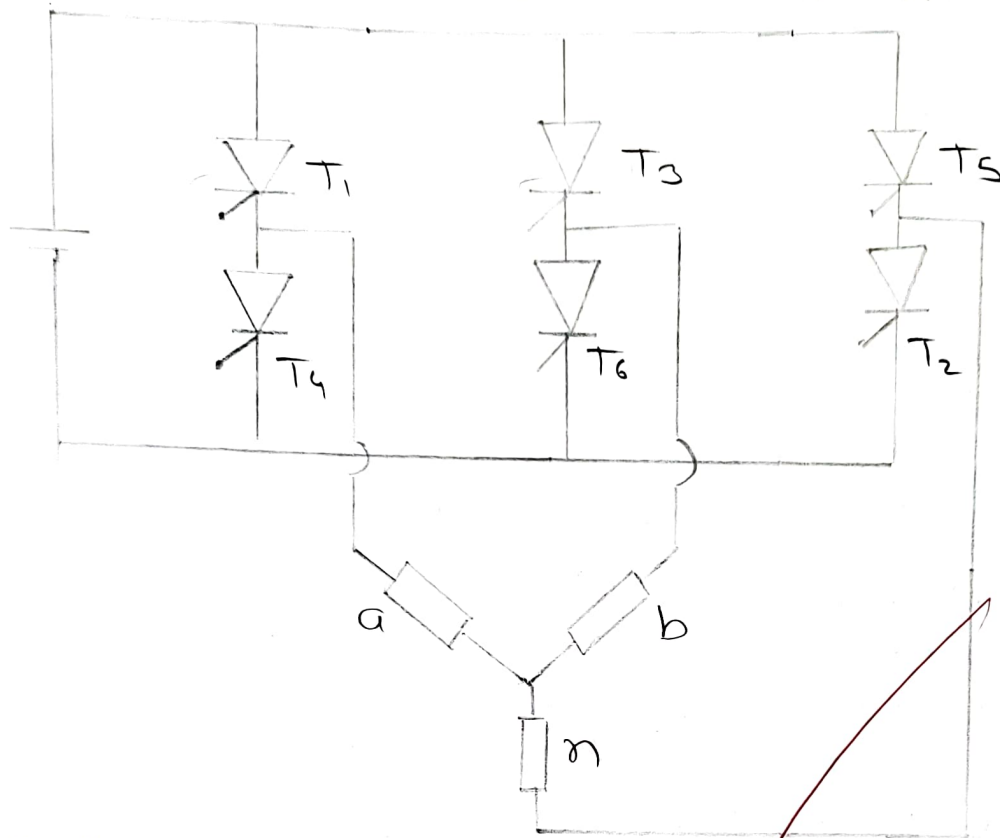


• Circuit Dig of 3Ø inverter with 180° mode conduction.

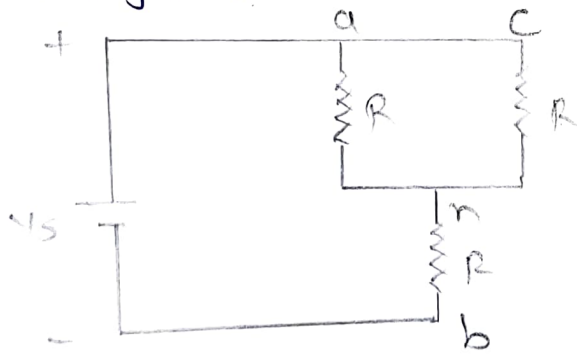


P-6

Conduction sequence

60°	60°	60°	60°	60°	60°	60°
SG1	G12	123	234	345	456	561

Each thyristor will conduct for a phase period of 180°



a → +ve plate
 b → -ve plate
 c → +ve plate

$$R_{eqn} = \frac{R \times R}{R + R} = \frac{R^2}{2R} = \frac{R}{2}$$

$$I = \frac{V_s}{R} = \frac{V_s}{R/2 + R} = \frac{2V_s}{3R}$$

$$V_{an} = V_{cn} = I \times R = \frac{2V_s}{3R} \times \frac{R}{2}$$

$$V_{an} = V_{cn} = \frac{V_s}{3}$$

$$V_{nb} = I R = \frac{2V_s}{3R} \times R$$

$$V_{nb} = \frac{2V_s}{3}$$

$$V_{bn} = -\frac{2V_s}{3}$$

• Inference:-

a) If two phases are connected to supply then $V_{pnn} = V_s/3$

'+' terminal of battery = $V_s/3$

'-' terminal of battery = $-V_s/3$

b) If one phase is connected to supply, then
 $V_{phn} = 2V_s/3$

'+' terminal of battery = $2V_s/3$

'-' terminal of battery = $-2V_s/3$

Sequence	V_{an}	V_{bn}	V_{cn}
561	$V_s/3$	$-2V_s/3$	$V_s/3$
612	$2V_s/3$	$-V_s/3$	$-V_s/3$
123	$V_s/3$	$V_s/3$	$-2V_s/3$
234	$-V_s/3$	$2V_s/3$	$-V_s/3$
345	$-2V_s/3$	$V_s/3$	$V_s/3$
456	$-V_s/3$	$-V_s/3$	$2V_s/3$

Design of 3 ϕ Inverter with 120° mode conduction:-

$$V_s = 24V$$

Step-I] To determine RMS Value of line voltage

$$V_{line} = 0.707V_s$$

$$V_{line} = 16.968V$$

Step-II] To determine RMS value of phase voltage.

$$V_{phase} = \frac{V_{line}}{\sqrt{3}} = 9.79V$$

$$V_{phase} = 9.79V$$

Step-III] $f = 50Hz$

$$T = \frac{1}{f} = \frac{1}{50} = 0.02 \text{ sec.}$$

$$\text{for } 360^\circ \rightarrow 0.02 \text{ sec}$$

$$\text{for } 180^\circ \rightarrow 0.01 \text{ sec}$$

$$1^\circ \rightarrow 5.55 \times 10^{-5} \text{ sec}$$

Phase delay
all below
values

a) for firing angle $0^\circ \rightarrow 0 \times 5.55 \times 10^{-5} = 0 \rightarrow \text{Thy 1}$

b) for firing angle $120^\circ \rightarrow 120 \times 5.55 \times 10^{-5} = 6.66 \times 10^{-3} \rightarrow \text{Thy 2}$

c) for firing angle $180^\circ \rightarrow 180 \times 5.55 \times 10^{-5} = 0.01332 \rightarrow \text{Thy 5}$

d) for firing angle $300^\circ \rightarrow 300 \times 5.55 \times 10^{-5} = 9.99 \times 10^{-3} \rightarrow \text{Thy 4}$

e) for firing angle $60^\circ \rightarrow 60 \times 5.55 \times 10^{-5} = 3.33 \times 10^{-3} \rightarrow \text{Thy 2}$

f) for firing angle $240^\circ \rightarrow 240 \times 5.55 \times 10^{-5} = 0.01332 \rightarrow \text{Thy 5}$

$$6.66 \times 10^{-3}$$

Rms

Blue colour
written

180

1 3 5

4 6 2

60

0-1

120-3

240-5

180-4

300-6

60-2

OBSERVATIONS

