

EXPERIMENT NO: 07

TITLE: To study construction and types of Induction Motor.

OBJECTIVES: To understand three phase Induction Motor and its characteristics.

THEORY:

Principle :-

When current carrying conductors are present in rotating magnetic field, they experience the force. This force then exerts torque on the shaft of 3 Φ induction motor in the presence of magnetic field setup in rotating nature. Current is supplied by the phenomenon of electromagnetic induction. Hence the motor is known as induction motor.

Construction:-

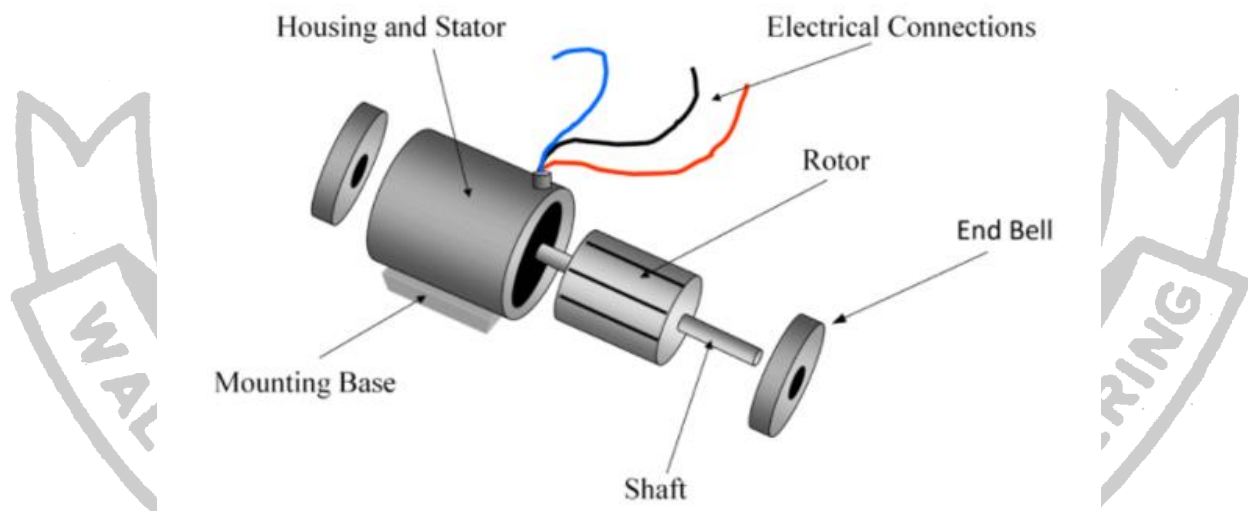


Fig1 : Motor stator and rotor

A. Stator:-

- [1] Stator is stationary part of rotating systems, found in electrical generators, electric motors, Siren of biological motors etc. The main use of a stator is to keep the field aligned.
- [2] Depending on the configuration of opening electromotive device the stator may act as field current, interacting with armature to receive its influence from moving field coils of the motor.
- [3] The stator of devices may be either permanent magnet or electromagnet.

B. Rotor:-

- [1] The rotor is moving component of an electromagnetic systems in the electrical motor, generator or alternator.

- [2] It is rotating due to interaction between winding and field due to magnetic which torque is produced around rotor axis.

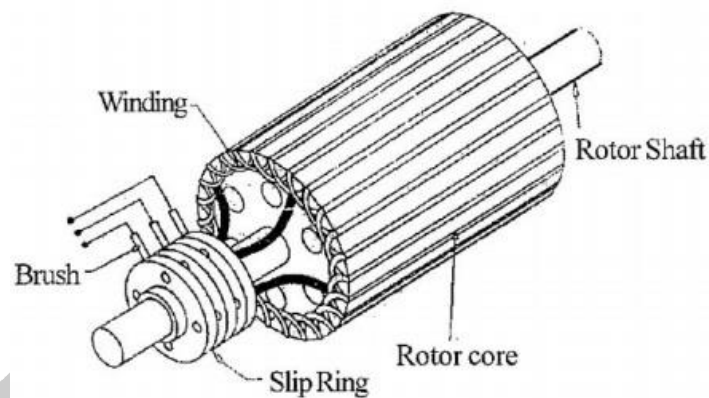


Fig1: Structure of wound rotor

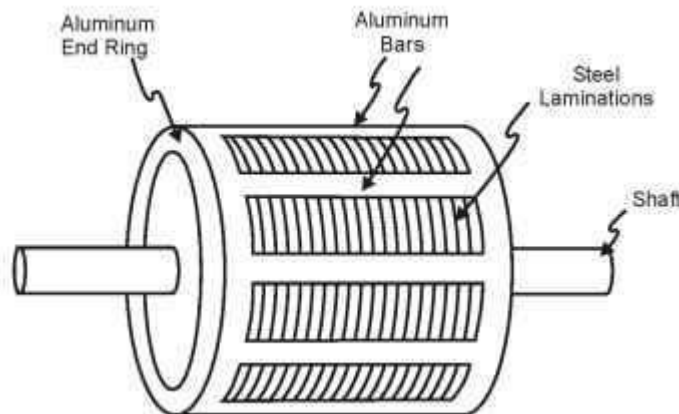


Fig2 : Structure of squirrel-cage rotor

Types and construction of Rotor:-

- Squirrel Cage rotors
- Wound rotors
- Salient Pole rotors
- Cylindrical rotors

Rotor equations:-

Rotor bar voltage, $E = BL(V_s - V_m)$

Induction motor slip, $N_s = \frac{120F}{P}$

Torque in Rotor, $F = (B \cdot l) L T = f \cdot x T$

Characteristics of Rotor:-

- a) Squirrel cage :
 - i. This rotor rotates at speed less than stator rotating magnetic field on synchronous speed.
 - ii. when rotor speed increases, slip decrease.

- b) Wound rotor :
 - i. This rotor operates at constant speed and has lower starting torque (current).
 - ii. It has higher torque & control speed.

- c) Salient Pole rotor:
 - i. This rotor operates at a speed below 1500 rpm and 40% of its rated torque without excitation.
 - ii. It has larger diameter.
 - iii. Air gap is non-uniform.
 - iv. Rotor has low mechanical strength.

- d) Cylindrical Rotor:
 - i. The rotor operates at speed between 1500 - 3000 rpm.
 - ii. Its diameter is small and has a large axial strength and requires higher torque than Salient pole rotor.

CONCLUSION :-

Various parts of AC motor are studied and learnt about their operating system.