Assignment-2 (Semiconductor Diode)

1. Describe the difference between n-type and p-type semiconductor materials.
2. Describe in your own words the conditions established by forward- and reverse-bias conditions on a p–n junction diode and how the resulting current is affected.
3. Describe in your own words the meaning of the word ideal as applied to a device or a system.
4. a. Determine the thermal voltage for a diode at a temperature of 25°C.
   b. For the same diode of part (a), find the diode current using the I_D equation if I_S=40 nA, n=2 (low value of V_D), and the applied bias voltage is 0.5 V.

$$I_D = I_s(e^{V_D/nV_T} - 1) \qquad V_T = \frac{kT}{q} \qquad T_K = T_C + 273° \qquad k = 1.38 \times 10^{-23}\,\text{J/K}$$