1 Cheat Sheet for EE463

1.1 Trigonometric

$$\sin A \cos B = \frac{1}{2}\left[\sin(A-B) + \sin(A+B)\right]$$
$$\sin A \sin B = \frac{1}{2}\left[\sin(A-B) - \cos(A+B)\right]$$
$$\cos A \cos B = \frac{1}{2}\left[\cos(A-B) + \cos(A+B)\right]$$

1.2 Diode

Full Bridge Rectifier Average Output V_s:rms value of source voltage

$$V_{av} = \frac{3\sqrt{6}V_s}{\pi} - \frac{3wL_sI_d}{\pi}$$

u: commutation period

$$\cos(u) = 1 - \frac{2\omega L_s I_d}{\sqrt{2}V_s}$$

1.3 Thyristor

α : firing angle

$$V_{av}(\alpha) = \frac{3\sqrt{6}V_d}{\pi} - \frac{3\sqrt{6}V_d}{\pi} \cdot (1 - \cos(\alpha))$$

At the output I_d

$$\cos(\alpha + u) = \cos(\alpha) - \frac{2\omega L_s I_d}{\sqrt{2}V_s}$$

1.4 Performance Parameters

$$FormFactor = \frac{V_{rms}}{V_{avg}} \tag{1}$$
$$CrestFactor = \frac{V_{peak}}{V_{rms}} \tag{2}$$
$$DistortionFactor = \frac{I_{1rms}}{I_{rms}} \tag{3}$$

ϕ : phase difference between fundamentals of current and voltage

$$DisplacementPowerFactor = \cos(\phi) \tag{4}$$
$$TruePowerFactor = \frac{P}{S} = DPF\frac{I_{1,RMS}}{I_{RMS}} \tag{5}$$
$$THD = \sqrt{(\frac{I_{rms}}{I_{1rms}})^2 - 1} \tag{6}$$