.

Examples of mechanical waves are water waves, sound waves and waves produced on the strings and springs.

Types of mechanical waves: (i) Longitudinal waves (ii) Transverse waves

21. Define electromagnetic waves.

(Knowledge)

[GUJ-I-25] [SWL-II-24]

Ans: Electromagnetic Waves: "Such waves which do not require a medium for their propagation are called electromagnetic waves."

Examples of electromagnetic waves: (i) Radio waves (ii) Television waves
(iii) X-rays and heat (iv) Light waves etc.

10.4 Types of Mechanical Waves

22. What is called compression?

[DGK-II,SGD-I,MTN-II,RWP-I] (Knowledge)

Ans: Such a wave consists of regions called compressions, where the loops of the spring are close together. In the regions of compression, particles of the medium are closer together.

23. Write the difference between longitudinal and transverse waves.

[MTN-II-24] [MTN-I-25] (Understanding)

Ans:

Longitudinal waves	Transverse waves
In longitudinal waves the particles of the medium move back and forth along the direction of propagation of wave. Examples: sound waves, spring waves etc.	In case of transverse waves, the vibratory motion of particles of the medium is perpendicular to the direction of propagation of waves. Examples: waves generated on water surface, waves generated in rope etc.

24. What is wavelength?

(Knowledge)

Ans: The distance between two consecutive crests or troughs is called wavelength.

10.5 Waves as carries of Energy

25. Prove: $v = f\lambda$

[BWP-II-25] (Understanding)

Ans: We know that:

$$\text{Velocity} = \frac{\text{Distance}}{\text{Time}}$$

$$v = \frac{d}{t}$$

If the wave spends a time equal to the time period T in its motion from one place to another, the distance traveled by the wave is equal to the wavelength (λ) so:

$$v = \frac{\lambda}{T}$$

$$\text{or } v = \frac{1}{T} \times \lambda \quad \left(\because f = \frac{1}{T} \right)$$

$$v = f \times \lambda$$

So proved: $v = f\lambda$

26. Find the speed of waves when the frequency is 2 Hz and the wavelength is 0.1 m.

[FSD-I,DGK-II,BWP-II,SGD-I] (Application)

Solution:

$$f = 2\text{Hz}$$

$$\lambda = 0.1 \text{ m}$$

$$v = ?$$

$$v = f\lambda$$

We know that:

$$v = 2 \times 0.1 = 0.2 \text{ ms}^{-1}$$

27. A wave moving on a slinky has a frequency of 4Hz and a wavelength of 0.4m. Find the speed of the wave. [MTN-II-24] [MTN-I-24] [SWL-I-25] [SGD-I-25] (Application)

Solution: Frequency = $f = 4\text{Hz}$

Wavelength = $\lambda = 0.4\text{m}$

Speed $v = ?$

Formula: $v = f\lambda$

$v = (4)(0.4)$

Ans: $v = 1.6\text{ms}^{-1}$

28. Write an activity that shows that water waves transfer energy without Transfer of medium.

Ans. Drop a stone into a pond of water. Water waves will be produced on the surface of water and will travel outwards. Place a cork at some distance from the falling stone. When waves reach the cork, it will move up and down along with the motion of the water particles by getting energy from the wave.

Conclusion: It is concluded that water waves like other waves transfer energy from one place to other without transferring matter.

29. The amount of energy transferred by a wave depends upon which factors?

Ans. The amount of energy carried by the wave depends on the distance of the stretched string from its rest position. That is, the energy in a wave depends on the wave amplitude of the wave. If we shake the string faster, we give more energy per second to produce wave of higher frequency, and the wave delivers more energy per second to the particles of the string as it moves forward.

10.6 Ripple Tank

30. What is ripple tank?

[RWP-I-25] (Knowledge)

Ans: Ripple tank is a device to produce water waves and to study their characteristics.

This apparatus consists of a rectangular tray having glass bottom and is placed nearly half metre above the surface of a table. Waves can be produced on the surface of water present in the tray by means of a vibrator (paddle).

31. Define refraction of waves.

[SGD-I-24] (Knowledge)

Ans: Refraction of Waves: The process of changing the direction of motion of waves from one medium entering to another medium at some angle is called refraction of waves.

32. What is meant by diffraction of wave?

[SGD-I-24] (Knowledge)

Ans: "The bending or spreading of waves around the sharp edges or corners of obstacles or slits is called diffraction of waves."

33. Define reflection of waves.

[FSD-II,DGK-I,SWL-I/II] (Knowledge)

Ans: When waves moving in one medium fall on the surface of another medium they bounce back into the first medium such that the angle of incidence is equal to the angle of reflection.

(Exercise MCQs)

- i. Which of the following is an example of simple harmonic motion?

(GUJ-II,BWP-II-23)

- a the motion of simple pendulum B the motion of ceiling fan
C the spinning of the earth on its axis D a bouncing ball on a floor

- ii. If the mass of the bob of a pendulum is increased by a factor of 3, the period of the pendulum's motion will: [BWP-I-II,DGK-II,MTN-II-23]

- A Be increased by a factor of 2 b Remain the same
C Be decreased by a factor of 2 D Be decreased by a factor of 4

- iii. Which of the following devices can be used to produce both transverse and longitudinal waves? [SWL-I-23][RWP-II-25] [SGD-I-25] [FSD-II-24]

- A String B Ripple Tank C Helical Spring (Slinky) D Tuning Fork

- iv. Waves transfer:

[GUJ-II-25] [SGD-II-25] [MTN-II-25]

- a energy B frequency C wavelength D velocity

- v. Which of the following is a method of energy transfer? [SGD-I-23] [MTN-II-25] [BWP-I-25]

- A Conduction B Radiation C Wave motion d All of these

- vi. In a vacuum, all electromagnetic waves have the same: [FSD-II-25] [MTN-I-24]
 a Speed B Frequency C Amplitude D Wavelength
- vii. A large ripple tank with a vibrator working at a frequency of 30Hz produces complete waves in a distance of 50cm, The velocity of the wave is:
 A 53cm s^{-1} b 60cm s^{-1} C 75cm s^{-1} D 1500cm s^{-1}
- viii. Which of the following characteristics of a wave is independent of the others? [RWP-I-25] [SWL-I-25] [SGD-I-24]
 A speed B frequency c amplitude D wavelength
- ix. The relation between v , f and λ of a wave is: [LHR-II-25] [DGK-II-25]
 A $v=f\lambda$ b $f\lambda=v$ C $v\lambda=f$ D $v=\lambda/f$

Long Questions

- 10.1. What is simple harmonic motion? What are the necessary conditions for a body to execute simple harmonic motion?
 [GRW-I-15, RWP-I,DGK-II,BWP-I-16, DGK-II-17, SWL-III-20]
- 10.2. Define simple harmonic motion. Write down its four properties.
 [GRW-I-15, RWP-I,DGK-II,BWP-I-16, DGK-II-17, SWI-III-20]
- 10.3. Prove that the motion of simple pendulum is simple harmonic motion. [SGD-II-25] [DGK-II-25]
 [SWL-II,RWP-I-15, FSD-I,SGD-I-16, GRW-II,FSD-II-17, BWP-II-18, LHR-I,DGK-I-20, LHR-I,FSD-I,SWL-II,RWP-II,DGK-II-21]
- 10.4. What are damped oscillations? How damping progressively reduces the amplitude of oscillation?
 [LHR-I-16, SGD-II-17, DGK-I/II-18]
- 10.5. Distinguish between longitudinal and trasverse waves with suitable examples.
 [Lhr-II,FSD-II,SGD-I-14, GRW-II,DGK-I-15, MTN-II,DGK-I-16,SGD-I-18]
6. Explain types of mechanical waves. [MTN-II-17, LHR-I, RWP-I-18, RWP-I,DGK-II-20, SWL-I-21]
7. Waves are the means of energy transfer without transfer of matter. Justify this statement with the help of a simple experiment. [LHR-II-14, BWP-II-15, FD-II,BWP-I-18]
8. Explain wave as a carrier of energy and prove that $v=f\lambda$
 [GRW-I,MTN-I-17, GRW-I,FD-I/II,SWL-II-22]
9. Explain the following properties of waves with reference to ripple tank experiment.
 a. Reflection b. Refraction c. Diffraction
 [BWP-II-14, MTN-I,LHR-I,SGD-II,MTN-I-15, LHR-I,GRW-II-16, SWL-II,SGD-II-18, FSD-II-20, MTN,SGD-I-22]
10. What is ripple tank? Write the construction and working of ripple tank.
 [BWP-I-14, GRW-I-16, SWL-II-17, GRW-I-18]
11. How can you define the term wave? Elaborate the difference between mechanical and electromagnetic waves? Give examples of each. [LHR-II-17, GRW-II-19]

Solved Numerical Problems

- 10.1: The time period of a simple pendulum is 2 s. What will be its length on the Earth?

What will be its length on the Moon if $g_m = \frac{g_e}{6}$ where $g_e = 10\text{ms}^{-2}$.

Solution: Given Data: Time period = $T = 2$ sec
 Gravitational acceleration on Earth = $g_e = 10\text{ms}^{-2}$

$$\text{Gravitational acceleration on Moon} = g_m = \frac{g_e}{6}$$

Required:(a) Length of pendulum on Earth = $\ell_e = ?$

(b) Length of pendulum on Moon = $\ell_m = ?$

Formula: $T = 2\pi\sqrt{\frac{\ell_e}{g_e}}$

Calculations:(a) As we know that $T = 2\pi\sqrt{\frac{\ell_e}{g_e}}$

By putting values, $2 = 2\pi\sqrt{\frac{\ell_e}{10}}$

By rearranging the formula, we get.

$$\left(\frac{2}{2(3.14)}\right)^2 \times 10 = \ell_e$$

$$\frac{4}{39.43} \times 10 = \ell_e$$

$$\ell_e = 1.02\text{m} \text{ which is required.}$$

(b) Now as it is given that;

$$g_m = \frac{g_e}{6} = \frac{10}{6} = 1.67\text{m/sec}^2$$

Modify the above formula for Moon. $T = 2\pi \sqrt{\frac{\ell_m}{g_m}}$

By rearranging the formula, we get $\left(\frac{2}{2\pi}\right)^2 \times g_m = \ell_m$

By putting values in above equations, we get

$$\left(\frac{2}{2(3.14)}\right)^2 \times 1.67 = \ell_m$$

$$\ell_m = \frac{4}{39.43} \times 1.67 = 0.169$$

$$\ell_m = 0.17\text{m} \text{ which is required.}$$

10.2: A pendulum of length 0.99 m is taken to the Moon by an astronaut. The period of the pendulum is 4.9 s. What is the value of g on the surface of the Moon?

Solution: Given Data:

length of pendulum at Moon = $\ell_m = 0.99\text{m}$

Time period of pendulum = $T = 4.9\text{sec}$

Required: Value of g on surface of Moon = $g_m = ?$

Formula: $T = 2\pi \sqrt{\frac{l}{g}}$

Calculations: As we know that $T = 2\pi \sqrt{\frac{l}{g}}$

Modifying this formula for Moon, we get : $T_m = 2\pi \sqrt{\frac{\ell_m}{g_m}}$

By rearranging the formula for the required parameter, we get: $g_m = \left(\frac{2\pi}{T_m}\right)^2 \ell_m$

By putting values,

$$g_m = \left(\frac{2(3.14)}{4.9}\right)^2 (0.99)$$

$$g_m = \left(\frac{39.44}{24.01}\right) (0.99) = 1.63\text{m/sec}^2$$

10.3: Find the time periods of a simple pendulum of 1 metre length, placed on Earth and on Moon. The value of g on the surface of Moon is $1/6^{\text{th}}$ of its value on Earth, where g_e is 10ms^{-2} .

