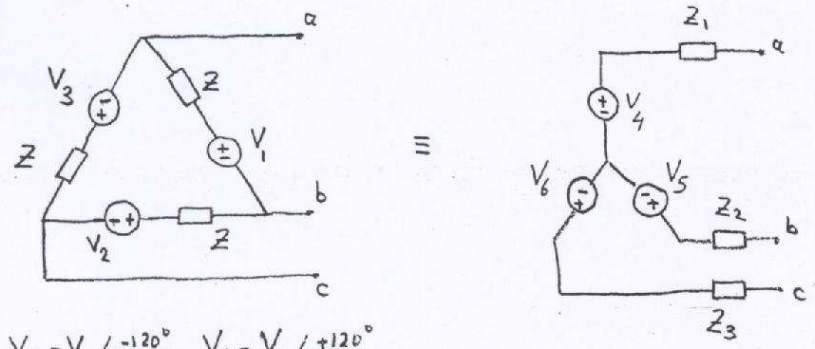
METU / EEED

Spring 2009

EE 202 / 2PS IV

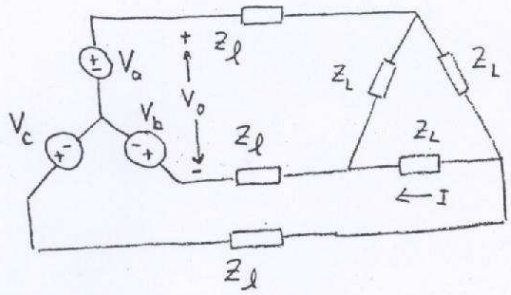
1)



$V_2 = V_1 \angle -120^\circ$, $V_3 = V_1 \angle +120^\circ$

Express V_4, V_5, V_6 in terms of V_1 and Z_1, Z_2, Z_3 in terms of Z.

2)



$V_b = V_a \angle -120^\circ$, $V_c = V_a \angle +120^\circ$

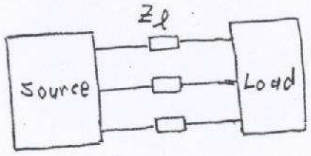
$Z_l = 1 + j5\ \Omega$

$Z_L = 15 + j9\ \Omega$

$I = 10 \angle 15^\circ$ A rms

Find V_o.

3)



A balanced 3-phase circuit.

$Z_l = 0.5 + j\frac{2}{3}\ \Omega$

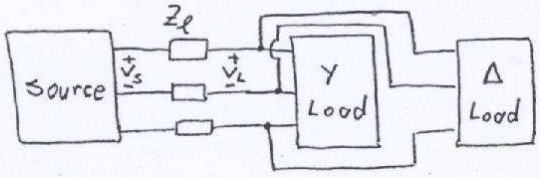
$P_s = 12$ KW

Load: 12 KVA, $pf_L = 0.8$ lagging

Find the line voltages at the load and source ends and the complex power supplied by the source.

4) In a balanced 3-phase circuit the line impedance is $1.5 + j2.5\ \Omega$, the total real power lost on the lines is 1.8 KW, the total real power delivered to the inductive load is 10.2 KW, the line voltage at the source end is $250\sqrt{3}$ Vrms. Find the load power factor and the line voltage at the load end.

5)



A balanced 3-phase circuit.

$Z_\ell = \frac{1+j}{30}\ \Omega$

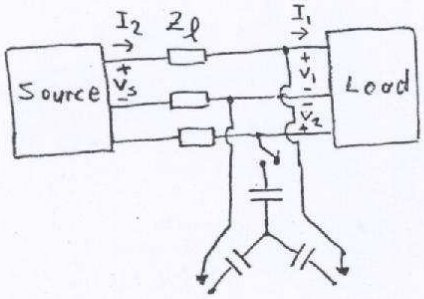
Y load: 15 KVA, pf = 0.8 logging

Δ load: $Z_\Delta = 1.6 + j1.2\ \Omega$

$V_{Leff} = 100$ V rms

Find V_{seff} and the complex power supplied by the source.

6)



A balanced 3-phase circuit.

Load: 400 KW, pf = $\frac{1}{\sqrt{2}}$ lagging

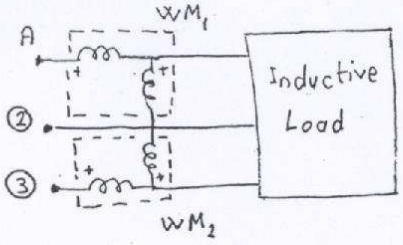
$V_1 = 400\angle 30^\circ$ Vrms, $V_2 = 400\angle -30^\circ$ Vrms

$Z_\ell = 0.07 + j0.16\ \Omega$

(a) The switches are open: Find I_1, V_{seff}, the complex power supplied by the source and the efficiency.

(b) The switches are closed: The power factor of the load-capacitor bank combination is 0.8 lagging. Find the susceptance of a capacitor, I_1, I_2, V_{seff}, the complex power supplied by the source and the efficiency.

7)



A balanced 3-phase circuit.

The readings of the wattmeters:

WM_1: 600W, WM_2: 400 W

The load power factor: pf > $\frac{1}{2}$

Find the real and reactive powers delivered to the load.

Assuming that the phase sequence is A-B-C, should we label the terminal ② as B or C?