EE320 Exam 1 Equation Sheet
Fall 2012

AC Analysis

$Z_L = j\omega L$, $Z_c = \dfrac{-j}{\omega C}$, $V_i = V_{tot}\dfrac{Z_i}{Z_{eq}}$, $I_k = I_{tot}\dfrac{Z_{eq}}{Z_k}$

Inductive load $\Rightarrow 0 \le \theta_z \le 90^o$, Capacitive load $\Rightarrow -90^o \le \theta_z \le 0$

Average value = $\bar{x} = \dfrac{1}{T}\int_0^T x(t)dt$, RMS value = $x_{RMS} = \sqrt{\left[\dfrac{1}{T}\int_0^T x^2(t)dt\right]}$

Single Phase Power

$P = V_{rms}I_{rms}\cos(\theta_Z)$, $Q = V_{rms}I_{rms}\sin(\theta_Z)$, $|S| = V_{rms}I_{rms}$, $S = V_{rms}I_{rms}\angle\theta_Z$

$|S| = \sqrt{P^2 + Q^2}$, $Q = P\tan(\theta_z)$

Power Factor Correction

Power factor (P.F) = $\cos(\theta_z)$, $Q_c = -\omega C V_{rms}^2$

Three phase

Positive (abc) sequence *Van* is the reference, $V_{bn} = V_{an}\angle -120^o$, $V_{cn} = V_{an}\angle 120^o$

Negative (acb) sequence *Van* is the reference, $V_{bn} = V_{an}\angle 120^o$, $V_{cn} = V_{an}\angle -120^o$

Wye Connection

For a positive sequence:

$V_{ab} = \sqrt{3}V_{an}\angle 30^o$, $V_{bc} = V_{ab}\angle -120^o$, $V_{ca} = V_{ab}\angle 120^o$

For a negative sequence

$Vab = \sqrt{3}Van\angle -30^o$ $Vbc = Vab\angle 120^o$ $Vca = Vab\angle -120^o$

Delta Connection

For a positive sequence

$I_a = \sqrt{3}I_{AB}\angle -30^o$ $I_b = I_a\angle -120^o$ $I_c = I_a\angle 120^o$

For a negative Sequence

$I_a = \sqrt{3}I_{AB}\angle 30^o$ $I_b = I_a\angle 120^o$ $I_c = I_a\angle -120^o$