Solution: $\ell = 1\text{m}$

$$g_e = 10 \text{ m/s}^2$$

$$g_m = g_e / 6 = 10 / 6$$

$$g_m = 1.67 \text{ m/s}^2$$

Time period at Earth's surface

$$T = 2\pi \sqrt{\frac{\ell}{g_e}}$$

$$T_e = 2(3.14) \sqrt{1/10} = 6.28 \sqrt{0.1}$$

$$T_e = 1.99 \text{ s} = 2 \text{ sec}$$

Time period on the Moon's surface

$$T_m = 2\pi \sqrt{\frac{\ell}{g_m}}$$

$$T_m = 2(3.14) \sqrt{1/1.6}$$

$$T_m = 6.28 \sqrt{0.598} = 4.9 \text{ s}$$

10.4: A simple pendulum completes one vibration in two seconds. Calculate its length, when $g=10.0 \text{ ms}^{-2}$.

[RWP-II-16, GRW-II, BWP-I-19, SGD-II-22]

Solution: Given Data:

$$T = 2 \text{ s}$$

$$\text{Value of } g = 10 \text{ m/sec}^2$$

Required: Find out the length of simple pendulum = $\ell = ?$

Formula: We know that

$$T = 2\pi \sqrt{\frac{\ell}{g}}$$

By rearranging the formula, $g \left(\frac{T}{2\pi} \right)^2 = \ell$

By putting values, we get $\Rightarrow (10) \left(\frac{2}{2\pi} \right)^2 = \ell$

$$(10) \left(\frac{2}{2(3.14)} \right)^2 = \ell$$

$$\ell = 10 \left(\frac{4}{39.43} \right) = 10 \times 0.1014 = 1.014$$

$$\boxed{\ell = 1.02 \text{ m}}$$

10.5: If 100 waves pass through a point of a medium in 20 seconds, what is the frequency and the time period of the wave? If its wavelength is 6cm, calculate the wave speed.

Solution:

$$t = 20 \text{ s}$$

$$\text{Number of waves} = n = 100$$

$$\lambda = 6 \text{ cm} = 0.06 \text{ m}$$

$$f = n/t$$

$$f = 100 / 20 = 5 \text{ Hz}$$

$$T = 1/f$$

$$T = 1/5 = 0.2 \text{ s}$$

$$v = f\lambda$$

$$v = 5 \times 0.06 = 0.3 \text{ m/s}$$

10.6: A wooden bar vibrating into the water surface in a ripple tank has a frequency of 12 Hz. The resulting wave has a wavelength of 3 cm. What is the speed of the wave?

Solution: Given Data:

Frequency of wooden bar = $f = 12\text{Hz}$

$$\text{Wavelength} = \lambda = 3\text{cm} = \frac{3}{100} = 0.03\text{m}$$

Required: Speed of the wave = $v = ?$

Formula: $v = f\lambda$ (I)

Calculations: By using the above well known relation of equation (I). $v = f\lambda$

By putting values, we get; $v = (12) (0.03)$

$$v = 0.36\text{m/s}$$

10.7: A transverse wave produced on a spring has a frequency of 190 Hz and travels along the length of the spring of 90 m, in 0.5 s.

(a) What is the period of the wave? (b) What is the speed of the wave?

(c) What is the wavelength of the wave?

Solution: Given Data:

Frequency of transverse wave for 0.5 s = $f = 190\text{ Hz}$

Length of spring = $\ell = 90\text{m}$

Time for travelling of wave = $t = 0.5\text{ s}$.

Required: (a) Time period of wave = $T = ?$
 (b) Speed of the wave = $v = ?$
 (c) Wavelength of wave = $\lambda = ?$

Calculations: (a) We know that

$$T = \frac{1}{f} = \frac{1}{190} = 0.01\text{s}$$

(b) For finding the speed of wave,

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{d}{t}$$

here, $d = \ell$

$$\text{so, } v = \frac{\ell}{t}$$

$$\text{By putting values, we get } v = \frac{90}{0.5} = 180\text{m/s}$$

(C) As we know the relation $v = f\lambda$

$$\text{By rearranging the formula; } \lambda = \frac{v}{f}$$

$$\text{By putting values, we get } \lambda = \frac{180}{190} = 0.95\text{m}$$

10.8. Water waves in a shallow dish are 6.0 cm long. At one point, the water moves up and down at a rate of 4.8 oscillations per second.

(a) What is the speed of the water waves?

(b) What is the period of the water waves

Solution: $f = 4.8\text{Hz}$

$$\lambda = 6\text{cm} = 0.06\text{m}$$

$$(a) v = f\lambda$$

$$v = 4.8 \times 0.06 = 0.29\text{m/s}$$

$$(b) T = 1/f$$

$$T = 1/4.8 = 0.21\text{s}$$

10.9. At one end of a ripple tank 80 cm across, a 5 Hz vibrator produces waves whose wavelength is 40 mm. Find the time the waves need to cross the tank.

Solution: Given data:

Distance of one end of ripple tank = $d = 80\text{cm}$

$$= \frac{80}{100}\text{m} = 0.8\text{m}$$

$$\begin{aligned}\text{Frequency of vibrator} &= f = 5\text{Hz} \\ \text{Wavelength of wave} &= \lambda = 40\text{mm} \\ &= \frac{40}{1000}\text{m} = 0.04\text{m}\end{aligned}$$

Required data: Time period of wave = $T = ?$

Formula: $v = \frac{d}{T}$ and $v = f\lambda$

$$T = \frac{1}{f}$$

Calculations: By using following relation; $v = \frac{d}{T}$

By rearranging the formula: $T = \frac{d}{v}$ _____ (I)

To find v , we known that = $v = f\lambda$ _____ (II)

By putting values in eq (II)

$$v = (5) (0.04) = 0.2\text{m/s}$$

By putting value of v in eq (I), we get

$$T = \frac{0.8}{0.2} = 4\text{s}$$

10.10. What is the wavelength of the radio waves transmitted by an FM station at 90 MHz? where $1\text{M} = 10^6$, and speed of radio wave is $3 \times 10^8 \text{ms}^{-1}$.

Solution: Given data

Frequency of radiowave = $f = 90\text{M Hz}$

As we know $(1\text{M} = 10^6)$

So, $f = 90 \times 10^6 \text{ Hz}$

Required data: Wavelength of radiowave = $\lambda = ?$

Formula: $v = f\lambda$

Calculations: As we know that $v = f\lambda$

By rearranging the formula; $\lambda = \frac{v}{f}$

By putting values in above equation we get;

$$\lambda = \frac{3 \times 10^8}{90 \times 10^6} = \frac{3 \times 10^{8-6}}{90} = 0.033 \times 10^2 = 3.33\text{m}$$

Analytical and Conceptual Questions

Quick Quiz

☆ **What is the displacement of an object SHM when the kinetic and potential energies are equal?**

Ans. The kinetic and potential energies are equal of the object in simple harmonic motion (SHM) when object is exactly at the mid point of mean and extreme position.

☆ **Do mechanical waves pass through vacuum, that is, empty space?**

Ans. No, mechanical waves can not pass through vacuum. Because mechanical waves always require some medium for their propagation.

Useful Information

Do you know?

A human eardrum can oscillate back and forth up to 20,000 time in one second.

Check your understanding:

Tell whether or not these motions are examples of simple harmonic motion:

(a) Up and down motion of a leaf in water pond.

Ans. It is an example of SHM.

(b) Motion of a ceiling fan

Ans. It is not an example of SHM.

(c) Motion of hands of clock

Ans. It is not an example of SHM.

(d) Motion of a plucked string fixed at both its end

Ans. It is an example of SHM.

(e) Movement of honey bee

Ans. It is not an example of SHM.

**AL-RAZI
UP-TO-DATE
PAPERS**

**BOARD PAPERS
GROUP I-II**

2024-2025

Lahore (Group-I) 2024

Roll No. Of Candidate: _____

Paper Code: 1061

Time Allowed: 15 Minutes

Maximum Marks: 12

Date:

D	D	M	M	Y	Y	Y	Y

 Morning (M)
Evening (E)

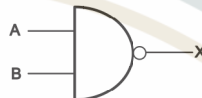
Objective Type

Note: You have four choices for each objective types question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number on your answer book. Use marker or pen to fill the circles. Cutting or filling of two or more circles will result in zero mark in that question.

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1. The logical operation performed by this gate is:



- A NAND B NOR C AND D OR
2. Which refers to computer programmes and the manuals that support them:
- A data B hardware C software D information
3. Capacitance is defined as:
- A VC B QV C Q/V D V/Q
4. The half-life of a certain isotope is one day. What is the quantity of the isotope after two days:
- A one-half B one-quarter C one-eighth D None of these
5. To make burglar alarm we use:
- A NOT gate B OR gate C NOR gate D NAND gate
6. The relation between v , f and λ of a wave is:
- A $v=f\lambda$ B $f\lambda=v$ C $\lambda v=f$ D $v = \frac{\lambda}{f}$
7. The turn ratio of transformer is 10. It means:
- A $I_s=10I_p$ B $N_s=N_p/10$ C $N_s=10N_p$ D $V_s=V_p/10$
8. The loudness of a sound is most closely related to its:
- A frequency B period C wavelength D amplitude
9. From which of the following we can get information almost about everything:
- A books B teacher C computer D internet
10. What happens to the intensity or the brightness of the lamps connected in series as more and more lamps are added:
- A increases B decreases C remains the same D cannot be predicted
11. Image formed by a camera is:
- A real, inverted and diminished B virtual, upright and diminished
- C virtual, upright and magnified D real, inverted and magnified
12. Which compound is used for diagnosis of brain tumor?
- A P-32 B I-131 C H-3 D N-152

Time Allowed: 1:45 Hours

(SUBJECTIVE TYPE)

Maximum Marks: 48

Section - I

Q2. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Define time period and frequency.
- (ii) If 100 waves pass through a point of a medium in 20 seconds. What is the frequency of the waves?
- (iii) Think of several examples of motion in everyday life that are simple harmonic motion.
- (iv) Write some uses of capacitors.
- (v) Write two characteristics of series combination of capacitors.
- (vi) What is the difference between fixed capacitor and variable capacitor?
- (vii) What is the difference between cell and battery?
- (viii) Define resistance and write its unit.

Q3. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Define loudness of sound. How does it change with the increase in amplitude?
- (ii) How can you reduce the level of noise pollution?
- (iii) What is meant by SONAR (sound navigation and ranging)?
- (iv) What is the difference of data and information?
- (v) How are light signals sent through optical fibre?
- (vi) What is the difference between hardware and software?
- (vii) Define atomic number and mass number.
- (viii) How can the scientist estimate dead tree age by C-14?

Q4. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Define power of lens, also write its formula.
- (ii) According to sign conventions when object distance are taken positive and negative in spherical mirror.
- (iii) Describe the principle focus of a convex lens by ray diagram.
- (iv) Write two uses of logic gates.
- (v) Draw the symbol of NOT gate and also write its truth table.
- (vi) Define the term thermionic emission.
- (vii) Write working principle of electric motor.
- (viii) What is right hand rule to determine the magnetic poles of a current carrying coil?

Section - II

Note: Attempt any TWO questions.**9×2=18****Q5. (a) What is meant by refraction of wave? Explain the refraction of water waves diagrammatically by using ripple tank.****4**

(b) Two capacitors of capacitances $6\mu\text{F}$ and $12\mu\text{F}$ are connected in series with 12V battery. Find the equivalent capacitance of the combination. Find the potential difference across each capacitor.

5**Q6. (a) Explain transmission of radio waves through space.****4**

(b) A sound wave has a frequency of 2KHz and wave length 35cm. How long will it take to travel 1.5km?

5**Q7. (a) What is an electron gun? How does it work in CRO?****4**

(b) A step up transformer has turn ratio 1:100. An alternating supply of 20V is connected across the primary coil. What is the secondary voltage.

