CBSE EXAMINATION PAPER-2026

PHYSICS

(Solved)

Time allowed : 3 hours | Maximum Marks : 82

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **38 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 2** are case based questions

iv. **Section B** – questions number **3 to 18** are multiple choice questions

v. **Section C** – questions number **19 to 24** are very short answer

vi. **Section D** – questions number **25 to 32** are short answer

vii. **Section E** – questions number **33 to 38** are long answer

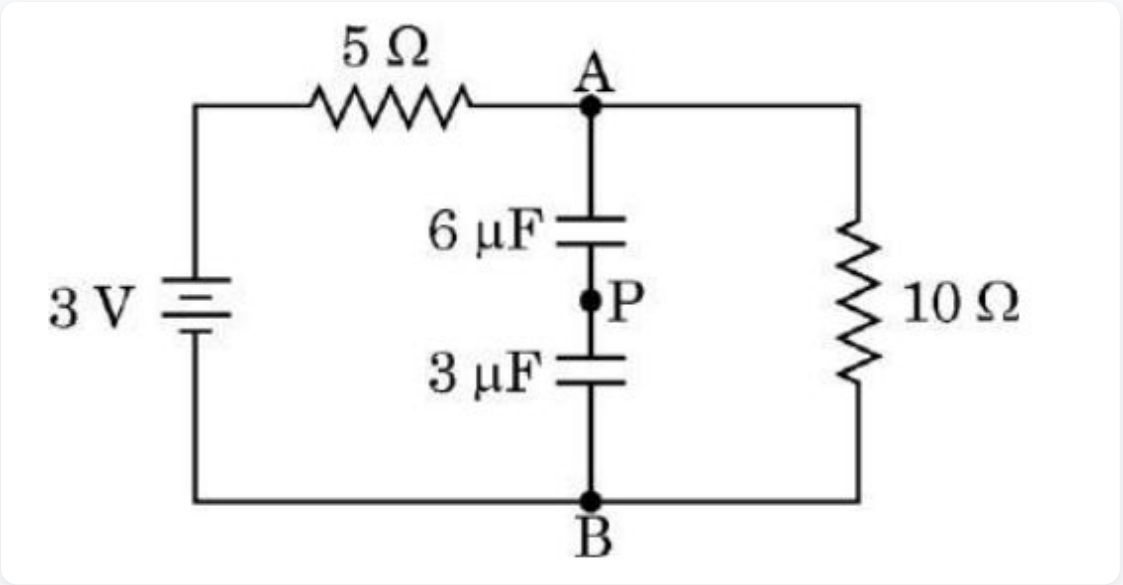
viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

Section A

Question 1. Capacitors are manufactured with certain standard capacitances and working voltages. However, these standard values may not be the ones that are actually needed in a particular application. Two or more capacitors can be grouped in series or in parallel to achieve desired capacitance and voltage. When connected in series, the total capacitance decreases while the voltage rating increases, whereas in parallel connections, the total capacitance increases and maintains the same voltage rating. A capacitor stores energy in the electric field between its plates and stored energy is proportional to the square of the voltage and capacitance $U = 1/2\ CV^2$, where

symbols have their usual meanings. Two capacitors, one of 3 μF and the other of 6 μF, are connected in series in the circuit as shown in the figure, for a long time.



(1)

The total capacitance of the circuit is:

(A) 6 μF

(B) 3 μF

(C) 9 μF

(D) 2 μF

[1 Marks]

(2)

The current in the 10 Ω resistor is:

(A) 0.3 A

(B) 0.6 A

(C) 0.2 A

(D) 0

[1 Marks]

(3)

The potential difference between point A and B is:

(A) 2 V

(B) 0.3 V

(C) 0.2 V

(D) 3 V

[1 Marks]

(4)

The value of charge on the plates of the 6 μF capacitor is:

(A) 6 μC

(B) 4 μC

(C) 12 μC

(D) 8 μC

[1 Marks]

(5)

The wire between two capacitors is cut at point P. The current in the circuit will :

(A) increase

(B) decrease

(C) remain the same

(D) first increase then become stable

[1 Marks]

Question 2.

