CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Physics

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

Total : 11 Marks (expected) [MCQ(2)-1 Mark, Assertion-Reason(1)-1 Mark, SA(1)-3 Marks, LA(1)-5 Marks]

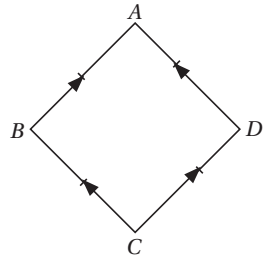
Level - 2(Higher Order)

MCQ Type Question:

1. Diffusion current in a *p-n* junction is greater than the drift current in magnitude

Ⓐ if the junction is forward0biased
Ⓑ if the junction is reverse-biased
Ⓒ if the junction is unbiased
Ⓓ in no case

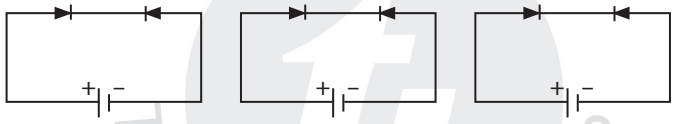
2. For the given circuit shown in figure, to act as full waves rectifier : a.c. input should be connected across _____ and _____ the d.c. output would appear across _____ and _____



Ⓐ *A, C, B, D*
Ⓑ *B, D, A, C*
Ⓒ *A, B, C, D*
Ⓓ *C, A, D, B*

[Hints : concept of bridge rectifier]

3. Two identical *P-N* junction may be connected in series with a battery in three ways (figure below). The potential drops across the two *P-N* junction are equal in



(i) (ii) (iii)

Ⓐ circuit (i) and (ii) Ⓑ circuit (ii) and (iii) Ⓒ circuit (iii) and (i) Ⓓ circuit (i) only

[Hints : Apply the concept of forward and reverse bias condition]

4. Increase in temperature

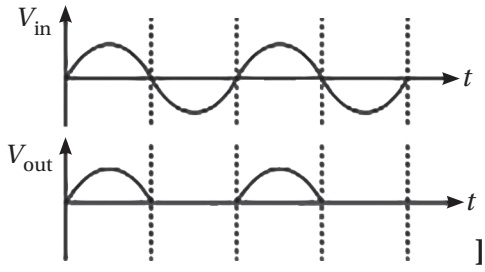
Ⓐ increases forward resistance
Ⓑ increase reverse resistance
Ⓒ affects *V-I* characteristics of *p-n* junction
Ⓓ does not affect *V-I* character

[Hints : Increase in temperature increases the mobility of charge carriers hence decreases resistance]

5. In the half wave rectifier circuit of operating from 50 Hz mains frequency, the fundamental frequency in the ripple would be

Ⓐ 25 Hz Ⓑ 50 Hz Ⓒ 70.7 Hz Ⓓ 100 Hz

[Hints : Give answer from input and output graph



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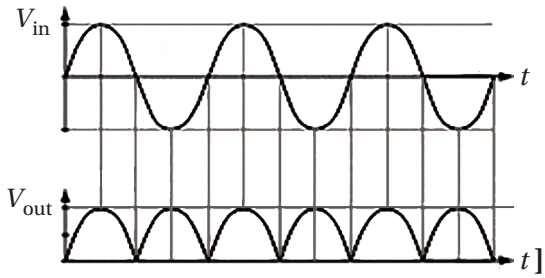
6. What is the ratio of output frequencies of full wave rectifier and a half wave rectifier, when an input of frequency 50 Hz is fed at input?

Ⓐ 1 : 2 Ⓑ 2 : 1 Ⓒ 4 : 1 Ⓓ 1 : 4

[Hints : Give answer front input and output graph



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

7. Assertion : When a semiconductor is doped with a donor impurity, the hole concentration decreases and the electron concentration increases.

Reason : A donor impurity is an atom with valence electrons of five always.

Ⓐ a Ⓑ b Ⓒ c Ⓓ d

8. Assertion : *p-n* junction diode can be used even at ultra high frequencies.

Reason : Capacitive reactance of a *p-n* junction diode increases as frequency increases.

Ⓐ a Ⓑ b Ⓒ c Ⓓ d

9. Assertion : Light Emitting Diode (LED) emit spontaneous radiation.

Reason : LED are forward-biased *p-n* junction.

Ⓐ a Ⓑ b Ⓒ c Ⓓ d

Short Answer Type Questions (SAQ)

10. State the level of doping and biasing condition used in—
(i) Light emitting diode
(ii) Photo diode
(iii) Zener diode

11. What is the relation between emitter current (I_E), base current (I_B) and collector current (I_C) at any instant in a properly biased common emitter transistor circuit?.

[Hints : From the concept of working of transistor]

12. a) What is the value of phase difference between the input and output signal when transistor used as common emitter amplifier?

b) How does the collector current change in a junction transistor, if the base region has larger width.

13. Derive the relation between current gains α and β.

14. For a transistor the value of β is 100. What is value of α.

[Hints : use the relation $\beta = \frac{\alpha}{1-\alpha}$**]**

Long Answer Type Questions (LAQ)

15. a) Draw a labeled circuit diagram of a common base amplifier using *n-p-n* transistor.

b) Name the purpose for which common emitter transistor amplifier is preferred over common base transistor amplifier.

16. a) Differentiate between three segments of an *n-p-n* transistor on the basis of their size and level of doping.

b) Draw a plot of transistor characteristic and show which portion of the characteristic is used in amplification.

17. a) Describe briefly the functions of the three segments of *n-p-n* transistor.

b) Draw the circuit arrangement for studying the output characteristics on *n-p-n* transistor in CE mode. Explain how the output characteristics is obtained.

ANSWER

1. Ⓐ
2. Ⓑ
3. Ⓑ
4. Ⓒ
5. Ⓑ
6. Ⓑ
7. Ⓑ
8. Ⓒ
9. Ⓑ
10.
11.
12.
13.
14. $\alpha = \frac{100}{101}$
15.
16.
17.

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