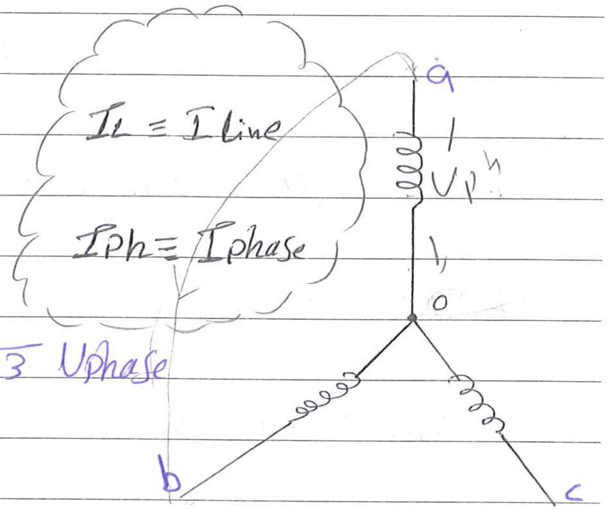
[1] => Y connection lows:-



- → * $V_{ab} = V_{ao} + V_{ob}$
- → * $V_{ab} = 2 V_{phase}$
- → * $V_L = 2 V_{phase} \cos 30 = \sqrt{3}\, V_{phase}$
- → * $I_L = I_{phase}$
- → * $P.f = \cos\theta = \frac{R}{2} = \frac{P}{5} = 1$
- → * $P_{ph} = V_{ph} \cdot I_{ph} = 3 \frac{V_L}{\sqrt{3}} * I_L = \sqrt{3}\, V_L I_L$
- → * $P_T = 3 V_{ph} \cdot I_{ph}$

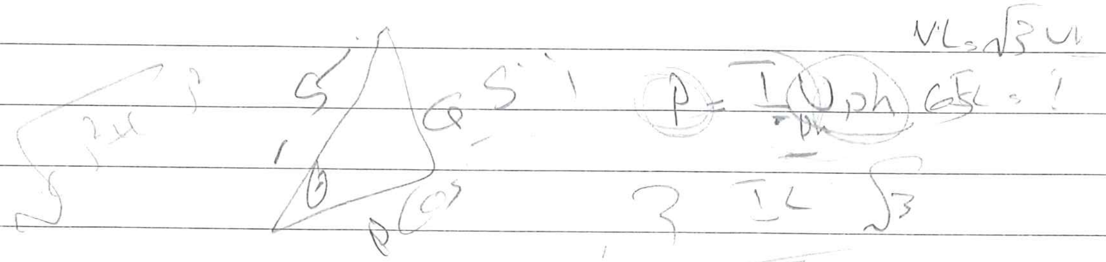
---

* when power factor < 1

P => "true power" $= \sqrt{3}\, V_L I_L \cos\phi$

Q => "Re active power" $= \sqrt{3}\, V_L I_L \sin\phi$

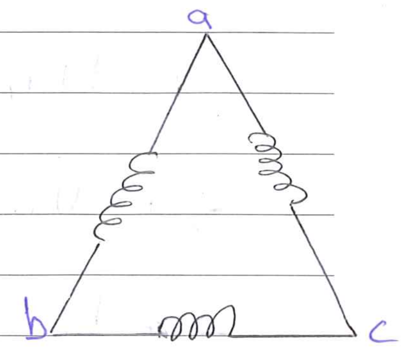
S => "Apperent power" $= P + jQ = \sqrt{3}\, V_L I_L$



Date: No.