5

Lahore (Group-II) 2024

Roll No. Of Candidate: _____

Paper Code: 1062

Time Allowed: 15 Minutes

Maximum Marks: 12

Objective Type

Note: You have four choices for each objective types question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number on your answer book. Use marker or pen to fill the circles. Cutting or filling of two or more circles will result in zero mark in that question.

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- Wave transfers:**
A velocity B wavelength C frequency D energy
- Which is an example of longitudinal waves:**
A sound waves B light waves C radio waves D water waves
- Which of the following quantity is not changed during refraction of light:**
A its direction B its direction C its wavelength D its frequency
- A positive electric charge:**
A attract other positive charge B repels other positive charge
C attract a neutral charge D repels a neutral charge
- Which is the power rating of lamp connected to 12V source when it carries 2.5A current:**
A 4.8W B 14.5W C 30W D 60W
- The direction of induced emf in a circuit is in accordance with conservation of:**
A mass B charge C momentum D energy
- AND gate can be formed by using two:**
A NOT gate B OR gates C NAND gates D NOR gates
- The brain of any computer system is:**
A monitor B CPU C memory D control unit
- Which among the following radiations has more penetrating power:**
A a beta particle B a gamma ray
C an alpha particle D all have the same penetrating ability
- In case of simple pendulum which component of weight acts as restoring force:**
A $mg \sin \theta$ B $mg \cos \theta$ C $mg \sec \theta$ D $mg \csc \theta$
- We can see sound waves by using:**
A microscope B telescope C oscilloscope D stethoscope
- Farsightedness can be corrected by using:**
A diverging mirror B converging mirror
C diverging lens D converging lens

Time Allowed: 1:45 Hours

(SUBJECTIVE TYPE)

Maximum Marks: 48

Section - I

Q2. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Define simple harmonic motion.
- (ii) How damping progressively reduces the amplitude of oscillation?
- (iii) What is the difference between cell and battery? (iv) State Coulomb's law
- (v) Define electric potential and write its unit. (vi) Two capacitors of capacitance $6\mu\text{F}$ and $12\mu\text{F}$ are connected in parallel with a 12 volt battery. Find their equivalent capacitance.
- (vii) Why do the electric current cannot pass through insulator?
- (viii) Define specific resistance and write its unit.

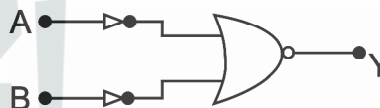
Q3. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) What is meant by intensity of sound? Write its unit
- (ii) Write the audible frequency range of bats and rats.
- (iii) What is meant by echo? Write its one use.
- (iv) What is the relation between information technology and telecommunication?
- (v) What do you know about INTELSAT and SATCOM?
- (vi) What is difference between hardware and software?
- (vii) How can we find the need of phosphate fertilizer for a plant?
- (viii) How can we monitor the thyroid gland in the human body?

Q4. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) State the laws of refraction of light.
- (ii) Describe the types of reflection with diagram.
- (iii) How the focal length is related to the radius of curvature?
- (iv) What does magnetic field lines show? Explain.
- (v) Differentiate between step-up and step-down transformer.
- (vi) State the principle of an AC generator.
- (vii) Define thermionic emission.

- (viii) Show that the circuit give below acts as AND gate.



Section - II

Note: Attempt any TWO questions.**9×2=18****Q5. (a) Write down the characteristics of series combination of resistors with circuit diagram.****4****(b) A simple pendulum completes one vibration in two seconds. Calculate the length, when: $g=10\text{ms}^{-2}$.****5****Q6. (a) Write name of any four parts of computer based information system and explain them.****4****(b) Carbon-14 has a half-life of 5730 years. How long will it take for the quantity of carbon-14 in a sample to drop to one-eighth of the initial quantity?****5****Q7. (a) Define nuclear fusion and explain it.****4****(b) A sound wave has a frequency of 2KHz and wavelength of 35cm. How long will it take to travel 1.5km?****5**

Lahore (Group-I) 2025

Roll No. Of Candidate: _____

Paper Code: 1061

Time Allowed: 15 Minutes

Maximum Marks: 12

Date:

D	D	M	M	Y	Y	Y	Y

 Morning (M) Evening (E)

Objective Type

Note: You have four choices for each objective types question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number on your answer book. Use marker or pen to fill the circles. Cutting or filling of two or more circles will result in zero mark in that question.

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Paper Code									
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1. **A positive electric charge:**

A Attract positive B Attract neutral C Repel positive D Repel neutral
2. **One byte is equal to:**

A 8 bits B 16 bits C 64 bits D 128 bits
3. **The output of NAND gate is zero if:**

A $B = 0, A = 0$ B $B = 1, A = 1$ C $A = 0, B = 0$ D $A = 1, B = 1$
4. **Which form of energy is sound:**

A Electrical B Mechanical C Thermal D Chemical
5. **In computer terminology, information means:**

A Any data B Raw data C Processed data D Large data
6. **Ohm's law is:**

A $I \times V = R$ B $V = R / I$ C $V = I / R$ D $V = IR$
7. **It does not change during refraction of light:**

A Speed B Frequency C Direction D Wavelength
8. **Equivalent resistance in series is 8Ω , what will be in parallel:**

A 2Ω B 4Ω C 8Ω D 12Ω
9. **Presence of magnetic field can be detected by a:**

A Small mass B Stationary positive charge
C Stationary negative charge D Magnetic compass
10. **Refractive index of ice is:**

A 1.30 B 1.31 C 1.32 D 1.33
11. **If mass of bob is increased by 3 times then time period of simple pendulum:**

A Increased B Same C Decreased D All of these
12. **Half life of an isotope is one day, what quantity remains after 2 days:**

A Half B One quarter C One eighth D None of these

Time Allowed: 1:45 Hours

(SUBJECTIVE TYPE)

Maximum Marks: 48

Section - I

Q2. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Differentiate between compression and rarefaction.
- (ii) Write two properties of simple harmonic motion.
- (iii) What is spring constant? Write its formula.
- (iv) Does electric potential depend upon test charge?
- (v) How would you define potential difference between two points? Define its units.
- (vi) What is meant by Faraday Cage?
- (vii) Write the symbol and truth table of NAND gate.
- (viii) What do you know about discovery of electron?

Q3. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Write two methods to reduce noise pollution.
- (ii) Define intensity level of sound, write its unit.
- (iii) Differentiate between noise and music.
- (iv) What is current also write its formula.
- (v) Define unit of resistance.
- (vi) Describe Joule's law also write its formula.
- (vii) Define fax machine
- (viii) Write down two uses internet.

Q4. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) State what is difference between regular and irregular reflection?
- (ii) What mirror formula? Write its mathematical form.
- (iii) An object is placed 6 cm in front of a concave mirror that has focal length 10 cm. Determine the position of image.
- (iv) Define right hand grip rule.
- (v) What is D.C. motor?
- (vi) State the principle of an A.C. generator.
- (vii) What is the atomic number, write its symbol.
- (viii) Find the number of protons and neutrons in nuclide defined by ${}^{13}_6\text{X}$.

Section - II

Note: Attempt any TWO questions.**9×2=18**

- Q5. (a) Describe construction of ripple tank and hence explain phenomenon of reflection and diffraction.** 4
- (b) The charge of how many negatively charged particles would be equal to 100 μC . Assume charge on one negatively charged particle is $1.6 \times 10^{-19}\text{C}$.** 5
- Q6. (a) Explain the parallel combination of resistors with the help of diagram.** 4
- (b) A marine survey sends a sound wave straight to the seabed. It receives an echo 1.5 s late. The speed of sound in seawater is 1500ms^{-1} . Find the depth of the sea at this position.** 5
- Q7. (a) What is transformer? State the principle of its working? Write a note on its types.** 4
- (b) A convex lens of focal length 6 cm is to be used to form a virtual image three times the size of the object. Where must the lens be placed?** 5

Lahore (Group-II) 2025

Roll No. Of Candidate: _____

Paper Code: 1062

Time Allowed: 15 Minutes

Maximum Marks: 12

Date:

D	D	M	M	Y	Y	Y	Y

 Morning (M)
Evening (E)

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7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

1. The relation between v , f and λ of a wave is:

A $v f = \lambda$
B $f \lambda = v$
C $v \lambda = f$
D $v = \lambda / f$
2. Which form of energy is sound:

A Mechanical
B Electrical
C Thermal
D Chemical
3. S.I units of capacitance of a capacitor is:

A V
B A
C F
D N
4. Which of the following quantity is not changed during refraction of light:

A Its direction
B Its speed
C Its wavelength
D Its frequency
5. Five joules of work is needed to shift 10 C of charge from one place to another. The potential difference between the places is:

A 0.5 V
B 2 V
C 5 V
D 10 V
6. An electric current in conductors is due to the flow of:

A Positive ions
B Negative ions
C Positive charges
D Free electrons
7. The direction of induced e.m.f in a circuit is in accordance with conservation of:

A Mass
B Energy
C Charge
D Momentum
8. Half-life of carbon-14 is:

A 123 years
B 30 years
C 5730 years
D 7530 years
9. The process by which electrons are emitted by a hot metal surface is known as:

A Boiling
B Evaporation

C Conduction
D Thermionic emission
10. What does the term e-mail stand for:

A Emergency mail
B Electronic mail
C Extra mail
D External mail
11. Release of energy by the sun is due to:

A Nuclear fission
B Chemical reaction
C Nuclear fusion
D Burning of gases
12. Formula for the electric potential is:

A $v = \frac{w}{q}$
B $v = q w$
C $v = \frac{q}{w}$
D $v = 2 q w$

Time Allowed: 1:45 Hours

(SUBJECTIVE TYPE)

Maximum Marks: 48

Section - I

Q2. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Find the time period of simple pendulum of 1.0 m long where $g = 10\text{ms}^{-2}$
- (ii) Define transverse wave with example.
- (iii) What are damped oscillations?
- (iv) Define volt?
- (v) What is capacitor? Write the unit of capacitance.
- (vi) If $V = 50\text{ V}$ and $C = 100\mu\text{F}$ then $Q = ?$
- (vii) Draw symbol diagram of AND gate, write down its truth table.
- (viii) Write the names of logic operations.

Q3. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) What is meant by reverberation?
- (ii) Define pitch, on what factors it depend.
- (iii) Why sound of women is shrill as compared to men?
- (iv) What is unit of electric current, define it.
- (v) Define e.m.f., also write its formula.
- (vi) Write down the limitations of Ohm's law.
- (vii) Define transmitter and transmission channel.
- (viii) What do you know about flash drive?

Q4. Write short answers to any FIVE (5) questions.**2×5=10**

- (i) Define Snell's law. Write down its formula.
- (ii) Differentiate between convex mirror and concave mirror.
- (iii) Find the value of critical angle for water (refracted angle = 90°), refractive index of water is 1.33 and refractive index of air is 1.
- (iv) Who observed induced current first time?
- (v) Define electromagnet. How many poles it has?
- (vi) What is the basic difference between generator and motor?
- (vii) Write two properties of α -particles.
- (viii) Write the difference between fission and fusion reaction.

Section - II

Note: Attempt any TWO questions.**9×2=18**

- Q5. (a)** How does electrostatic air cleaner work, explain. **4**
- (b)** At one end of ripple tank 80 cm across, a 5 Hz vibrator produces waves whose wavelength is 40 mm. Find time the waves need to cross the tank. **5**
- Q6. (a)** Define ultrasound and write any three its uses. **4**
- (b)** The resistance of a conductor wire is 10 M Ω . If a potential difference of 100 V is applied across its ends then find the value of current passing through it in mA. **5**
- Q7. (a)** What is meant by nuclear transmutation? Give examples of Alpha, Beta and Gamma decay. **4**
- (b)** An object 10.0 cm in front of a convex mirror forms an image 5.0 cm behind the mirror. What is the focal length of the mirror? **5**

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BOARD PAPERS
GROUP I-II SOLVE
2024-2025

Solution of Lahore Board (G-I)-2024**Objective Type**

1. A NAND
2. C software
3. C Q/V
4. B one-quarter
5. D NAND gate
6. B $f\lambda = v$
7. C $N_s = 10N_p$
8. D amplitude
9. D internet
10. B decreases
11. A real, inverted and diminished
12. A P-32

Note: Answers to subjective type questions are in Reading Material.

