

Started on Thursday, 5 October 2017, 11:02 PM

State Finished

Completed on Thursday, 5 October 2017, 11:05 PM

Time taken 2 mins 55 secs

Grade 2.0 out of 10.0 (20%)

Question 1

Correct

Mark 1.0 out of 2.0

Which of the following is true ?

Select one:

- ☐ a. Carbon is never used as a dopant in Silicon
- ☐ b. Arsenic is often used as an N-type dopant in Silicon
- ☐ c. Phosphorus is often used as an N-type dopant in Silicon
- ☒ d. All of these ✓
- ☐ e. Boron is often used as a P-type dopant in Silicon

The correct answer is: All of these

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 2

Correct

Mark 0.0 out of 2.0

The intrinsic carrier concentration for silicon stays approximately constant as temperature increases.

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Question 3

Not answered

Mark 0.0 out of 2.0

If a PN junction is doped with boron at a concentration of $5.0 \times 10^{16}/\text{cm}^3$ and phosphorus at a concentration of $2.2 \times 10^{15}/\text{cm}^3$, then what is the built-in voltage in millivolts for this junction? Assume $n_i = 1.5 \times 10^{10}/\text{cm}^3$ and $V_t = kT/q = 26\text{mV}$ at 300°K . Since small changes in the built-in voltage imply large changes in the doping levels, be sure to give your answer to the nearest millivolt!

Answer:



The correct answer is: 700

Question 4

Correct

Mark 1.0 out of 2.0

Which of the following is true for the depletion region surrounding a PN junction?

Select one:

- ☒ a. In the depletion region there is an electric field, which creates a barrier voltage ✓
- ☐ b. All of these
- ☐ c. In the depletion region there are free electrons and holes which cause a separation of charge
- ☐ d. In the depletion region there are almost no immobile ions
- ☐ e. In the depletion region the amount of charge stored stays constant as the bias is varied

The correct answer is: In the depletion region there is an electric field, which creates a barrier voltage

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 5

Correct

Mark 0.0 out of 2.0

As the forward bias across a PN junction is increased, the potential barrier increases.

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Started on Thursday, 5 October 2017, 11:06 PM

State Finished

Completed on Thursday, 5 October 2017, 11:10 PM

Time taken 4 mins 45 secs

Grade 5.0 out of 10.0 (50%)

Question 1

Correct

Mark 2.0 out of 2.0

Which of the following is true ?

Select one:

- ☐ a. Phosphorus is often used as a P-type dopant in Silicon
- ☐ b. Boron is often used as an N-type dopant in Silicon
- ☒ c. None of these ✓
- ☐ d. Arsenic is often used as a P-type dopant in Silicon
- ☐ e. Carbon is often used as an N-type dopant in Silicon

The correct answer is: None of these

Correct

Marks for this submission: 2.0/2.0.

Question 2

Correct

Mark 2.0 out of 2.0

Phosphorus (P) and Arsenic (As) are commonly used as donor atoms in silicon.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0.

Question 3

Not answered

Mark 0.0 out of 2.0

If a PN junction is doped with boron at a concentration of $1.0 \times 10^{18}/\text{cm}^3$ and phosphorus at a concentration of $1.1 \times 10^{17}/\text{cm}^3$, then what is the built-in voltage in millivolts for this junction? Assume $n_i = 1.5 \times 10^{10}/\text{cm}^3$ and $V_t = kT/q = 26\text{mV}$ at 300°K . Since small changes in the built-in voltage imply large changes in the doping levels, be sure to give your answer to the nearest millivolt!

Answer:



The correct answer is: 879

Question 4

Correct

Mark 1.0 out of 2.0

As the reverse bias voltage across a PN junction is decreased, the width of the depletion region will

Select one:

- ☐ a. None of these
- ☐ b. No way to determine
- ☒ c. Decrease ✓
- ☐ d. Stays the same
- ☐ e. Increase

The correct answer is: Decrease

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 5

Correct

Mark 0.0 out of 2.0

The maximum value for the depletion region capacitance of a reverse biased PN junction occurs when the reverse bias is equal to zero volts.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.