Started on	Wednesday, 13 February 2019, 9:27 AM
State	Finished
Completed on	Wednesday, 13 February 2019, 9:28 AM
Time taken	58 secs
Grade	**100.00** out of 100.00

Question 1

Correct

Mark 10.00 out of 10.00

P11.1_10ed

What is the phase sequence of each of the following sets of voltages?

a) v_a = 137 cos(ωt + 63°) V v_b = 137 cos(ωt - 57°) V v_c = 137 cos(ωt + 183°) V

abc – Positive Phase Sequence: ▼ ✓

b) v_a = 820 cos(ωt -36°) V v_b = 820 cos(ωt + 84°) V v_c = 820 sin(ωt - 66°) V

acb – Negative Phase Sequence: ▼ ✓

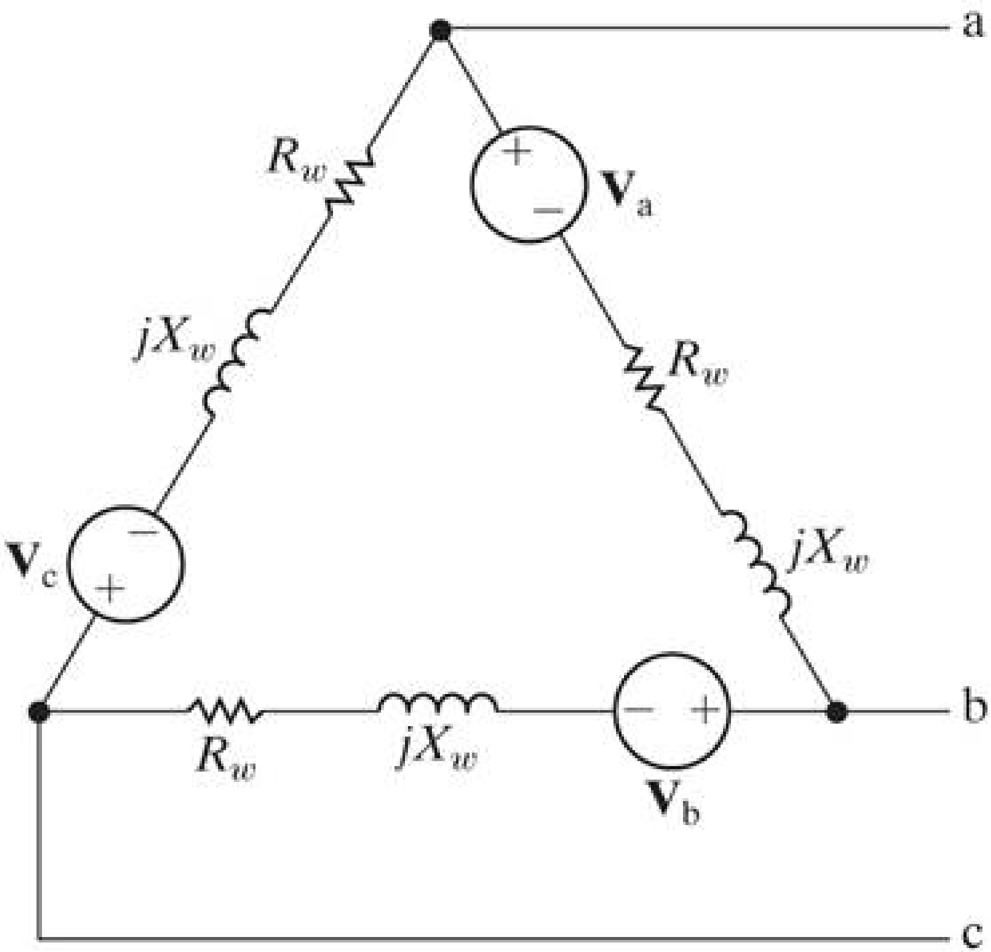
Correct

Marks for this submission: 10.00/10.00.