Solution of Lahore Board (G-II)-2024**Objective Type**

1. D energy
2. A sound waves
3. D its frequency
4. B repels other positive charge
5. C 30W
6. D energy
7. C NAND gates
8. B CPU
9. B a gamma ray
10. A $mg \sin \theta$
11. D stethoscope
12. D converging lens

Note: Answers to subjective type questions are in Reading Material.

Solution of Gujranwala Board (G-I)-2024**Objective Type**

1. A speed
2. B mechanical
3. B the speed of light
4. D $+2q$ and $-2q$
5. D quadruples
6. C energy
7. C $B=0, A=0$
8. A 6V, 0.3A
9. A microwaves
10. B telefacsimile
11. D atomic mass
12. C 2

Note: Answers to subjective type questions are in Reading Material.

Solution of Gujranwala Board (G-II)-2024**Objective Type (Multiple Choice Questions)**

1. B reflect only
2. D $A=1, B=1$
3. C Q/V
4. D Bq
5. A sound wave
6. B electronic mail
7. C NAND
8. C decreases by 2
9. A 2Ω
10. B 20Hz – 10kHz
11. B transformer
12. B $f\lambda = v$

Note: Answers to subjective type questions are in Reading Material.

Solution of Rawalpindi Board (G-I)-2024**Objective Type**

1. D $+2q$ and $-2q$
2. C 18V
3. A The commutator
4. A $A=1$ and $B=1$
5. C processed data
6. D 93 protons
7. C 498m
8. A $\frac{1}{4}$

9. B $P_p = P_s$
10. A energy

11. C 20Hz – 20kHz

12. B real, inverted, diminished

Note: Answers to subjective type questions are in Reading Material.

Solution of Rawalpindi Board (G-II)-2024**Objective Type**

1. C $f = \frac{R}{2}$
2. B $C = \frac{Q}{V}$
3. A 3A
4. C 6 Volt
5. D energy
6. D thermionic emission
7. D CPU
8. A 92
9. B $+2e$
10. A energy
11. D 2s
12. C metal

Note: Answers to subjective type questions are in Reading Material.

Solution of Faisalabad Board (G-I)-2024**Objective Type**

1. A energy
2. A amplitude
3. D 10dB
4. D real, inverted and diminished
5. B Q/V
6. C $V=IR$
7. B 1500 watt
8. D $N_s = 10N_p$
9. D NAND gates
10. D gathering
11. C 93 protons
12. B 10.6 hours

Note: Answers to subjective type questions are in Reading Material.

Solution of Faisalabad Board (G-II)-2024**Objective Type (Multiple Choice Questions)**

1. C helical spring (slinky)
2. A $\sqrt{2}T$
3. A sound wave
4. D 40dB
5. C its frequency
6. B $f_o < 1\text{cm}$
7. B stationary and point charges
8. D free electrons
9. D magnetic compass
10. A electrons
11. B processed data
12. C decreases by two

Note: Answers to subjective type questions are in Reading Material.

Solution of Sargodha Board (G-I)-2024**Objective Type**

1. B both of its inputs are '1'
2. C gathering
3. B one-quarter
4. C amplitude
5. D $\sqrt{2}T$
6. D 85-90dB
7. D amplitude
8. A inverted and real
9. A $f_e = \text{few cm}$
10. B never cross each other
11. C 30W
12. A increases

Note: Answers to subjective type questions are in Reading Material.

Solution of Lahore Board (G-I)-2025

Objective Type

1. C Repel positive
2. A 8 bits
3. B $B = 1, A = 1$
4. B Mechanical
5. C Processed data
6. D $V = IR$
7. B Frequency
8. C 8Ω
9. D Magnetic compass
10. B 1.31
11. B Same
12. B One quarter

Subjective Type (Section-I)

Q2. Write short answers to any FIVE (5) questions.

(i) Differentiate between compression and rarefaction.

Ans:

Compression	Rarefaction
In the regions of compression particles of the medium are closer together.	In the regions of rarefaction, particles of the medium are spaced apart.

(ii) Write two properties of simple harmonic motion.

Ans. 1. In simple harmonic motion a body always moves about a mean position.

2. Its acceleration is always directed towards the mean position

(iii) What is spring constant? Write its formula.

Ans: According to Hooke's law:

$$F = Kx$$

K is called spring constant. The value of K is measure of stiffness of spring. Stiff spring have large value of K and soft spring have small

value of K which is calculated by $K = -\frac{F}{x}$

(iv) Does electric potential depend upon test charge?

Ans: Electric potential is a characteristic of the field of source charge and is independent of a test charge that may be placed in the field.

(v) How would you define potential difference between two points? Define its units.

Ans. The potential difference between two points is equal to the energy that a unit positive charge imparts while moving towards another point in the direction of the field.

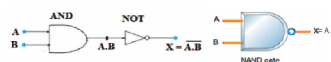
Unit: Its unit is Volt (V).

(vi) What is meant by Faraday Cage?

Ans: A Faraday Cage is an enclosure used to block electric fields and electromagnetic waves.

(vii) Write the symbol and truth table of NAND gate.

Ans. Symbol of NAND gate:



$X = A.B$ And read it as "X is equal to A AND B NOT".

NAND gate Truth Table:

A	B	$X = A.B$
0	0	1
0	1	1
1	0	1
1	1	0

(viii) What do you know about discovery of electron?

Ans: In the 1850's, physicists started to examine the passage of electricity through a vacuum by putting two electrodes in a sealed vacuum tube. Some kind of rays were emitted from the cathode or the negative electrode. These rays were called cathode rays. J.J. Thomson in 1897 observed the deflection of cathode rays by both electric and magnetic fields. From these deflection experiments, he concluded that cathode rays must carry a negative charge. These negatively charged particles were given the name electrons.

Q3. Write short answers to any FIVE (5) questions.

(i) Write two methods to reduce noise pollution.

Ans: Noise pollution can be reduced to acceptable level by replacing the noisy machinery with environment friendly machinery and equipments, putting sound reducing barriers, or using hearing protection devices.

(ii) Define intensity level of sound, write its unit.

Ans: Intensity level of the sound: The difference between the loudness of two sounds ($L - L_0$) is called intensity level of sound. The intensity level of an unknown sound is given by intensity level

$$L - L_0 = k \log \frac{1}{I_0}$$

Unit: bel is a very large unit of intensity level of sound but generally the small unit decibel is used.

(iii) Differentiate between noise and music.

Ans: Noise: Sound which has jarring and unpleasant effect on our ears is called noise.

Music: Such sounds which are pleasant to our ears are called musical sounds.

(iv) What is current also write its formula.

Ans. Electric current: The rate of flow of electric charge through any cross-sectional area is called Charge.

Formula:

$$I = \frac{Q}{t}$$

(v) Define unit of resistance.

Ans. The property of a substance which offers opposition to the flow of current through it, is called its resistance.

SI Unit: The SI unit of resistance is ohm (Ω).

(vi) Describe Joule's law also write its formula.

Ans. Joule's law: The amount of heat generated in a resistance due to flow of charges is equal to the product of square of current 'I', resistance 'R' and the time duration t.

$$\text{Equation: } W = I^2 R t = \frac{V^2 t}{R}$$

(vii) Define fax machine.

Ans. Telefacsimile's or Fax machines are must for many businesses around the world.

A fax machine basically scans a page to convert its text and graphic into electronic signals and transmits it to another fax machine through telephone line. The receiving machine converts the signal and uses a printer to create copy of receiving message.

(viii) Write down two uses internet.

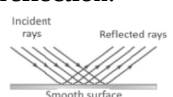
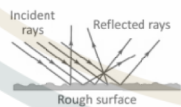
Ans. 1. Among the widespread use of internet, the use of email much higher. It allows fast delivery of messages to any active site on the Internet.

2. People also use the internet for money transfer, online shopping etc.

Q4. Write short answers to any FIVE (5) questions.

(i) State what is difference between regular and irregular reflection?

Ans:

Regular reflection	Irregular reflection
The reflection by smooth surfaces is called regular reflection.	The rough surfaces of objects reflect the rays of light in many direction. Such reflection is called irregular reflection.
	

(ii) What is mirror formula? Write its mathematical form.

Ans. Mirror formula: Mirror formula is the relationship between object distance p, image distance q from the mirror and focal length of the mirror.

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

(iii) An object is placed 6 cm in front of a concave mirror that has focal length 10 cm. Determine the position of image.

Ans. p = 6cm

f = 10cm

$$\text{Formula: } \frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

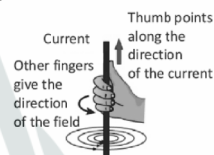
$$\frac{1}{q} = \frac{1}{10\text{cm}} - \frac{1}{6\text{cm}}$$

$$\frac{1}{q} = -\frac{1}{15\text{cm}}$$

$$q = -15\text{cm}$$

(iv) Define right hand grip rule.

Ans: Right Hand Grip Rule: Grasp a wire with your right hand such that your thumb is pointed in the direction of current. Then curling fingers of your hand will point in the direction of the magnetic field.



(v) What is D.C. motor?

Ans: Electric motor (D.C. motor) is a device which converts electrical energy into mechanical energy.

(vi) State the principle of an A.C. generator.

Ans: If a coil is rotated in a magnetic field, a current will be induced in the coil. The strength of this induced current depends upon the number of magnetic lines of force passing through the coil. The number of lines of magnetic force passing through the coil will be maximum when the plane of the coil is perpendicular to the lines of magnetic force. The number of lines of magnetic force will be zero when plane of the coil is parallel to the lines of force. Thus, when a coil rotates in a magnetic field, the induced current in it continuously changes from maximum to minimum value and from minimum to maximum value and so on. This is the basic principle on which an A.C. generator works.

(vii) What is the atomic number, write its symbol.

Ans. Atomic number: The number of protons inside the nucleus is called the atomic number. Atomic number is represented by Z.

(viii) Find the number of protons and

neutrons in nuclide defined by ${}^{13}_{6}\text{X}$.

Ans. From the symbol, we have

Atomic number Z = number of protons = 6

Atomic mass A = number of protons + number of neutrons = 13

But number of protons are 6, so number of neutrons will be 7.

So the element is an isotope of carbon-6, and is written as ${}^{13}_6\text{C}$.

Solution of Lahore Board (G-II)-2025

Objective Type

1. B $f\lambda = v$ 2. A Mechanical
3. C F 4. D Its frequency
5. A 0.5 V 6. D Free electrons
7. B Energy 8. C 5730 years
9. D Thermionic emission
10. B Electronic mail

11. C Nuclear fusion 12. A $v = \frac{w}{q}$

Subjective Type (Section-I)

Q2. Write short answers to any FIVE (5) questions.

(i) Find the time period of simple pendulum of 1.0 m long where $g = 10\text{ms}^{-2}$

Sol. Given Data:

length of pendulum = $\ell = 1.0\text{m}$

gravitational force $g = 10.0\text{ms}^{-2}$

time period $T = ?$

Formula: $T = 2\pi\sqrt{\frac{\ell}{g}}$

Solution: $T = 2(3.14)\sqrt{\frac{1.0}{10.0}}$

$$T = 6.28\sqrt{0.1}$$

$$T = (6.28)(0.31622)$$

$$T = 1.99 \text{ sec}$$

(ii) Define transverse wave with example.