2 Delta Connection Laws :-

1) when power factor = 1



* $I_a = I_L = I_{ab} + I_{ac}$

* $I_L = 2\, I_{ph} \cos 30 = \sqrt{3}\, I_{ph}$

* $V_{ab} = V_L = V_{ph}$

* $P_{ph} = V_{ph} \cdot I_{ph}$

* $P_T = 3 V_L \cdot \frac{I_L}{\sqrt{3}} = \sqrt{3}\, V_L I_L$

2) when pf < 1

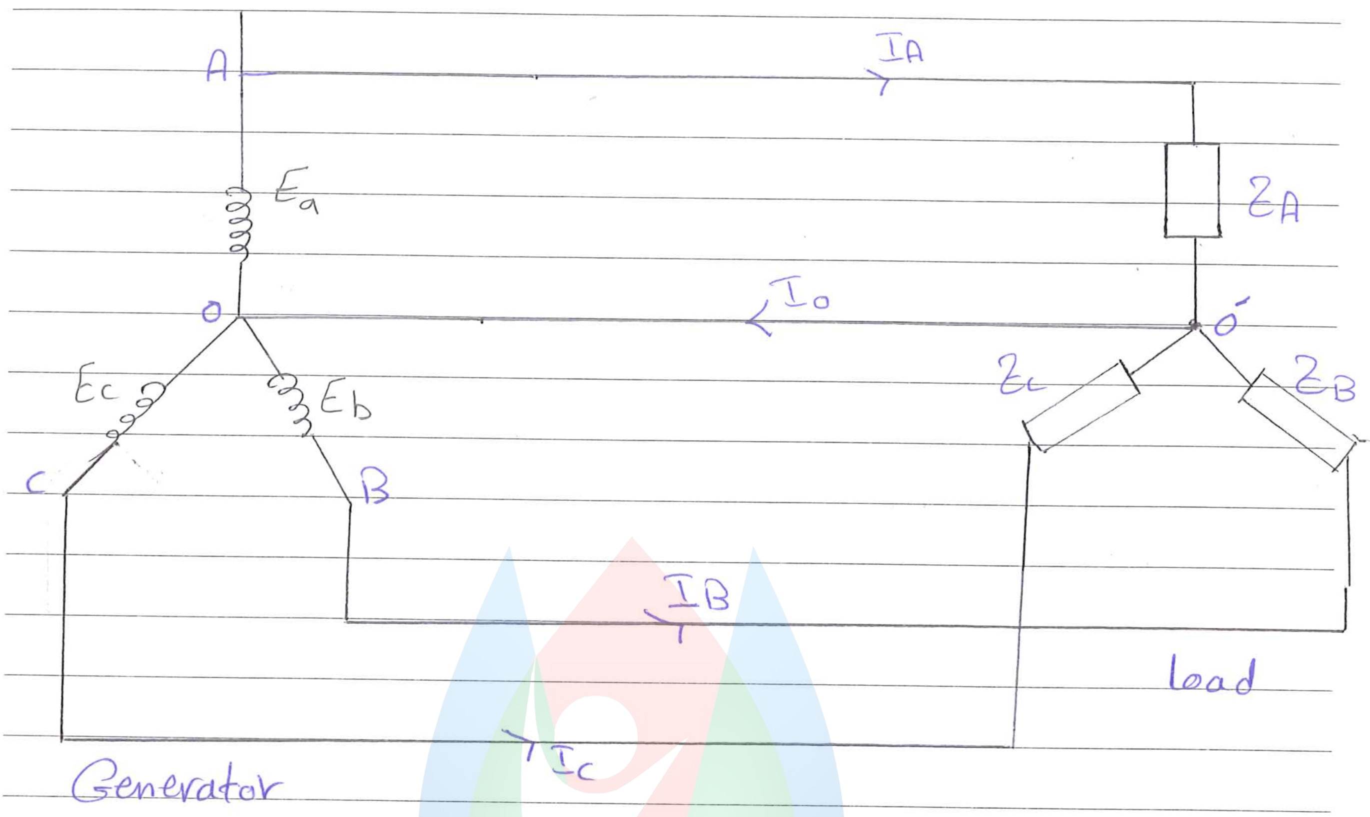
* $P = \sqrt{3}\, V_L I_L \cos\theta$

* $Q = \sqrt{3}\, V_L I_L \sin\theta$

* $S = \sqrt{3}\, V_L I_L$

Date: No.

