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FACULTY OF ENGINEERING & TECHNOLOGY

Electrical Machine-ii

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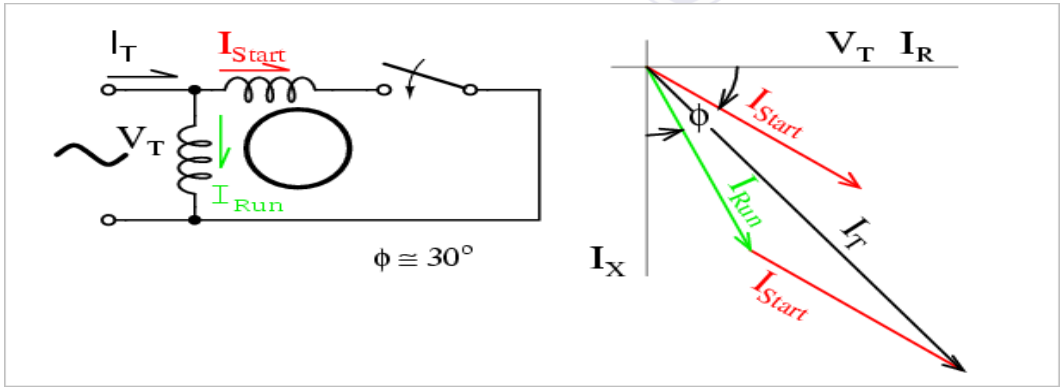
TYPES OF SINGLE PHASE INDUCTION MOTOR

The single phase induction motors are made self starting by providing an additional flux by some additional means. Now depending upon these additional means the single phase induction motors are classified as:

1. Split phase induction motor.
2. Capacitor start inductor motor.
3. Capacitor start capacitor run induction motor (two value capacitor method).
4. Shaded pole induction motor.

Split Phase Induction Motor

In addition to the main winding or running winding, the stator of single phase induction motor carries another winding called auxiliary winding or starting winding. A centrifugal switch is connected in series with auxiliary winding. The purpose of this switch is to disconnect the auxiliary winding from the main circuit when the motor attains a speed up to 75 to 80% of the synchronous speed. We know that the running winding is inductive in nature. Our aim is to create the phase difference between the two winding and this is possible if the starting winding carries high resistance. I_{run} is the current flowing through the main or running winding, I_{start} is the current flowing in starting winding, and V_T is the supply voltage.



The highly resistive winding the current is almost in phase with the voltage and for highly inductive winding the current lag behind the voltage by large angle. The the applied voltage by very small angle and the running winding is highly inductive in nature so, the current flowing in running winding lags behind applied voltage by large angle. The resultant of these two current is I_T. The resultant of these two starting winding is highly resistive so, the current flowing in the starting winding lags behind current produce rotating magnetic field which rotates in one direction. In split phase induction motor the starting and main current get splitted from each other by some angle so this motor got its name as split phase induction motor.

Applications of Split Phase Induction Motor

Split phase induction motors have low starting current and moderate starting torque. So these motors are used in fans, blowers, centrifugal pumps, washing machine, grinder, lathes, air conditioning fans, etc. These motors are available in the size ranging from 1/20 to 1/2 KW.

Capacitor Start Induction Motor

The construction of this motor is as shown in fig.(1a). As shown in fig, the starting winding connected in series with the capacitor draws a leading current while the main winding continues to draw the lagging current. Due to this the fluxes produce a rotating magnetic field which result in the rotation of the motor. The current (I_m) through the main winding will lag behind the source voltage as the main winding is inductive. But the current (I_{st}) through the starting winding leads the supply voltage by some angle due to the presence of capacitor. Hence the angle between the fluxes produced by I_m and I_{st} will be large as shown in fig.(1b). Due to this large angle, the starting torque produced by the capacitor start motor produces a larger starting torque as compared to that produced by the split phase induction motor. As soon as the speed reaches 75% to 80% of the maximum speed, the centrifugal switch is automatically open circuited and the starting winding along with the capacitor goes out of the circuit. The induction motor will then be running only on the flux produced by the main winding.