Question 2

Correct

Mark 10.00 out of 10.00



P11.4_10ed

Assume that nodes a,b,c are “open circuited” with no external connections.

Given: v_a = 188 cos(ωt + 60°) V v_b = -188 cos(ωt) V v_c = 188 cos(ωt - 60°) V

Determine the current circulating in this Δ-connected generator.

I_Δ = 0 A

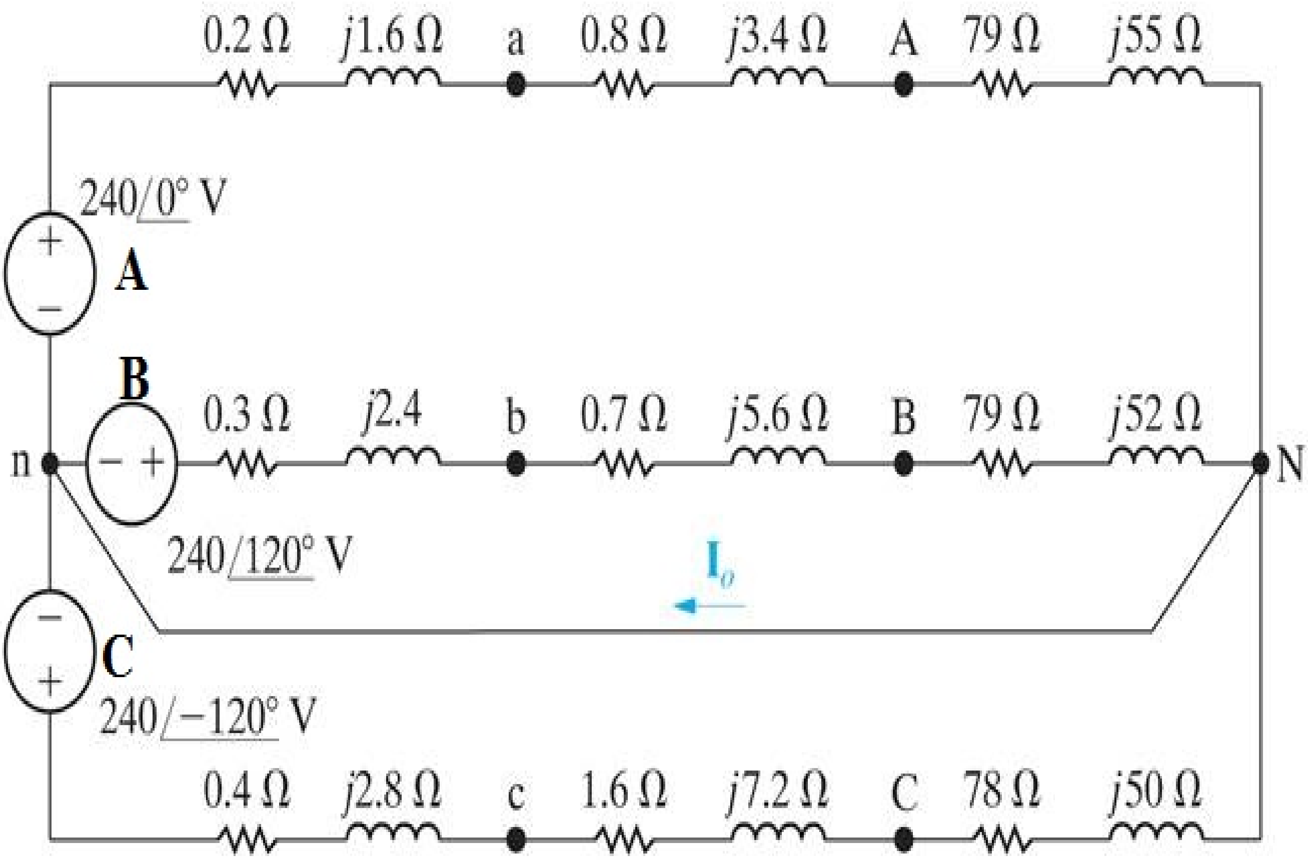
Correct

Marks for this submission: 10.00/10.00.

