DELHI PUBLIC SCHOOL NEWTOWN
SESSION 2023-2024
FINAL EXAMINATION

CLASS: IX | **FULL MARKS: 80**
SUBJECT: PHYSICS [SET A] | **TIME: 2 HOURS**

Candidates are allowed additional 15 minutes for only reading the paper.
They must NOT start writing during this time.
The intended marks for questions or parts of questions are given in brackets [ ]
Section A is compulsory. Attempt any four questions from Section B
This paper consists of six printed pages

SECTION A

Question 1 [15 × 1 = 15]

Choose the correct answers to the questions from the given options:

(i) In simple pendulum, what does the slope of T^2 vs l graph indicate ?
(a) value of g (b) value of T (c) value of $4\pi^2/g$ (d) none of these

(ii) Assertion: An object may have acceleration even if it is moving with uniform speed.
Reason: The object may be moving with uniform speed but it may be changing its direction of motion.
(a) Both assertion and reason are true.
(b) Both assertion and reason are false.
(c) Assertion is false but reason is true.
(d) Assertion is true but reason is false.

(iii) An object is placed 40 cm from a concave mirror of focal length 20 cm. The image formed is
(a) real, inverted and of same size. (b) real, inverted and smaller in size.
(c) virtual, erect and larger in size (d) virtual, erect and smaller in size.

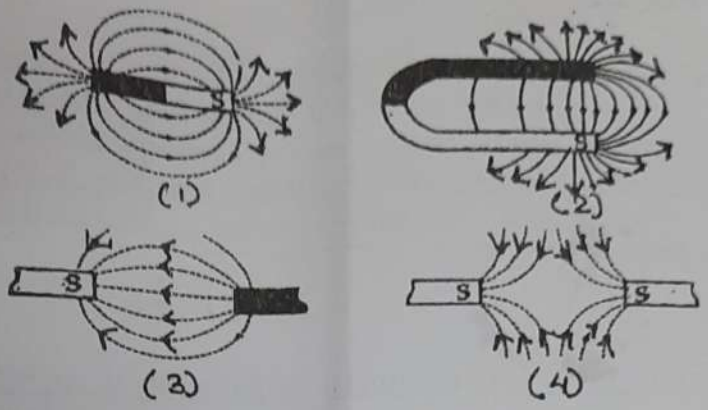
(iv) A particle is moving in a circular path of radius r. The displacement after half a circle would be
(a) zero (b) πr (c) 2r (d) $2\pi r$

(v) Sound travels 2 km in 3 sec and 3 km in 10 sec in a medium and air respectively. The ratio of the wavelengths of sound in the two media is
(a) 1:8 (b)1:18 (c) 8:1 (d) 20:9

(vi) The potential difference between a cell of 30V and earth is
(a) 0 V (b) -15 V (c) 30 V (d) -30 V

(vii) Action-reaction forces
(a) act on the same body.
(b) act on different bodies.
(c) act along different lines.
(d) act in the same direction.

(viii) Which of the following figures doesn't show the correct path for magnetic lines of forces?



(a) Figure 1 (b) Figures 1 and 2 (c) Figures 1, 2, 3 (d) All of the diagrams are correct

(ix) How will be the volume change when a given mass of water is heated from 0°C to 10°C?
(a) First increases and then decreases. (b) First decreases and then remains constant.
(c) First decreases and then increases. (d) None of the above.

(x) Two conducting wires of same material are taken. The length of the first wire is double than the second wire. The ratio of their resistances is
(a) 1:4 (b) 4:1 (c) 2:1 (d) 1:2

(xi) A cell supplies a charge of 75 C. If current drawn from the cell is 750 μA, the time required for the cell to discharge completely is
(a) 10^6 second (b) 10^{-6} second (c) 10^5 second (d) 10^{-5} second

(xii) A ray of light incidents on a plane mirror at an angle 30° with the mirror. The deviation produced in the ray is
(a) 30° (b) 60° (c) 90° (d) 120°

(xiii) If the two plane mirrors are inclined at an angle of 60°, then the number of images formed by the object placed between these mirrors is
(a) 4 (b) 3 (c) 5 (d) 6

(xiv) A liquid whose density is twice the density of mercury is used as barometric liquid. Then one atmospheric pressure equals to __ cm of liquid pressure.
(a) 380 (b) 152 (c) 76 (d) 38

(xv) The diagram shows the positions of a boy and a flower pot in front of a plane mirror.

