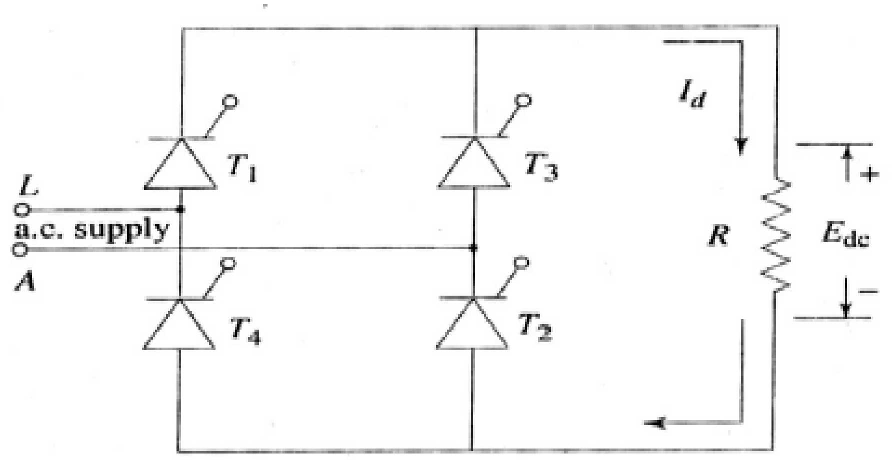
# RECTIFIER

**Concept of Phase Angle Control:**

As we know that SCR is 3 terminal devices i.e. Anode, Cathode & Gate. To turn it 'ON' by the gate at some angle with respect to the applied voltage, this firing angle is measured with respect to the given reference at which the firing pulses are applied to the thyristor gates. The reference point is the point at which the application of the gate pulses results in the maximum mean positive DC-terminal voltage of which the converter is capable i.e. a firing angle of 0˚ corresponds to the conditions when each thyristor in the circuit is fired at the instant its anode voltage becomes at positive in each cycle, under this condition, therefore, the converter operates in exactly the same manner as it was an uncontrolled rectifier circuit. The symbol 'α' is known as firing angle. Hence the most common method to turn ON the thyristor is achieved by varying the firing angle of the thyristor. This method of thyristor control is known as phase angle control. This method is very efficient for the controlling the average power to the load such as lamps, heaters, motors, dc transmission

## Bridge Rectifier:

A single-phase fully controlled bridge circuit consists of four thyristor as shown in fig., with a resistive load. During the positive half cycle when terminal 'P' is positive with respect to point 'Q', thyristors $T_1$and $T_2$ are in the forward blocking state and when these thyristors fire simultaneously at $\omega t = \alpha$, the load is connected to the input through $T_1$ and $T_2$. During negative half cycle i.e., after $\omega t = \pi$, thyristor $T_3$ and $T_4$ are in the forward blocking state, and simultaneous firing of these thyristors reverse biases the previously conducting thyristors $T_1$ and $T_2$. These reverse biased thyristors turn off due to line or natural commutation and the load current transfers from $T_1$and $T_2$ to $T_3$ and $T_4$. The voltage and current waveforms are shown in figure.




Fully-controlled bridge-circuit with resistive-load

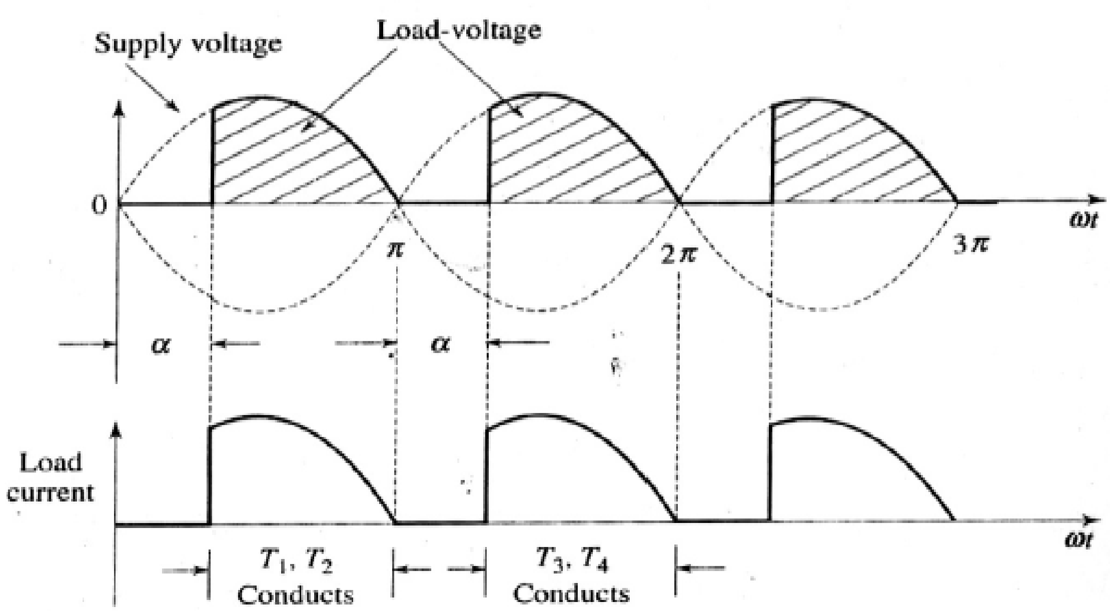



**Fig. Single Phase Fully Controlled Bridge Rectifier**

The average dc voltage across load is

$$V_{dc} = E_m (1+\cos\alpha) / \pi \quad \text{…………………………………………… } \mathbf{(6)}$$

The average load current is

$$I_{dc} = E_m (1+\cos\alpha) / \pi R \quad \text{…………………..………………………... } \mathbf{(7)}$$

Therefore, the dc output power is

$$P_{dc} = V_{dc} \times I_{dc}$$