* Star to star with a neutral wire:



* If Z_A, Z_B, Z_c is very small "low" then the potential at ó practically the same as the potential at o

$I_A = \frac{E_A}{Z_A}$, $I_B = \frac{E_B}{Z_B}$, $I_c = \frac{E_c}{Z_c}$

By applaying KCL $I_o = I_A + I_B + I_c$

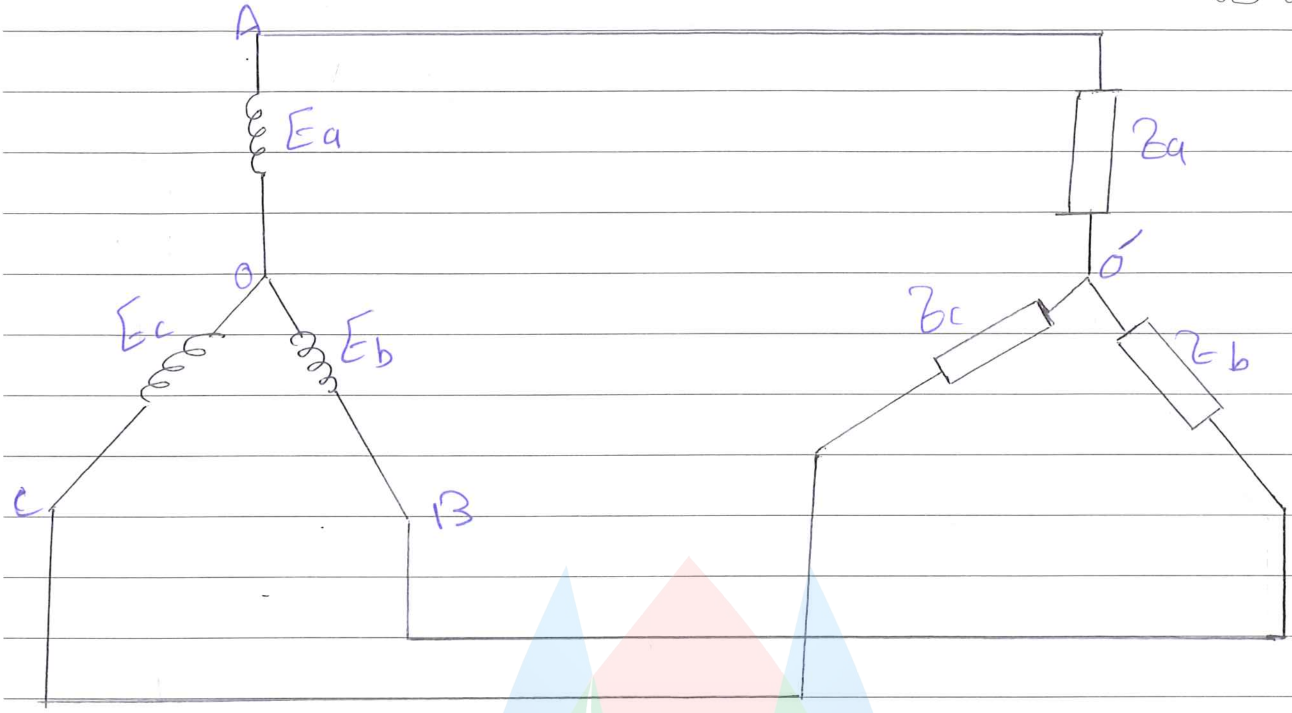
If $Z_A = Z_B = Z_c \Rightarrow$ load is Balanced

then $I_o = \text{zero}$

If load isn't Balanced $I_o \neq \text{zero}$.

Date: No.

* Star to Star Connection Without a Neutral Wire :-



$$V_{o\acute{o}} = \frac{E_A Y_A + E_B Y_B + E_C Y_C}{Y_A + Y_B + Y_C}$$ where $Y_{A,B,C}$ admittance

With Balanced Loads :- $Y_A = Y_B = Y_C$

$$\therefore V_{o\acute{o}} = \frac{Y_A (E_A + E_B + E_C)}{3 Y_A} = \frac{1}{3}(E_A + E_B + E_C) = 0$$