A charged particle +q in an electric field □□ experiences a force in the direction of the electric field. As a result, its kinetic energy changes. Similarly, the charged particle also experiences a force when it moves in a magnetic field □□ . But this magnetic force is perpendicular to both velocity □□ of the charged particle and the magnetic field □□, so it cannot change the kinetic energy of the charged particle. Consider two charged particles 1 and 2 of masses m and m/2 having charges −q and +2q respectively. They are accelerated from rest through the same potential difference V and acquire kinetic energies K_1 and K_2. Then they enter in a region of uniform magnetic field □□ perpendicular to their velocities.

(1)

The ratio of their kinetic energies (K_1/K_2) is:

(A) 1/2

(B) 1/4

(C) 4

(D) 1

[1 Marks]

(2)

The ratio of the radii of the circular paths described by them (r_1/r_2) is:

(A) 1/√2

(B) √2

(C) 1/2

(D) 2

[1 Marks]

(3)

If period of revolution for particle 1 is 4 s, then for particle 2, the period will be:

(A) 1 s

(B) 2 s

(C) 4 s

(D) 8 s

[1 Marks]

(4)

Suppose particles 1 and 2 enter the magnetic field) □□ = B_0 $\hat{k}$ with velocities v_1(vector) = v_1 $\hat{i}$ and v_2(vector) = v_2 $\hat{i}$. Then:

(A) both particles revolve clockwise

(B) both particles revolve anticlockwise

(C) particle 1 revolves clockwise while particle 2 revolves anticlockwise

(D) particle 1 revolves anticlockwise while particle 2 revolves clockwise

[1 Marks]

(5)

If the value of momentum for particles 1 and 2 are p_1 and p_2 , then:

(A) $p_1 = p_2/2$

(B) $p_1 = p_2$

(C) $p_1=2p_2$

(D) $p_1= 4p_2$

[1 Marks]

Section B

Question 3.

A particle of mass m and charge q starts from rest and moves in an electric field □□ = E_0 î. After travelling a distance x in the field along x-axis, the kinetic energy of the particle will be:

[1 Marks]

(A) q^2E_0x

(B) $q^2E_0^2x$

(C) qE_0x

(D) qE_0x^2

Question 4.

A square loop of side 50 cm is placed in a uniform magnetic field of 3.0 T acting perpendicular to the plane of the loop. If the loop is rotated through an angle of 90° in 0.3 s, the value of emf induced in the loop would be:

[1 Marks]

(A) 1.0 V

(B) 0.75 V

(C) 0.50 V

(D) 0.25 V

Question 5. A plane electromagnetic wave travels through a medium, and the magnetic field associated with it is given by $B = 5 \times 10^{-8} \sin (3 \times 10^{10} t - 150x)$ T where x is in metres and t is in seconds. The velocity of the wave is:

[1 Marks]

(A) 2.0×10^8 m s^{-1}

(B) 3.5×10^7 m s^{-1}

(C) 2.5×10^8 m s^{-1}

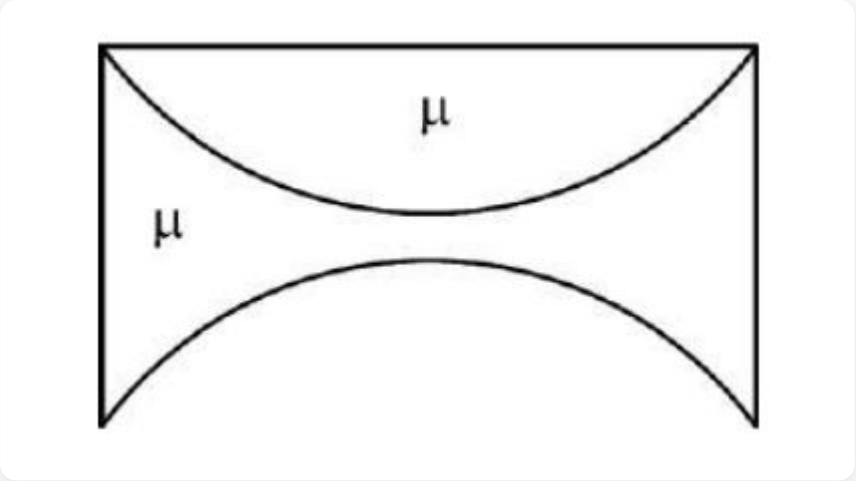
(D) 4.5×10^7 m s^{-1}

Question 6.

