THE PN JUNCTION (EDC) ASSIGNMENT-02

Q_01

At the junction of a PN diode

(A) The space charge region exists predominantly in the heavily doped side of the junction

(B) The depletion region has an electrostatic potential which makes p side positive with respect to the n side

(C) Holes are prevented from diffusing from n side to the p side

(D) The electric field at the junction is of such value to cause the diffusive tendency to be counterbalanced by the drift tendency of electrons and holes

Ans: D

Q_02

In a uniformly doped GaAs junction at T = 300 K, at zero bias only 20% of the total space charge region is to be in the p-region. The built in potential concentration in n-region is

(A) $1 \times 10^{16}\ cm^{-3}$

(B) $4 \times 10^{16}\ cm^{-3}$

(C) $1 \times 10^{22}\ cm^{-3}$

(D) $4 \times 10^{22}\ cm^{-3}$

Ans: A

Q_03

A silicon pn junction at T = 300 K with zero applied bias has doping concentration of N_d = $5\times 10^{16}\ cm^{-3}$ and N_a = $5\times 10^{15}\ cm^{-3}$. The width of depletion region extending into the n-region is

(A) 4.11×10^{-6} cm

(B) 3.22×10^{-6} cm

(C) 4.11×10^{-5} cm

(D) 3.22×10^{-5} cm

Ans: A

Q_04

When reverse bias is applied to a PN junction

(A) Majority carriers flow down the potential
(B) The barrier potential is decreased
(C) Thermally generated minority carriers are responsible for the saturation current
(D) Minority carriers are holes from p-side moving to the n-side

Ans: C

Q_05

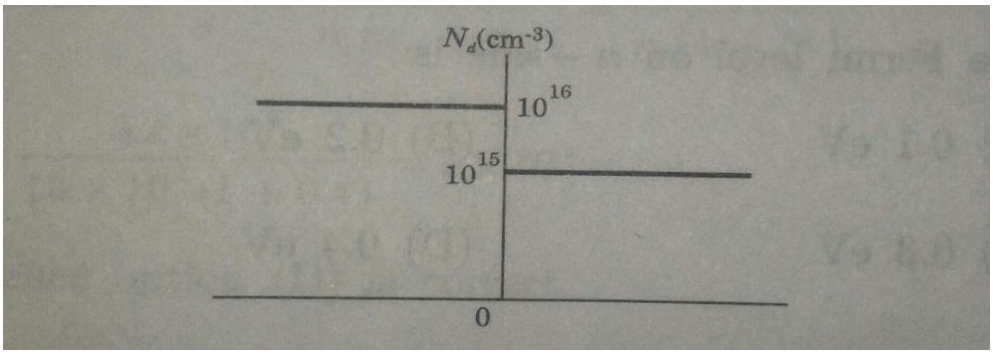
For the above question, in depletion region maximum electric field $|E_{max}|$ is

(A) 1.1×10^4 V/cm
(B) 2.2×10^4 V/cm
(C) 3.2×10^4 V/cm
(D) 4.1×10^4 V/cm

Ans: C

Q_06

An n – n isotype doping profile is shown below. The built in potential barrier is (n_i = $1.5 \times 10^{10}\ cm^{-3}$)



(A) 0.66 V
(B) 0.06 V
(C) 0.03 V
(D) 0.33 V

Ans: B

Q_07

The diffusion capacitance of PN junction

(A) Decreases with increasing current and increasing temperature
(B) Decreasing with increasing current and increasing temperature
(C) Increasing with increasing current and increasing temperature
(D) Does not depend on current and temperature.

Ans: C

Q_08

A silicon abrupt junction has dopant concentration of $N_d = 2 \times 10^{16}\ cm^{-3}$ and $N_a = 2\times 10^{15}\ cm^{-3}$. The applied reverse bias voltage is $V_R = 8$ V. The maximum electric field $|E_{max}|$ in depletion region is

(A) 5.5×10^4 V/cm
(B) 6.9×10^4 V/cm
(C) 3.5×10^4 V/cm
(D) 5×10^4 V/cm

Ans: B

Q_09

In a uniformly doped silicon pn junction has $N_d = 10^{17}\ cm^{-3}$ and $N_a = 5\times 10^{17}\ cm^{-3}$. The junction has a cross-sectional area of $10^{-4}\ cm^2$ and has an applied reverse bias voltage of $V_R = 5$ V. The total junction capacitance is

(A) 10 pF
(B) 5.5 pF
(C) 7 pF
(D) 3.5 pF

Ans: D

Q_10

The switching speed of a PN junction (having a heavily doped p-region) depends primarily on

(A) The mobility of minority carriers in the P+ region
(B) The life time of minority carriers in the P+ region
(C) The mobility of minority carriers in the N region
(D) The life time of minority carriers in the N region

Ans: D