

EQUATIONS YOU SHOULD KNOW (these will not be given in exams)

1. Ohm's Law

2. Einstein eqtn: $\frac{D_n}{\mu_n} = V_{th}$

3. Bulk Resistivity: $\rho = \frac{1}{nq\mu_n}$

4. Sheet resistivity: $R_s = \frac{1}{tnq\mu_n}$

5. Carrier concentration (compensated): $n_o = \frac{N_d - N_a}{2} + \left[\left(\frac{N_d - N_a}{2} \right)^2 + n_i^2 \right]^{0.5}$

6. Mobility = velocity/field

7. $q = 1.6 \times 10^{-19}$ Coulombs

8. Minority diffusion coefficient: $L_n^2 = D_n \tau_n$

9. Drift current: $J_n^{dr} = qn\mu_n E$, $J_p^{dr} = qp\mu_p E$

10. Diffusion Current: $J_n^{diff} = qD_n \frac{dn}{dx}$, $J_p^{diff} = -qD_p \frac{dp}{dx}$

11. Thermal voltage: $V_{th} = \frac{kT}{q}$

12. 60 mV Rule

13. Capacitance of parallel plate capacitor: $C = \frac{\epsilon}{t}$

14. Equilibrium minority carrier concentration: $p_o = \frac{n_i^2}{N_d}$

15. Junction or barrier potential: $\phi_j = \phi_B - V_D$

16. Built in potential: $\phi_B = \phi_n - \phi_p$

17. $Q = VC$

18. Depletion or junction capacitance: $C_j = \frac{\Delta Q}{\Delta V}$

19. Depletion or junction capacitance: $C_j = \frac{\epsilon}{X_d}$