Ans. "A wave in which the vibratory motion of the particles of the medium is perpendicular to the direction of motion of the wave is called a transverse wave."

Examples: Water surface waves, waves generated in a string etc.

(iii) What are damped oscillations?

Ans. Damped Oscillations: Oscillations of a system in the presence of a resisting force are called damped oscillations. Shock absorbers in automobiles are one practical application of damped motion.

(iv) Define volt?

Ans: SI unit of potential difference is volt which is defined as:

If one joule of work is done against the electric field in bringing one coulomb positive charge from infinity to a point in the electric field then the potential at that point will be one

volt.

(v) What is capacitor? Write the unit of capacitance.

Ans: Capacitor: A device which is used to store charge is called capacitor.

The SI unit of capacitor is farad.

(vi) If $V = 50 \text{ V}$ and $C = 100\mu\text{F}$ then $Q = ?$

Ans: $Q = CV$

$$Q = 100 \mu\text{F} \times 50\text{V} = 5000 \mu\text{C}$$

(vii) Draw symbol diagram of AND gate, write down its truth table.

Ans.



Truth Table of AND Gate:

A	B	X = A.B
0	0	0
0	1	0
1	0	0
1	1	1

(viii) Write the names of logic operations.

Ans: Logical operations are as follows.

- i. AND operation ii. OR operation
- iii. NOT operation
- iv. NAND operation v. NOR operation

Q3. Write short answers to any FIVE (5) questions.

(i) What is meant by reverberation?

Ans: When the sound is reflected from the highly reflective surfaces of the walls, ceiling and floor of the room, there is a lot of distortion in the sound. This is caused by multiple reflections, called reverberation.

(ii) Define pitch, on what factors it depend.

Ans: Pitch: Pitch is the characteristic of sound by which we can distinguish between a shrill and a grave sound. Pitch depends upon the frequency.

(iii) Why sound of women is shrill as compared to men?

Ans. The frequency of voice of women is higher than that the men. Therefore the voice of ladies is shrill and having high pitch.

(iv) What is unit of electric current, define it.

Ans. Electric current: The rate of flow of electric charge through any cross-sectional area is called Charge.

Formula:

$$I = \frac{Q}{t}$$

Unit: SI unit of current is Ampere (A).

(v) Define e.m.f., also write its formula.

Ans: It is the energy supplied by a battery to a unit positive charge when it flows through the closed circuit. Or

The energy converted from non-electrical forms to electrical form when one coulomb of positive charge passes through the battery. Therefore

$$\text{e.m.f} = \frac{\text{Energy}}{\text{Charge}}$$

$$E = \frac{W}{Q}$$

(vi) Write down the limitations of Ohm's law.

Ans: Ohm's law is applicable when temperature of conductor is kept constant. It has been observed that only good conductors obey ohm's law as long as the electric current through them is not very large and physical state of the conductor also remains the same.

(vii) Define transmitter and transmission channel.

Ans: The transmitter processes the input signal. The transmission channel is the medium which sends the signal from source to destination. It may be a pair of wires, a coaxial cable, a radiowave or optical fibre cable. So, the signal power progressively decreases with increasing distance.

(viii) What do you know about flash drive?

Ans. Flash drive is an electronic based device and consist of data storage ICs. A flash drive is small storage device that can be used to transport files from one computer to another.

Q4. Write short answers to any FIVE (5) questions.

(i) Define Snell's law. Write down its formula.

Ans. Snell's Law: The ratio of the sine of the angle of incidence $\hat{i}$ to the sine of the angle of refraction $\hat{r}$ is always equal to a constant i.e.

$$\frac{\sin i}{\sin r} = \text{constant} = n$$

where the ratio $\frac{\sin i}{\sin r}$ is known as the

refractive index of the second medium with respect to the first medium. It is called Snell's law.

(ii) Differentiate between convex mirror and concave mirror.

Ans:

	Convex mirror	Concave mirror
1.	A spherical mirror whose convex outer surface is reflective is called a convex mirror.	A reflector mirror whose inner deep surface is reflective is called a concave mirror.

2.	Image size in a convex mirror is always less than the body size.	The size of the image in the consumer depends on the position of the body.
3.	Convex mirror forms only virtual and upright image.	Consumer can create both real and virtual images.

(iii) Find the value of critical angle for water (refracted angle = 90°), refractive index of water is 1.33 and refractive index of air is 1.

$$\text{Sol: } n = \frac{\sin r}{\sin i}$$

$$\sin i = \frac{\sin r}{n}$$

$$\left(\because r = 90^\circ \right) \text{ and } \left(\because i = c \right)$$

$$\sin c = \frac{\sin 90}{1.33}$$

$$\sin c = \frac{1}{1.33}$$

$$\sin c = 0.75$$

$$c = \sin^{-1}(0.75)$$

$$i = 48.8^\circ$$

(iv) Who observed induced current first time?

Ans: It is said; Joseph Henry (1797–1878) had observed an induced current before Faraday, but Faraday published his results first and investigated the subject in more detail.

(v) Define electromagnet. How many poles it has?

Ans. Electromagnetic: The type of temporary magnet, which is created when current flows through a coil, is called an electromagnet. It has two poles. i.e. North pole and south pole.

(vi) What is the basic difference between generator and motor?

Ans.

Generator	Motor
A generator converts mechanical energy into electrical energy that we can use to run various electrical appliances.	A motor converts electrical energy into mechanical energy. Mechanical energy is used to move an object.

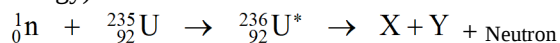
(vii) Write two properties of α -particles.

Ans: 1. Alpha (α) particles have the greatest power of ionization of as compared to beta particles and gamma rays. It is due to large positive charge and large mass of alpha particles.

2. Alpha particles has the shortest range because of its strong interacting or ionizing power.

(viii) Write the difference between fission and fusion reaction.

Ans: Fission reaction takes place when a heavy nucleus like U-235 splits or fissions into two smaller nuclei by absorbing a slow moving (low energy) neutron.



Slow neutrons Stable Uranium Unstable Uranium smaller nuclei

Nuclear Fusion: When two light nuclei combine to form a heavier nucleus, the process is called nuclear fusion.

Solution of Gujranwala Board (G-I)-2025

Objective Type

1. C 20,000 times 2. A 1246 kmh⁻¹
3. B Decreases 4. B $v = f\lambda$
5. C -15 cm 6. B 146
7. A $X = A.B$ 8. B Free electrons
9. B 20 Hz – 20 kHz 10. D Energy
11. D Internet 12. C +2q and -2q

Subjective Type (Section-I)

Q2. Write short answers to any FIVE (5) questions.

(i) Define time period and frequency.

Ans. Time period (T): "The time required to complete one vibration of a body in vibratory motion around a point is called time period." It is denoted by T.

The unit of time period is second (s).

Frequency: The number of vibrations per second of a body in vibratory motion around a point is called frequency. It is reciprocal of time period i.e., $f = 1/T$

It is denoted by f.

(ii) Define electromagnetic waves and write down the names of its types.

Ans. Electromagnetic Waves: "Such waves which do not require a medium for their propagation are called electromagnetic waves."

Types: Radio waves, television waves, X-rays, heat and light waves.

(iii) If the length of simple pendulum is doubled, what will be the change in its time period?

Ans. If the length of the simple pendulum become doubled then its time period increase

by $\sqrt{2}$ times e.g.

$$T = 2\pi\sqrt{\frac{\ell}{g}} \quad \dots(i)$$

$$\text{If } \ell' = 2\ell$$

$$\text{Then } T' = 2\pi\sqrt{\frac{2\ell}{g}}$$

$$T' = 2\pi\sqrt{\frac{\ell}{g}}\sqrt{2}$$

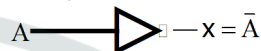
Now using equation (i)

$$T' = T\sqrt{2}$$

$$T' = \sqrt{2}T$$

(iv) Draw symbol of NOT gate and write down its truth table.

Ans. NOT Gate Symbol:



Truth Table:

A	X = $\bar{A}$
0	1
1	0

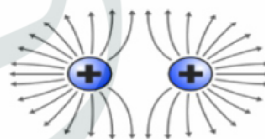
(v) Write down definition of analogue and digital quantities.

Ans. Analogue quantities: The quantities whose values vary continuously are known as analogue quantities.

Digital quantities: The quantities whose values vary in non-continuously manner are called digital quantities. Digital quantities are expressed in form of digits or numbers.

(vi) Draw electric field lines between two positive point charges.

Ans:



Electric field lines for two positive point charges.

(vii) Write down any two uses of capacitors.

Ans. Following are the uses of capacitors:

1. Capacitors are used for tuning transmitters, receivers and radios.
2. Capacitors are used in table fans, ceiling fans, exhaust fans, air conditioners, air coolers, washing machines and many household appliances.

(viii) Define electric field and electric field intensity.

Ans. Electric field: "The electric field of a charge is the area around the charge in which it exerts an electrostatic force on other charges."

Electric field intensity: The strength of an electric field at any point in space is known as electric field intensity.

$$\text{Formula: } E = \frac{F}{q_0}$$

Q3. Write short answers to any FIVE (5) questions.

(i) Describe briefly that sound is produced by a vibrating body.

Ans: Sound waves are produced by the vibrating

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OBJECTIVE TYPE Multiple Choice Questions

1. The particles that emitted from the hot metal surface are:

- A Holes B Protons
C Neutrons d Electrons

2. waves transfer:

- A Frequency B Wavelength
C Velocity d Energy

3. The index of refraction depends on:

- A Focal length
b Speed of light
C Image distance
D Body distance

4. What does the term e-mail stand for?

- A Emergency Mail
b Electronic Mail
C External Mail D None

5. The ___ of waves does not depend on other characteristics.

- A Speed B Frequency
C Amplitude D Wavelength

6. Which method is used to transfer energy?

- A Conduction B Radiation
C Wave motion d All these

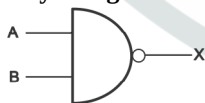
7. The Focal length formula is:

- a $f = \frac{R}{2}$ B $f = \frac{R}{4}$
C $f = \frac{R}{3}$ D $f = \frac{R}{5}$

8. From which of them can we get all kinds of information?

- A Books B Teacher
C Computer d Internet

9. Which logic operation is obtained by this gate?



- A AND B NOR
C NAND D OR

10. The output of NAND gate will be 0 if:

- A A=1, B=0 B A=0, B=1
C A=1, B=1 D A=0, B=0

11. Which is the type of sound energy?

- A Chemical B Thermal
C Electrical d Mechanical

12. The formula for capacitance is:

- A QV b $\frac{Q}{V}$
C QV D $\frac{V}{Q}$

13. A method in which electrons are emitted from the heated surface of the metal is called:

- A Boiling B Evaporation
C Thermionic emission
D Conduction

14. The sun emits energy:

- A By nuclear fission
b By nuclear fusion
C Due to combustion of gases
D By chemical reaction

15. The brain of any computer system is:

- A Monitor B Memory
C CPU D Control unit

16. Computer Based Information System (CBIS) can be accessed from:

- A 4 B 3 C 5 D 6

17. The presence of magnetic field can be detected by:

- A Small mass
B Stationary positive charge
C Stationary negative charge
d Magnetic compass

18. If the ratio of turns of the transformer is 10:

- A $I_3 = 10I_p$

- B $N_s = \frac{N_p}{10}$

- C $V_s = V_p \times 10$

- d $N_s = 10N_p$

19. The speed of sound at 0°C is:

- A 386ms^{-1} B 376ms^{-1}

- C 331ms^{-1} D 231ms^{-1}

20. All electromagnetic waves in a vacuum behave the same:

- a Speed B Frequency

- C Amplitude D Wavelength

21. The value of K in Coulomb's law is:

- A $9 \times 10^9 \text{ Nm}^2 \text{C}^{-2}$

- b $9 \times 10^9 \text{ Nm}^2 \text{C}^{-2}$

- C $9 \times 10^9 \text{ m}^2 \text{C}^{-2}$

- D $9 \times 10^9 \text{ Nm}^2 \text{C}^2$

22. ___ is the formula of electric field intensity.