A thin plano-convex lens and a thin equi-concave lens are kept coaxially in contact as shown in the figure. Assuming both the lenses are made of glass of refractive index μ, and R is the radius of

curvature of each curved surface, the focal length of the combination is:

[1 Marks]



(A) R/μ − 1

(B) 2R/μ − 1

(C) −2R/μ − 1

(D) −R/μ − 1

Question 7. The phase difference between the two superimposing waves that give rise to a bright spot in a Young's double-slit experiment is (n is an integer):

[1 Marks]

(A) $2n\pi + \pi/4$

(B) $2n\pi$

(C) $2n\pi + \pi/2$

(D) $2n\pi + \pi$

Question 8.

A telescope has an objective lens of focal length 144 cm and an eyepiece of focal length 6.0 cm. The magnifying power and the length of telescope tube will be respectively:

[1 Marks]

(A) 42, 150 cm

(B) 24, 138 cm

(C) 42, 138 cm

(D) 24, 150 cm

Question 9. In which of the following, total internal reflection does not occur?

[1 Marks]

(A) Twinkling of stars

(B) Optical fibre

(C) Reflecting prism

(D) Brilliance of diamonds

Question 10.

Radiation of wavelength 200 nm is incident on a photosensitive surface of work function 4.2 eV. The kinetic energy of fastest photoelectrons emitted from this surface will be close to:

[1 Marks]

(A) 3.0 eV

(B) 3.5 eV

(C) 2.0 eV

(D) 2.5 eV

Question 11.

A proton and an alpha particle have equal momentum. The ratio of their kinetic energies (E_p/E_a) and de Broglie wavelengths associated with them (λ_p/λ_a) respectively are:

[1 Marks]

(A) 1, 2

(B) 1, 4

(C) 4, 1

(D) 2, 1

Question 12.

If r_1 and r_2 are the radii of atomic nuclei of mass number 64 and 27 respectively, then the value of (r_1/r_2) is:

[1 Marks]

(A) 3/4

(B) 27/64

(C) 4/3

(D) 1

Question 13.

When the forward bias voltage in a semiconductor diode is changed from 0.8 V to 1.0 V, the forward current changes by 2.0 mA. The forward bias resistance of the diode will be:

[1 Marks]

(A) 125 Ω

(B) 100 Ω

(C) 175 Ω

(D) 200 Ω

Question 14. The process named ‘minority carrier injection’ in a p-n junction diode occurs during:

[1 Marks]

(A) forward biasing

(B) reverse biasing

(C) no biasing at low temperature

(D) no biasing at high temperature

Question 15.

Assertion (A): In a Wheatstone bridge circuit, if we interchange the position of the cell and the galvanometer, the balance condition P/Q = R/S remains unchanged. Reason (R): P/Q = R/S ⇒ Q/S = P/R, so balance condition remains same.

[1 Marks]

(A) Assertion (A) is true, but Reason (R) is false.

(B) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(C) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(D) Both Assertion (A) and Reason (R) are false.

Question 16.

Assertion (A): The cylindrical soft iron core in a moving coil galvanometer only makes the magnetic field radial and does not affect the strength of the magnetic field. Reason (R): In a moving coil galvanometer, the plane of the coil is always perpendicular to the magnetic field.

[1 Marks]

(A) Assertion (A) is true, but Reason (R) is false

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)

(C) Both Assertion (A) and Reason (R) are false

(D) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A)

Question 17.

Assertion (A): Photoelectric current depends upon the intensity of the incident radiation. Reason (R): Stopping potential is independent of the intensity of the incident radiation.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are false

(B) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A)

(C) Assertion (A) is true, but Reason (R) is false

(D) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)

Question 18.

