Chapter 1

Typesetting Mathematics in LaTeX

$$ax + by + c = 1 \tag{1.1}$$

$$X + y \tag{1.2}$$

1.1 Simple Equations

$$Y_D = Z_C$$

$$x + y = 1$$

$$ax + by + c = z + 1$$

$$
\begin{aligned}
Y_D &= Z_C \\
x + y &= 1 \\
ax + by + c &= z + 1 \\
x^{10^{15}} &= y^{12}\theta \\
\beta & \\
\Omega & \\
\rho & \\
\alpha & \\
\delta & \\
\Delta & \\
\chi & \\
\phi & \\
\Pi & \\
\pi & \\
\gamma & \\
\Gamma & \\
\lambda & \\
l * b & \\
a.b & \\
Ohm's law: & \\
I = \frac{V}{R} &
\end{aligned}
$$

Ohm's law:

$$I = \frac{V}{R}$$

1.2 Square Root, Cube Root, fourth root and nth Root

$$\sqrt{[n]x}$$

$$\sqrt[3]{8}$$

$$\frac{1}{2}$$

$$\sqrt{2}, \sqrt[3]{81}, \sqrt[4]{16}, \sqrt[n]{x}$$

Evaluate:

$$\sqrt{2+\sqrt{2+\sqrt{2+}...}}$$

1.3 Simple Equations

$$ax + by + cz = 0$$

$$\frac{a}{b} = \frac{c}{d}$$

$$\frac{a^x}{y} = b^y.c^x$$

1.4 Diode Equations:

$$i_D = I_S(e^{\frac{v_D}{\eta.V_T}} - 1) \tag{1.3}$$

$$V_{D2} - V_{D1} = 2.303\eta V_T ln(\frac{I_{D2}}{I_{D1}}) \tag{1.4}$$

$$i_D = I_S\left(^{\frac{V_D}{\eta.V_T}} - 1\right) \tag{1.5}$$

$$V_{D_2} - V_{D_1} = 2.303\eta V_T \ln(\frac{I_{D2}}{I_{D1}}) \tag{1.6}$$

$$\tag{1.7}$$

Chapter 2

Calculas

2.1 Differential Equations:

$$\frac{dy}{dx} + 1 = 0 \tag{2.1}$$

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} + 6 = 0 \tag{2.2}$$

$$\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6 = 1 \tag{2.3}$$

$$\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6 = 2e^{ax}\sin bx \tag{2.4}$$

$$\frac{d^3y}{dx^3} + 8\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6 = 2e^{ax}\cos bx \tag{2.5}$$

$$\frac{d^2y}{dx^2} = -\frac{y^3}{x^3} \tag{2.6}$$

$$\sin^2 x + \cos^2 x = 1 \tag{2.7}$$

2.2 Integration:

2.2.1 Line Integrals:

$$\int \tag{2.8}$$

$$\int f(x)dx \tag{2.9}$$

$$\int_a^b f(x)dx \tag{2.10}$$

$$\int_a^b f(x)dx \tag{2.11}$$

$$\int_{x_1}^{x_2} f(x)dx \tag{2.12}$$

2.2.2 Surface Integrals:

$$\iint_S f(x,y)dx\,dy \tag{2.13}$$

$$\oiint_S f(x,y)dx\,dy \tag{2.14}$$

$$\int_{x_1}^{x_2}\int_{y_1}^{y_2} f(x,y)dx\,dy \tag{2.15}$$

2.2.3 Volume Integral:

$$\iiint_V f(x,y,z)dx\,dy\,dz \tag{2.16}$$

$$\int_{x_1}^{x_2}\int_{y_1}^{y_2}\int_{z_1}^{z_2} f(x,y,z)dx\,dy\,dz \tag{2.17}$$

2.3 Fourier Integral:

$$f(t) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} F(S)e^{jwt}dt \tag{2.18}$$

2.4 Fourier Transform:

$$F(S) = \int_{-\infty}^{+\infty} f(t)e^{-jwt}dt \tag{2.19}$$

2.5 Inverse Laplace Transform:

$$f(t) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} F(S)e^{st}dt \tag{2.20}$$

2.6 Laplace Transform:

$$F(S) = \int_{-\infty}^{+\infty} f(t)e^{-st}dt \tag{2.21}$$

2.7 Maxwell's Equations:

2.7.1 Differential form of Maxwell's Equation:

Differential form of Maxwell's equations are categorized as follows:
Gauss law:

$$\vec{\nabla}.\vec{E} = \frac{\rho}{\epsilon_0}$$
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$$\vec{a}.\vec{b} = 0$$
$$\vec{a} \times \vec{b} = 0$$
$$\overline{a}$$

Electrical Engineering

Gauss law for magnetism:

$$\vec{\nabla}.\vec{B} = 0$$

Faraday's law of induction:

$$\vec{\nabla} \times \vec{E} = -\frac{B}{\delta t}$$

Ampere's Circuital Law:

$$\vec{\nabla} \times \vec{E} = -\mu_o(J + \epsilon_o\frac{dE}{dt})$$

2.7.2 Integral form of Maxwell's Equation

Integral Form of Maxwell's equation are categorized as follows:
Gauss Law:

$$\int \vec{E}.\vec{dl} = 0$$

Gauss Law for Magnetism:

$$\int_S \vec{B}.\vec{ds} = 0$$

2.8 Typesetting Matrices and Determinants:

$$A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

$$B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$C = \begin{Bmatrix} \alpha & \beta & \gamma \\ \varsigma & \epsilon & \kappa \\ \Delta & \lambda & \hbar \end{Bmatrix}$$

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a33 \end{bmatrix} = B = \begin{bmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x33 \end{bmatrix}$$

$$x + y - z = 5 \tag{2.22}$$
$$x - y + z = 5 \tag{2.23}$$
$$x - z = 0 \tag{2.24}$$

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

$$a_1x + b_1y + c_1z = d_1 \tag{2.25}$$
$$a_2x + b_2y + c_2z = d_2 \tag{2.26}$$
$$a_3x + b_3y + c_3z = d_3 \tag{2.27}$$

2.9 Equations involving limits:

$$\lim_{\Delta x \to 0} \frac{f(x + \delta x) - f(x)}{\Delta x}$$

$$\lim_{x \to 0} \frac{\sin x}{x} = 1$$

2.10 Typesetting Boolean Expressions

$$\underline{x + y} = \overline{x}.\overline{y}$$

$$\overline{A}BC + A\overline{BC} + \overline{ABC}$$

2.11 Typesetting equations involving summation

$$\sum_{k=0}^{\infty} \frac{(-1)^k}{k+1} = \int_0^1 \frac{dx}{1+x}$$