The distance between the flower pot and the image of the boy is

(a) 1 m (b) 5 m (c) 7 m (d) 14 m

Question 2

(i) (a) What do you understand by the term real image?
(b) What type of mirror is used to obtain real image?
(c) Does the mirror named by you in (b) always form real image? [3]

(ii) Name the factors affecting pressure at a point in a liquid. [2]

(iii) What fraction of an iceberg of density 910 kgm^{-3} will be above the surface of sea water of density 1170 kgm^{-3}? [2]

(iv) Name the type of mirror used as the rear-view mirror of a car. State the reason for such use. [2]

(v) Show the variation of time period of a simple pendulum with its effective length graphically. [2]

(vi) How is the working of an electric bell affected, if alternating current be used instead of direct current? Justify your answer. [2]

(vii) Is it possible that velocity time graph becomes parallel to velocity axis? Give reason in support of your answer. [2]

Question 3

(i) A piece of wood is suspended from the hook of a spring balance, it reads 70gf. The wood is now lowered into water. What change would you expect in the reading of the spring balance? Justify your answer. [2]

(ii) Why would you prefer an electromagnet over a permanent magnet. [2]

(iii) State any two ways to save energy. [2]

(iv) A charge of 25 C is moved from infinity to points A and B in an electric field when the work done to do is 10 J and 10.5 J respectively. Calculate the potential difference between the points A and B. [2]

(v) Compare the time periods of a simple pendulum at places where acceleration due to gravity are 2.45 ms^{-2} and 9.8 ms^{-2}. [2]

SECTION B

(Attempt any four questions)

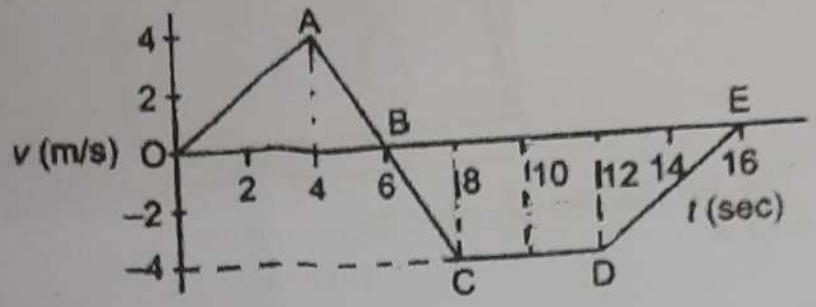
[3+3+4]

Question 4

(i) (a) Name two factors on which the strength of magnetic field of an electromagnet depends.
(b) Name the material used for preparing an electromagnet.

(ii) Using a cell, key, rheostat, bulb, voltmeter and ammeter draw a labelled diagram of an electric circuit.

(iii) The velocity-time graph in figure shows a particle starting from rest and travelling east. Find



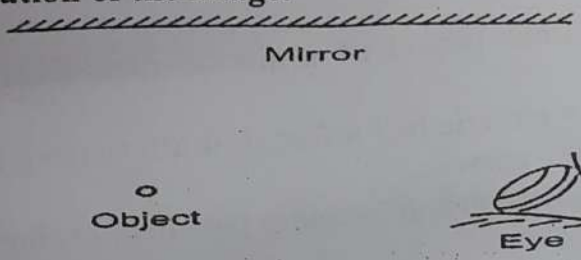
a) the average speed of the particle.
b) the average velocity of the particle.
c) the interval(s) when the velocity of the particle is decreasing with time.

[3+3+4]

Question 5

(i) a) How does a bat avoid obstacles in its way when in flight?
b) Mention one practical use of ultrasonic vibrations.

(ii) Copy the figure and complete the ray diagram using minimum two incident rays to show the formation of the image.



(iii) When an object with a height 1 cm is held at a distance of 4 cm from a concave mirror at a point, its erect image is formed at a distance of 6 cm behind the mirror. Find the
a) focal length of the mirror.
b) height of the image.

[3+3+4]

Question 6

(i) a) Define 1 Pascal of pressure.
b) Obtain the relation between SI and CGS units of force.