- a $E = \frac{F}{q}$ B $E = Fq$

- C $E = \frac{1}{qF}$ D $E = 2Fq$

23. The frequency is equal to:

- a $f = \frac{1}{T}$ B $f = \frac{\ell}{g}$

- C $f = 2\pi\sqrt{\frac{\ell}{g}}$ D $f = kx$

24. The relationship between velocity, frequency and wavelength of a wave is:

- A $v\lambda = \lambda$ b $f\lambda = v$

- C $v\lambda = f$ D $v = \frac{\lambda}{f}$

25. If $X=A.B$ then X is 1, if:

- a A=1, B=1 B A=0, B=0

- C A=0, B=1 D A=1, B=0

26. In computer terminology Information means:

- A Any data
B Redundant data
C Processed data
D More data

27. The audible frequency range of sound of a normal person is:

- A 10 Hz - 10 kHz

- b 20 Hz - 20 kHz

- C 25 Hz - 25 kHz

- D 30 Hz - 30 kHz

28. The ___ part of a DC motor reverses the direction of the current flowing through the coil after every half cycle.

- A Armature B Commutator
C Brushes d Slip rings

29. The direction of the applied emf in the circuit follows the law of conservation:

- A Mass B Charge
C Momentum d Energy

30. How many kilobytes is in one megabyte?

- a 1024 kB B 1034 kB
C 1044 kB D 1054 kB

31. Isotopes are atoms of the same element having different:

- a Atomic mass
B Atomic number
C Number of protons
D Number of electrons

32. An electroscope is an instrument used for:

- a detect the presence of charge
B detect the current
C detect radiations
D None of these

33. The unit of sound intensity is:

- A Wm^{-1} b Wm^{-2}
C Wm^{-3} D Wm

34. The unit of electric intensity is:

- a NC^{-1} B $N.m$
C $N.C$ D $N.A$

35. _____ is used as a dielectric in a mica capacitor.

- a Mica B Plastic
C Paper D Aluminum

36. A transformer is used to change the value of:

- A charge B energy
C power d voltage

37. The capacitor stores:

- A Current B Voltage
C Charge D Resistance

38. The formula for Hooke's law is:

- A $k = \frac{-2F}{x}$ b $F = -kx$
C $x = -Fk$ D $k = -Fx$

39. The time period formula for a simple pendulum is:

- A $T = 2\pi\sqrt{\frac{m}{g}}$ B $T = 2\pi\sqrt{\frac{m}{k}}$
C $T = 2\pi\sqrt{\frac{\ell}{g}}$ D $T = 2\pi\sqrt{\frac{g}{\ell}}$

40. Which type of image is formed by concave lens on screen?

- A Inverse and real

- B Inverse and virtual
C Direct and Real
d Direct and Virtual

41. The Boolean symbol of NAND gate is:

- A $X = A+B$ B $X = A-B$
C $X = A.B$ d $X = \overline{A.B}$

42. The time period formula for simple harmonic motion of a mass m attached to a spring is:

- A $T = 2\pi\sqrt{\frac{k}{m}}$
b $T = 2\pi\sqrt{\frac{m}{k}}$
C $T = 2\pi\sqrt{\frac{1}{m}}$
D $T = 4\pi\sqrt{\frac{m}{4}}$

43. Find the time period of a simple pendulum of length one meter.

- a 1.99s B 2.11s
C 1.89s D 1.88s

44. The speed equation of wave is:

- a $f \times \lambda$ B $f \times v$
C $\frac{1}{\lambda v}$ D $\frac{v}{\lambda}$

45. A large ripple tank with a vibrator at 30 Hz that produces 25 complete waves at a distance of 50 cm. What will its velocity?

- A $53cm s^{-1}$
b $60cm s^{-1}$
C $75cm s^{-1}$
D $1500cm s^{-1}$

46. A positive electric charge attracts other:

- A Positive charge
b repels other positive charge
C attracts Neutral charge
D repels Neutral charge

47. Each thunderbolt of lightning is equal to:

- A 2000 million joules of energy
B 3000 million joules of energy
C 1000 million joules of energy
D 4000 million joules of energy

48. The unit of electric power is:

- A Ampere b Watt
C Joule D Volt

49. If $X = A + B$ while $X = 0$ then:

- a $A=0, B=0$ B $A=1, B=1$
C $A=0, B=1$ D $A=1, B=0$

50. Which is not processing?

- A Sorting B Storing
C Using d Collecting

51. Which of the following radiations has more penetrating power?

- A beta particle b gamma rays
C Alpha particle
D Beta and all penetrating have the same potential

52. The mouthpiece and earpiece are parts of a _____:

- A Microscope b Telephone
C Television D Computer

53. Radio Waves are:

- A Mechanical
b Electromagnetic
C Sound waves
D All of these

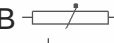
54. Michael Faraday belongs to:

- a England B America
C Saudi Arabia D Russia

55. Which of the following is not the same as Watt:

- A J/S B AV
C $A^2\Omega$ d A/V

56. The symbol of fixed resistor is:

- a  B 
C  D 

57. Reason for flow of electric current in conductor:

- A Positive ions
B Negative ions
C Positive charges
d Free electrons

58. A current of 3A passes through a wire in one minute. How much charge passes through the wire:

- A 3C b 180C
C $180 \times 10^{-3}C$ D 20C

59. Instrument that is used for generating transverse and longitudinal waves is:

- A Cord B Ripple tank
C Helical spring
D Tuning force

60. If the length of a pendulum is doubled, its time period will be:

- a $\sqrt{2}T$ B $2T$
C $T/2$ D $T/\sqrt{2}$

61. Loudness of sound depends mostly on?

- A Frequency B Period
C Wavelength d Amplitude

62. The sound level of rustling leaves is:

- A 40dB B 30dB
C 20dB d 10dB

63. The intensity of the train siren is:

- A 150dB B 130dB
C 100dB d 120dB

64. That quality of sound by which we can distinguish between high and low sound is called:

- A Pitch B Quality
C Intensity d Loudness

65. The laws of reflection of light are:

- a 2 B 3 C 4 D 5

66. The image formed by concave mirror is:

- A Real B Virtual
C Real or Virtual
d Real and Virtual

67. A body lies on the center of curvature of a concave mirror. What will be the position of the image formed?

- A Outward from Center of curvature
B At the center of curvature
C Between the center of curvature and the focal point
d At the focal point

68. The speed of light in water is approximately:

- A $3.3 \times 10^8 \text{ ms}^{-1}$
B $2.5 \times 10^8 \text{ ms}^{-1}$
C $2.3 \times 10^8 \text{ ms}^{-1}$
D $2.4 \times 10^8 \text{ ms}^{-1}$

69. The refractive index of diamond is:

- A 1.22 B 1.52
C 2.21 d 2.42

70. The Refractive index of ice is:

- A 1.36 b 1.31
C 1.33 D 1.00

71. The critical angle of water is:

- a 48.8° B 49.50°
C 45° D 46°

72. An endoscope that used to examine the throat is called:

- A Gastroscope B Cystoscope
C Bronchoscope

D None of these

73. Image is formed by camera, is:

- a Real, inverted and very small
B Virtual, straight and very small
C Virtual, straight and huge
D Real, inverted and very large

74. The instrument used to determine the nature of charge:

- A Stroboscope
b Electroscope
C Spectroscope
D Microscope

75. The SI unit of capacitance is:

- A Newton B Volt
C Coulomb d Farad

76. Two capacitors having capacitances $12\mu\text{F}$ and $6\mu\text{F}$ respectively are connected in parallel to a 12V battery. Its equivalent capacitance is:

- A $6\mu\text{F}$ B $12\mu\text{F}$
C $1.2\mu\text{F}$ d $18\mu\text{F}$

77. The Law of Lenz is exactly the same as the Law of ____.

- A Conservation of mass
b Conservation of energy
C Conservation of charge
D Conservation of momentum

78. The working principle of transformer is:

- a principle of mutual induction
B principle of DC motor
C principle of AC generator
D principle of self-induction

79. The symbol of a diode is:

- A  B 
C  d 

80. The Boolean symbol for NOR gate is:

- A $X = A + B$
B $X = A.B$
C $X = \overline{A.B}$
d $X = \overline{A + B}$

81. Which of these is not a storage device?

- A Hard disk B Flash drive
C Keyboard D Cassettes

82. CD refers to:

- A Computer disk
B Chemical disk
C Compact disc
D None of these

83. A process that helps users to view web pages is called:

A Email B Gmail

C Browser D MS Office

84. ____ are also called gamma ray.

- a Photons B Electrons
C Protons D Positrons

85. The half-life of Uranium

$^{235}_{92}\text{U}$ is:

- a 7.1×10^8 year
B 7.1×10^9 year
C 7.1×10^{10} year
D 7.1×10^{11} year

86. When uranium (92 protons) emits a beta particle, how many protons will remain?

- A 89 B 90 C 91 d 93

87. Which of the following is not radioactive element:

- A Uranium B Polonium
C Thorium d Sodium

88. Step-up transformer:

- A Increases the input current
b Increases the input voltage
C has more turns in the

primary coil

- D has fewer turns in the secondary coil

89. Which quantity remains constant in an ideal transformer?

- A Voltage b Power
C Current
D Both A and B

90. In CRO the grid potential is:

- A Positive B Zero
C Neutral d Negative

91. CRO controls the brightness of the fluorescent screen at.

- A Anode
b Negative potential of Grid
C Plates D Cathode

92. Which two gates can be used so that the output as AND gate can be used?

- A NOT gates B OR gates
C NOR gates
d NAND gates

93. If $X = A + B$ when $X = 1$ then:

- A $A=1, B=1$ B $A=0, B=1$
C $A=0, B=0$ D $A=1, B=0$

94. Cell phones send and receive messages as ____.

- A Sound waves
B Longitudinal waves
C Radio waves
D Mechanical waves

95. One byte equals:

- A 10 bits b 8 bits
C 6 bits D 4 bits

96. The basic operation of a computer is:

- A Arithmetic operations
- B Logic operation
- C Non-arithmetic operations
- D Arithmetic and Logic Operation

97. An isotope of uranium has the number of neutrons:

- A 92 B 146 C 238 D 330

98. There are rays used for brain radiotherapy.

- A Alfa rays B Beta rays
- C Gamma rays D X-rays

99. The change in nucleon number during a beta-decay is:

- A decreases 4 B increases 4
- C Does not change
- D Decreases 2

100. One kg of Uranium-235 fission reaction gives energy:

- A $4.7 \times 10^{11} J$ B $5.7 \times 10^{11} J$
- C $6.7 \times 10^{11} J$ D $7.7 \times 10^{11} J$

Short Questions

1. What is meant by ohmic conductor?
2. What is meant by electric potential?
3. Define echo. Write the speed of sound in air at normal temperature.
4. Define loudness. On what factors does it depend?
5. Define Coulomb's law.
6. Write the definition of electric power and its unit.
7. Write two uses of ultrasound.
8. Define simple harmonic motion.
9. What is the difference between mechanical waves and electromagnetic waves?
10. What is electrostatic?
11. Define EMF.
12. State Ohm's law and write its equation.
13. State Joule's law.
14. Define isotopes.
15. What is meant by pitch of sound?
16. What is an Electroscope?
17. How is nature of charge detected by electroscope?
18. What is the difference between hardware and software?
19. What is meant by Internet?
20. What is meant by regular reflection of light?
21. Define resistivity and write its formula.
22. Explain the types of transformer.
23. Define Analogue quantities and give examples.
24. What is meant by insulator? Write an example of it.

