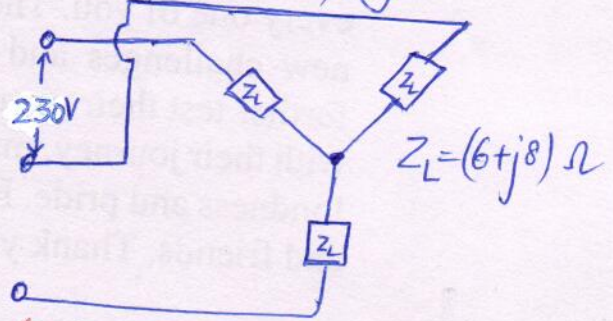


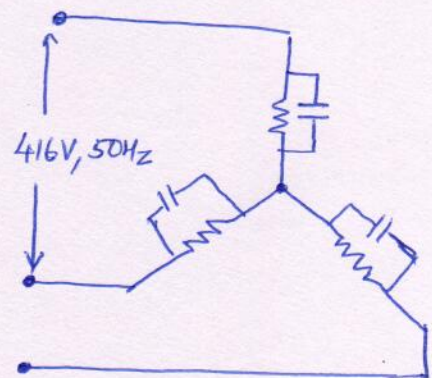
Tutorial #03

- Q1. A balanced 3ϕ Y-connected load of $(6+j8)\Omega$ is connected to a balanced 3ϕ 230V power supply as shown. Find the line current and power absorbed by each phase of the load.



[Ans: $I_\phi = I_L = 13.3\text{A}$ (in magnitude) and at phase angles -53° , -173° & -293° respectively. Real power/phase = 1067W]

- Q2. Each phase of a star-connected load consists of a non-reactive resistance of 100Ω in parallel with a capacitance of $31.8\mu\text{F}$ as shown. Determine the line current, power factor, real and reactive power when connected to a 416V, 3ϕ , 50-Hz power supply.



[Ans: $I_L = 3.39\text{A}$; $\text{Pf} = 0.707$ (leading); $P = 1.728\text{kW}$; $Q = 2.433\text{kVAR}$]

- Q3. A 3ϕ 400V, 50Hz a.c supply is feeding a 3ϕ delta-connected load with each phase having a resistance of 25Ω , and inductance of 0.15H , and a capacitance of $120\mu\text{F}$ in series. Determine line current, power factor, real and reactive powers.

[Ans: $I_L = 21.4\text{A}$; $\text{Pf} = 0.772$ lagging; $P = 11.446\text{kW}$; $Q = 9.43\text{kVAR}$]

Q4. A star-connected ac power supply feeds a delta connected load. The impedance of the load branch is $(8+j6)\Omega$ per phase. The line voltage is 230V. Determine (i) phase currentⁱⁿ each branch of the load, (ii) power factor, (iii) Real and reactive power.

[Ans: $I_{ph} = 23A$; p.f = 0.8 (lagging); $P = 12.684 kW$, $Q = 9.513 kVAR$]

Q5. A 3 ϕ ac power supply with a line voltage of 173V supplies two balanced 3 ϕ loads; one Y-connected with each branch impedance equal to $(6+j8)\Omega$ and other Δ -connected with each branch impedance equal to $(18+j24)\Omega$. Calculate.

(i) the magnitude of branch currents taken by each 3- ϕ load. [10A]

(ii) the magnitude of the total line current [20A]

(iii) the power factor of the entire load circuit [0.6 (lagging)]

Q6. The identical impedances $30\angle 30^\circ \Omega$ are connected in delta to a 3ϕ , 208V ac power supply by conductors which have impedances of $(0.8 + j0.63)\Omega$. Find the magnitude of the line voltage at the load end. $[109.3\angle 2.03^\circ V]$

Q7. A balanced delta-connected load having an impedance $Z_L = (300 + j210)\Omega$ in each phase is supplied from 400-V, 3-phase supply through a 3ϕ line having an impedance of $Z_{Line} = (4 + j8)\Omega$ in each phase. Find the total power supplied to the load as well as the current and voltage in each phase of the load.

$$[V_{\phi, Load} = 216.9V; I_{\phi, Load} = 1.78A; P = 951W]$$