1. Given a three phase wye source connected to a wye load: the phase voltage between phase **a** and neutral **n** is **380VAC** at an angle of **50o**. Assuming positive phase sequence and a balanced load of (12+j8), find the phase voltages, **Vbn**, **Vcn**; the line-to-line voltages **Vab**, **Vbc** and **Vca** and the line currents, **IaA**, **IbB**, and **IcC**.

Also, find Pϕ (Real Power for a single phase), PT (Real Power for all 3 phases), Qϕ (Reactive Power for a single phase), QT (Reactive Power for all 3 phases), Sϕ (Apparent Power for a single phase), ST (Apparent Power for all 3 phases) and the Power Factor. (See last 2 pages for Power formulas and explanations.)

Z

Z

Z

- +

- +

- +

IaA

IbB

IcC

a

b

c

n

A

B

C

N

INn

Van

1. Given a three phase wye source connected to a delta load: the phase voltage between phase **a** and **n** is **277VAC** at an angle of **0o**. Assuming positive phase sequence and a balanced load of (10-j6), find the phase voltages, **Vbn**, **Vcn**; the line-to-line voltages **Vab**, **Vbc** and **Vca** ; the phase currents, I**AB**, I**BC**, and I**CA**; the line currents, I**aA**, I**bB**, and I**cC**; and the total complex power absorbed by the load.

Also, find Pϕ (Real Power for a single phase), PT (Real Power for all 3 phases), Qϕ (Reactive Power for a single phase), QT (Reactive Power for all 3 phases), Sϕ (Apparent Power for a single phase), ST (Apparent Power for all 3 phases) and the Power Factor. (See last 2 pages for Power formulas and explanations.)

Z

Z

Z

- +

- +

- +

IAB

IbB

IcC

a

b

c

A

B

C

Van

IaA

Power Formulas:

Pϕ *indicates real power in one phase of a 3-phase system.*

PT *indicates real power in the total system(all 3 phases).*

Qϕ *indicates reactive power in one phase of a 3-phase system.*

QT *indicates reactive power in the total system(all 3 phases).*

Sϕ *indicates apparent power in one phase of a 3-phase system.*

ST *indicates apparent power in the total system(all 3 phases).*

Vϕ *and* Iϕ *refer to phase voltages and phase currents*. Remember: Phase voltages are the voltages across the load. Phase currents are the currents through the load.

VL *and* IL *refer to line voltages and line currents*. Remember: Line voltages are the voltages between the incoming lines of the source. Line currents are the currents coming from the source.

θϕ *is the angle of the load impedance*, Zϕ.

Anywhere cos() or sin() is used; be sure the Calculator is in degree mode because the angles we are using are in degrees.

In the following formulas for powers, only magnitudes of the indicated voltages and currents are used.

Real Power (single phase)



Real Power (Total: All 3 phases)



or



Reactive Power (single phase)

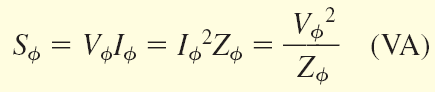


Reactive Power (Total: all 3 phases)

or



Apparent Power (single phase)



Apparent Power (Total: all 3 phases)

or



Power Factor

