A.C. MEASUREMENTS

In a single phase circuit, the simple and easy method of measuring the power is by wattmeter. However, 3-voltmeter and 3-ammeter methods can also be used. The latter methods are not used in practice because small errors in the meters will give much larger error of calculations.

Power factor plays an important part in the consumption of electrical energy in A.C. circuits. It is the ratio of true power to the apparent power.

\[
\text{Power Factor} = \frac{\text{True Power}}{\text{Apparent Power}} = \frac{VI \cos \phi}{VI} = \cos \phi
\]

It is always desired to have it near unity and is measured by the P.F. meter directly. Its low value means the wastage of energy in the circuit. The effect of frequency is to affect the impedance of the circuit. Inductive reactance increases while capacitive reactance decreases with frequency. Thus in A.C. circuits, P.F. and frequency play an important role in the consumption of power.

In a 3-phase circuit with balanced load, wattmeter is connected in one phase. The total power is then determined by multiplying the reading with three.

Total power = 3 x wattmeter reading

If the load is unbalanced, then 2-wattmeters are connected, one in each phase. In this case total power = \( W_1 + W_2 \). Thus two wattmeter method can be used for circuit with balanced as well as unbalanced loads.