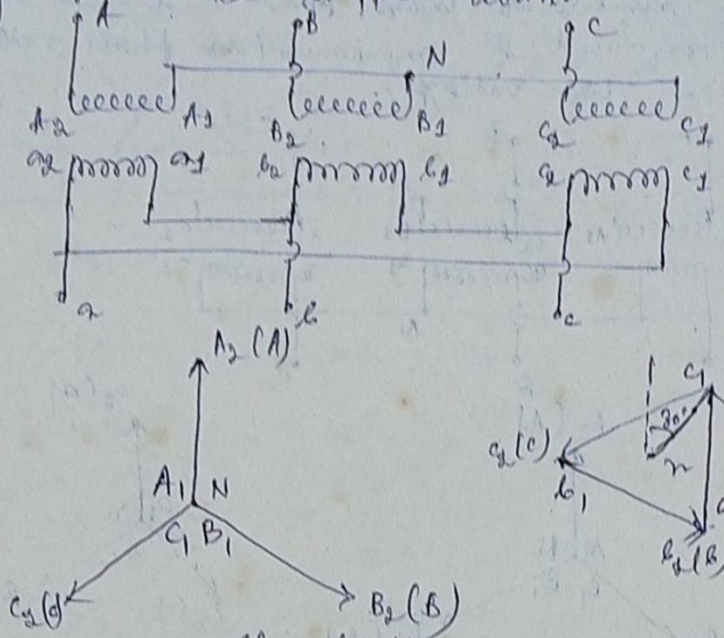
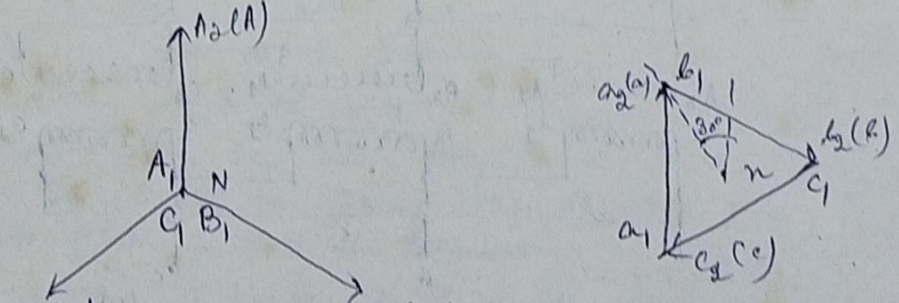
(8) Star/delta (Y/Δ) - connection:-

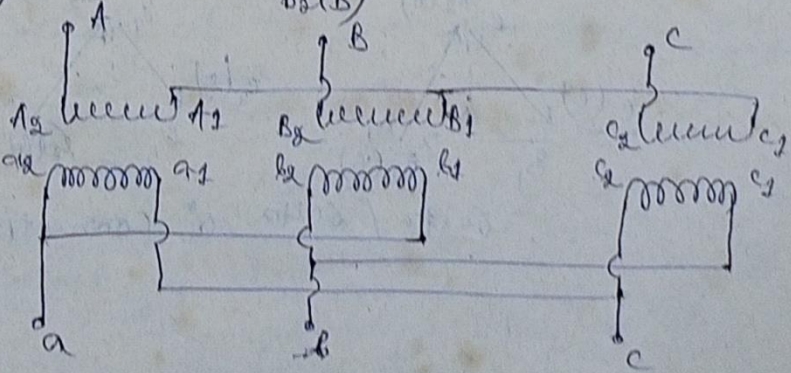
The main use of this connection is at the substation end of the transmission line where the voltage is to be stepped down.



Star/delta -30° connection.

It is observed from the phasor diagram that phase a to neutral voltage (equivalent star basis) on the delta side lags by -30° to the phase to neutral voltage on the star side.

