

# ASSIGNMENT # 1

Sub:- Electronic Devices

Code:- ETEC-106

- Q.1. Explain Energy band theory of crystals. Also differentiate Conductor, semiconductor and Insulator on the basis of energy band.
- Q.2. List the major areas of Application of electronic.
- Q.3. Derive the expression for electrical conductivity of intrinsic semiconductor.
- Q.4. Find the resistivity of (a) intrinsic Si (b) P-type Si with  $N_A = 10^6 / \text{cm}^3$ . use  $n_i = 1.5 \times 10^{10} / \text{cm}^3$  and assume that for intrinsic Si,  $\mu_n = 1350 \text{ cm}^2 / \text{V-s}$  and  $\mu_p = 480 \text{ cm}^2 / \text{V-s}$  for the doped Silicon  $\mu_n = 1110 \text{ cm}^2 / \text{V-s}$  &  $\mu_p = 400 \text{ cm}^2 / \text{V-s}$
- Q.5. A pure semiconductor Ge is simultaneously doped with donor and acceptor impurities to the extent of  $1 : 10^7$  donor atoms and  $1 : 10^{11}$  acceptor. Find its conductivity. Given total no. of atoms =  $4.421 \times 10^{22} / \text{cm}^3$ ,  $n_i = 2.5 \times 10^{13} / \text{cm}^3$ ,  $\mu_n = 3800 \text{ cm}^2 / \text{V-s}$  &  $\mu_p = 1800 \text{ cm}^2 / \text{V-s}$ .
- Q.6 :- Explain the variation in semiconductor properties with temperature variation.
- Q.7 :- In a certain semiconductor, the mobility of electrons is  $0.3 \text{ m}^2 / \text{V-s}$ . The mobility of holes is  $0.2 \text{ m}^2 / \text{V-s}$  and forbidden energy band is  $0.7 \text{ eV}$ . Calculate the intrinsic carrier concentration in semiconductor at  $300 \text{ K}$ , if effective mass of electron and holes are respectively  $0.55$  &  $0.37$  times the rest ~~mass~~ mass of the electron.
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