Rectifier Firing Circuit Using Cosine Firing Scheme:

This scheme used to fire thyristors in single phase converter. The pulse output of this scheme synchronizes with AC supply using step down transformer supply voltage step down to an appropriate level. Input to this transformer taken from same source from which converter circuit is energized. The output voltage of transformer is integrated using integrator to get cosine wave V_1. The cosine signal compare with reference voltage in comparator 1 and in comparator 2 compare with invert of reference voltage. The dc control voltage E_C varies from maximum positive E_{CM} to maximum negative E_{CM} so that firing angle can be varied from zero to 180 degree. So the comparator 1 and comparator 2 give output pulses V_2 and V_3. The firing angle is governed by the intersection of V_1 and E_C. When EC is maximum, firing angle is zero. Thus firing angle α in terms of V_{2M} and E_C can be expressed as $V_{2M} \cos\alpha = E_C$

Or $\alpha = \cos^{-1}(E_C / V_{2M})$

Where V_{2m} = maximum value of cosine signal V_2.

The signals V_3, V_4 obtained from comparators are fed to clock pulse generators 1, 2 to get clock pulses V_5 , V_6. These signals V_5, V_6 energies a JK flip flop to generate output signals V_i and V_j .the signal V_i is amplified through the amplifier circuit and then employed to turn on the SCR's in the positive half cycle. Signals Vj, after amplification, is used to trigger SCR's in the negative half cycle.

Firing angle in time is

$\alpha = (180 \times T) / 10ms$ ……………………………………………………………….(0)

So,

$T = (\alpha \times 10ms) / 180$ …………………………………………………………...(1)

Where, time T in ms

And,

$V_{RMS} = V_M / \sqrt{2}$ ……………………………………………………………………….(2)

Then,

$V_M = \sqrt{2} \times V_{RMS}$ …………………………………………………………......……. (3)