Capacitor Start Induction Motor (Conti..)

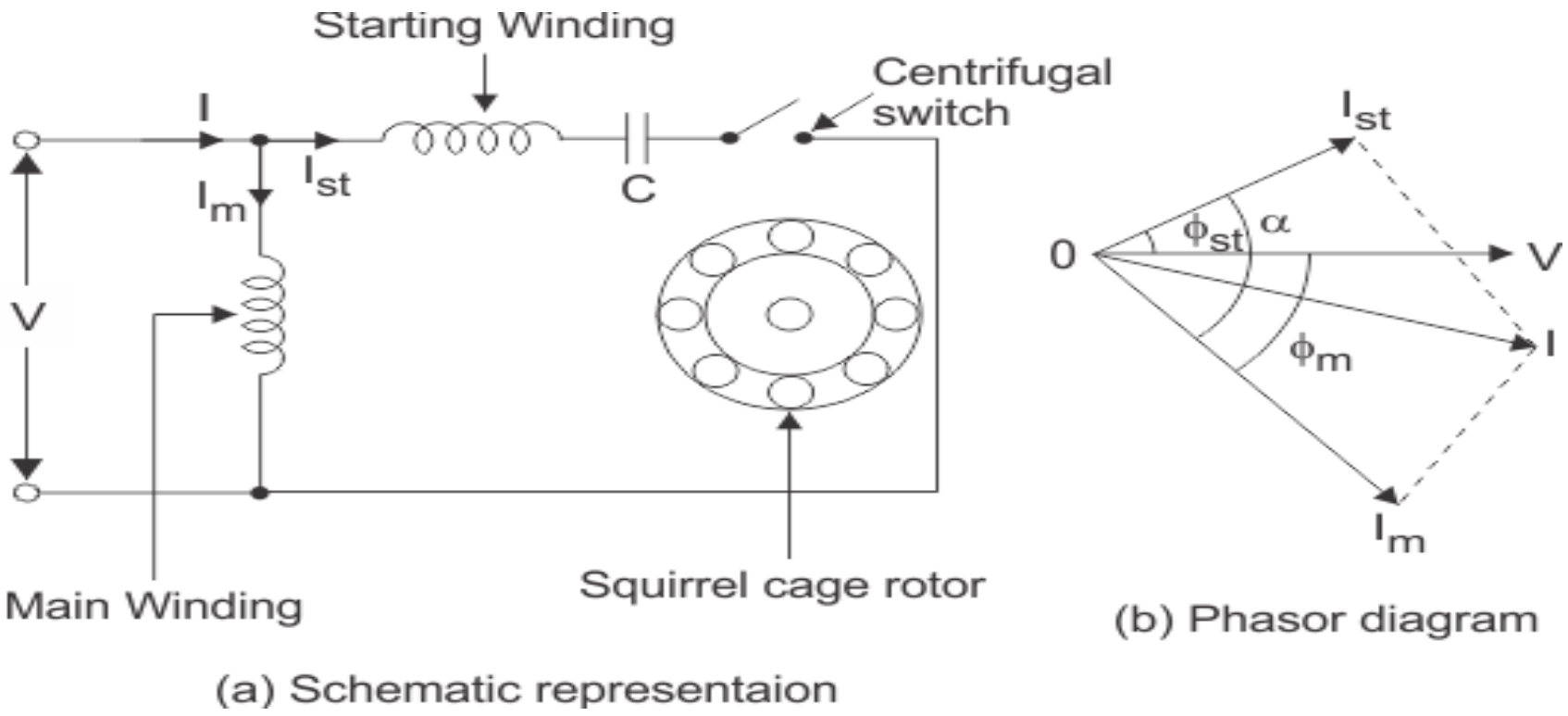


Fig.(1): Capacitor Start Motor