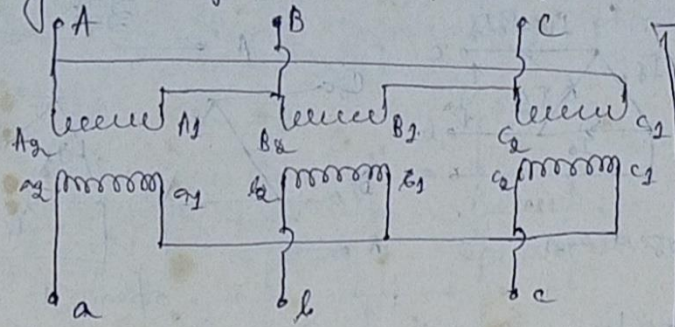


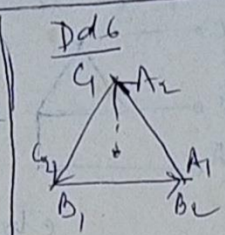


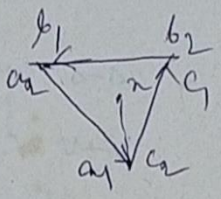
Star/delta +30° - connection

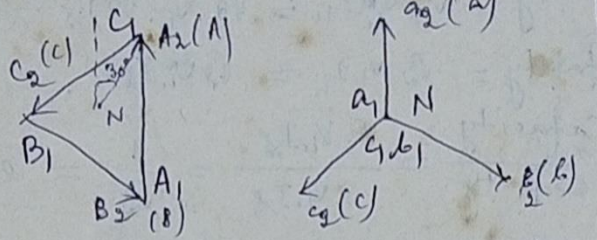
(4) Delta / Star (Δ - Y) - connection :-

This connection is generally employed where it is necessary to step-up the voltage, such as at the beginning of high tension transmission system.

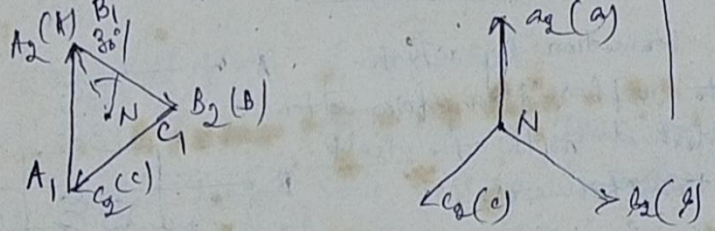




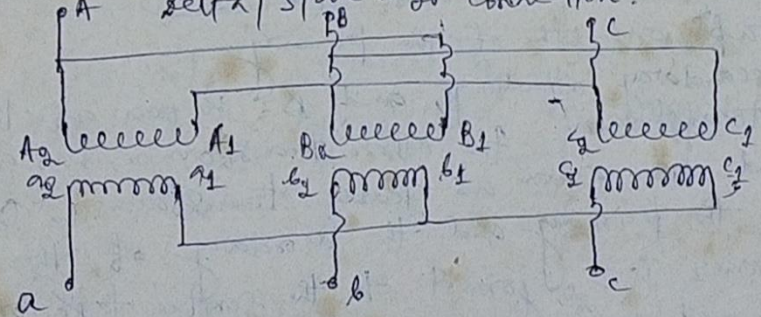




Delta / star +30° - connection

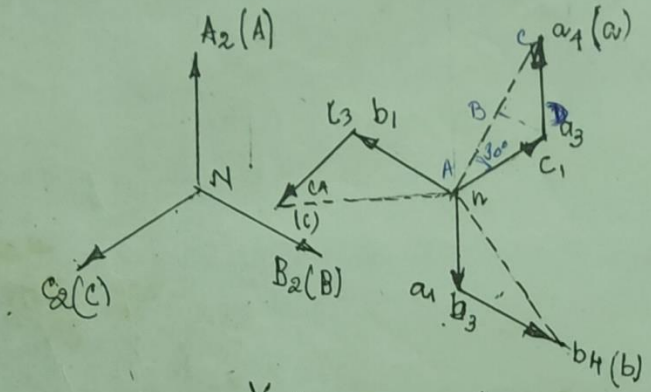


Delta / star -30° connection.



Zigzag/star (Yz1 or Yz11) :-

The winding of each phase on the star side is divided into two equal halves, as shown.



Yz1 connection.

Say, $AC = V$

$AB = \frac{V}{2}$

$AD \cos 30° = AB$

$\Rightarrow AD = \frac{2}{\sqrt{3}} AB$

$= 1.15\ AB$

$\therefore a_1a_n = 15\%$ more than normal a_1a_2 of star connection.

Zigzag or inter star connection is primarily used to suppress the third harmonic emfs between the line and neutral. Since the phase voltages are composed on the zigzag side of two half-voltages with a phase difference of 60°, 15% more turns are required for a given total voltage per phase compared with a normal phase connection, which may necessitate an increase in the frame size over that normally used for the rating. The zigzag/star connection has been employed where delta connections were mechanically weak (on account of large no of turns and small copper sections) in h.v. transformers. Inter-star connections are also used for rectifier circuits.