Question 3

Correct

Mark 10.00 out of 10.00



P11.6_8ed

a) Find the current $\mathbf{I_0}$ as shown in the circuit.

$\mathbf{I_0}$ = 0 A

b) Find the voltage $\mathbf{V_{AN}}$.

$\mathbf{V_{AN}}$ = 231 + j -8.16 V

c) Find the voltage $\mathbf{V_{AB}}$.

$\mathbf{V_{AB}}$ = 331 + j -211 V

d) Is this circuit a balanced or unbalanced three-phase system?

Balanced/Unbalanced? Unbalanced ▼

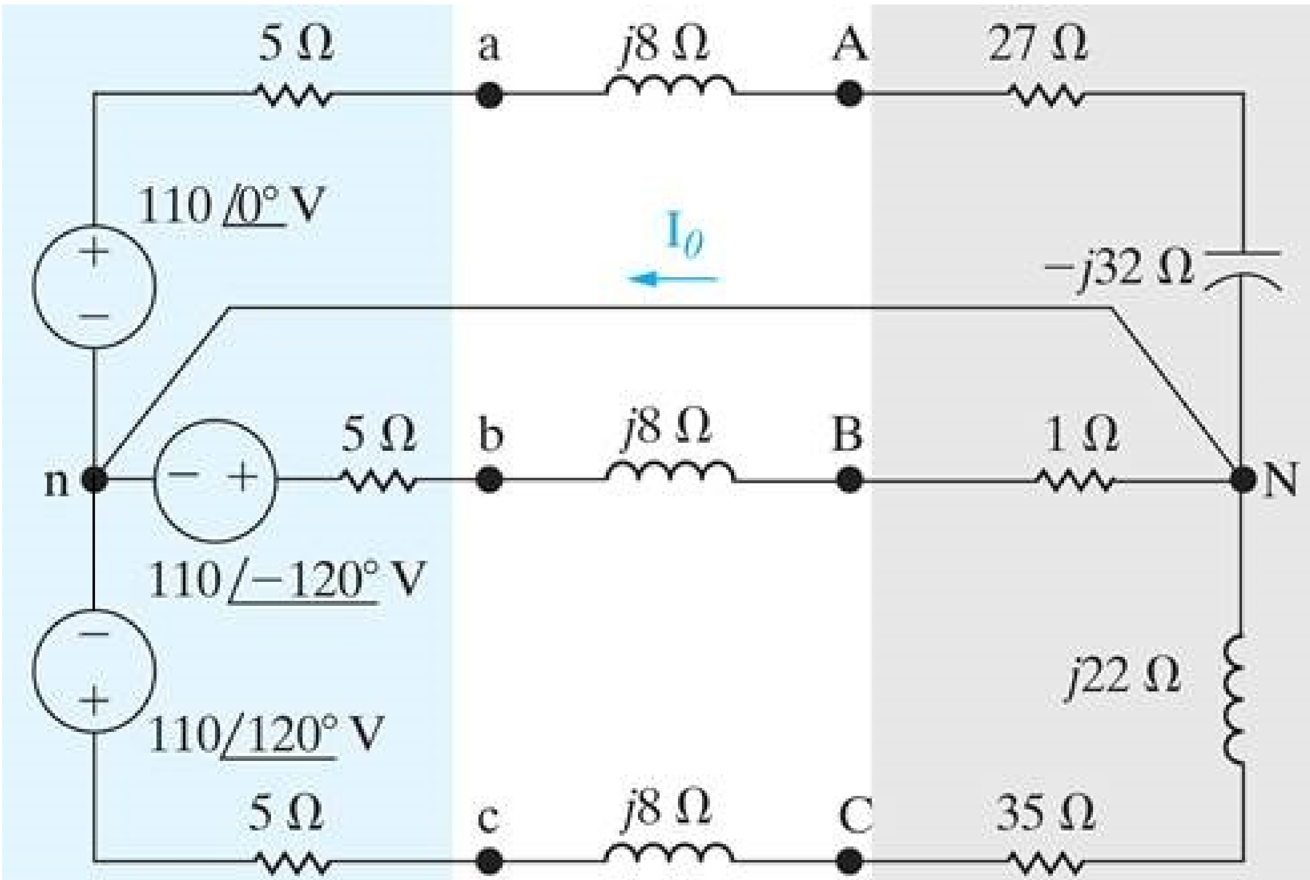
Correct

Marks for this submission: 10.00/10.00.

Question 4

Correct

Mark 10.00 out of 10.00



P11.6_10ed

Given that all voltages are rms values.

a) Find the current $\mathbf{I}_{aA}$.

$\mathbf{I}_{aA}$ = 2.2 + j 1.65 A_{rms}

b) Find the current $\mathbf{I}_{bB}$.

$\mathbf{I}_{bB}$ = -10.92 + j -1.32 A_{rms}

c) Find the current $\mathbf{I}_{cC}$.

$\mathbf{I}_{cC}$ = .26 + j 2.18 A_{rms}

d) Find the current $\mathbf{I}_0$ as shown in the circuit.

$\mathbf{I_0}$ = -8.46 + j 2.51 A_{rms}

e) Is this circuit a balanced or unbalanced three-phase system?

Balanced/Unbalanced? Unbalanced ▼

Correct