(ii) a) Calculate the total number of electrons flowing through a circuit in 20 min 40 s, if a current of 40 μA flows through the circuit. [Charge of one electron $=1.6 \times 10^{-19}$ C]
b) Define 1 Ohm resistance

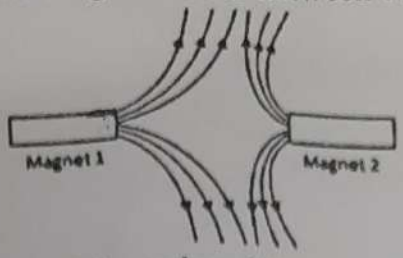
(iii) Draw the displacement-time graphs for the following cases:
a) When a body is moving with constant velocity
b) When a body moves with constant acceleration.

[3+3+4]

Question 7

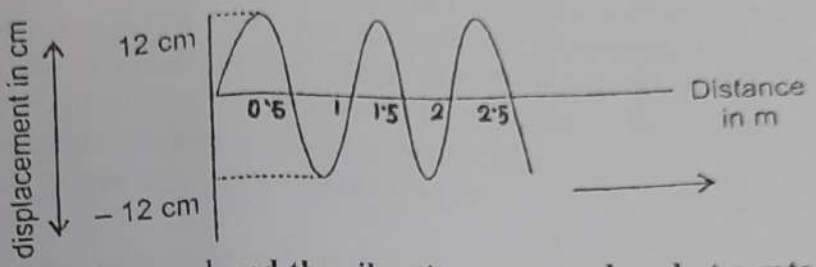
(i) Two balls a and b of masses m and 2m are in motion with velocities 2v and v respectively. Compare their (a) inertia (b) momentum (c) the force needed to stop them in the same time.

(ii) The given figure shows the magnetic field between two magnets.



a) Copy the diagram and label the poles of the magnet.
b) Which one of the above is the weaker magnet? Give reason to support your answer.

(iii) a) The figure shows the snapshot of a sound wave in a certain medium at a certain instant. Find the amplitude of the wave.



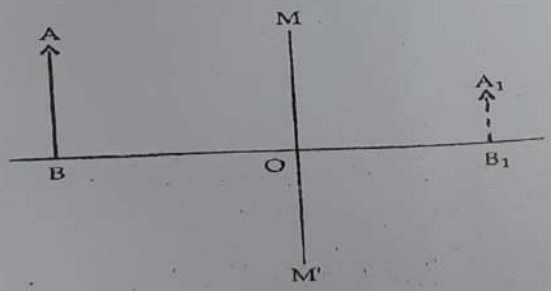
b) If the velocity of a wave is 4 ms^{-1} and the vibrations are produced at a rate of 1200 per minute, calculate the wavelength of the wave.
c) When wave of same type as mentioned in (b) but of higher frequency is passed in the given medium, will the speed of the wave increase, decrease or remain the same?

[3+3+4]

Question 8

(i) A body is dropped freely under gravity from the top of a tower of height 98.6 m. Calculate
a) the time at which it strikes the ground.
b) the velocity with which it strikes the ground. [Take g = 9.8 ms^{-2}]

(ii) In the given figure AB is an object placed in front of the mirror MM' and A_1B_1 is the corresponding image formed by the mirror.
a) Identify the type of mirror.
b) Copy and complete the ray diagram.



(iii) a) Why does the atmospheric pressure vary with altitude? Draw a graph to illustrate it.
b) Mention one merit of aneroid barometer.

Question 9 [3+3+4]

(i) a) What is the depth below the surface of water with pressure being equal to twice the atmospheric pressure?

[The atmospheric pressure = 10^5 Nm^{-2}
The density of water = 10^3 kgm^{-3}
$g = 9.8$ ms^{-2}]

b) State Pascal's law.

(ii) Derive the equation $S = ut + \frac{1}{2} at^2$ graphically for a uniformly accelerated motion.

(iii) Sound is produced by vibrating objects. The matter or substance through which sound is transmitted is called a medium. It can be solid, liquid or gas. Sound moves through a medium from the point of generation to the listener. When an object vibrates, it sets the particles of the medium around it vibrating. The particles do not travel all the way from the vibrating object to the ear. Sound waves are characterized by the motion of particles in the medium and are called mechanical waves. When a vibrating object moves forward, it pushes and compresses the air in front of it creating a region of high pressure; this region is called a compression(C). When the vibrating object moves backwards, it creates a region of low pressure called rarefaction (R). Hence sound wave is longitudinal wave.

a) How does the speed of sound in air change, with change in temperature?

b) Mention any two requisites of a medium for sound to propagate through that medium.

c) A source of sound wave produces 20 compressions and 20 rarefactions in 0.2 s. What is the frequency of the sound wave?

d) Why doesn't radio wave require mechanical medium to propagate?