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

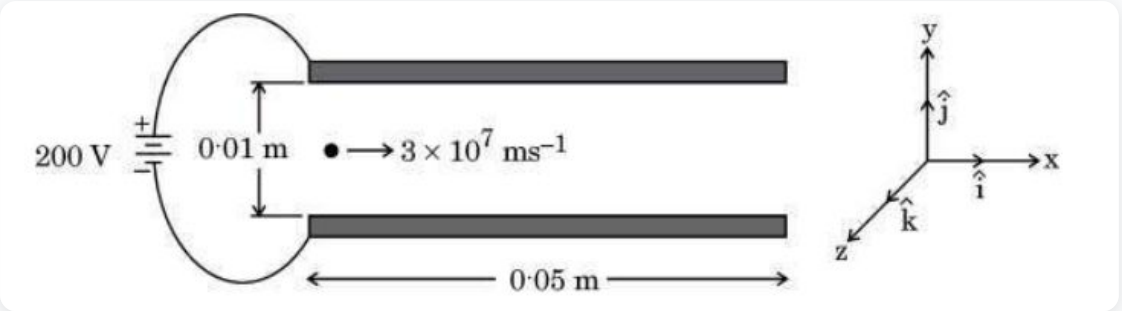
viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

Section A

Question 1. The electric potential (V) and electric field (E) are closely related concepts in electrostatics. The electric field is a vector quantity that represents the force per unit charge at a given point in space, whereas electric potential is a scalar quantity that represents the potential energy per unit charge at a given point in space. Electric field and electric potential are related by the equations $E_r = -dV/dr$ and $E(\text{vector}) = E_r \hat{r}$, i.e., electric field is the negative gradient of the electric potential. This means that electric field points in the direction of decreasing potential and its magnitude is the rate of change of potential with distance. The electric field is the force that drives a unit charge to move from higher potential region to lower potential region and electric potential difference between the two

points determines the work done in moving a unit charge from one point to the other point. A pair of square conducting plates having sides of length 0.05 m are arranged parallel to each other in x-y plane. They are 0.01 m apart along z-axis and are connected to a 200 V power supply as shown in the figure. An electron enters with a speed of 3×10^7 m s^{-1} horizontally and symmetrically in the space between the two plates. Neglect the effect of gravity on the electron.



(1)

In the region between the plates, the electron moves with an acceleration □□ given by:

(A) −(3.5 × 10¹⁵ m s⁻²) k̂

(B) (3.5 × 10¹⁵ m s⁻²) k̂

(C) (3.5 × 10¹³ m s⁻²) î

(D) −(3.5 × 10¹³ m s⁻²) î

[1 Marks]

(2)

The electric field □□in the region between the plates is:

(A) □2 × 10² V/m□ k̂

(B) −□2 × 10² V/m□ k̂

(C) □2 × 10⁴ V/m□ k̂

(D) −□2 × 10⁴ V/m□ k̂

[1 Marks]

(3)

Time interval during which an electron moves through the region between the plates is:

(A) 9.0×10^{-9} s

(B) 1.67×10^{-8} s

(C) 1.67×10^{-9} s

(D) 2.17×10^{-9} s

[1 Marks]

(4)

Which one of the following is the path traced by the electron in between the two plates?

(A) a

(B) b

(C) c

(D) d

[1 Marks]

(5)

The vertical displacement of the electron which travels through the region between the plates is :

(A) 10 mm

(B) 4·9 mm

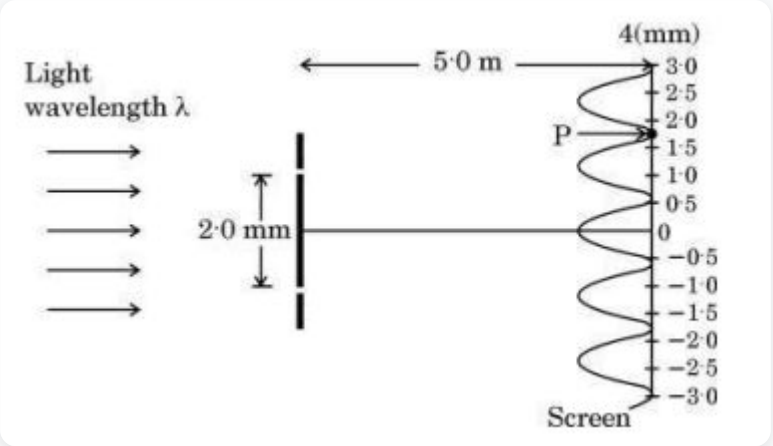
(C) 5·9 mm

(D) 3·0 mm

[1 Marks]

Question 2. In a Young's double-slit experiment, the two slits behave as coherent sources. When coherent light waves superpose over each other they create an interference pattern of successive

bright and dark regions due to constructive and destructive interference. Two slits 2 mm apart are illuminated by a source of monochromatic light and the interference pattern is observed on a screen 5.0 m away from the slits as shown in the figure.