Assertion (A): Nuclear forces are always attractive. Reason (R): The nuclear force between protons and neutrons in a nucleus is a weak force.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)

(B) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A)

(C) Assertion (A) is true, but Reason (R) is false

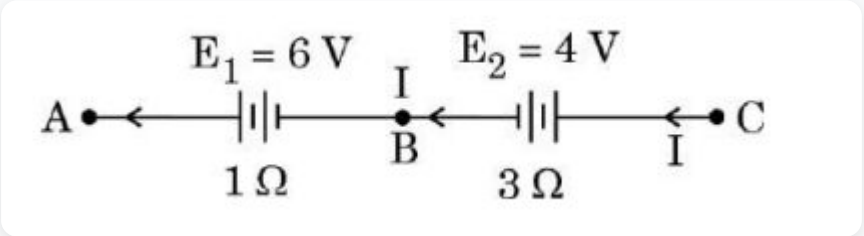
(D) Both Assertion (A) and Reason (R) are false

Section C

Question 19.

In the given figure, a steady current I flows through the circuit when points A and C are connected by a wire of negligible resistance. Find the potential difference between points B and C.

[2 Marks]



Question 20.

A battery of emf 21 V and internal resistance 3Ω is connected to a resistor. If the current in the circuit is 3 A, find :

(i) the resistance of the resistor.

(ii) the terminal voltage of the battery.

[2 Marks]

Question 21.

Explain why diffraction of sound is more common in daily experience than that of light.

[2 Marks]

Question 22.

Explain the terms mass defect and binding energy. How are they related ?

[2 Marks]

Question 23.

A particle of mass M at rest splits up into two particles of masses m_1 and m_2 having non-zero velocities. Calculate the ratio of the de Broglie wavelengths associated with the two particles.

[2 Marks]

Question 24.

How are charge carriers created in an intrinsic semiconductor? Explain.

[2 Marks]

Section D

Question 25.

(a) Establish the relation between drift velocity of electrons (v_d) and electric current (I) in a conductor.
(b) How is v_d affected when the length of the conductor is doubled, keeping the voltage applied across the conductor constant?

[3 Marks]

Question 26.

A circular coil of 30 turns and radius 8.0 cm carrying a current of 6 A is suspended vertically in a uniform horizontal magnetic field of 1.0 T. The field lines make an angle of 30° with the plane of the coil. Calculate the magnitude of the external torque that must be applied to prevent the coil from turning. What would happen if the circular coil is replaced by a planar coil of irregular shape that encloses the same area, keeping other parameters unchanged?

[3 Marks]

Question 27.

An alpha particle (mass 6.4×10^{-27} kg and charge 3.2×10^{-19} C) having 8.0 MeV energy, enters a region of uniform magnetic field of 0.5 T. If the field is directed perpendicular to the velocity of the particle, find the radius of the circular path described by the particle. Mention the conditions under which the particle in this region (i) describes a helical path, and (ii) goes straight undeviated.

[3 Marks]

Question 28.

(a) Discuss the behaviour of an inductor connected to (i) a dc source, and (ii) a high frequency ac source.

(b) What is the phase relation between current and voltage in an ideal inductor connected to an ac source ? Draw a phasor diagram for the circuit.

[3 Marks]

Question 29.

(a) Depict the variation of electric field (□□) and magnetic field (□□) with respect to the direction of propagation of an electromagnetic wave. Write their two important characteristics.
(b) Show that $1/\sqrt{(\varepsilon_0\mu_0)}$ gives the velocity of an electromagnetic wave in free space.

[3 Marks]

Question 30.

A ray of light is travelling through a rectangular glass slab (refractive index 3/2) and is incident on the horizontal glass-air surface at the critical angle for the two media. The slab is then brought in contact with water (refractive index 4/3) such that a thin horizontal layer of water is formed on the surface of the slab. Find the angle at which the ray will emerge into air from the water-air surface.

[3 Marks]

Question 31.

Differentiate between nuclear fission and nuclear fusion. Give one example for each with nuclear reaction.

[3 Marks]

Question 32.

With the help of circuit diagrams, briefly explain the forward biasing and the reverse biasing of a p-n junction diode.