25. Write two hazards of radiations.
26. Define intensity of sound.
27. Define conventional current.
28. What is meant by solenoid?
29. Name any two factors affecting the induced E-M-F.
30. What is meant by resolving power?
31. How does a circuit breaker work?
32. What is word processing?
33. Define nuclear fusion and write its equation.
34. Write the formula for parallel method of connecting capacitors.
35. What is a variable capacitor?
36. What is a transformer? Write its principle.
37. What is Telecommunication?
38. Write two properties of alpha particle.
39. Define refractive index. What is its unit?
40. What is meant by electric field lines? What is their direction?
41. Write the definition of electromagnet.
42. What is a Re Lay? How does it work?
43. What is meant by spring constant?
44. Define sound waves and give an example.
45. Define half-life.
46. What is compression?
47. Define pitch and quality.
48. What is meant by ultrasound?
49. What is the right-hand rule for finding the magnetic poles of a current-carrying coil?
50. Write two/three uses of computer.
51. Explain Fleming's left-hand rule.
52. Define electromagnetic induction.
53. Define Lenz's law.
54. Define mutual induction.
55. Define restoring force.
56. Define Restoring Force. Which component of weight acts as the restoring force in the vibratory motion of a simple pendulum?
57. What is meant by damping oscillations?
58. What is meant by sound level? Write its formula.
59. What is the audible frequency range?
60. Why Ultrasound is beneficial in the Medical Field?
61. What is meant by reflection of light?
62. State the laws of reflection.
63. Define critical angle.
64. What is meant by Shortsightedness?
65. Define electronic field.

66. What is electric field intensity? Write its unit.
67. What is meant by potential difference?
68. Define resistance and write its unit.
69. Define kilowatt hour.
70. What is meant by thermionic emission?
71. What are the magnitudes of voltage and current for the filament of a tungsten bulb? Briefly explain.
72. What is the difference between ADC and DAC?
73. Define natural radioactivity.
74. Write the definition of nuclear transmutation.
75. Define transverse waves and longitudinal waves.
76. Write two effects of noise on human health.
77. What is the difference between musical sound and noise?
78. What is a light pipe?
79. Explain the difference between variable and fixed capacitors.
80. State the difference between conductors and insulators.
81. If resistors of $6k\Omega$ and $4k\Omega$ are connected in series with a 10V battery, what will be the equivalent resistance?
82. State the right-hand rule for a straight wire.
83. Define OR gate and construct its truth table.
84. Define CPU. Why is it called brain of computer?
85. What is the difference between data and information?
86. Explain the difference between primary memory and secondary memory.
87. Define time period and frequency.
88. What is the difference between vibration and amplitude in terms of simple pendulum?
89. What is sound quality?
90. Find the frequency of a sound wave when the speed of the sound is 340 m/s and the wavelength is 0.5 m.
91. Define refraction of light.
92. Write the laws of refraction.
93. Define capacitance.
94. Define Farad.
95. If a 0.5C charge passes through a wire in 10s, how much current flows in the wire?
96. Define Ohm. Write its symbol.
97. Name two protective devices for safe use of electricity.
98. What is logic operation? Name its two types.
99. How is the NOT Gate use as inverter?
100. Define Photophone.



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CLASS TEST

Class Test # 1	Physics-10	SYLLABUS: Unit: 10	Objective Type	Time: 12 Min.	Marks: 10
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1. Choose the correct answer.

(i) The formula of Hooke's law is:

- A $F = kx$ B $F = -kx$ C $k = \frac{x}{F}$ D $x = -Fk$

(ii) If the time period is given then frequency is calculated as:

- A $f = 1/T$ B $f = 2/T$ C $f = 3/T$ D $f = 4/T$

(iii) Shock absorbers vehicle are examples of:

- A Simple harmonic motion B Vibratory motion
C Damped motion D Linear motion

(iv) In electromagnetic waves are perpendicular to each other.

- A Electric field B Magnetic field C Gravitational field D Both A and B

(v) Longitudinal waves move faster in:

- A In gases B In liquids C Both A and B D In solids

(vi) Which of the following quantities does not change during refraction of light?

- A Its speed B Its direction C Its frequency D Its wavelength

(vii) Waves transfer:

- A energy B frequency C wavelength D velocity

(viii) Which of the following characteristics of a wave is independent of the others?

- A speed B frequency C amplitude D wavelength

(ix) The unit of wavelength is equal to ...:

- A Time B Frequency C Speed D Distance

(x) The time period of a simple pendulum of length one meter is:

- A 1.99s B 2.11s C 1.89s D 1.88s

✂-----> PTO

Class Test # 2	Physics-10	SYLLABUS: Unit: 11	Objective Type	Time: 12 Min.	Marks: 10
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1. Choose the correct answer.

(i) One Bel is equal to:

- A 5dB B 10dB C 60dB D 20dB

(ii) Intensity of sound of rustling leaves is:

- A 10^{-10} Wm^{-2} B 10^{-11} Wm^{-2} C 10^{-12} Wm^{-2} D 10^{-18} Wm^{-2}

(iii) The sensation of sound persists in our mind:

- A 0.01 s B 0.1 s C 0.02 s D 0.2 s

(iv) The speed of sound at 25°C in air or room is:

- A 320ms^{-1} B 330ms^{-1} C 346ms^{-1} D 350ms^{-1}

(v) The level of noise recommended in most countries over an eight hour workday is usually.

- A 82-90 dB B 83-90 dB C 84-90 dB D 85-90 dB

(vi) Which is an example of longitudinal waves?

- A Sound waves B Light waves C Radio waves D Water waves

(vii) The loudness of a sound is most closely related to its:

- A Frequency B Period C Amplitude D Wavelength

(viii) Principle of stethoscope depends on which process of sound?

- A Transmission B Reflection C Absorption D Refraction

(ix) The property of sound by which we can distinguish two sounds of the same loudness and pitch is called:

- A Frequency B Intensity C Quality D Sound level

(x) At 0°C the speed of sound in air is:

- A 331ms^{-1} B 346ms^{-1} C 327ms^{-1} D 386ms^{-1}

Class Test # 1	Physics-10	SYLLABUS: Unit: 10	Subjective Type	Time: 28 Min.	Marks: 30
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2. Give short answers to the following questions. (10 × 2 = 20)

- (i) Explain Hooke's law.
- (ii) What is meant by time period?
- (iii) Define damped oscillations. Give an example from daily life.
- (iv) How can you define a wave?
- (v) What is called compression?
- (vi) Define transverse wave and give an example.
- (vii) Prove: $v = f\lambda$
- (viii) Define refraction of waves.
- (ix) A wave moving on a slinky has a frequency of 4Hz and a wavelength of 0.4m. Find the speed of the wave.
- (x) What is meant by diffraction of wave?

3. Attempt the following questions. (2 × 5 = 10)

- (i) Distinguish between longitudinal and transverse waves with suitable examples.
- (ii) Find the time periods of a simple pendulum of 1 metre length, placed on Earth and on Moon. The value of g on the surface of Moon is $1/6^{\text{th}}$ of its value on Earth, where g_e is 10ms^{-2} .

✂-----✂

Class Test # 2	Physics-10	SYLLABUS: Unit: 11	Subjective Type	Time: 28 Min.	Marks: 30
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2. Give short answers to the following questions. (10 × 2 = 20)

- (i) What is a tuning fork?
- (ii) Define Loudness.
- (iii) What is meant by resonance of waves?
- (iv) Find the intensity level of the faintest audible sound when the intensity is 10^{-12}Wm^{-2} .
- (v) Which equation is used to find the speed of sound?
- (vi) Briefly explain why noise is harmful to health?
- (vii) Define acoustic protection.
- (viii) What is range of sound audible to the human ear?
- (ix) Define ultrasound and describe one application.
- (x) How is the depth of water in the ocean measured?

3. Attempt the following questions. (2 × 5 = 10)

- (i) Write a note on characteristics of sound.
- (ii) If at Anarkali Bazar Lahore, intensity level of sound is 80 dB, what will be the intensity of sound there?

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**ASSESSMENT TEST
CHAPTER WISE**

Q1. Choose the correct option.

1 × 12 = 12

1. The equation to find the time period of a mass attached to a spring is:

A $T = 2\pi\sqrt{\frac{\ell}{g}}$ B $T = 2\pi\sqrt{\frac{g}{\ell}}$ C $T = 2\pi\sqrt{\frac{m}{k}}$ D $T = 2\pi\sqrt{\frac{k}{m}}$

2. Earthquake produces waves through the crust of the earth in the form of:

A Seismic waves B Sound waves C Light waves D Radio waves

3. An example of longitudinal waves is:

A Sound wave B Light wave C Radio wave D Water wave

4. Which of the following is an example of simple harmonic motion?

A the motion of simple pendulum B the motion of ceiling fan
C the spinning of the earth on its axis D a bouncing ball on a floor

5. Oscillation of electric and magnetic field in electromagnetic waves is at an angle of:

A Parallel B Perpendicular C 45° D 180°

6. In a vacuum, all electromagnetic waves have the same:

A Speed B Frequency C Amplitude D Wavelength

7. The number of vibrations per second of a vibrating body is called:

A Frequency B Amplitude C Vibration D Displacement

8. When water waves enters the region of shallow water their wave length.

A remains the same B becomes zero
C Increases D Decreases

9. When did Christian Huygens invent the pendulum clock?

A 1656 B 1756 C 1856 D 1956

10. Time period formula for simple pendulum:

A $T = 2\pi\sqrt{\frac{g}{\ell}}$ B $T = 2\pi\sqrt{\frac{\ell}{g}}$ C $T = 2\pi\sqrt{\frac{m}{k}}$ D $T = 2\pi\sqrt{\frac{k}{m}}$

11. The unit of spring constant is:

A $\frac{N}{m^2}$ B $\frac{N}{m}$ C $\frac{N}{C}$ D $\frac{m^2}{N}$

12. What does the energy of a wave depend on?

A Frequency B Time period C Amplitude D Distance

Al-Razi Assessment Papers		10	Physics - 10	
Assessment Chapterwise Test 1	Syllabus: Unit 10	Subjective Type	Time: 1:45 Min.	Marks: 48

(Section - I)

Q2. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- Define simple harmonic motion.
- Define restoring force.
- What is the reciprocal of time? Define it.
- Find the time period of a simple pendulum whose length is 1.0m while $g=10.0\text{ms}^{-2}$
- Define mechanical waves and name its types.
- Write the difference between longitudinal and transverse waves.
- Define reflection of waves.
- Define ripple tank.

Q3. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- Write two characteristics of simple harmonic motion.
- Define vibration.
- Name four examples of electromagnetic waves.
- Explain the difference between crest and Trough of transverse waves.
- What is wavelength?
- Find the speed of waves when the frequency is 2 Hz and the wavelength is 0.1 m.
- What is meant by diffraction of wave?
- Define longitudinal wave and give its examples.

Q4. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- Define simple pendulum and write its time period formula.
- What is the relationship between frequency and time period?
- Define amplitude.
- Define mechanical waves and electromagnetic waves.
- Write the definition and formula for wave equation.
- If the length of a simple pendulum is doubled, what will be the change in its time period?
- If the time period of a simple pendulum is 1.99 seconds, find its frequency.
- Define damped oscillations. Give an example from daily life.

