



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 :

1. The resistivity of a semiconductor depends upon its
Ⓐ size Ⓑ nature of solid Ⓒ length Ⓓ size and type of atom
2. The relation between number of free electrons (n) in a semiconductor and temperature is given by
Ⓐ $n \propto T$ Ⓑ $n \propto T^2$ Ⓒ $n \propto \sqrt{T}$ Ⓓ $n \propto T^{3/2}$

[Hints : use the formula $n^2 \propto T^3$]

3. Region which have no free electrons and holes in a $p-n$ junction is
Ⓐ p -region Ⓑ n -region Ⓒ junction Ⓓ depletion region
4. The majority charge carriers in p -type semiconductor are
Ⓐ holes Ⓑ electrons Ⓒ holes and electrons Ⓓ negative ions
5. Intrinsic silicon becomes p -type if it is doped with
Ⓐ aluminium Ⓑ germanium Ⓒ phosphorus Ⓓ antimony
6. The band gap of silicon semiconductor is—
Ⓐ 0.7 eV Ⓑ 1.0 eV Ⓒ 1.1 eV Ⓓ 0.1 eV
7. The depletion layer in silicon diode is $1 \mu\text{m}$ wide and the knee potential is 0.6 V, then the electric field in the depletions layer will be
Ⓐ zero Ⓑ 0.6 V m^{-1} Ⓒ $6 \times 10^4 \text{ V m}^{-1}$ Ⓓ $6 \times 10^5 \text{ V m}^{-1}$

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

Assertion-Reason based questions

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

Ⓑ b

Ⓒ c

Ⓓ 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]

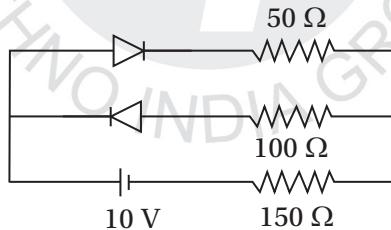
17. In the circuit shown assume the diode to be ideal when V_1 increases from 2 V to 6 V. Find the change in the current?



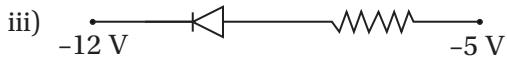
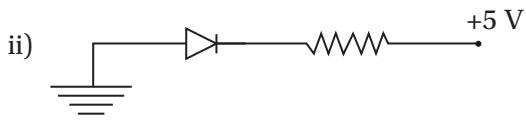
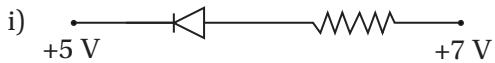
[Hints : Find reverse biased current and then forward biased current]

Long Answer Type Questions (LAQ)

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



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

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.	

