



CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Physics

Chapter Name : *Semiconductor Electronics* (Chapter : 9)

Total : 07 Marks (expected) [MCQ(2)-1 Mark, SA(1)-2 Marks, LA(1)-3 Marks]

Level - 1

MCQ Type Questions :

- The resistivity of a semiconductor depends upon its
(A) size (B) nature of solid (C) length (D) size and type of atom
- The relation between number of free electrons (n) in a semiconductor and temperature is given by
(A) $n \propto T$ (B) $n \propto T^2$ (C) $n \propto \sqrt{T}$ (D) $n \propto T^{3/2}$
- Region which have no free electrons and holes in a p - n junction is
(A) p -region (B) n -region (C) junction (D) depletion region
- The majority charge carriers in p -type semiconductor are
(A) holes (B) electrons (C) holes and electrons (D) negative ions
- Intrinsic silicon becomes p -type if it is doped with
(A) aluminium (B) germanium (C) phosphorus (D) antimony
- The band gap of silicon semiconductor is—
(A) 0.7 eV (B) 1.0 eV (C) 1.1 eV (D) 0.1 eV
- The depletion layer in silicon diode is 1 μm wide and the knee potential is 0.6 V, then the electric field in the depletion layer will be
(A) zero (B) 0.6 Vm^{-1} (C) $6 \times 10^4 \text{ Vm}^{-1}$ (D) $6 \times 10^5 \text{ Vm}^{-1}$

[Hints : use the formula $E = \frac{\Delta V}{\Delta x}$]

Assertion-Reason based questions

- Both Assertion and Reason are correct and Reason is a correct explanation of Assertion
 - Both Assertion and Reason are correct and Reason is not a correct explanation of Assertion
 - Assertion is correct, Reason is incorrect
 - Assertion is incorrect, Reason is correct
- Assertion : Electron has higher mobility than hole in a semiconductor.
Reason : Mass of electron is less than the mass of hole.
(A) a (B) b (C) c (D) d
 - Assertion : Silicon is preferred over germanium for making semiconductor devices.
Reason : The energy band for germanium is more than the energy band of silicon.
(A) a (B) b (C) c (D) d
 - Assertion : Diamond behaves like an insulator.
Reason : There is a large energy gap between valance band and conduction band of diamond.
(A) a (B) b (C) c (D) d

11. Assertion : Diffusion current in a p - n junction is greater than the drift current in magnitude if the junction is forward biased.

Reason : Diffusion current in a p - n junction is from the n side to p side of the junction is forward biased.

(A) a (B) b (C) c (D) d

Short Answer Type Questions (SAQ)

12. Draw the circuit diagram of a p - n junction diode in (i) forward biasing and (ii) reverse biasing. Also draw its I-V characteristics in the two cases.

[Hints : Refer to page no. 335 and 336 in NCERT books]

13. Explain with the help of a circuit diagram, the working of a p - n junction diode as a half wave rectifier.

[Hints : Refer page no. 338 in NCERT book]

14. Draw the energy band diagram of a p -type semiconductor. Deduce an expression for the conductivity of a p -type semiconductor.

[Hints : Refer to page no. 331 in NCERT book]

15. How is an n -type semiconductor formed? Name the major charge carriers in it. Draw the energy band diagram of a n -type semiconductor.

[Hints : Refer to page no. 330 in NCERT book]

16. Explain the terms depletion region and potential barrier in the formation of a p - n junction.

[Hints : Refer to page no. 333 in NCERT book]

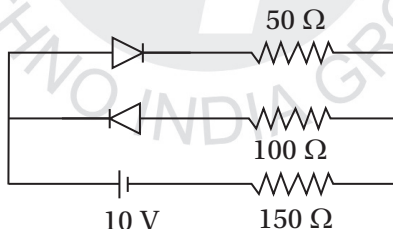
17. In the circuit shown assume the diode to be ideal when V_1 increases from 2 V to 6 V. Find the change in the current?



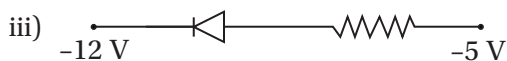
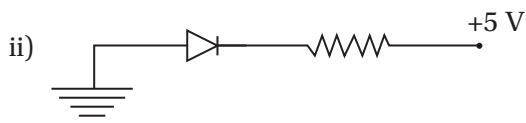
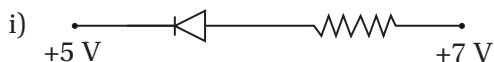
[Hints : Find reverse biased current and then forward biased current]

Long Answer Type Questions (LAQ)

18. Assume that each diode shown in the figure has a forward bias resistance of $50\ \Omega$ and an infinite reverse bias resistance. Find the current through the resistance $150\ \Omega$.



19. In the following diagrams, indicate which of the diodes are forward biased and which are reversed bias.



20. Explain with circuit diagram the process of full wave rectifier.

[Hints : Refer the page no. 339 in NCERT book]

21. Write the 3 uses of a p - n junction diode and explain the working of each.

22. Explain the following :

- (i) A doped semiconductor is electrically neutral.
- (ii) In p - n junction under equilibrium, there is no net current.
- (iii) In a diode, the reverse current is practically not dependent on the applied voltage.

ANSWER

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|------|-------|--|
| 1. B | 9. D | 17. 20 mA |
| 2. D | 10. A | 18. 0.04 A |
| 3. D | 11. D | 19. Forward biased (i) and (iii);
Reverse bias (ii) |
| 4. A | 12. | 20. |
| 5. A | 13. | 21. |
| 6. C | 14. | 22. |
| 7. D | 15. | |
| 8. B | 16. | |

