Name :→ TEST-1 B.E ROLL NO→ Date – 16-07-20
Branch –

(1) If an intrinsic semiconductor is doped with a very small amount of boron, then in the extrinsic semiconductor so formed, the number of electrons & holes will ....
(a) decreases
(b) increases and decreases
(c) increases
(d) decreases and increases

(2) In an N-Type Semiconductor, the concentration of minority carriers mainly depends upon the..
(a) doping technique
(b) temperature & material
(c) number of donor atoms
(d) quality of the intrinsic semiconductor material.

(3) The intrinsic carrier concentration of a silicon sample at 300K is $1.5\times10^{11}/m^3$. If after doping, the number of majority carriers is $5\times10^{20}/m^3$, the minority carrier density is ....
(a) $4.50\times10^{11}/m^3$
(b) $3.33\times10^{4}/m^3$
(c) $5.00\times10^{20}/m^3$
(d) $3.00\times10^{-5}/m^3$

(4) For Intrinsic GaAs, the room-temperature electrical conductivity is 10^{-6} (ohm-m)$^{-1}$, the electron and hole mobilities are, respectively, 0.85 & 0.04 $m^2/V\text{-}s$. What is the intrinsic carrier concentration n_i at the room temp.
(a) $10^{21}\ m^{-3}$ (b) $10^{20}\ m^{-3}$ (c) $7.0\times10^{12}\ m^{-3}$ (d) $7.0\times10^{20}\ m^{-3}$

(5) Drift current in semiconductor depends upon.
(a) only the electric field
(b) only the carrier concentration gradient
(c) both the electric field & carrier concentration
(d) both the electric field and the carrier concentration gradient.

(6) In an intrinsic semiconductor, the free electron concentration depends on —
(a) effective mass of electrons only
(b) effective mass of holes only.
(c) temperature of the semiconductor
(d) Shape & Size of the semiconductor.

(7) In silicon at T = 300K, the thermal-equilibrium concentration of electron is $n_0 = 5\times10^{4}\ cm^{-3}$. The hole concentration is ....
(a) $4.5\times10^{15}\ cm^{-3}$
(b) $4.5\times10^{15}\ m^{-3}$
(c) $0.3\times10^{-6}\ cm^{-3}$
(d) $0.3\times10^{-6}\ m^{-3}$

(8) A sample of silicon at $T = 300K$ is doped with boron at a concentration of $2.5 \times 10^{13}\ cm^{-3}$ and also with Arsenic at a concentration of $1 \times 10^{13}\ cm^{-3}$. The material is ....

(a) P-type with $P_0 = 1.5 \times 10^{13}\ cm^{-3}$

(b) P-type with $P_0 = 1.5 \times 10^{7}\ cm^{-3}$

(c) n-type with $n_0 = 1.5 \times 10^{13}\ cm^{-3}$

(d) n-type with $n_0 = 1.5 \times 10^{7}\ cm^{-3}$

(9) A silicon crystal having a cross-sectional area of $0.001\ cm^2$ and a length of 20μm is connected to its ends to a 20V battery. At $T = 300K$, we want a current of 100mA in crystal. The concentration of donor atoms to be added is....

(a) $2.4 \times 10^{13}\ cm^{-3}$ (b) $4.6 \times 10^{13}\ cm^{-3}$

(c) $7.8 \times 10^{14}\ cm^{-3}$ (d) $8.4 \times 10^{14}\ cm^{-3}$

(10) An additional Energy level Ed (donor energy level) created in Extrinsic semiconductor, lies near to.....

(a) Valance band (b) conduction band (c) middle of both valance band & conduction band.

(d) None of the above.