

CBSE EXAMINATION PAPER-2025

PHYSICS

(Solved)

Time allowed : 3 hours

Maximum Marks : 42

General Instructions :

Read the following instructions carefully and follow them :

- i. This question paper contains **20 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 13** are very short answer Each question carries **2 marks**.
- v. **Section C** – questions number **14 to 18** are short answer Each question carries **3 marks**.
- vi. **Section D** – questions number **19 to 20** 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 I.

Two charges $-q$ each are placed at the vertices A and B of an equilateral triangle ABC. If M is the mid-point of AB, the net electric field at C will point along:

[1 Marks]

(A) CM

(B) CB

(C) MC

(D) CA

Question 2.

In the figure X is a coil wound over a hollow wooden pipe.

A permanent magnet is pushed at a constant speed v from the right into the pipe and it comes out at the left end of the pipe. During the entry and the exit of the magnet, the current in the wire YZ will be from

[1 Marks]

(A) Y to Z and then Y to Z

(B) Z to Y and then Y to Z

(C) Y to Z and then Z to Y

(D) Z to Y and then Z to Y

Question 3.

The alternating current I in an inductor is observed to vary with time t as shown in the graph for a cycle.

Which one of the following graphs is the correct representation of wave form of voltage V with time t ?

[1 Marks]

(A) D

(B) C

(C) B

(D) A

Question 4.

A transformer is connected to a 200 V ac source. The transformer supplies 3000 V to a device. If the number of turns in the primary coil is 450, then the number of turns in its secondary coil is -

[1 Marks]

(A) 30

(B) 4500

(C) 6750

(D) 450

Question 5.

Which one of the following statements is correct ? Electric field due to static charges is

[1 Marks]

(A) conservative and field lines do not form closed loops.

(B) conservative and field lines form closed loops.

(C) non-conservative and field lines do not form closed loops.

(D) non-conservative and field lines form closed loops.

Question 6.

Atomic spectral emission lines of hydrogen atom are incident on a zinc surface. The lines which can emit photoelectrons from the surface are

members of

[1 Marks]

(A) Neither Balmer, nor Paschen nor Lyman series

(B) Lyman series

(C) Paschen series

(D) Balmer series

Question 7.

The energy of an electron in a hydrogen atom in ground state is -13.6 eV. Its energy in an orbit corresponding to quantum number n is -0.544 eV.

The value of n is

[1 Marks]

(A) 4

(B) 5

(C) 3

(D) 2

Question 8.

Assertion (A) : In a semiconductor diode the thickness of depletion layer is not fixed.

Reason (R) : Thickness of depletion layer in a semiconductor device depends upon many factors such as biasing of the semiconductor.

[1 Marks]

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

(B) If both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

(C) If both Assertion (A) and Reason (R) are false.

(D) If both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Question 9.

Assertion (A) : Out of Infrared and radio waves, the radio waves show more diffraction effect.

Reason (R) : Radio waves have greater frequency than infrared waves.

[1 Marks]

(A) If both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

(B) If Assertion (A) is true but Reason (R) is false.

(C) If both Assertion (A) and Reason (R) are false.

(D) If both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Section B

Question 10. Two wires of the same material and the same radius have their lengths in the ratio 2:3. They are connected in parallel to a battery which supplies a current of 15 A. Find the current through the wires.

[2 Marks]

Question 11.

In the circuit, three ideal cells of e.m.f. V , V and $2V$ are connected to a resistor of resistance R , a capacitor of capacitance C , and another resistor of resistance $2R$ as shown in the figure. In the steady state, find (i) the potential difference between P and Q and (ii) the potential difference across capacitor C.

[2 Marks]

Question 12.

Two concave lenses A and B, each of focal length 8.0 cm, are arranged coaxially 16 cm apart as shown in figure. An object P is placed at a distance of 4.0 cm from A. Find the position and nature of the final image formed.

[2 Marks]

Question 13. The threshold voltage of a silicon diode is 0.7 V. It is operated at this point by connecting the diode in series with a battery of V volts and a resistor of 1000Ω . Find the value of V when the current drawn is 15 mA.

[2 Marks]

Section C

Question 14.

(a) A cell of e.m.f. E and internal resistance r is connected with a variable external resistance R and a voltmeter showing potential drop V across R . Obtain the relationship between V , E , R and r .

(b) Draw the shape of the graph showing the variation of terminal voltage V of the cell as a function of current I drawn from it. How one can determine the e.m.f. of the cell and its internal resistance from this graph ?

[3 Marks]

Question 15.

(a) State Lenz's law.

(b) In the given figure :

(i) Identify the machine.

(ii) Name the parts P and Q and R of the machine.

(iii) Give the polarities of the magnetic poles.

(iv) Write the two ways of increasing the output voltage.

[3 Marks]

Question 16.

(a) When a parallel beam of light enters water surface obliquely at some angle, what is the effect on the width of the beam ?

(b) With the help of a ray diagram, show that a straw appears bent when it is partly dipped in water and explain it.

(c) Explain the transmission of optical signal through an optical fibre by a diagram.

[3 Marks]

Question 17.

(a) Show the variation of binding energy per nucleon with mass number. Write the significance of the binding energy curve.

(b) Two nuclei with lower binding energy per nucleon form a nuclei with more binding energy per nucleon.

(i) What type of nuclear reaction is it ?

(ii) Whether the total mass of nuclei increases, decreases or remains unchanged ?

(iii) Does the process require energy or produce energy ?

[3 Marks]

Question 18.

- (a) What are majority and minority charge carriers in an extrinsic semiconductor ?
- (b) A p-n junction is forward biased. Describe the movement of the charge carriers which produce current in it.
- (c) The graph shows the variation of current with voltage for a p-n junction diode.

[3 Marks]

Section D

Question 19.

- i) A thin pencil of length $(f/4)$ is placed coinciding with the principal axis of a mirror of focal length f . The image of the pencil is real and enlarged, just touches the pencil. Calculate the magnification produced by the mirror.
- ii) A ray of light is incident on a refracting face AB of a prism ABC at an angle of 45° . The ray emerges from face AC and the angle of deviation is 15° . The angle of prism is 30° . Show that the emergent ray is normal to the face AC from which it emerges out. Find the refraction index of the material of the prism.

[5 Marks]

Question 20.

- i) Light consisting of two wavelengths 600 nm and 480 nm is used to obtain interference fringes in a double slit experiment. The screen is placed 1.0 m away from slits which are 1.0 nm apart.
- (1) Calculate the distance of the third bright fringe on the screen from the central maximum for wavelength 600 nm.
- (2) Find the least distance from the central maximum where the bright fringes due to both the wavelengths coincide.
- ii) (1) Draw the variation of intensity with angle of diffraction in single slit diffraction pattern. Write the expression for value of angle corresponding to zero intensity locations.
- (2) In what way diffraction of light waves differs from diffraction of sound waves ?

[5 Marks]
