# 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*

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

$$Id\_av = \frac{\int_b^f i(\theta)d\theta}{\pi}$$

$$Id\_(short - circuit) = \frac{Vs}{\omega Ls}$$

## 1.3 Thyristor

*$\alpha$ : firing angle*

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

$$V_d = 0.9V_s\cos(\alpha) - \frac{2\omega L_s I_d}{\pi}$$

*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

$$FormFactor = \frac{V_{rms}}{V_{avg}} \tag{1}$$

$$CrestFactor = \frac{V_{peak}}{V_{rms}} \tag{2}$$

$$DistortionFactor = \frac{I_{1rms}}{I_{rms}} \tag{3}$$

*$\phi$ : phase difference between fundamentals of current and voltage*

$$DisplacementPowerFactor = \cos(\phi) \tag{4}$$

$$TruePowerFactor = \frac{P}{S} = DPF\frac{I_{1,RMS}}{I_{RMS}} \tag{5}$$

$$THD = \sqrt{(\frac{I_{rms}}{I_{1rms}})^2 - 1} \tag{6}$$