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. A p-type or n-type semiconductor can be converted into a p-n junction by doping it with suitable impurity. The motion of majority charge carriers causes diffusion current across the junction while the barrier electric field causes motion of minority carriers for drift current. In case of unbiased diode, the diffusion and drift currents are equal. This equilibrium is disturbed by the biasing batteries. Diodes, therefore, allow currents in one direction. This property of diode is used in making rectifiers.

(1)

Silicon is doped with which of the following to obtain p-type semiconductor?

(A) Phosphorus

(B) Arsenic

(C) Boron

(D) Antimony

[1 Marks]

(2)

A semiconductor has an electron concentration of $5 \times 10^{22}\ m^{-3}$. The concentration of holes is (given $n_i = 1.5 \times 10^{16}\ m^{-3}$)

(A) $5 \times 10^{22}\ m^{-3}$

(B) $1.5 \times 10^{6}\ m^{-3}$

(C) $9 \times 10^{8}\ m^{-3}$

(D) $4.5 \times 10^{9}\ m^{-3}$

[1 Marks]

(3)

During forward biasing of a p-n junction diode, the

(A) current is mainly due to drifting of majority carriers

(B) current is mainly due to drifting of minority carriers

(C) diffusion and drift currents are equal

(D) current is of the order of 1 A

[1 Marks]

(4)

The threshold voltage for silicon diode is about

(A) 0.2 V

(B) 0.5 V

(C) 0.7 V

(D) 1.5 V

[1 Marks]

(5)

When we dope Ge with a pentavalent element, four of its electrons bond with four germanium neighbours but fifth electron remains weakly bound. The ionisation energy for this electron is about

(A) 0.01 eV

(B) 0.05 eV

(C) 0.1 eV

(D) 0.15 eV

[1 Marks]

Question 2. In an experiment with convex lens of focal length f, the screen is fixed at a distance D from the object. A student slowly moves the lens away from the object towards the screen and finds that he is able to form sharp image of the object for two positions of the lens. The distance between these two positions of the lens is d.

(1)

The value of d is

(A) √D(D − 4f)

(B) √D(D − 2f)

(C) 2√(Df)

(D) √D(D − f)

[1 Marks]

(2)

Compared to the size of the object, the images formed in the two positions are respectively

(A) reduced, enlarged

(B) reduced, reduced

(C) enlarged, enlarged

(D) enlarged, reduced

[1 Marks]

(3)

If the distance between object and screen is 80.00 cm and the lens forms sharp images at two positions separated by 20.00 cm, the focal length of convex lens is

(A) 15.50 cm

(B) 18.75 cm

(C) 20.50 cm

(D) 22.75 cm

[1 Marks]

(4)

Consider a convex lens of focal length 15 cm. For which of the following values of object-screen distance, two positions of the lens can be found to obtain sharp image on the screen?

(A) 45 cm

(B) 50 cm

(C) 55 cm

(D) 65 cm

[1 Marks]

(5)

A thin convex lens of focal length 10 cm and another thin lens of focal length ‘f’ are placed coaxially in contact. If the power of their combination is 10/ 3 D, the value of ‘f’ is

(A)–15 cm

(B) –10 cm

(C) –20 cm

(D) –30 cm

[1 Marks]

Section B

Question 3.

Three point charges 2q, –2q and q are kept at the vertices of an equilateral triangle of side l. The potential energy of the system is

[1 Marks]

(A) $-q^2/(\pi\epsilon_0 l)$

(B) $q^2/(2\pi\epsilon_0 l)$

(C) zero

(D) $-2q^2/(\pi\epsilon_0 l)$

Question 4.

Two metal spheres of radii r_1 and r_2 ($r_1 > r_2$) having charges q_1 and q_2 respectively kept in air, are brought in contact. Which of the following statements is not correct?

[1 Marks]

(A) The final potential of the system equals $1/4\pi\epsilon_0 \times (q_1 + q_2)\ (r_1 + r_2)/\ r_1\ r_2$

(B) Both spheres attain the same potential

(C) The final potential of the system equals $1/4\pi\epsilon_0 \times (q_1 + q_2)/(r_1 + r_2)$

(D) The total charge of the two spheres is conserved

Question 5.