Marks for this submission: 10.00/10.00.

Question 5

Correct

Mark 10.00 out of 10.00

P11.19_8ed

A three-phase Δ-connected generator has an internal source impedance of $Z_{\Delta,gen} = 0.6 + j\,4.8\ \Omega/\Phi$. When the load is removed from the generator, the magnitude of the terminal voltage at the output is 34,500 V (where the load will connect). The generator feeds a Δ-connected load through a transmission line with an impedance of $Z_T = 0.8 + j\,6.4\ \Omega/\Phi$. The per-phase impedance of the load is $Z_{\Delta,load} = 2{,}877 - j\,864\ \Omega/\Phi$.

a) Calculate the magnitude of the current in the line feeding the load.

$|\mathbf{I}_{aA}| = |\mathbf{I}_{bB}| = |\mathbf{I}_{cC}| =$ 19.9 A

b) Calculate the magnitude of the line voltage at the terminals of the load.

$|\mathbf{V}_{AB}| = |\mathbf{V}_{BC}| = |\mathbf{V}_{CA}| =$ 34545 V

c) Calculate the magnitude of the line voltage at the terminals of the source.

$|\mathbf{V}_{ab}| = |\mathbf{V}_{bc}| = |\mathbf{V}_{ca}| =$ 34508 V

d) Calculate the magnitude of the phase current in each leg of the load.