(1)

What property of light does this interference experiment demonstrate?

(A) Wave nature of light

(B) Particle nature of light

(C) Transverse nature of light

(D) Both wave nature and transverse nature of light

[1 Marks]

(2)

The wavelength of light used in this experiment is:

(A) 720 nm

(B) 590 nm

(C) 480 nm

(D) 364 nm

[1 Marks]

(3)

The path difference between the two waves meeting at point P, where there is a minimum in the interference pattern is:

(A) 8.1×10^{-7} m

(B) 7.2×10^{-7} m

(C) 6.5×10^{-7} m

(D) 6.0×10^{-7} m

[1 Marks]

(4)

The fringe width in the interference pattern formed on the screen is:

(A) 1.2 mm

(B) 0.2 mm

(C) 4.2 mm

(D) 6.8 mm

[1 Marks]

(5)

When the experiment is performed in a liquid of refractive index greater than 1, then fringe pattern will :

(A) disappear

(B) become blurred

(C) be widened

(D) be compressed

[1 Marks]

Section B

Question 3.

Two small identical metallic balls having charges q and – 2q are kept far at a separation r. They are brought in contact and then separated at distance r/2 . Compared to the initial force F, they will now :

[1 Marks]

(A) attract with a force F/2

(B) repel with a force F

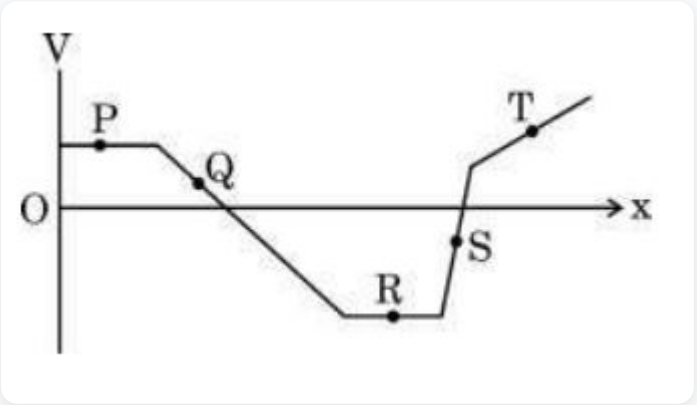
(C) attract with a force F

(D) repel with a force F/2

Question 4.

The figure represents the variation of the electric potential V at a point in a region of space as a function of its position along the x-axis. A charged particle will experience the maximum force at :

[1 Marks]



(A) S

(B) R

(C) P

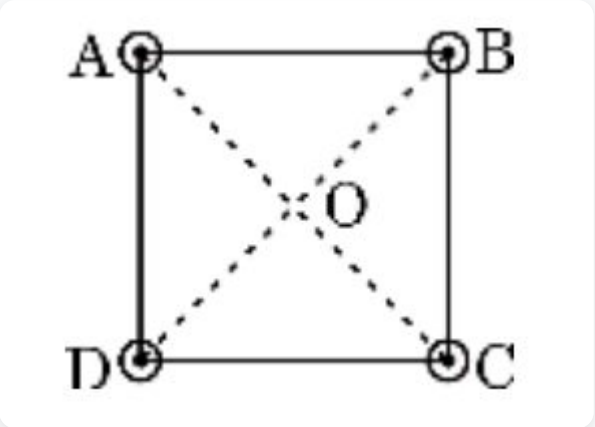
(D) Q

Question 5.

Four long straight thin wires are held vertically at the corners A, B, C and D of a square of side ‘a’, kept on a table and carry equal current ‘I’. The wire at A carries current in upward direction whereas

the current in the remaining wires flows in downward direction. The net magnetic field at the centre of the square will have the magnitude:

[1 Marks]



(A) $\mu_0 I/\pi a$ and directed along OC

(B) $\mu_0 I\sqrt{2}/\pi a$ and directed along OB

(C) $2\mu_0 I/\pi a$ and directed along OA

(D) $\mu_0 I/\pi a\sqrt{2}$ and directed along OD

Question 6.