The maximum kinetic energy of the electrons emitted from a photosensitive surface depends on

[1 Marks]

(A) work function of the surface 'ϕ_0' only

(B) Both ϕ_0 and ν

(C) frequency of the incident radiation 'ν' only

(D) intensity of the incident radiation 'I' only

Question 6.

In Bohr model of hydrogen, for large values of n, the distance between consecutive orbits is proportional to

[1 Marks]

(A) n^3

(B) n^2

(C) n

(D) $\sqrt{n}$

Question 7.

A straight long wire lying along y-axis, carries a current of 1 A along –y direction. The magnetic field due to the conductor at a point (50 cm, 0, 0) will point along.

[1 Marks]

(A) –x-axis

(B) z-axis

(C) –z-axis

(D) x-axis

Question 8.

Which of the following materials has positive and small value of magnetic susceptibility?

[1 Marks]

(A) Ni

(B) Al

(C) Cu

(D) Bi

Question 9.

A galvanometer of resistance 27 Ω is converted into an ammeter of range (0 – 10 mA) using a resistance of 3 Ω. The galvanometer will show full scale deflection for a current of about-

[1 Marks]

(A) 1 mA

(B) 3 mA

(C) 100 mA

(D) 10 mA

Question 10.

The magnetic flux ϕ (in Wb) linked with a coil is related to time t (in s) as $\phi = 5At^2 + Bt – 2C$ The SI units of A and B are respectively

[1 Marks]

(A) Wbs^{-1}, Wb

(B) Wbs^{-2}, Wbs^{-1}

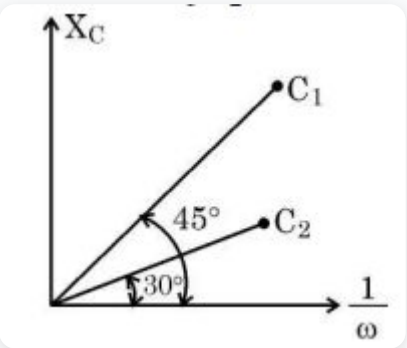
(C) Wbs^{-1}, Wbs^{-2}

(D) Wbs^{2}, Wbs

Question 11.

The figure shows the variation of capacitive reactance (X_C) of two ideal capacitors of capacitances C_1 & C_2 with the reciprocal of angular frequency ($1/\omega$) of ac source. The value of C_1/C_2 is

[1 Marks]



(A) $1/\sqrt{3}$

(B) 2

(C) $\sqrt{3}$

(D) 1/2

Question 12. A magnet held vertically, with its north pole down is dropped along the axis of a closed solenoid placed vertically on a table. If the observer looks down from the top,

[1 Marks]

(A) the induced current will flow in the anticlockwise direction

(B) the induced current will flow in the clockwise direction

(C) the magnet will fall with a constant velocity

(D) no induced current will flow in the solenoid

Question 13.

An electromagnetic wave is propagating along x-axis. At any instant, the phase difference (in radian) between the electric field (□□) and the magnetic field (□□) associated with the wave is

[1 Marks]

(A) π/4

(B) zero

(C) π/2

(D) π

Question 14.

In Bohr model of hydrogen atom, the electron makes a transition from n = 5 to n = 1 state. As a result, a photon of wavelength λ is emitted in the process. The wavelength of the photon emitted when an electron makes a transition from energy level n = 5 to n = 2 will be

[1 Marks]

(A) 8/7λ

(B) 24/7 λ

(C) 16/7λ

(D) 32/7 λ

Question 15.

Assertion (A): On increasing the intensity of incident light of frequency ($\nu > \nu_0$) on a photosensitive surface, the photocurrent increases. Reason (R): The stopping potential for a photosensitive surface increases with increase of frequency ($\nu > \nu_0$) of incident light.

[1 Marks]

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

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

(C) Assertion (A) is false and Reason (R) is also false

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

Question 16.

