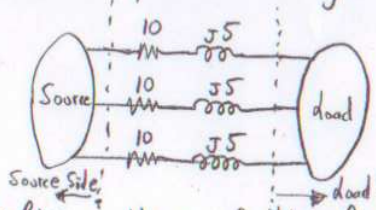
— 3-Phase Problems —

(2) A 3ϕ load is powered through the following line:



The line-to-line voltage of the load is 420 V (RMS).

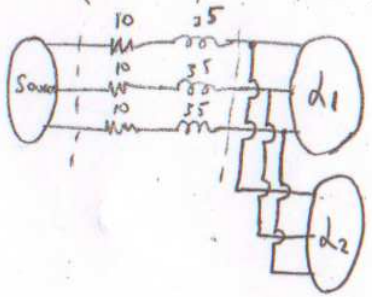
(a) Assume load is Y connected with per phase impedance of $Z_\phi = 60 + j30$.

i) Find the magnitude of the line to line source voltage to operate the load.

ii) Find the magnitude of phase current of the source if the source is a) Y connected b) Δ connected.

(b) Determine a Δ connected load that can be placed instead of the Y connected one described in part (a), which does not change line-voltage level at the source side.

(c) Determine the source side line voltage to operate both loads together. (loads require 420 V, RMS line-line voltage)



d_1: load of part (a)
d_2: load of part (b)

(d) Determine the three phase complex power of loads 1 and 2 the total complex power of the line and the source. What is the p.f. on the source side?

3rd problem is on the next page.

③ A balanced 3ϕ load draws a total power of 6 kW at the p.f. of 0.8 lagging. A balanced Δ-connected capacitor bank is to be placed in parallel to the load to increase the p.f. to 0.9 lagging. The operating frequency is 50 Hz, line to line voltage is 350 V (RMS).

a) Assume load is Y connected. Draw the single phase equivalent of the load and capacitor bank combination.

Determine the capacitance per phase of the capacitor bank.

b) Do not make any assumptions on the connection type of the load in this part.

Find the capacitance per phase by calculating the VAR that has to be supplied by the capacitor bank.