Lecture 14

Tuesday, 5 March 2024 3:35 PM

EE114 - Power Engineering 1

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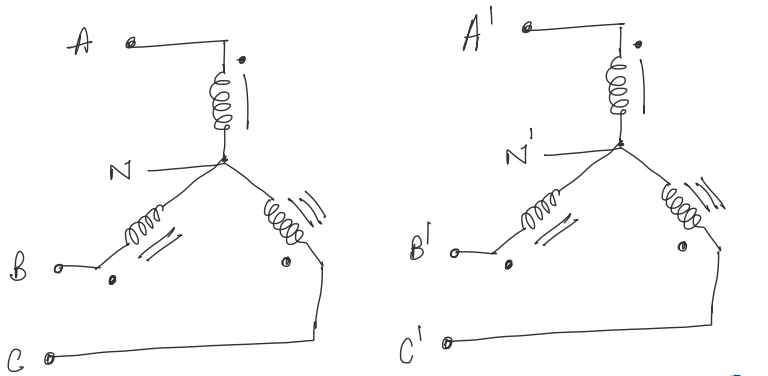
Scribe: Saurabh Singh

* 3-phase transformers :-

1. Y-Y connection



Here the voltage difference across the coupled coils is same.

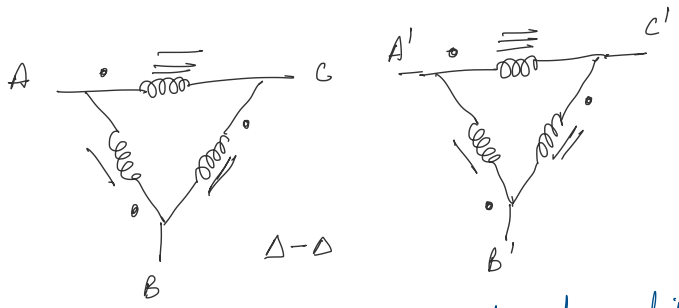
(No phase shift b/w $\bar{V}_{AB}$ & $\bar{V}_{A'B'}$)

(i) $\angle \frac{V_{AB}}{V_{A'B'}} = 0$

$n = \frac{N_2}{N_1}$ (effective turns ratio)

(ii) $V_{A'N'} = \frac{N_2}{N_1} V_{AN}$

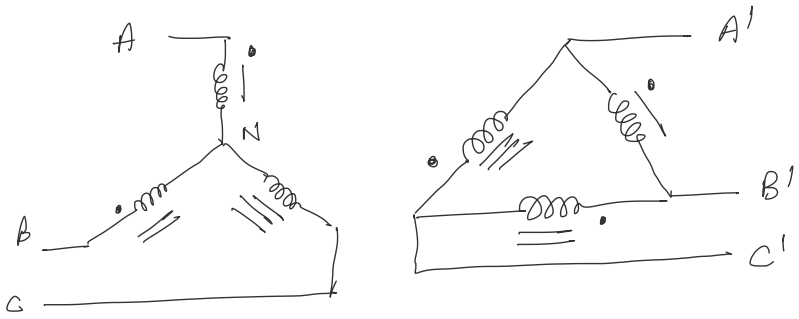
2. Δ-Δ connection :-



Effective turns ratio $n = \frac{\bar{V}_{A'B'}}{\bar{V}_{AB}} = \frac{N_2}{N_1}$

No phase shift b/w $\bar{V}_{AB}$ & $\bar{V}_{A'B'}$

5) Y - Δ connection



$$\overline{V_{A'B'}} = \frac{N_2}{N_1}\,\overline{V_{AN}}$$

$$\overline{V_{AB}} = \frac{N_2}{N_1}\,\frac{1}{\sqrt{3}}\,\overline{V_{AB}}\,\angle -30^\circ$$

$$n = \frac{\overline{V_{A'B'}}}{\overline{V_{AB}}} = \frac{N_2}{N_1}\,\frac{1}{\sqrt{3}}\,\angle -30^\circ$$

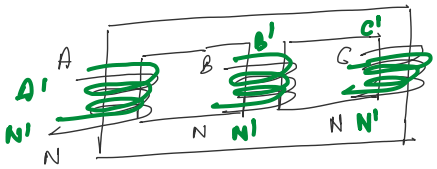
** Popular configuration — Δ — Y

We need neutral on distribution side.

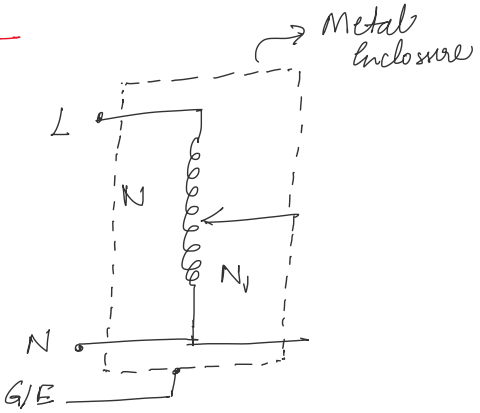
* Open delta :-

Improves availability of supply

* Practical 3 ϕ transformer :-



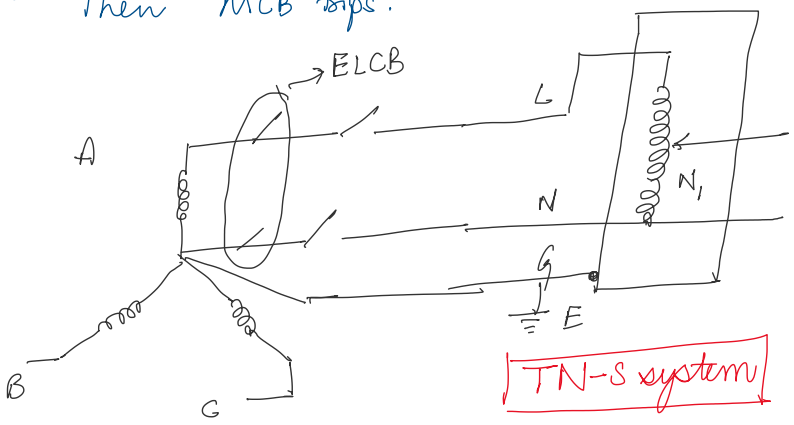
* Distribution system :-



Any metal enclosure has to be earthed (physically earthed) to avoid shock due to static charge.

Also if line wire is damaged & touches the metal enclosure and the enclosure is not earthed then if someone touches it, the person may

receive a serious shock.
If earthed then large current flowes for L to E
Then MCB trips.



TN-S system

If someone accidently touches live wire, a net current flowes through L N, which is detected by ELCB (earth leakage ckt. breaker) and breaks the circuit.