CBSE EXAMINATION PAPER-2025

PHYSICS

(Solved)

Time allowed : 3 hours | Maximum Marks : 35

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **18 questions.** All questions are **compulsory.**

ii. This question paper is divided into **4 sections.**

iii. **Section A** – questions number **1 to 9** are multiple choice questions Each question carries **1 marks.**

iv. **Section B** – questions number **10 to 12** are very short answer Each question carries **2 marks.**

v. **Section C** – questions number **13 to 17** are short answer Each question carries **3 marks.**

vi. **Section D** – questions number **18 to 18** are long answer Each question carries **5 marks.**

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

viii. Use of calculator is NOT allowed.

Section A

Question 1.

A metal sheet is inserted between the plates of a parallel plate capacitor of capacitance C. If the sheet partly occupies the space between the plates, the capacitance :

[1 Marks]

(A) becomes less than C

(B) becomes greater than C

(C) remains C

(D) becomes zero

Question 2.

The magnetic flux linked with a coil changes with time t as $\varphi = (8t^2 + 5t + 7)$, where t is in seconds and φ is in Wb. The value of emf induced in the coil at t = 4 s is :

[1 Marks]

(A) 64 V

(B) 37 V

(C) 32 V

(D) 69 V

Question 3.

Which of the following rays coming from the Sun plays an important role in maintaining the Earth's warmth?

[1 Marks]

(A) Infrared rays

(B) Visible light rays

(C) UV rays

(D) γ rays

Question 4.

Which of the following electromagnetic waves has photons of largest momentum ?

[1 Marks]

(A) X-rays

(B) TV waves

(C) AM radio waves

(D) Microwaves

Question 5.

The kinetic energy of an alpha particle is four times the kinetic energy of a proton. The ratio (λ_α/λ_p) of de Broglie wavelengths associated with them will be :

[1 Marks]

(A) 1/2

(B) 1/16

(C) 1/8

(D) 1/4

Question 6.

Assertion (A) : The impurities in p-type Si are not pentavalent atoms. Reason (R) : The hole density in valance band in p-type semiconductor is almost equal to the acceptor density.

[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 7.

Assertion (A) : During formation of a nucleus, the mass defect produced is the source of the binding energy of the nucleus.

Reason (R) : For all nuclei, the value of binding energy per nucleon increases with mass number.

[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 8.

Assertion (A) : The Balmer series in hydrogen atom spectrum is formed when the electron jumps from higher energy state to the ground state.

Reason (R) : In Bohr's model of hydrogen atom, the electron can jump between successive orbits only.

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

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

Question 9.

Assertion (A) : In Rutherford's alpha particle scattering experiment, the presence of only few alpha particles at angle of scattering led him to the discovery of nucleus.

Reason (R) : The size of nucleus is approximately 10 5 times the size of an atom and therefore only few alpha particles are rebounded.

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

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

Section B

Question 10. The threshold frequency for a given metal is 3.6×10^{14} Hz. If monochromatic radiations of frequency 6.8×10^{14} Hz are incident on this metal, find the cut-off potential for the photoelectrons.

[2 Marks]

Question 11. A voltmeter of resistance 1000 Ω can measure up to 25 V. How will you convert it so that it can read up to 250 V?

[2 Marks]

Question 12. The resistance of a wire at 25°C is 10.0 Ω. When heated to 125°C, its resistance becomes 10.5 Ω. Find (i) the temperature coefficient of resistance of the wire, and (ii) the resistance of the wire at 425°C.

[2 Marks]

Section C

Question 13.

(a) Draw the energy-band diagrams for conductors, semiconductors and insulators at T = 0 K. How is an electron-hole pair formed in a semiconductor at room temperature?

(b) Carbon and silicon both, are members of the IV group of the periodic table and have the same lattice structure. Carbon is an insulator whereas silicon is a semiconductor. Explain.

[3 Marks]

Question 14.

A parallel plate capacitor has plate area A and plate separation d. Half of the space between the plates is filled with a material of dielectric constant K in two ways as shown in the figure.

Find the values of the capacitance of the capacitors in the two cases.

[3 Marks]

Question 15.

In Young's double slit experiment, the separation between the two slits is 1·0 mm and the screen is 1·0 m away from the slits. A beam of light consisting of two wavelengths 500 nm and 600 nm is used to obtain interference fringes. Calculate :

(i) the distance between the first maxima for the two wavelengths.

(ii) the least distance from the central maximum, where the bright fringes due to both wavelengths coincide.

[3 Marks]

Question 16. Differentiate between half-wave and full-wave rectification. With the help of a circuit diagram, explain the working of a full-wave rectifier.

[3 Marks]

Question 17.

A rectangular glass slab ABCD (refractive index 1·5) is surrounded by a transparent liquid (refractive index 1·25) as shown in the figure. A ray of light is incident on face AB at an angle i such that it is refracted out grazing the face AD. Find the value of angle i.

[3 Marks]

Section D

Question 18.

(i) Define the term mutual inductance. Deduce the expression for the mutual inductance of two long coaxial solenoids of the same length having different radii and different number of turns.

(ii) The current through an inductor is uniformly increased from zero to 2 A in 40 s. An emf of 5 mV is induced during this period. Find the flux linked with the inductor at t = 10 s.

[5 Marks]