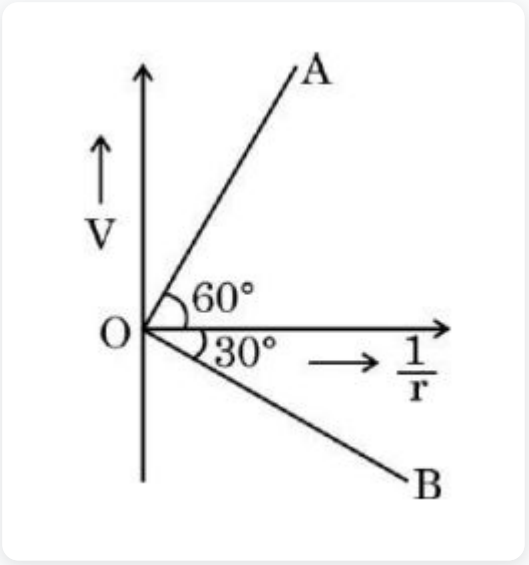
[3 Marks]

Section E

Question 33.

(i) In the figure, OA and OB show the variation of electric potential V at a point due to two point charges Q_1 and Q_2 with 1/r respectively. Here r represents the distance of the point from the two point charges.
(a) Identify the nature of the two charges Q_1 and Q_2.
(b) What is the value of (Q_1/Q_2)? Justify your answer.
(ii) Two point charges –2 μC and 5 μC are placed at (–30 cm, 0) and (30 cm, 0) respectively and an external electric field □□= (A/x^2) î, where $A = 9 \times 10^5$ N m² C^{-1}.
Find the electrostatic potential energy of this configuration.

[5 Marks]



Question 34.

(i) Two infinitely long straight wires having linear charge densities –λ and 3λ are held vertically parallel to each other, distance r apart in free space. Find the nature and magnitude of the force/length exerted by one wire on the other.

(ii) A small hollow conducting sphere of radius r_1 is given a charge Q. It is surrounded by a concentric conducting spherical shell of inner radius r_2 and outer radius r_3, having charge –3q.
If a point charge 2q were kept at the centre, find:
(I) the electric flux through a concentric spherical Gaussian surface of radius x for (1) $x < r_1$, and (2) $r_1 < x < r_2$.
(II) electric field at a point distant x from the centre for (1) $x > r_3$, and (2) $r_1 < x < r_2$.
(III) surface charge density on the inner surface of (1) sphere, and (2) shell.

[5 Marks]

Question 35.

(i) A light bulb and an open coil inductor are connected in series across a source of variable frequency. How will the glow of the bulb be affected when:

(I) an iron bar is inserted inside the coil, and
(II) the frequency of the source is decreased?
Justify your answers. Assume that in each above case other changes remain unchanged.
(ii) An ac voltage V = 280 sin (100πt) volt is connected across a series LCR circuit in which R = 400 Ω, L = 5/π H, and C = 50/(π) μF. Taking √2 = 1.4, calculate:
(I) impedance of the circuit.
(II) rms value of current that flows in the circuit.
(III) power factor of the circuit.

[5 Marks]

Question 36.

(i) State Lenz's law and explain that it follows the law of conservation of energy.
(ii) Write the dimensional formula for self-inductance.
The current in a coil changes from 8.0 A to 2.0 A in 0.6 s. If an average emf induced in the coil is 50 V, calculate the self-inductance of the coil.

[5 Marks]

Question 37.

(i) A point object is kept in front of a convex spherical surface of curvature radius R. Draw the ray diagram to show the formation of image and derive the relation between object and image distance (u and v) in terms of refractive index n of the medium and R.
(ii) A convex lens of focal length of 20 cm is used to form the image of an object placed 30 cm away from the lens. Find the position and nature of the image formed.

[5 Marks]

Question 38.

(i) Two thin converging lenses of focal length f_1 and f_2 are placed coaxially in contact. Derive expression for the focal length of the combination.
(ii) A beam of coherent light of wavelength 550 nm is incident normal to the plane of a pair of two slits S_1 and S_2, each of width 1.2×10^{-6} m separated by 1.1 mm. Dark and bright fringes are observed on a screen 2.2 m away from the plane of the slits.
Calculate:
(I) fringe width.
(II) distance of the second dark fringe from the central maximum.
(III) what will happen when the entire apparatus is immersed in water.

[5 Marks]