X

Unit 5 - p-n junction

Week 4 - Assignment

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2019-02-27, 23:59 IST.**

1) Calculate the built-in potential for a Silicon P-N junction with ND=10^16/cm3 and NA = 10^19/cm3 at 300 K. Assume ni = 10^10/cm3 ***1 point***

- 0.9 V
- 2 V
- 0.05 V
- 1.5 V

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.9 V

2) Calculate the depletion width of a Silicon P-N junction with ND=10^16/cm3 and NA = 10^18/cm3 at 300 K. Assume ni = 1010 cm-3, εs = ε0 x εSi = 8.854x10^-14 F/cm x 11.7. ***2 points***

- 3.2 X 10^-5 cm
- 5.2 X 10^-7 cm
- 7.2 X 10^-3 cm
- 1.2 X 10^-2 cm

No, the answer is incorrect.
Score: 0

Accepted Answers:
3.2 X 10^-5 cm

3) Calculate the maximum electric field at zero bias for question no. 2 ***1 point***

- 15 X 10^6 V/cm
- 5 X 10^4 V/cm

5 X 10^4 V/cm

4) Calculate the donor atom concentration (ND) in a Silicon P-N junction to get a built-in potential of 0.77 V, with NA = 10^18/cm3 at 300 K. Assume ni = 10^10/cm3 **1 point**

- 10^19/cm3
- 10^18/cm3
- 10^15/cm3
- 10^20/cm3

No, the answer is incorrect.
Score: 0

Accepted Answers:
10^15/cm3

5) For a GaAs P+-N diode and a GaN N+-P diode (P+ indicates heavy P doping and N+ indicates heavy N doping, neglect heavy doping effects), which of the following statements is true. **1 point**

- Depletion region has greater width in N region for GaAs diode while depletion region has greater width in P region in GaN diode.
- Depletion region has greater width in P+ region for GaAs diode while depletion region has greater width in P region in GaN diode.
- Depletion region has greater width in N region for GaAs diode while depletion region has greater width in N+ region in GaN diode.
- Depletion region has greater width in N+ region for GaAs diode while depletion region has greater width in P+ region in GaN diode.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Depletion region has greater width in N region for GaAs diode while depletion region has greater width in P region in GaN diode.

6) Consider an ideal PN junction diode with cross-section dimension of 10 um X 10um. The reverse-saturation current density is 0.1A/m2. At a forward bias voltage of 0.5V across the diode, the forward current flowing through the diode is (Assume thermal energy is 25meV and ignore recombination and generation effects) **1 point**

- 4.85 mA
- 4.8 A
- 9.7 mA
- 19.4 mA

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.85 mA

7) Consider diodes made of four different materials, namely, Gallium Nitride, Gallium Arsenide, Silicon and Germanium. If there is a requirement of a switch which has good off-state characteristics i.e. it should have very low off state current (Reverse biased diode can act as switch in off-state), diode made of which material satisfies this requirement better **1 point**

- Gallium Arsenide
- Germanium

- Silicon
- Gallium Nitride

No, the answer is incorrect.
Score: 0

Accepted Answers:
Gallium Nitride

8) Consider diodes made of four different materials, namely, Gallium Nitride, Gallium Arsenide, Silicon and Germanium. If there is a requirement of a switch which has good on-state characteristics i.e. it should have very low on state voltage drop (Forward biased diode can act as switch in on-state), diode made of which material satisfies this requirement better? ***1 point***

- Gallium Arsenide
- Germanium
- Silicon
- Gallium nitride

No, the answer is incorrect.
Score: 0

Accepted Answers:
Germanium

9) Consider a semiconductor material in which electrons and holes have the same capture cross sections and thermal velocities. A p-n junction is formed using this material and all the trap levels in the depletion region lie at the mid-gap. As the doping of P and N sides of the junction is reduced (but is still much greater than intrinsic concentration), the generation current under reverse bias. ***1 point***

- Increases
- Decreases
- Remains same
- Needs more information

No, the answer is incorrect.
Score: 0

Accepted Answers:
Increases

Previous Page End