Formulae

Energy, Work Done, Charge, Power:

$W = QV$ $\quad P = \frac{W}{t}$ $\quad I = \frac{Q}{t}$

The maximum of number of electrons in a shell (band) = $2N^2$

6.25×10^{18} electrons ➔1C of negative charge

Diodes:

Forward voltage drop V_F is 0.7 V for silicon diode and 0.3 V for germanium diode

Zener dynamic resistance $Z_Z = \frac{\Delta V_Z}{\Delta I_Z}$

AC Voltages and Currents:

$I_{rms} = I_p / \sqrt{2} = 0.7071\ I_p$ $\quad I_{p\text{-}p} = 2I_p$ $\quad I_{avg} = 2I_p / \pi = 0.637 I_p$

$V_{rms} = V_p / \sqrt{2} = 0.7071\ V_p$ $\quad V_{p\text{-}p} = 2V_p$ $\quad V_{avg} = 2V_p / \pi = 0.637 V_p$

Half-Wave Rectifier:

$V_{out(p)} = V_{sec(p)} - 0.7V$ $\quad V_{AVG} = \frac{V_{out(p)}}{\pi}$ $\quad PIV = V_{sec(p)}$

Centre-Tapped Full-Wave Rectifier:

$V_{out(p)} = \frac{V_{sec(p)}}{2} - 0.7V$ $\quad V_{AVG} = \frac{2V_{out(p)}}{\pi}$ $\quad PIV = 2V_{out(p)} + 0.7V$

Full-Wave Bridge Rectifier:

$V_{out(p)} = V_{sec(p)} - 1.4\ V$ $\quad V_{AVG} = \frac{2V_{out(p)}}{\pi}$ $\quad PIV = V_{out(p)} + 0.7\ V$

Ripple Factor:

$r = \frac{V_{r(rms)}}{V_{DC}}$ where $V_{r(rms)} = \frac{V_{r(p-p)}}{2\sqrt{3}}$

Line Regulation = $\left(\frac{\Delta V_{OUT}}{\Delta V_{IN}}\right)100\%$ $\quad$ **Load Regulation** = $\left(\frac{V_{NL} - V_{FL}}{V_{FL}}\right)100\%$

Transistors:

$I_E = I_C + I_B$ $\quad \beta_{DC} = \frac{I_C}{I_B}$ $\quad \alpha_{DC} = \frac{I_C}{I_E}$ $\quad \beta_{DC} = \frac{\alpha_{DC}}{1 - \alpha_{DC}}$

$V_{BE} = 0.7V$ $\quad V_{CC} = V_{CE} + I_C R_C$

$V_{BB} = V_{BE} + I_B R_B$ $\quad V_{CE} = V_{CB} + V_{BE}$