AC Power Examples (56:09)

Determine the relative phase shift between \( V = 60V \angle 30^\circ \) and \( I = 200mA \angle 10^\circ \).

1-1) Given \( V = 24V \angle 0^\circ \) and \( I = 380mA \angle -23.4^\circ \) solve for \( S, P, \) and \( Q \).

1-2) Given \( V = 90V \angle 0^\circ \) and \( Z = 150\Omega \angle -50^\circ \) solve for \( S, P, \) and \( Q \).

1-3) Given \( I = 1.6A \angle -34^\circ \) and \( Z = 75\Omega \angle 34^\circ \) solve for \( S, P, \) and \( Q \).

1-4) Given \( V=208V, S=249.6VA, \) and \( PF=0.87 \) lagging solve for \( I, P, I, Q, \) and \( Z \).

1-5) Given \( V = 9.8V \angle 0^\circ \) and \( I = 40mA \angle 90^\circ \) solve for \( S, P, \) and \( Q \).

Describe how apparent, real, and reactive power for purely resistive, purely capacitive, and purely inductive elements are illustrated in the power domain.

2-1) Given \( V = 86V \angle 17^\circ \) and \( I = 80mA \angle 35^\circ \) solve for \( S, P, \) and \( Q \).

2-2) Given \( V = 120V \angle 22^\circ \) and \( I = 800mA \angle 22^\circ \) solve for \( S, P, \) and \( Q \).

2-3) Given \( V = 105V \angle -14^\circ \) and \( Z = 280\Omega \angle 40^\circ \) solve for \( S, P, \) and \( Q \).

Given an unloaded motor that draws 507mA of current at a PF of 0.17 calculate \( S, P, \) and \( Q \).

Given a loaded motor that draws 994mA of current at a PF of 0.84 calculate \( S, P, \) and \( Q \).

Compare and contrast the unloaded and load motor's power consumption.

Describe the significance of low and high power factor values.

Given a transformer powered by 120V with \( V_{SECONDARY} = 24V \angle 0^\circ \) and \( I_{SECONDARY} = 4.8A \angle 0^\circ \) solve for \( S, P, \) and \( Q \) for both the primary and secondary assuming ideal conditions, additionally solve for current in the primary.

Given a transformer with: \( V_{PRIMARY} = 120V \angle 0^\circ \)
\[ I_{PRIMARY} = 1A \angle -7^\circ \]
\[ V_{SECONDARY} = 24V \angle 0^\circ \]
\[ I_{SECONDARY} = 4.8A \angle 0^\circ \]
solve for \( S, P, \) and \( Q \) for both the primary and secondary. Determine the efficiency of this non-ideal transformer.

Determine the efficiency of a motor producing 86W of useable power that consumes 119.3VA at a power factor of .84 lagging.

Determine the useable power output of a 95% efficient device consuming 1kVA with a power factor of .9 lagging.

Determine the input power for a 92% efficient motor producing 400W with a power factor of .87 lagging.