The magnetic flux through a loop placed in a magnetic field can be changed by changing:

[1 Marks]

(A) orientation of the loop in the magnetic field only

(B) any one or more of the factors given in (A), (B) and (C)

(C) area of the loop only

(D) the value of magnetic field only

Question 7.

Which of the following statements is not true for electric energy in ac form compared to that in dc form?

[1 Marks]

(A) Production of ac is economical

(B) ac can be transmitted economically over long distances

(C) ac can be easily and efficiently converted from one voltage to the other

(D) ac is less dangerous

Question 8.

The magnetic field in a plane electromagnetic wave travelling in glass (n = 1.5) is given by $B_y = (2 \times 10^{-7}\ T) \sin(\alpha x + 1.5 \times 10^{11}\ t)$ where x is in metres and t is in seconds. The value of α is:

[1 Marks]

(A) $7.5 \times 10^2\ m^{-1}$

(B) $1.5 \times 10^3\ m^{-1}$

(C) $0.5 \times 10^3\ m^{-1}$

(D) $6.0 \times 10^2\ m^{-1}$

Question 9.

Light of which of the following colours will have the maximum energy in a photon associated with it ?

[1 Marks]

(A) Blue light

(B) Green light

(C) Red light

(D) Yellow light

Question 10.

Nuclides with the same number of neutrons are called:

[1 Marks]

(A) Isotopes

(B) Isobars

(C) Isotones

(D) Isomers

Question 11. The radius of a nucleus of mass number 125 is:

[1 Marks]

(A) 6.0 fm

(B) 30 fm

(C) 150 fm

(D) 72 fm

Question 12.

The energy of an electron in an orbit in hydrogen atom is –3.4 eV. Its angular momentum in the orbit will be:

[1 Marks]

(A) $h/2\pi$

(B) h/π

(C) $2h/\pi$

(D) $3h/2\pi$

Question 13.

A good diode checked by a multimeter should indicate:

[1 Marks]

(A) low resistance in both reverse bias and forward bias

(B) high resistance in reverse bias and a low resistance in forward bias

(C) high resistance in forward bias and low resistance in reverse bias

(D) high resistance in both forward bias and reverse bias

Question 14.

The rms and the average value of an ac voltage $V = V_0 \sin \omega t$ volt over a cycle respectively will be:

[1 Marks]

(A) $V_0/\sqrt{2}$, 0

(B) V_0, $V_0/\sqrt{2}$

(C) V_0/π, $V_0/2$

(D) $V_0/2$, $V_0/\sqrt{2}$

Question 15.

Assertion (A): Induced emf produced in a coil will be more when the magnetic flux linked with the coil is more. Reason (R): Induced emf produced is directly proportional to the magnetic flux.

[1 Marks]

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

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

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

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

Question 16.

Assertion (A): In Young's double-slit experiment, the fringe width for dark and bright fringes is the same. Reason (R): Fringe width is given by $\beta = \lambda D/d$, where symbols have their usual meanings.

[1 Marks]

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

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

Question 17.

Assertion (A): Energy is released when heavy nuclei undergo fission or light nuclei undergo fusion. Reason (R): For heavy nuclei, binding energy per nucleon increases with increasing Z while for light nuclei, it decreases with increasing Z.

[1 Marks]

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

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

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

Question 18.

Assertion (A): Photoelectric effect is a spontaneous phenomenon. Reason (R): According to the wave picture of radiation, an electron would take hours/days to absorb sufficient energy to overcome the work function and come out from a metal surface.

[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.

An electric iron rated 2.2 kW, 220 V is operated at 110 V supply. Find:
(i) its resistance, and
(ii) heat produced by it in 10 minutes.

[2 Marks]

Question 20.

A current of 4.0 A flows through a wire of length 1 m and cross-sectional area 1.0 mm^2, when potential difference of 2 V is applied across its ends.
Calculate the resistivity of the material of the wire.

[2 Marks]

Question 21.

A plane circular coil is rotated about its vertical diameter with a constant angular speed ω in a uniform horizontal magnetic field. Initially the plane of the coil is parallel to the magnetic field. Draw plots showing the variation of the following physical quantities as the function of ωt, where t represents time elapsed:
(a) Magnetic flux ϕ linked with the coil, and
(b) emf induced in the coil.

[2 Marks]

Question 22.

A tank is filled with a liquid to a height of 12.5 m. The apparent depth of a needle lying at the bottom of the tank is measured to be 9.0 m. Calculate the speed of light in the liquid.

[2 Marks]

Question 23.

