

Synchronous Machine:

Construction: It consists of two basic parts i.e. stator & rotor.

1. Stator: Stator is the stationary part of the machine which consists of 3- ϕ Armature winding.

2. Rotor: Rotor is the rotatory part of the machine which consists of field winding, which are excited by the DC source. There are of two types
a. Salient-pole Rotor
b. cylindrical pole Rotor.

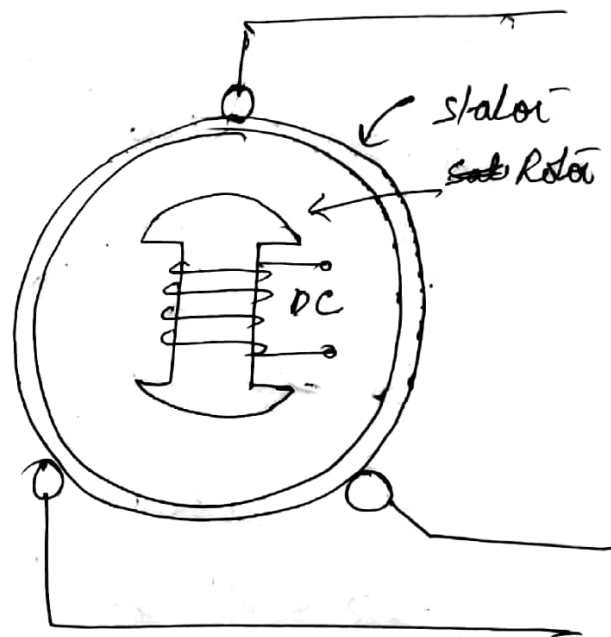
Principle of operation

3 ϕ synchronous motor :-

When a 3 ϕ ac voltage is applied to the stator winding, a rotating magnetic field is produced in the air gap. The stator field rotates at synchronous speed (N_s)

The field current of rotor produces a steady state magnetic field. Therefore there are two magnetic fields present in the machine.

The rotor magnetic field will tend to align with stator magnetic field, or the stator magnetic field will tend to drag the rotor field along.



as north pole of the stator locks in' with the south pole of the rotor. Hence, magnetic locking occurs & the rotor starts rotating (if we rotate the rotor by external means, so that magnetic locking occurs).

Synchronous Generator (Alternator)

Synchronous Generator is a machine which convert mechanical energy into electrical energy. It is based on the principle of electromagnetic

Induction. i.e. -

when there is a relative motion between the conductor and the magnetic field then the voltage induced in the

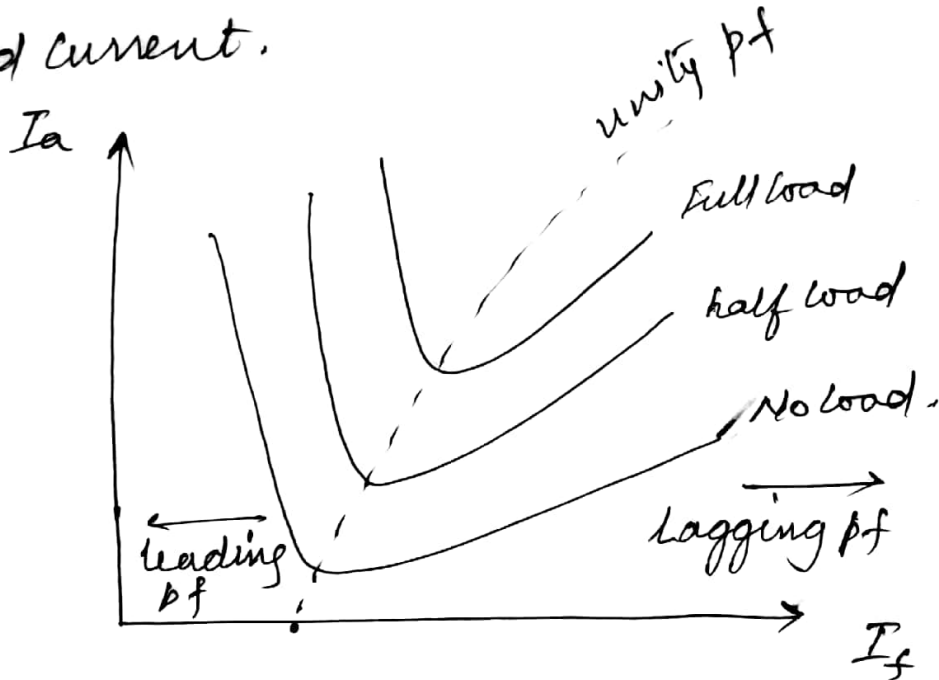
conductor; so, in this the armature conductor is stationary and the field is rotating, hence the voltage is induced in the conductor.

Applications

1. Generator is used for power generation in power plants called Alternator.
2. Motor is used for power factor correction called synchronous condenser. and also used for compressors, blowers, forced draft fan etc.

V-Curve

V-Curve: It is Curve (or characteristics) drawn between the ~~A~~ Armature current and field current.



Inverted V-curve: It is the Curve (or characteristics) between the power factor and the field current.

