Unit -I

Semi Conductors / p-n diode

1.1 Conduction electrons in a semiconductor have higher mobility than holes because they
(a) have negative charge.
(b) are lighter.
(c) experience collisions less frequently.
(d) need less energy to move them.

1.2 In an intrinsic semiconductor, the electron and hole densities are equal at which temperature?
(a) 0 k
(b) $0^{o}C$
(c) High temperature
(d) All temperatures

1.3 The Fermi level in a p-semiconductor lies close to
(a) The top of the valence band
(b) The top of the conduction band
(c) The bottom of the valence band
(d) The bottom of the conduction band.

1.4 The resistivity of an intrinsic semiconductor decreases with increasing temperature. This is because, with increasing temperature
(a) Both the carrier concentration and mobility of carriers decrease.
(b) The carrier concentration increases but the mobility of carriers decreases
(c) The carrier concentration decreases but the mobility of carriers increases
(d) The carrier concentration remains the same but the mobility of carriers decreases

1.5 An n-semiconductor as a whole is:
(a) Negatively charged
(b) Positively charged
(c) Electrically neutral
(d) Negatively or positively charged depending on doping.

1.6 The mobility of an electron is expressed in terms of
(a) cm/V-s
(b) cm^2/s
(c) cm^2/V
(d) $cm^2/V\text{-}s$

1.7 In a p-silicon sample the hole concentration is $2.25 \times 10^{15}/Cm^3$. If the intrinsic Carrier concentration is 1.5×10^{10}/Cm3. What is the electron concentration in the p-silicon sample?
(a) $10^{10}Cm^{-3}$
(b) $10^{5}Cm^{-3}$

(c) Zero
(d) 1.5 X 10^{25}

1.8 Current flow in a semi conductor depends on the phenomenon of
(a) Diffusion
(b) Drift
(c) Recombination
(d) All of the above

1.9 In a p-n junction, to make the depletion region extend prominently into p-region, the concentration of impurities in the p-region must be
(a) Much less than the concentration of impurities in n-region
(b) Much higher than the concentration of impurities in n-region
(c) Equal to the concentration of impurities in n-region
(d) zero

1.10 The depletion region of a p-n junction has
(a) Electrons and holes
(b) Positive ions and electrons
(c) Positive ions and negative ions
(d) No ions, electrons or holes.

1.11 When the reverse voltage across a p-n junction is gradually decreased, the depletion region
(a) Does not change in width
(b) Initially increases up to a certain width and then decreases
(c) Continuously increases in width
(d) Continuously decreases in width.

1.12 In an unbiased p-n junction, the junction current at equilibrium is
(a) Due to diffusion of minority carriers only.
(b) Due to diffusion of majority carriers only
(c) Zero, because equal and opposite drift and diffusion currents for electrons and holes cross the junction
(d) Zero, because no charges cross the junction.

1.13 In an unbiased p-n junction the thickness of depletion region in of the order of
(a) 0.005 μm
(b) 0.5 μm
(c) 5 mm
(d) 10^{-10}m

Answers

1.1 (c)	1.2 (d)	1.3 (a)	1.4 (b)	1.5 (c)	1.6 (d)
1.7 (b)	1.8 (d)	1.9 (a)	1.10 (c)	1.11 (c)	1.12 (c)
1.13 (b)					