Two thin lenses of focal length f_1 and f_2 are placed in contact with each other coaxially. Prove that the focal length f of the combination is given by $f = (f_1f_2)/(f_1 + f_2)$

[2 Marks]

Question 24.

Suppose a pure Si crystal has 5×10^{28} atoms per m^3. It is doped with 5×10^{22} atoms per m^3 of Arsenic. Calculate the majority and minority carrier concentration in the doped silicon. (Given: $n_i = 1.5 \times 10^{16}$ m^{-3})

[2 Marks]

Section D

Question 25.

Two parallel plate capacitors X and Y are connected in series to a 6 V battery. They have the same plate area and same plate separation but capacitor X has air between its plates, whereas capacitor Y contains a material of dielectric constant 4.
(a) Calculate the capacitances of X and Y, if the equivalent capacitance of the combination is 4 μF.
(b) Calculate the potential difference across the plates of X and Y.

[3 Marks]

Question 26.

Write the expression for the magnetic field due to a current element in vector form. Consider a 1 cm segment of a wire, centered at the origin, carrying a current of 10 A in positive x-direction. Calculate the magnetic field □□ at a point (1 m, 1 m, 0).

[3 Marks]

Question 27.

A long solenoid of length L and radius r_1 having N_1 turns is surrounded symmetrically by a coil of radius ($r_2 > r_1$) having N_2 turns ($N_2 << N_1$) around its mid-point. Derive an expression for the mutual inductance of solenoid and coil. Is $M_{12} = M_{21}$ valid in this case?

[3 Marks]

Question 28.

What is displacement current (i_d)? Considering the case of charging of a capacitor, show that i_d = ε_0 (dΦ_E/dt). What is the value of i_d for a conductor across which a constant voltage is applied?

[3 Marks]

Question 29.

(i) Write any two features of nuclear forces.
(ii) If both the number of protons and the neutrons are conserved in each nuclear reaction, in what way is mass converted into energy (or vice versa) in a nuclear reaction? Explain.

[3 Marks]

Question 30.

(i) Draw the number of scattered particles versus the scattering angle graph for scattering of alpha particles by a thin foil. Write two important conclusions that can be drawn from this plot.
(ii) If Bohr's quantization postulate (angular momentum = nh/2π) is a basic law of nature, it should be equally valid for the case of planetary motion also. Why, then, do we never speak of quantization of orbits of planets around the Sun? Explain.

[3 Marks]

Question 31.

Photoemission of electrons occurs from a metal (ϕ_0 = 1.96 eV) when light of frequency 6.4×10^{14} Hz is incident on it. Calculate:
(a) Energy of a photon in the incident light,

(b) The maximum kinetic energy of the emitted electrons, and
(c) The stopping potential.

[3 Marks]

Question 32.

Draw a circuit diagram of a full-wave rectifier using p-n junction diodes. Explain its working and show the input-output waveforms.

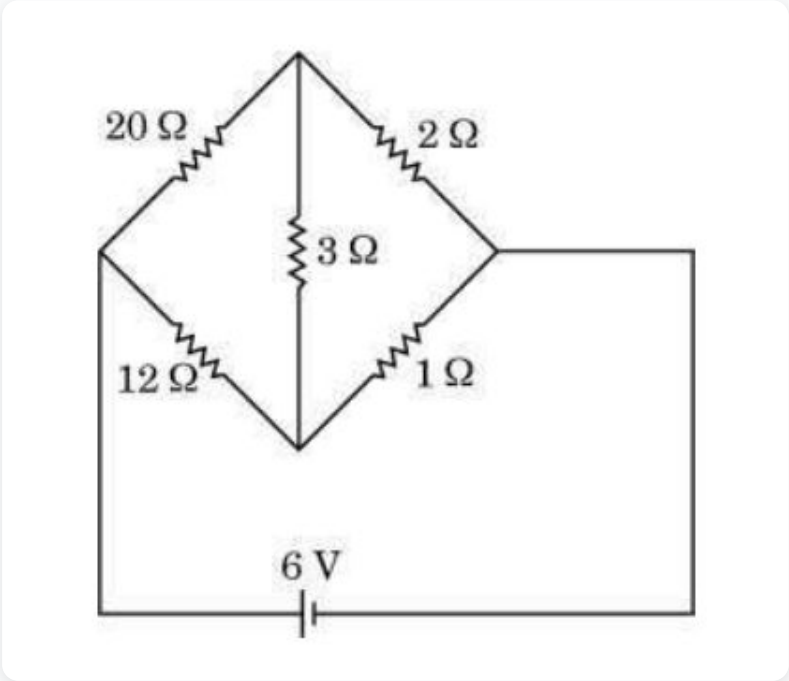
[3 Marks]

Section E

Question 33.

