I2b

16. LOAD TEST ON SINGLE PHASE INDUCTION MOTOR

Aim

To conduct load test on single phase induction motor and to plot performance characteristics.

Theory

A single phase induction motor is not self starting. When fed from a 1- ϕ supply, its stator winding produces a pulsating flux. As it is not synchronously rotating flux, it cannot produce a torque. So the motor is not self starting.

To make the motor self-starting, it is temporarily converted into a two-phase motor during starting period. The stator of a 1- ϕ motor is provided with an auxiliary winding in addition to the main winding. These windings are placed 90^0 apart and connected across single-phase supply. The capacitor in series with the auxiliary winding makes the voltage across the winding out of phase by nearly 90^0. The phase difference between the currents in the two windings is very large. The two currents produces a revolving flux and hence makes the motor self-starting.

In capacitor start motor the phase difference between the main winding current and auxiliary winding current is produced by connecting a capacitor in series with auxiliary winding. When the motor attains 75% speed the auxiliary winding and capacitor are cut off from the supply, leaving only main winding.

Machine Details

220/230V, 6 A, 1440 rpm, 50 Hz

Connection Diagram

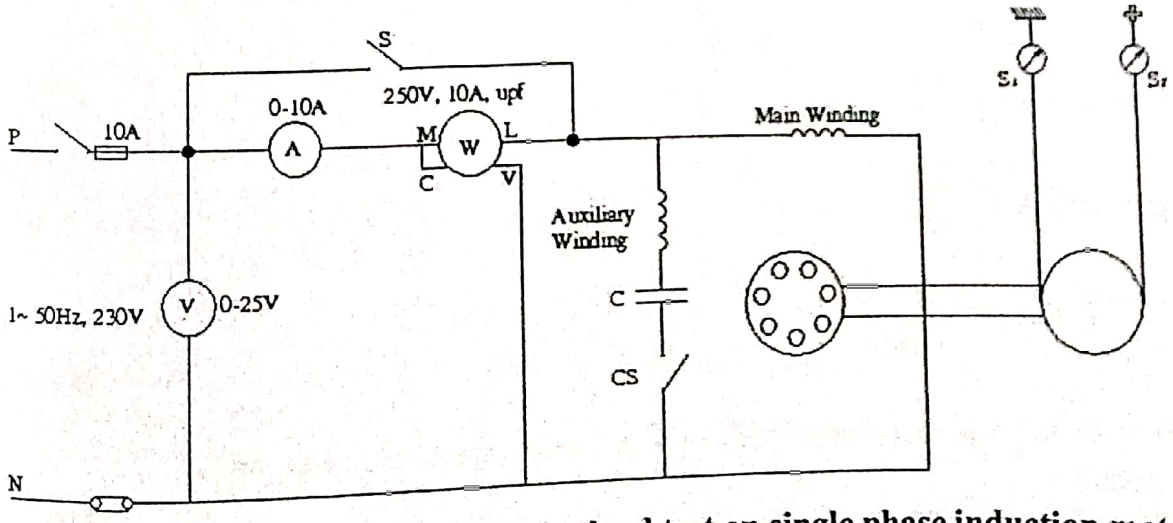

Fig.16.1. Connection Diagram for load test on single phase induction motor

Procedure

Keeping the switch S closed start the machine. Open switch S and take the no load readings. Apply the load in steps and take all corresponding readings. Continue this up to the rated full load current of the motor.

Tabulation

V/m V volts	A/m I amps	W/m W watts	Speed N r.p.m	S1 kg	S2 kg	Torque (S1-S2) rx9.81 N-m	Output $\frac{2\pi NT}{60}$ watts	Slip $\frac{Ns-N}{Ns}$	p.f $\frac{W}{VI}$	% η

Table. 16.1. Tabulation for load test on single phase induction motor

Calculation

$$Output = \frac{2\pi NT}{60}$$

$$\%slip = \frac{Ns - N}{Ns} x100$$

$$\text{power factor} = \frac{W}{VI}$$

$$\%Efficiency = \frac{Output}{Input} x100$$

Result:-

Performance characteristics of the given single phase Induction motor

Viva Questions

1. Why single phase Induction motors are not self starting?