$V_{a\acute{o}} = E_a$, $V_{b\acute{o}} = E_b$, $V_{c\acute{o}} = E_c$

=> With UnBalanced load :- $V_{o\acute{o}} \neq$ Zero

$\therefore$ $V_{a\acute{o}} = E_a + V_{\acute{o}o}$

$V_{b\acute{o}} = E_b + V_{o\acute{o}}$

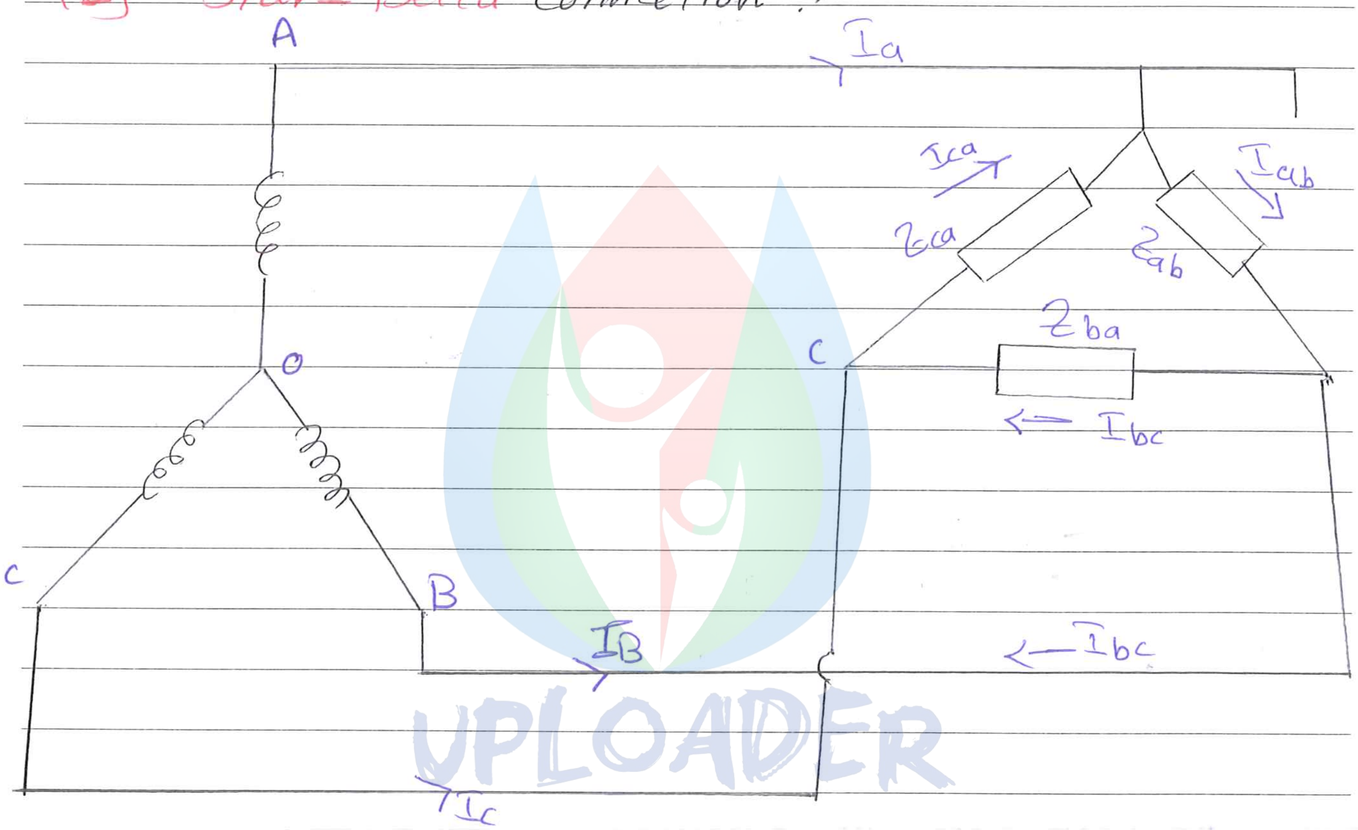
$V_{c\acute{o}} = E_c + V_{o\acute{o}}$

Date: No.

* phase Current at the load end:-

$$I_a = \frac{V_{ao'}}{Z_A} , \quad I_b = \frac{V_{bo'}}{Z_b} , \quad I_c = \frac{V_{co'}}{Z_c}$$

[2] Star - Delta Connection :-



* $I_A = I_{ab} - I_{ca}$, $I_B = I_{bc} - I_{ab}$

$I_C = I_{ca} - I_{bc}$ if the load Balanced

the line Current is $I_L = \sqrt{3}\, I_{ph}$