(i) Derive the condition for which a Wheatstone Bridge is balanced.
(ii) Determine the current in 3 Ω branch of a Wheatstone Bridge in the circuit shown in the figure.

[5 Marks]



Question 34.

(i) Consider a cylindrical conductor of length l and area of cross-section A. Current I is maintained in the conductor and electrons drift with velocity v_d(|□□_d| = e|□□ |/m τ), (where symbols have their usual meanings). Show that the conductivity σ of the material of the conductor is given by $\sigma = ne^2/m\tau$.
(ii) The resistance of a metal wire at 20°C is 1.05 Ω and at 100°C is 1.38 Ω. Determine the temperature coefficient of resistivity of this metal.

[5 Marks]

Question 35.

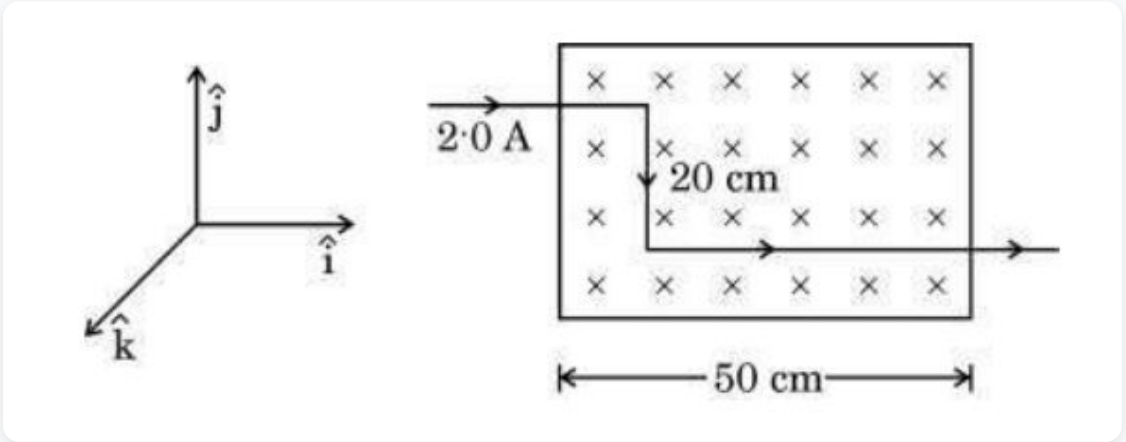
(i) A rectangular loop of sides a and b carrying current I is placed in a magnetic field □□ such that its area vector □□ makes an angle θ with □□. With the help of a suitable diagram, show that the torque τ(vector) acting on the loop is given by τ(vector) = □□× □□, where m(vector) (= I □□) is the magnetic dipole moment of the loop.
(ii) A circular coil of 100 turns and radius (10/√π) cm carrying current of 5.0 A is suspended vertically in a uniform horizontal magnetic field of 2.0 T. The field makes an angle 30° with the normal to the coil. Calculate:
(a) the magnetic dipole moment of the coil, and
(b) the magnitude of the counter torque that must be applied to prevent the coil from turning.

[5 Marks]

Question 36.

(i) Derive an expression for the force □□ acting on a conductor of length L and area of cross-section A carrying current I and placed in a magnetic field □□ .
(ii) A part of a wire carrying 2.0 A current and bent at 90° at two points is placed in a region of uniform magnetic field □□ = −(0.50 T) k̂, as shown in the figure. Calculate the magnitude of the net force acting on the wire.

[5 Marks]



Question 37.

(i) A parallel beam of monochromatic light falls normally on a single slit of width ‘a’ and a diffraction pattern is observed on a screen placed at distance D from the slits. Explain :

(I) the formation of maxima and minima in the diffraction pattern, and

(II) why the maxima go on becoming weaker and weaker with its increasing number (n).

(ii) Write any two points of difference between interference pattern due to double-slit and diffraction pattern due to single-slit.

[5 Marks]

Question 38.

(i) With the help of a ray diagram, describe the construction and working of a compound microscope.

(ii) (I) The real image of an object placed between f and 2f from a convex lens can be seen on a screen placed at the image location. If the screen is removed, is the image still there ? Explain.

(II) Plane and convex mirrors produce virtual images of objects. Can they produce real images under some circumstances ? Explain.

[5 Marks]