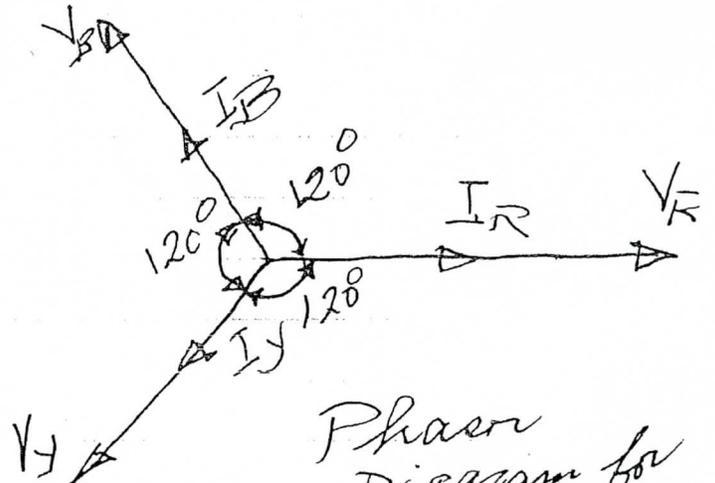
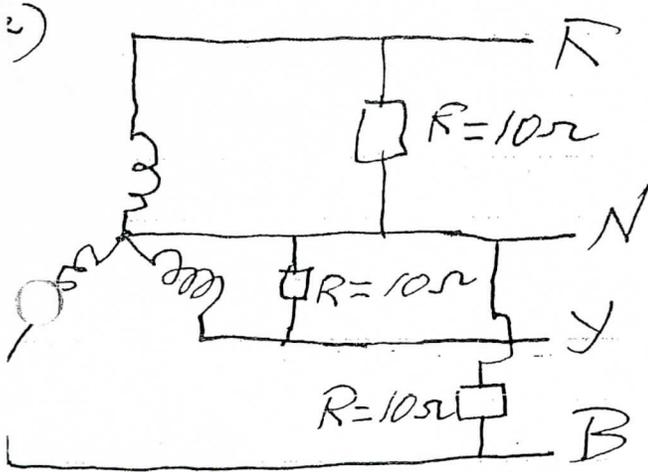


a 3Φ, 4 wire, 60Hz, $V_L = 208$ supply feeds a balanced load with $10\ \Omega$ resistor/Phase



Phasor Diagram for V & I

a) For WYE connection: $V_{ph} = \frac{V_L}{\sqrt{3}}$

$\therefore V_{phase} = \frac{208}{\sqrt{3}} = 120V$

I_{ph} & P_{phase} :

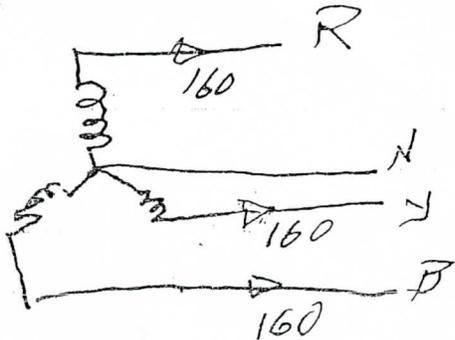
b) $I_{phase} = \frac{V_{ph}}{R_{ph}} = \frac{120}{10} = 12$ amps in each phase.

$P_{ph} = VI \cos \phi = 120 \times 12 \times 1 = 1440W$ as $\cos \phi = 1$ for resistive load

c) I_N : $I_N = \vec{I}_R + \vec{I}_Y + \vec{I}_B$

since it is a balanced load $I_R = I_Y = I_B \therefore I_N = 0$

2)



$V_L = 1100V, 50Hz, I = 160$ amp
Load = 250KW leading P.F.

