RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

Electrical Machine-ii

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F.H.P. MOTORS

Classification Of F.H.P. Motors

There are many types of motors on the market today that the electrician is required to install, maintain, repair, or replace. Some of these motors are very small and are classified as fractional-horsepower (FHP) motors. These motors are under 1 horsepower. The vast majority of motors in use today will be fractional horsepower motors

Power Requirements

Motors are designed to operate on either AC, DC, or on AC or DC (universal motors). Voltage requirements can be as low as 1.5 volts for FHP motors and as high as 6600 volts for multiple-horsepower motors. Alternating current motors are single phase or polyphase.

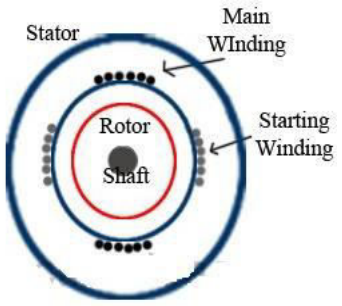
The standard frequency for AC motors in this country is 50 hertz.

Constructional Details Of Single Phase Induction Motor

Construction of a single phase induction motor is similar to the construction of three phase induction motor having squirrel cage rotor, except that the stator is wound for single phase supply. Stator is also provided with a 'starting winding' which is used only for starting purpose

Working Principle Of Single Phase Induction Motor

When the stator of a single phase motor is fed with single phase supply, it produces alternating flux in the stator winding. The alternating current flowing through stator winding causes induced current in the rotor bars according to Faraday's law of electromagnetic induction. This induced current in the rotor will also produce alternating flux. Even after both alternating fluxes are set up, the motor fails to start (the reason is explained below). However, if the rotor is given a initial start by external force in either direction, then motor accelerates to its final speed and keeps running with its rated speed. This behavior of a single phase motor can be explained by double- field revolving theory.



Production of Rotating Field

Consider two winding 'A' and 'B' so displaced that they produce magnetic field 90° apart in space. The resultant of these two fields is a rotating magnetic field of constant magnitude ϕ_m. Non-Uniform magnetic field produces a non-uniform torque which makes the operation of the motor noisy, affect starting torque.

$$\varphi_A = \varphi_m \sin \omega t$$

$$\varphi_B = \varphi_m \sin(\omega t + 90°)$$

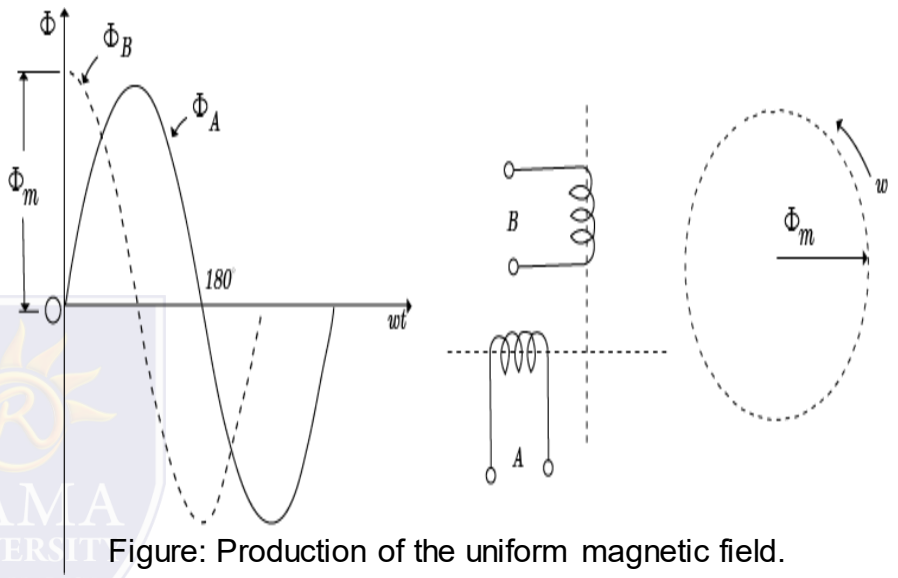


Figure: Production of the uniform magnetic field.

Single Phase Induction Motor Is Not Self Starting:

The stator of a single phase induction motor is wound with single phase winding. When the stator is fed with a single phase supply, it produces alternating flux (which alternates along one space axis only). Alternating flux acting on a squirrel cage rotor can not produce rotation, only revolving flux can. That is why a single phase induction motor is not self starting.