Assertion (A): On forward biasing a p-n junction diode, the height of the barrier potential increases. Reason (R): In forward biasing of a p-n junction diode, the direction of the applied voltage is in the same direction as the built-in potential.

[1 Marks]

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

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

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

(D) Assertion (A) is false and Reason (R) is also false

Question 17. Assertion (A): Light added to light can produce darkness. Reason (R): When two coherent light waves interfere, there is darkness at position of destructive interference.

[1 Marks]

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

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

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

(D) Assertion (A) is false and Reason (R) is also false

Question 18.

Assertion (A): Two electric heaters of power P_1 and P_2 ($P_1 > P_2$) are joined in series across a dc source of voltage V. The power consumed by the combination will be less than that consumed by P_1 when connected across the same source. Reason (R): The power consumed by an electric device when connected to a dc source of voltage V is proportional to its resistance.

[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 Assertion (A)

(C) Assertion (A) is false and Reason (R) is also false

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

Section C

Question 19.

Write two points of difference between intrinsic and extrinsic semiconductors.

[2 Marks]

Question 20.

Find ratio (λ_a/λ_p) of the de Broglie wavelength λ_a and λ_p associated respectively with an alpha particle and a proton,
(i) if they are moving with the same kinetic energy.
(ii) just after they are accelerated through the same potential difference.

[2 Marks]

Question 21.

A ray of light in air is incident at angle ∠i on a face of an equilateral glass prism and is refracted through the prism. As ∠i is varied, it is observed that the ray undergoes minimum deviation, when the ∠i is three-fourth of the angle of the prism. Calculate the speed of light in the prism.

[2 Marks]

Question 22.

A heating element using nichrome is connected to a 220 V supply. Initially it draws a current of 2.9 A. After some time, the current attains a steady value of 2.5 A. Find the steady temperature of the heating element if the room temperature is 27 °C. The temperature coefficient of resistance of nichrome is 1.7×10^{-4} °C^{-1}.

[2 Marks]

Question 23.

A 5 cm long pencil is placed along the principal axis of a concave mirror of focal length 20 cm such that its nearest end is at a distance of 25 cm from the mirror. Calculate the length of the image of the pencil.

[2 Marks]

Question 24.

In a Young's double-slit experiment, a beam of light consisting of two wavelengths 500 nm and 600 nm is used. The interference fringes are observed at a screen placed 1.8 m away from the plane of slits (slit separation 0.3 mm). Calculate the least distance from the central maximum where the bright fringes due to both the wavelengths coincide.

[2 Marks]

Section D

Question 25.

(a) Consider the following nuclides:
$^{12}_{6}C$, $^{198}_{80}Hg$, $^{14}_{6}C$, $^{197}_{79}Au$
Group them into isotopes and isotones.
(b) How does the size of a nucleus depend on its mass number A? Hence prove that the density of nucleus is a constant, independent of A, for all nuclei.

[3 Marks]

Question 26.

(a) An electric field □□ = E_0 î exists in a region of space. Draw three equipotential surfaces in the region.
(b) Two point charges –q and +q are located at points (–a, 0, 0) and (a, 0, 0) respectively. Find the electrostatic potential at point (x, 0, 0) where x >> a.

[3 Marks]

Question 27.

Name the electromagnetic waves which are used for
(i) detection of fractures in bones
(ii) physiotherapy
(iii) radar systems

Also write their wavelength range.

[3 Marks]

Question 28.

(i) Define mutual inductance of a pair of coils. Write its SI unit.
(ii) A long solenoid of radius R and length L has n turns per unit length. A circular loop of radius r(<R)

is placed inside at the centre of the solenoid such that its axis coincides with the axis of the solenoid. Obtain the mutual inductance of the solenoid and the loop.

[3 Marks]

Question 29.

Two long straight parallel conductors A and B carrying steady currents I_a and I_b in the same direction are separated by a distance d. Deduce the expression for the force acting on length L of conductor B due to conductor A and show in figure. Write the expression for the force acting on length L of conductor A due to conductor B and show that it follows Newton's third law.

[3 Marks]

Question 30.