Find the Circuits Constants/PR

$V_{ph} = \frac{1100}{\sqrt{3}} = 635V, P_{power/phase} = \frac{250KW}{3} = 83.3$ Kw

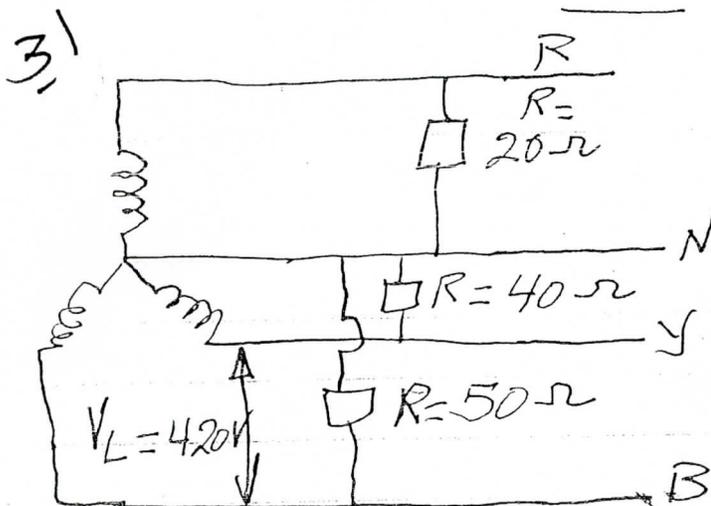
$\cos \phi = \frac{P_{PR}}{VI} = \frac{83333}{1100 \times 160} = 0.82$ leading

$$\frac{V}{I} = \frac{635}{160} = 3.968 \Omega, R = Z \cos \phi = \underline{\underline{3.25 \Omega}}$$

$$X = Z \sin \phi = 3.968 \sqrt{1 - (0.82)^2} = 2.27 \Omega$$

Pure Capacitive: $X_c = \frac{1}{\omega C}$

$$\therefore C = \frac{1}{2.27 \times 2\pi \times 50} = 1.402 \mu\text{F}$$



$$V_L = 420\text{V}$$

all loads
are resistive

$$a) V_{Rk} = \frac{V_L}{\sqrt{3}} = \frac{420}{\sqrt{3}} = 242.48$$

$$I_R = \frac{V_{Rk}}{R} = \frac{242.5}{20} = 12.12 \text{ amp}$$

$$I_Y = \frac{242.5}{40} = 6.06 \text{ amp}$$

$$I_B = \frac{242.5}{50} = 4.85 \text{ amp}$$

$$\therefore V_{pk} I_{pk} \cos \phi = 242.5 \times 12.12 \times 1 = 2938.94 \text{ KW}$$

$$= 1469.47 \text{ W}, P_B = 1176.06 \text{ W}$$

$$\vec{I}_N = \vec{I}_R + \vec{I}_Y + \vec{I}_B = 12.12 + 6.06(-0.5 - j0.866) + 4.85(-0.5 + j0.866)$$

$$= 6.665 - j1.048 = 6.746 \text{ amp}$$

$$P_{\text{Total}} = P_R + P_Y + P_B = 2938.94 + 1469.47 + 1176.06 = \underline{\underline{5584.47}}$$

1) 240 luminaires (4 x 60W), P.F. = 0.45 lagging, $V = 220$
 Supply: 3 Φ , 380V, 4 wire, 50Hz PR

$$I_{\text{luminaire before Compens.}} = \frac{4 \times 60}{220 \times 0.45} = 2.42 \text{ amp.}$$

$I_{\text{pk}} = I_L$ (A): as the luminaires are equally distributed between each of the phases & Neutral. $I_L = 80 \times 2.42 = 193.9 \text{ amp}$
 The Current/phase = I_L after Compensation. = $\frac{80 \times 4 \times 60}{220 \times 0.9}$
 = 0.97 amp

$$\begin{aligned} \text{Cap.} &= I_{\text{react. before Comp.}} - I_{\text{active after}} \\ &= 0.606 \times 0.893 - \frac{80 \text{ W}}{220 \times 0.9} \sqrt{1 - 0.9^2} = 0.409 \text{ amp.} \end{aligned}$$

$$C = \frac{I}{V \omega} = 5.9 \mu\text{F}$$

$$P_{\text{total}} = 240 \times (60 \times 4) = 57.6 \text{ kW}$$

$$I_N = 0 \quad \text{balanced loading}$$