FACULTY OF ENGINEERING & TECHNOLOGY

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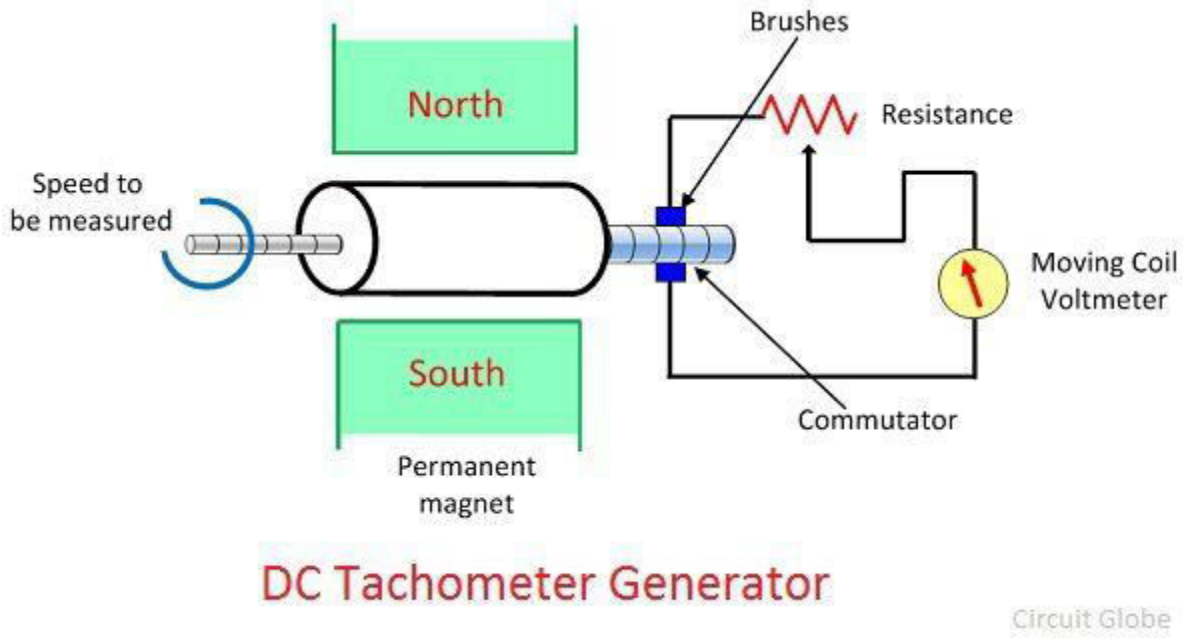
CONTROL SYSTEM COMPONENTS

1. DC Tachometer Generator

Permanent magnet, armature, commutator, brushes, variable resistor, and the moving coil voltmeter are the main parts of the DC tachometer generator. The machine whose speed is to be measured is coupled with the shaft of the DC tachometer generator. The DC tachometer works on the principle that when the closed conductor moves in the magnetic field, EMF induces in the conductor. The magnitude of the induces emf depends on the flux link with the conductor and the speed of the shaft.



The armature of the DC generator revolves between the constant field of the permanent magnet. The rotation induces the emf in the coil. The magnitude of the induced emf is proportional to the shaft speed.

The commutator converts the alternating current of the armature coil to the direct current with the help of the brushes. The moving coil voltmeter measures the induced emf. The polarity of the induces voltage determines the direction of motion of the shaft. The resistance is connected in series with the voltmeter for controlling the heavy current of the armature.

The emf induces in the dc tachometer generator is given as

$$E = \frac{\emptyset PN}{60} \times \frac{z}{a}$$

Where, E – generated voltage
Φ – flux per poles in Weber
P- number of poles
N – speed in revolution per minutes
Z – the number of the conductor in armature windings.
a – number of the parallel path in the armature windings.

$$E \; \alpha \; N$$

$$E = KN$$

$$K = Constant = \frac{\emptyset P}{60} \times \frac{z}{a}$$

Advantages of the DC Generator

- The polarity of the induces voltages indicates the direction of rotation of the shaft.
- The conventional DC type voltmeter is used for measuring the induces voltage.

Disadvantages of DC Generator

- The commutator and brushes require the periodic maintenance.
- The output resistance of the DC tachometer is kept high as compared to the input resistance. If the large current is induced in the armature conductor, the constant field of the permanent magnet will be distorted.