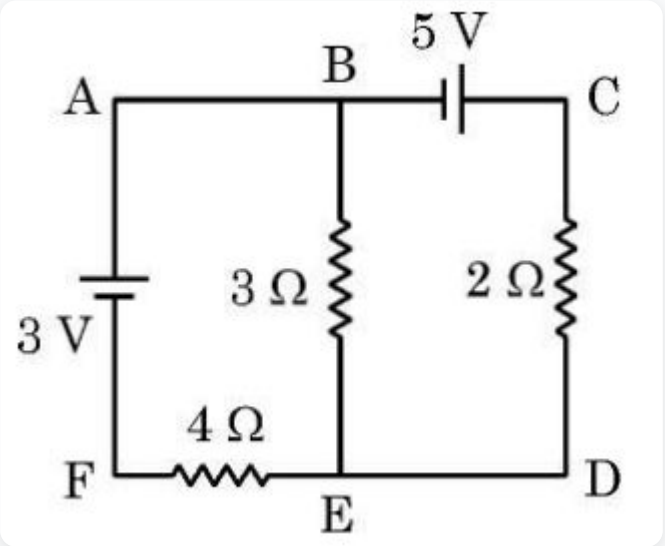
(a) State Bohr's second postulate and mention its significance.
(b) Prove that, in Bohr model of hydrogen atom as principal quantum number n becomes large, the energy levels get closer and closer.

[3 Marks]

Question 31.

(a) Explain the statement - "Current is a scalar although we represent current with an arrow."
(b) Use Kirchhoff's rules to find the current through 3 Ω resistor in the circuit shown in the figure:

[3 Marks]



Question 32.

Derive an expression for the magnetic field □□, due to a circular coil of N turns, each of radius r carrying current I, at a distance 'x' from the centre along its axis.

[3 Marks]

Section E

Question 33.

(a) What are coherent sources? Why are they necessary for observing stable interference pattern? Draw a graph showing the variation of intensity of light with the position on the screen in Young's double-slit experiment.
(b) Find the intensity of light at a point on the screen when two interfering waves of the same intensity (I_0) have a path difference of
(i) $\lambda/4$ and (ii) $\lambda/3$.

[5 Marks]

Question 34.

(a) Draw a labelled ray diagram of a refracting telescope when it forms image of a distant object at infinity. Derive expression for its magnifying power.
(b) (i) In a telescope the objective has much larger aperture than the eye piece. Why?
(ii) Write two advantages of reflecting telescope over refracting telescope.

[5 Marks]

Question 35.

(a) Derive an expression for the capacitance of a parallel plate capacitor of plate area A and plate separation d with air present between the plates.
(b) Two air-filled capacitors of capacitances C_1 and C_2 are connected in parallel with a dc battery. After the capacitors are fully charged, a slab of dielectric constant K is inserted between the plates of each capacitor. How will the (i) charge on each capacitor and (ii) energy stored in the capacitor affected after the slab is introduced.

[5 Marks]

Question 36.

(a) An electric field □□ is established across the ends of a cylindrical conductor of length L and area of cross-section A. Discuss how electrons attain an average velocity, independent of time. Hence, obtain a relation between current in the conductor and this 'average velocity' of electrons.

(b) (i) This 'average velocity' is found be few mm/s for currents in range of a few amperes. How then is current established almost the instant a circuit is closed ?

(ii) Two copper wires having their radii in the ratio of 3 : 2 are connected in series across a battery. Find the ratio of the drift velocities of the electrons in the wires.

[5 Marks]

Question 37.

(a) A series combination of L, C and R is connected to an a.c. source. Using a phasor diagram, derive an expression for the impedance of the circuit and phase difference between V and I.

(b) Under what conditions the

(i) impedance of the circuit is minimum ?

(ii) Wattless current flows in the circuit ?

[5 Marks]

Question 38.

(i) With the help of a labelled diagram, explain the principle, construction and working of an a.c. generator.

(ii) Deduce an expression for the induced emf in the coil of the generator.

(iii) If T is the time period of the rotation of the coil, at what values of T in a cycle, the emf generator is maximum ?

[5 Marks]