$|\mathbf{I}_{AB}| = |\mathbf{I}_{BC}| = |\mathbf{I}_{CA}| =$ 11.5 A

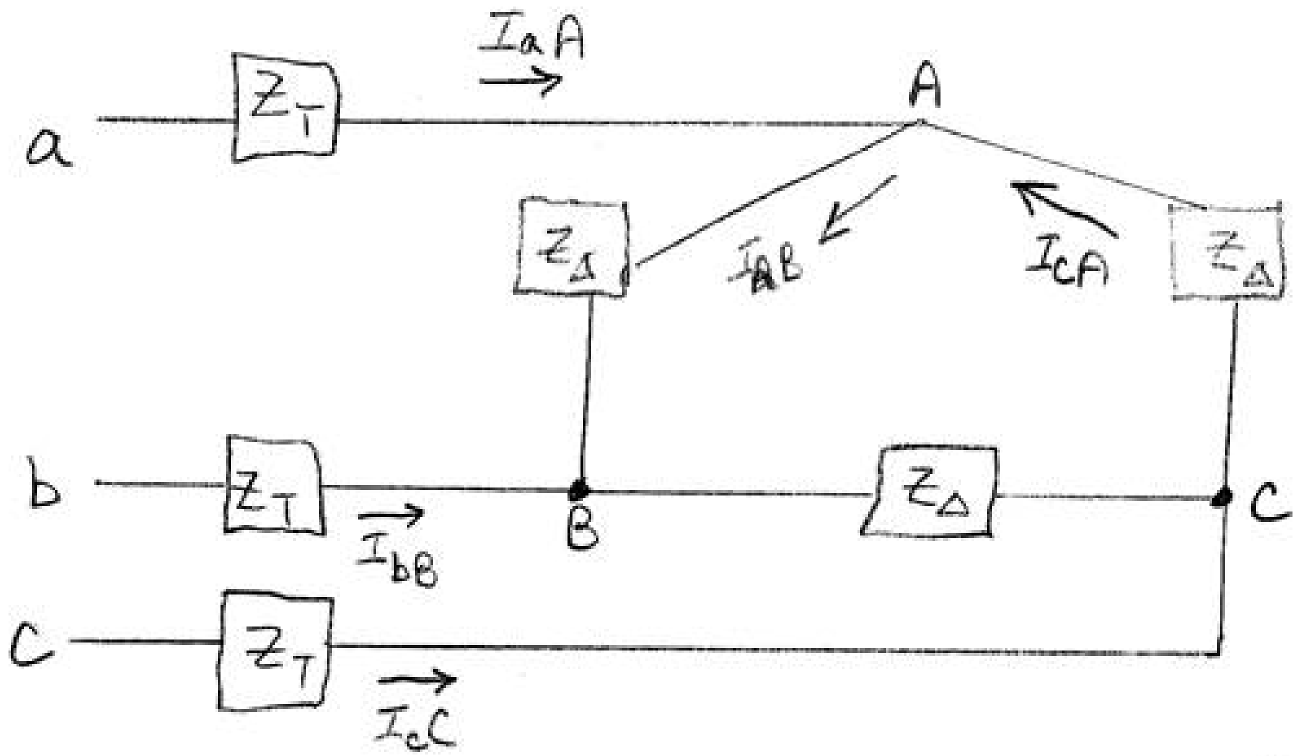
Correct

Marks for this submission: 10.00/10.00.

Question 6

Correct

Mark 10.00 out of 10.00



P11.11_7ed

A balanced Δ-connected load has an impedance of $Z_\Delta = 60 + j\,45\ \Omega/\Phi$.

The load is fed through a line have an impedance $Z_T = 0.8 + j\,0.6\ \Omega/\Phi$.

The phase voltage at the terminals of the load is $|\mathbf{V_{AB}}| = 480\ V_{rms}$.

The phase sequence is positive.

Use $\mathbf{V_{AB}}$ as the zero angle reference.

a) Calculate the three phase currents in the load.

$\mathbf{I_{AB}}$ = 5.2 + j -3.84 A_{rms}

$\mathbf{I_{BC}}$ = -5.88 + j -2.51 A_{rms}

$\mathbf{I_{CA}}$ = .76555 + j 6.35 A_{rms}

b) Calculate the three line currents.

$\mathbf{I_{aA}}$ = 4.35 + j -10.19 A_{rms}

$\mathbf{I_{bB}}$ = -11 + j 1.32 A_{rms}

$\mathbf{I_{cC}}$ = 6.65 + j 8.86 A_{rms}

c) Calculate the three line voltages at the sending end of the line.

