



Weekly Test 6- Semiconductor Devices

Date: 29.09.2012

Time: 30 Min

Course: E2Sem1_ECE

Max Marks: 10

Q1. For a semiconductor material $\epsilon = 11.7 \times 8.85 \times 10^{-14}$, it is given that doping concentration on n-side of the junction $N_d = 10^{16}$ /cubic centimeter, at $T = 300$ K the Debey length is equals to

- A. 4.09×10^{-6} cm B. 6.09×10^{-6} cm C. 7×10^{-6} cm
D. 8×10^{-6} cm E. 1×10^{-6} cm

Q2. At the ohmic contact for a semiconductor, the values of surface recombination velocity and the excess carrier concentration respectively are (approximately) equals to

- A. 0, 0 B. 1, 0 C. infinite, 0 D. 1, infinite

Q3. Zener diode and Avalanche diode provide variable current at fixed voltage, i.e both may be used as voltage regulators, for most of the practical application we use only Zener diode, the reason is that zener diode

- A. provides high current
B. provides large power compared avalanche diode
C. both A and B
D. has controlled breakdown characteristics

Q4. Which of the following process is involved in making the windows in semiconductor material while fabricating a p-n junction diode

A. Epitaxial growing

B. Lithography

C. Doping

D. Metallization

Common data for Q5-Q7

A p-n junction diode is at $T = 300$ K under thermal equilibrium, zero bias applied across the junction, the doping concentrations on p-side and n-side are $N_a = 10^{17}$ / cubic centimeter and $N_d = 5 \times 10^{15}$ / cubic centimeter respectively. Take $n_i = \frac{1.5 \times 10^{10}}{\text{cubic centimeter}}$

Q5. $E_F - E_{fi}$ on n-side is equals

A. 0.3294 eV

B. 1.1 eV

C. 1.4 eV

D. 0.8 eV

E. 1.8 eV.

Q6. $E_{fi} - E_F$ on p-side is equals to

A. 0.08 eV

B. 1.2 eV

C. 1 eV

D. 0.407 eV

Q7. Built in potential across the junction is equal to

A. 1.2 V

B. 0.3 V

C. 1 V

D. 0.7364

Q8. Once you connect a voltmeter across a p-n junction diode under thermal equilibrium , what is the voltage value that it reads

- A. 0 V
- B. built in potential
- C . greater than built in potential
- D. less than built in potential
- E. not sure

Q9. A p-n junction diode is under thermal equilibrium at $T=300$ K, Assume that the n-region and p-region are doped such that $E_c - E_F \approx 0$ and $E_F - E_v \approx 0$, then the built in potential approximately equals to (if E_g is energy gap of semiconductor)

- A. 0 V
- B. E_g/q V
- C. E_g q
- D. E_g
- E. $E_g/2q$

Q10. A p-n junction is under thermal equilibrium and applied bias voltage is zero, slope of the developed electric field in the depletion region on P-side and N-side respectively is

- A. Positive, positive
- B. zero,zero
- C . Negative, positive
- D. zero, positive

KEY

1. A
2. C
3. D
4. B
5. A
6. D
7. D
8. A
9. B
- 10.C