(Section - II)

Note: Attempt TWO question in all. (2 × 9 = 18)

- What is simple harmonic motion? What are the necessary conditions for a body to execute simple harmonic motion? 4
 - A pendulum of length 0.99 m is taken to the moon by an astronaut. The period of the pendulum is 4.9 s. What is the value of g on the surface of the moon? 5
- Explain types of mechanical waves. 4
 - A simple pendulum completes one vibration in two seconds. Calculate its length, when $g=10.0\text{ms}^{-2}$. 5
- What is ripple tank? Write the construction and working of ripple tank. 4
 - Water waves in a shallow dish are 6.0 cm long. At one point, the water moves up and down at a rate of 4.8 oscillations per second.
 - What is the speed of the water waves?
 - What is the period of the water waves?

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**ASSESSMENT TEST
1ST HALF**

Q1. Choose the correct option.

 $1 \times 12 = 12$

1. If the length of simple pendulum is doubled then its time period will be:

- A $\sqrt{2}T$ B $\frac{T}{\sqrt{2}}$ C $2T$ D $\frac{T}{2}$

2. Radio waves are:

- A Infrared B X-ray C Electromagnetic D Mechanical

3. If the mass of the bob of a pendulum is increased by a factor of 3, the period of the pendulum's motion will:

- A Be increased by a factor of 2 B Remain the same
C Be decreased by a factor of 2 D Be decreased by a factor of 4

4. Sound level in dB can be stated as:

- A $10 \log I/I_0$ dB B $\log I/I_0$ dB C $10 \log I_0/I$ dB D $\log I_0/I$ dB

5. How does sound travel from its source to your ear?

- A by change in air pressure B by vibration of string or cord
C by electromagnetic waves D by infrared waves

6. The depth of water can be measured by ____.

- A Infrasonic B Ultrasonic
C Both A and B D None of the above

7. Types of spherical mirrors is/are:

- A 2 B 4 C 6 D 8

8. Snell's law is:

- A $n = \frac{\sin \hat{i}}{\sin \hat{r}}$ B $n = \frac{\sin \hat{r}}{\sin \hat{i}}$ C $n = \sin \hat{r}$ D $n = \sin \hat{i}$

9. The variation of focal length of eye lens to form a sharp image on retina is called:

- A Modification B Induction C Accommodation D Distinct vision

10. SI unit of electric field intensity is:

- A NC^{-1} B $N^{-1}C$ C $\frac{N^{-1}}{C}$ D $\frac{C}{N^2}$

11. 1 nano Farad is equal to:

- A $10^{-9}F$ B $10^{-3}F$ C $10^{-6}F$ D $10^{-12}F$

12. How many types of charges are?

- A 2 B 3 C 4 D 5

Al-Razi Assessment Papers	26	Physics - 10		
Assessment First Half Test 9	Syllabus: Unit 10-13	Subjective Type	Time: 1:45 Min.	Marks: 48

(Section - I)

Q2. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- How can you define a wave?
- What is called compression?
- A wave moving on a slinky has a frequency of 4Hz and a wavelength of 0.4m. Find the speed of the wave.
- Explain Hooke's law.
- What is meant by time period?
- Define refraction of waves.
- What is stethoscope?
- What is meant by zero bell?

Q3. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- Explain the difference between frequency and pitch.
- Which of the solids and liquids has the highest speed of sound waves and why?
- State the factors of harmless level of noise.
- What is meant by the audible frequency range?
- What is a compound microscope? Write the formula to find its magnification.
- Write two uses of lenses.
- What is meant by the principal focus of convex lenses and concave lenses?
- What is meant by prism?

Q4. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- What is meant by critical angle?
- What is the mirror formula? Write its mathematical form.
- How can the capacitance of a capacitor be increased?
- Why the parallel plate capacitors are not used in appliances?
- Write the factors affecting the charge storing capacity of a capacitor.
- What do you know about electrostatic air cleaners?
- If $V = 50V$ and $C = 100\mu F$ then $Q = ?$
- State two uses of electrostatics.

(Section - II)

Note: Attempt TWO question in all.

Q5. (a) Prove that the motion of simple pendulum is simple harmonic motion. 4

(b) A sound wave has a frequency of 2 kHz and wavelength 35 cm. How long will it take to travel 1.5 km? 5

Q6. (a) What is total internal reflection? Explain with ray diagram. 4

(b) A convex lens of focal length 6 cm is to be used to form a virtual image three times the size of the object. Where must the lens be placed? 5

Q7. (a) Explain one application and one hazard of static electricity. 4

(b) A capacitor holds 0.06 coulombs of charge when fully charged by a 9 volt battery. Calculate capacitance of the capacitor. 5

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ASSESSMENT TEST
2ND HALF

Q1. Choose the correct option.

1 × 12 = 12

1. If a charge of 0.5C passes through a wire in 10s, then ____ current is flowing in the wire.
 - A 0.05 A
 - B 0.5 A
 - C 5 A
 - D 20 A
2. When resistors are connected in series, the current flowing through them is:
 - A Different
 - B Zero
 - C Equal
 - D None
3. The study of magnetic effects of current is called:
 - A Electrostatics
 - B Magnetism
 - C Electricity
 - D Electromagnetism
4. For an ideal transformer:
 - A $P_p = P_s$
 - B $P_p < P_s$
 - C $P_p > P_s$
 - D $P_p \neq P_s$
5. Number of input/inputs of NOT operation is/are:
 - A 1
 - B 2
 - C 3
 - D 4
6. The Output of NAND gate is '0' when:
 - A both of its inputs are '0'
 - B both of its inputs are '1'
 - C any of its inputs are '0'
 - D any of its inputs are '1'
7. When did Graham Bell make the simple telephone?
 - A 1876
 - B 1886
 - C 1870
 - D 1867
8. One byte is equals to:
 - A 10 bits
 - B 8 bits
 - C 6 bits
 - D 4 bits
9. Information can be downloaded from Broadband:
 - A in one minute
 - B in one second
 - C in one day
 - D in two days
10. The half-life of polonium $^{210}_{84}\text{Po}$ is:
 - A 140 days
 - B 130 days
 - C 145 days
 - D 138 days
11. The half-life of a certain isotope is one day. What is the quantity of the isotope after 2 days?
 - A one-half
 - B one-quarter
 - C one-eighth
 - D none of these
12. The number of protons in a nuclide $^{13}_6\text{X}$ is:
 - A 3
 - B 10
 - C 8
 - D 6

(Section - I)

Q2. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- i. Define resistance and also write its unit.
- ii. What is the advantage of connecting electrical devices in parallel circuit instead of series circuit?
- iii. State two causes of short circuit.
- iv. What is meant by earth wire?
- v. How many watt hours are there in 1000 joules?
- vi. What is meant by solenoid? How does a solenoid act like a magnet?
- vii. Define mutual induction.
- viii. What is a transformer? Write its types.

Q2. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- i. Define kilo-watt hour.
- ii. What does the brightness of the screen indicate?
- iii. Why does the picture get distorted when the magnet is brought near the television, explain the reason?
- iv. Write the use of logic gates.
- v. Define NOT gate and draw its symbol.
- vi. Define Boolean algebra.
- vii. Differentiate between information technology and telecommunication.
- viii. List the components of a computer-based information system.

Q3. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- i. What is meant by procedure in (CBIS)?
- ii. Define optical fiber.
- iii. Floppy disk or hard disk is better for storing data? Explain the reason.
- iv. What is the difference between atomic number and atomic mass?
- v. Who discovered radioactivity?
- vi. What is the difference between natural and artificial radioactivity?
- vii. What is a photon?
- viii. Define nuclear fusion.

(Section - II)

Note: Attempt TWO question in all.

- Q5. (a) Explain Ohm's law. What are its limitations? 4
 (b) A transformer is needed to convert a mains 240 V supply into a 12 V supply. If there are 2000 turns on the primary coil, then find the number of turns on the secondary coil. 5
- Q6. (a) What is NOR gate? Draw its symbolic diagram and truth table. 4
 (b) Half-life of a radioactive element is 10 minutes. If the initial count rate is 368 counts per minute, find the time for which count rates reaches 23 counts per minute. 5
- Q7. (a) What is Electronic Mail? Write down its three advantages. 4
 (b) The activity of carbon-14 in the ashes of a cave is that of fresh wood. $\frac{1}{8}$ is in competition. Determine the age of the ash. 5

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**ASSESSMENT TEST
FULL BOOK**

Q1. Choose the correct option.

 $1 \times 12 = 12$

1. If the time period is given then frequency is calculated as:

- A $f = 1/T$ B $f = 2/T$ C $f = 3/T$ D $f = 4/T$

2. Which of the following quantities does not change during refraction of light?

- A Its speed B Its direction C Its frequency D Its wavelength

3. Intensity of sound of rustling leaves is:

- A 10^{-10} Wm^{-2} B 10^{-11} Wm^{-2} C 10^{-12} Wm^{-2} D 10^{-18} Wm^{-2}

4. Speed of sound for steel at 25°C :

- A 3880 m/s B 5950 m/s C 6040 m/s D 5960 m/s

5. The speed of light in air is approximately equal to ms^{-1} .

- A 2×10^8 B 3×10^6 C 3×10^8 D 3×10^9

6. The variation of focal length of eye lens to form a sharp image on retina is called:

- A Modification B Induction
C Accommodation D Distinct vision

7. The S.I unit of capacitance of a capacitor is:

- A Volt (V) B Ampere (A) C Farad (F) D Newton (N)

8. Unit of electric power is:

- A watt B ampere C joule D volt

9. The practical application:

- A A.C generator B D.C generator C Transformer D Inductor

10. Arithmetic symbol for AND operation:

- A $X = A+B$ B $X = A \cdot B$ C $X = A \cdot B$ D $X = A \cdot B$

11. Sound waves are amplified by:

- A Receiver B Transmitter C Amplifier D Recorder

12. The half-life of Uranium ${}_{92}^{235}\text{U}$ is:

- A 5×10^8 Year B 6×10^8 Year C 7.1×10^8 years D 8×10^8 years

Al-Razi Assessment Papers		30	Physics - 10	
Assessment Second Half Test 10	Syllabus: Unit 10-18	Subjective Type	Time: 1:45 Min.	Marks: 48

(Section - I)

Q2. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- i. How shock absorber damp vibration?
- ii. Define sound waves and write an example.
- iii. State laws of reflection.
- iv. How does electrostatic induction differ from charging by friction?
- v. What is ammeter? How is it connected in a circuit?
- vi. Why magnetic poles cannot be separated unlike electric charges?
- vii. What is the cause of the glow produced in the tube?
- viii. What are browsers? Give two examples of them.

Q2. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- i. The amount of energy transferred by a wave depends upon which factors?
- ii. Define pitch and quality of sound.
- iii. Define principal axes and focal length.
- iv. What is affect of distance on Coulomb force? Write it.
- v. Write the difference between potential difference and e.m.f.
- vi. Explain Faraday's law of electromagnetic induction.
- vii. Define Boolean algebra.
- viii. Write any two properties of beta (β) particles.

Q3. Write short answers to any FIVE (5) questions. (5 × 2 = 10)

- i. Define electromagnetic waves.
- ii. How can an echo be heard more than once?
- iii. What is the refractive index of ice and water?
- iv. Define electric lines of force.
- v. What is a thermister? Write one use of it.
- vi. Define ideal transformer.
- vii. What is OR gate? Write its truth table.
- viii. Describe four Hazards of Radiations.

(Section - II)

Note: Attempt TWO question in all.

- Q5. (a) What is ripple tank? Write the construction and working of ripple tank. 4**
- (b) A doctor counts 72 heartbeats in 1min. Calculate the frequency and period of the heartbeats. 5**
- Q6. (a) What is telescope? Explain its working and magnification. 4**
- (b) A capacitor holds 0.06 coulombs of charge when fully charged by a 9 volt battery. Calculate capacitance of the capacitor. 5**
- Q7. (a) Explain the use of logic gates as safety alarm. 4**
- (b) Cobalt-60 is a radioactive element with half-life of 5.25 years. What fraction of the original sample will be left after 26 years? 5**

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