$\mathbf{V_{ab}}$ = 499 + j 0 V_{rms}

$\mathbf{V_{bc}}$ = -249 + j -432 V_{rms}

$\mathbf{V_{ca}}$ = -249 + j 432 V_{rms}

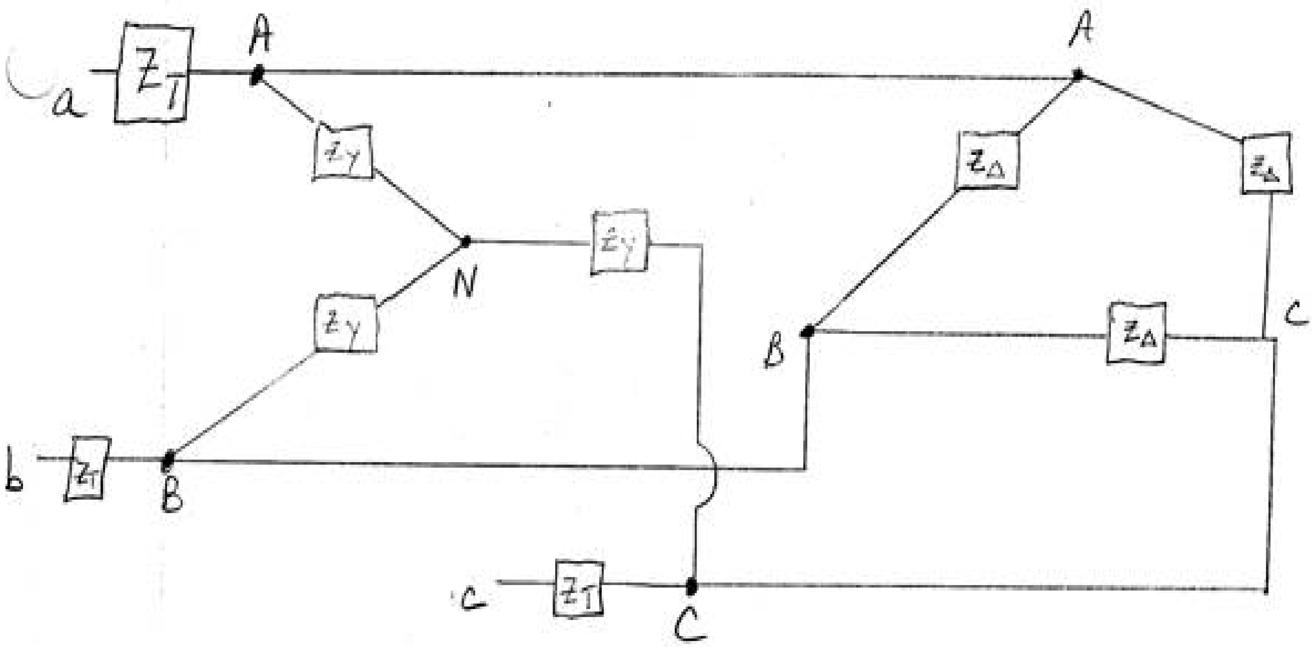
Correct

Marks for this submission: 10.00/10.00.

Question 7

Correct

Mark 10.00 out of 10.00



P11.12_7ed

A balanced Y-connected load having an impedance of $Z_Y = 72 + j\,21\ \Omega/\Phi$ is connected in parallel with a balanced Δ-connected load having an impedance of $Z_\Delta = 150 + j\,0\ \Omega/\Phi$. The parallel loads are fed from a line having an impedance of $Z_T = 0 + j\,1\ \Omega/\Phi$. The magnitude of the line-to-neutral voltage of the Y-connected load is 7,650 V_{rms}.

a) Calculate the magnitude of the current in the line feeding the loads.

$|\mathbf{I}_{aA}| = |\mathbf{I}_{bB}| = |\mathbf{I}_{cC}| =$ 255 A_{rms}

b) Calculate the magnitude of the phase current in the Δ-connected load.

$|\mathbf{I}_{AB}| = |\mathbf{I}_{BC}| = |\mathbf{I}_{CA}| =$ 88 A_{rms}

c) Calculate the magnitude of the phase current in the Y-connected load.

$|\mathbf{I}_{AN}| = |\mathbf{I}_{BN}| = |\mathbf{I}_{CN}| =$ 102 A_{rms}

d) Calculate the magnitude of the line-to-line voltages at the sending end of the line.

