A.C. GENERATOR

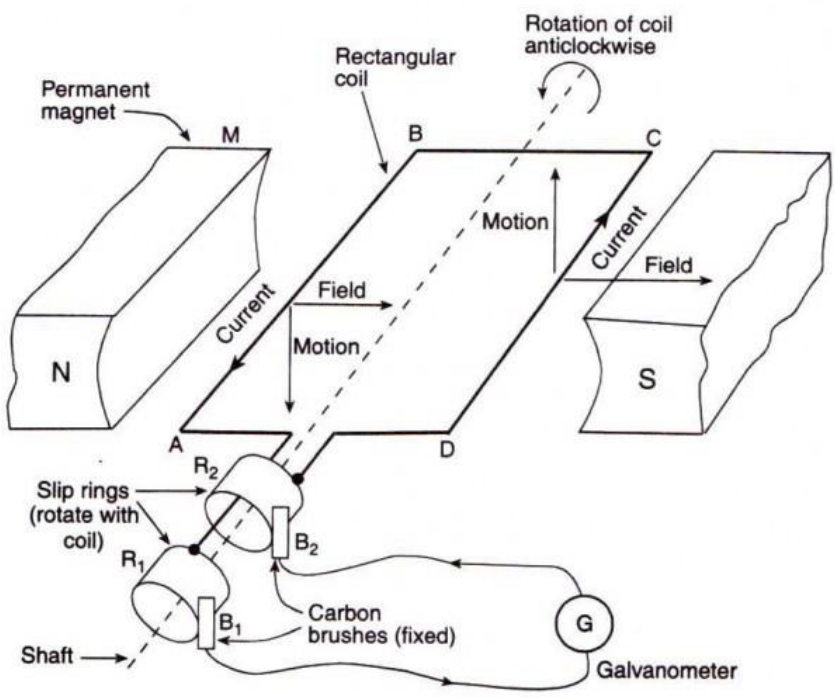
A generator is a machine that converts available mechanical energy into electrical energy. It works on the principle of Faraday's Law of Electromagnetic Induction.

AC generator, also known as alternators, is a machine that converts mechanical energy into electrical energy. The generated electrical energy is in the form of an alternating current sinusoidal output waveform. The mechanical energy is usually supplied by steam turbines, gas turbines, and combustion engines.

PRINCIPLE:-

AC generators work on the principle of Faraday's law of electromagnetic induction which states that electromotive force -EMF or voltage – is generated in a current-carrying conductor that cuts a uniform magnetic field. This can either be achieved by rotating a conducting coil in a static magnetic field, or by rotating the magnetic field that contains the stationary conductor. The preferred arrangement is to keep the coil stationary because it is easier to draw induced alternating current from a stationary armature coil than a rotating coil.The generated EMF depends on the number of armature coil turns, magnetic field strength, and the speed of the rotating field.

CONSTRUCTION:-



The various components of an AC generator are:

1 .Field 2.Armature 3.Prime Mover 4.Rotor 5.Stator 6.Slip Rings

Field:-

The field consists of coils of conductors that receive a voltage from the source and produce magnetic flux. The magnetic flux in the field cuts the armature to produce magnetic flux. This voltage is the output voltage of the AC generator.

Armature:-

The part of an AC generator in which the voltage is produced is known as an armature. This component primarily consists of coils of wire that are large enough to carry the full-load current of the generator.

Prime Mover:-

The component used to drive the AC generator is known as a prime mover. The prime mover could either be a diesel engine, a steam turbine, or a motor.

Rotor:-

The rotating component of the generator is known as a rotor. The generator's prime mover drives the rotor. Based on the type of generator, this component may either be the armature or the field. The rotor will be the armature if the voltage output is generated there; the rotor will be the field if the field excitation is applied there.

Stator:-

The stator of an AC generator is the stationary part. As the rotor, this component may be the armature or the field, depending on the type of generator. The stator will be the armature if the voltage output is generated there; the stator will be the field if the field excitation is applied there

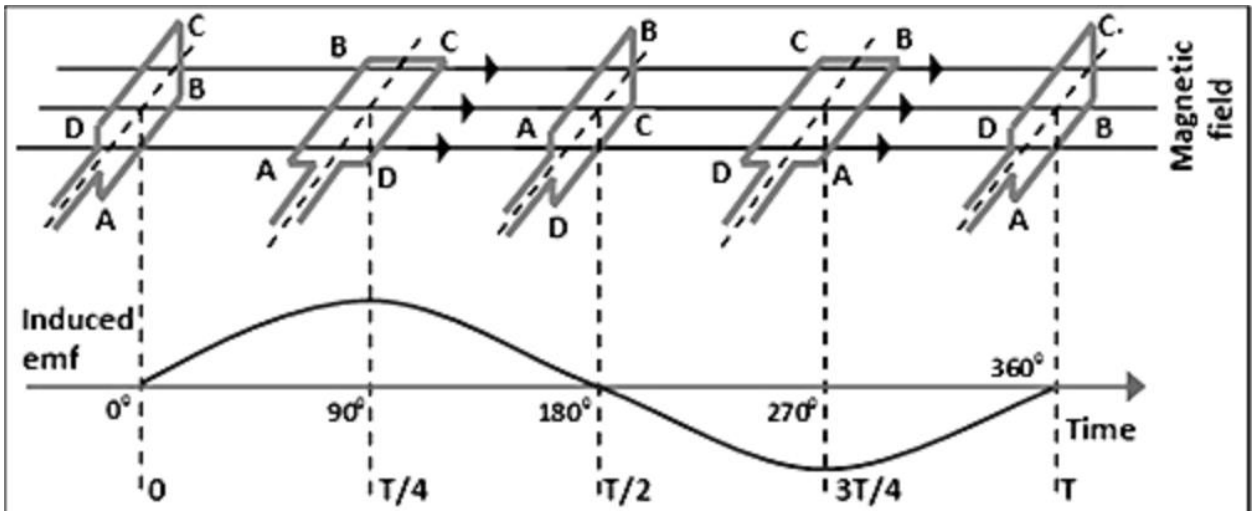
Slip Rings:-

Slip rings are electrical connections that are used to transfer power to and fro from the rotor of an AC generator. They are typically designed to conduct the flow of current from a stationary device to a rotating one.

Working of an AC Generator:-

When the armature rotates between the poles of the magnet upon an axis perpendicular to the magnetic field, the flux linkage of the armature changes continuously. Due to this, an emf is induced in the armature. This produces an electric current that flows through the galvanometer and the slip rings and brushes. The galvanometer swings between positive and negative values. This indicates that there is an alternating current flowing through the galvanometer. The direction of the induced current can be identified using Fleming's Right Hand Rule.

DIFFERENT STAGES THE COIL DURING ROTATION:-



Advantages of AC Generators

Following are a few advantages of AC generators over DC generators:

1. AC generators can be easily stepped up and stepped down through transformers.
2. Transmission link size might be thinner because of the step-up feature
3. Losses are relatively lesser than DC machine
4. Size of the AC generators are relatively smaller than DC generators

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