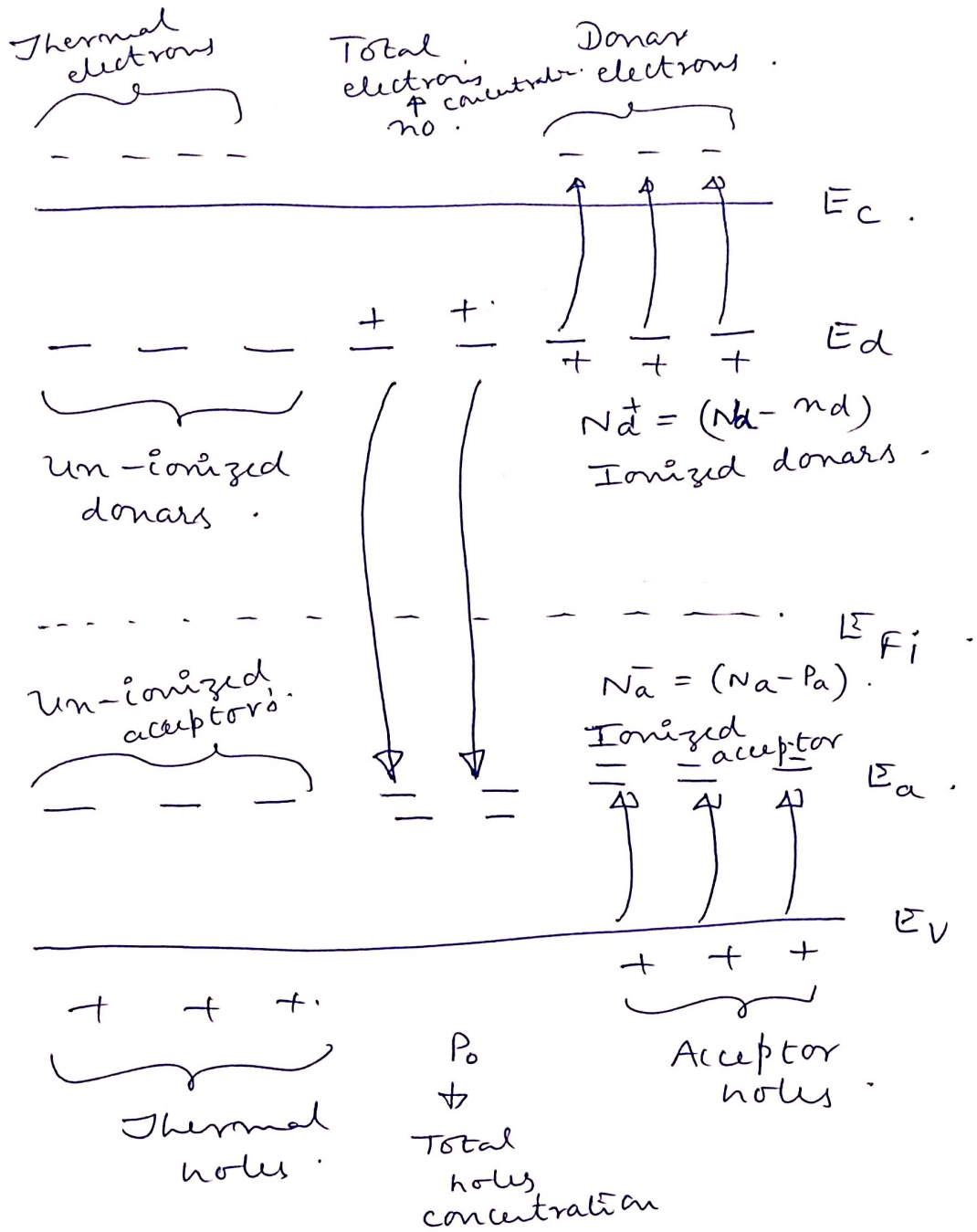


①

Compensated semiconductor's



For charge neutrality

$$n_0 + N_a^- = p_0 + N_d^+$$

$$n_0 + (N_a - p_a) = p_0 + (N_d - n_d)$$

For complete ionization, n_d & p_a are zero.

$$\Rightarrow n_0 + N_a = p_0 + N_d$$

$$\forall \quad n_0 p_0 = n_i^2 \Rightarrow p_0 = \frac{n_i^2}{n_0}$$

(2)

$$\therefore n_0 + N_a = \frac{n_i^2}{n_0} + N_d$$

$$\Rightarrow n_0^2 - (N_d - N_a)n_0 = n_i^2$$

$$\Rightarrow n_0^2 - (N_d - N_a)n_0 - n_i^2 = 0$$

$$\Rightarrow n_0 = \left(\frac{N_d - N_a}{2} \right) + \sqrt{\left(\frac{N_d - N_a}{2} \right)^2 + n_i^2}$$

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