$|\mathbf{V_{AB}}| = |\mathbf{V_{BC}}| = |\mathbf{V_{CA}}| =$ 13301 $\mathrm{V_{rms}}$

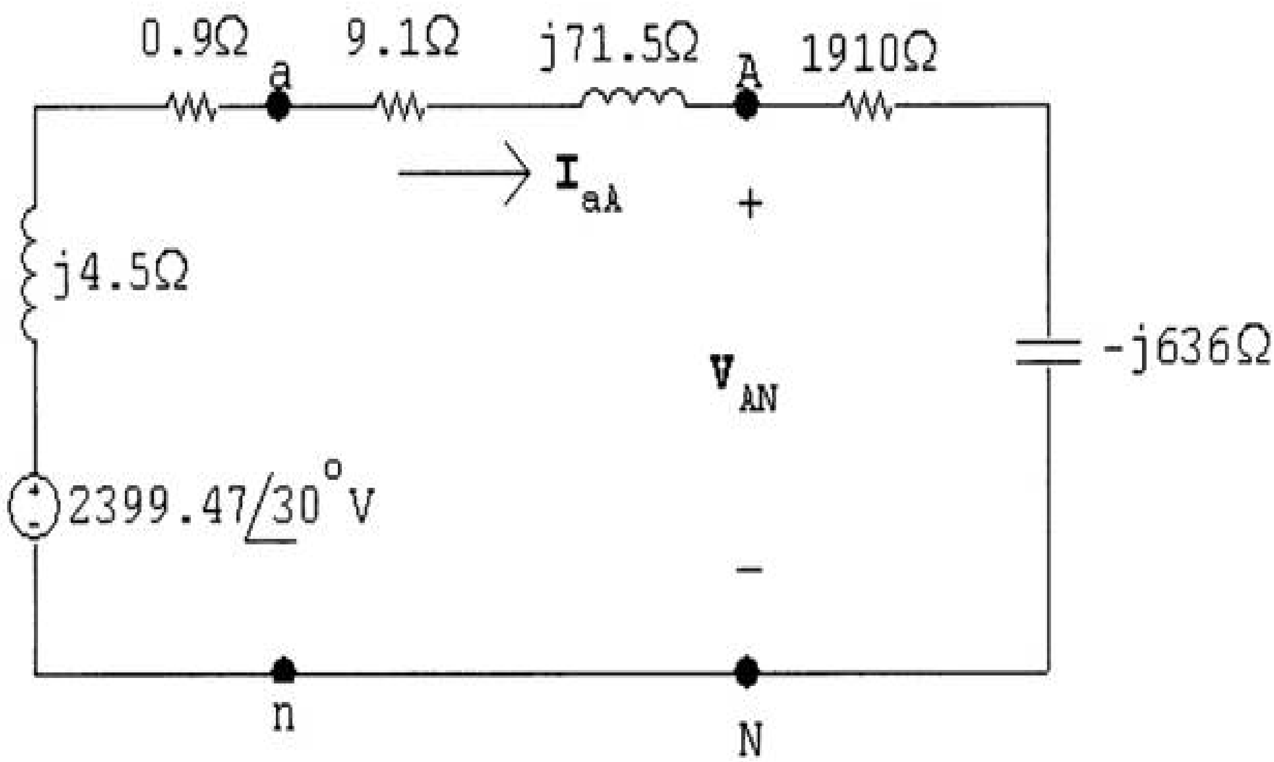
Correct

Marks for this submission: 10.00/10.00.

Question 8

Correct

Mark 10.00 out of 10.00



P11.14_7ed

A Δ-connected source is connected to a Y-connected load by means of a balanced three-phase distribution line with an impedance of $Z_T = 9.1 + j\ 71.5\ \Omega/\Phi$. The source phase sequence is negative. The voltage $\mathbf{V}_{\mathbf{ab}} = 4{,}156$ at angle 0° V_{rms}. The D-connected source impedance of $Z_D = 2.7 + j\ 13.5\ \Omega/\Phi$. The load impedance is $Z_Y = 1{,}910 - j\ 636\ \Omega/\Phi$. This figure shows the single-phase equivalent circuit.

a) Determine the magnitude of the line voltage at the terminals of the load.

