2. Self Excited DC Generator

A DC Generator in which the field magnet winding is supplied current from the output of generator itself is called **Self excited DC Generator**. They are classified into 3 types:

(i) DC Series Generator

(ii) DC Shunt Generator

(iii) DC Compound Generator

(i) DC Series Generator

In DC Series Generator, the field winding is connected in Series with armature winding as shown in Fig 3.6(a).

$$\text{Armature current} = I_a = I_{se} = I_L \tag{3.8}$$

$$\text{Terminal voltage } V = E_g - I(R_a + R_{se}) \tag{3.9}$$

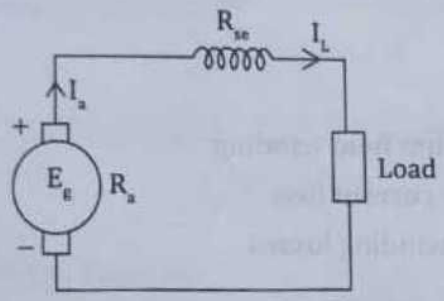


Fig 3.6(a) Schematic diagram of DC Series Generator

(ii) DC Shunt Generator

In DC Shunt Generator, the field winding is connected in Parallel with armature winding and the terminal voltage is applied across it and as shown in Fig 3.6(b).

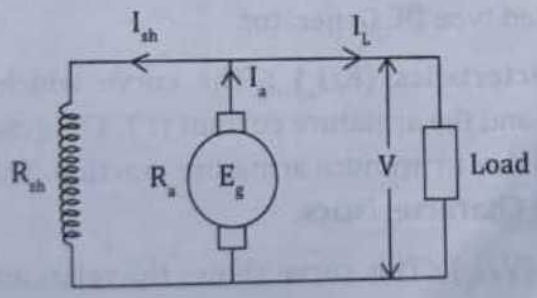
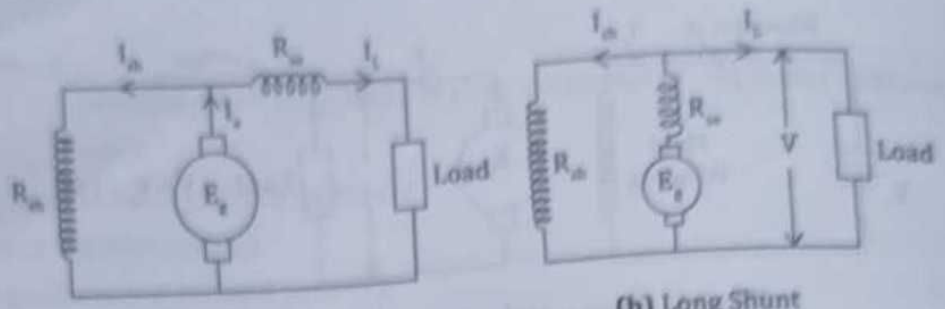


Fig 3.6(b) Schematic diagram of DC Shunt Generator

(iii)DC Compound Generator

In DC Compound Wound Generator, two set of field windings are used one is in series and other in Parallel with armature. The DC Compound Generator Long shunt and Short shunt as shown in Fig 3.6(c).



(a) Short Shunt (b) Long Shunt

Fig 3.6(c) Schematic diagram of DC Compound Generator

(a) Short Shunt

The shunt field winding is in parallel with armature winding such as (a) Short shunt (b) Long shunt

For **Short Shunt**

Series field current $I_{se} = I_L$

Terminal voltage $V = E_g - I_a R_a - I_{se} R_{se}$ (3.10)

For **Long Shunt**

Armature current $I_a = I_L + I_{sh}$

Terminal voltage $V = E_g - I_a (R_a - R_{se})$ (3.11)

Losses in a DC Machine

The losses of DC machine may be :

1. Copper losses – Armature, Shunt field winding
2. Iron losses – Hysteresis, Eddy current loss
3. Mechanical losses – Friction, winding losses

3.2.5 CHARACTERISTICS OF DC GENERATOR