$|\mathbf{V}_{\mathbf{AN}}| = |\mathbf{V}_{\mathbf{BN}}| = |\mathbf{V}_{\mathbf{CN}}| =$ 2416 ✓ V_{rms}

b) Determine the magnitude of the phase currents in the Δ-connected source.

$|\mathbf{I}_{\mathbf{AB}}| = |\mathbf{I}_{\mathbf{BC}}| = |\mathbf{I}_{\mathbf{CA}}| =$ .69 ✓ A_{rms}

c) Determine the magnitude of the line voltage at the terminals of the source.

$|\mathbf{V}_{ab}| = |\mathbf{V}_{bc}| = |\mathbf{V}_{ca}| =$ 4156 V_{rms}

Correct

Marks for this submission: 10.00/10.00.

Question 9

Correct

Mark 10.00 out of 10.00

P11.23_8ed

The total apparent power supplied in a balanced three-phase Y-Δ system is 3,600 VA. The load line-to-line voltage is 208 V_{rms}. If the line impedance is negligible and the power factor angle of the load is 25°, determine the impedance of the load.

$Z_{load,\Delta} =$ 32.67 $+ j$ 15.2 Ω (Ohms)

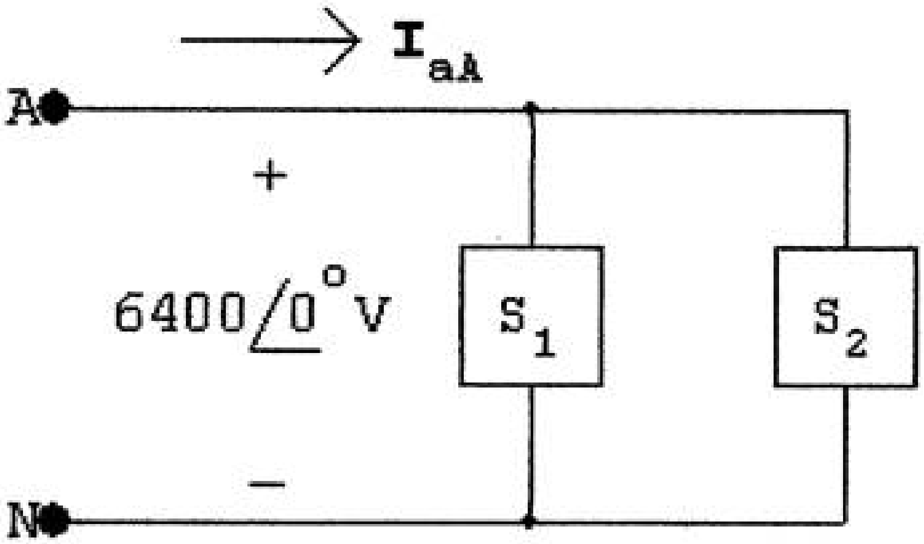
Correct

Marks for this submission: 10.00/10.00.

Question 10

Correct

Mark 10.00 out of 10.00



P11.35_8ed

A balanced three-phase source is supplying 1,800 kVA at 0.96 pf leading to two balanced Y-connected parallel loads. The distribution line connecting the source to the load has negligible impedance. The power associated with load 1 is $Z_{load,1} = 192 + j\ 1{,}464$ kVA.

a) Determine the impedance per phase of load 2 if the line voltage V_{line} = 11,085 Vrms and the impedance components are in series.

$Z_{load2,phase,series}$ = 30.6 + j -38.8 Ω (Ohms)

b) Repeat a) with the load 2 impedance components are in parallel.

$Z_{load2,phase,parallel}$ = 80 + j -62 Ω (Ohms)

Correct

Marks for this submission: 10.00/10.00.