SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EEB201- DC Machines and Transformers

II YEAR / III SEMESTER

Unit 1 – DC Generator

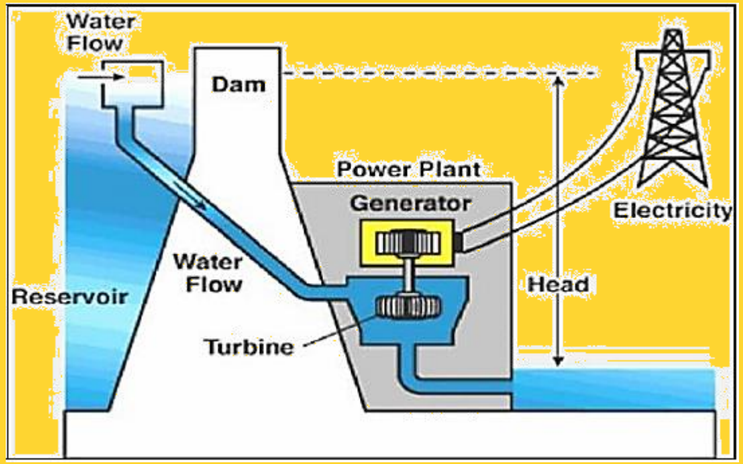
Topic 4: Types of DC generator

What We'll Discuss

TOPIC OUTLINE

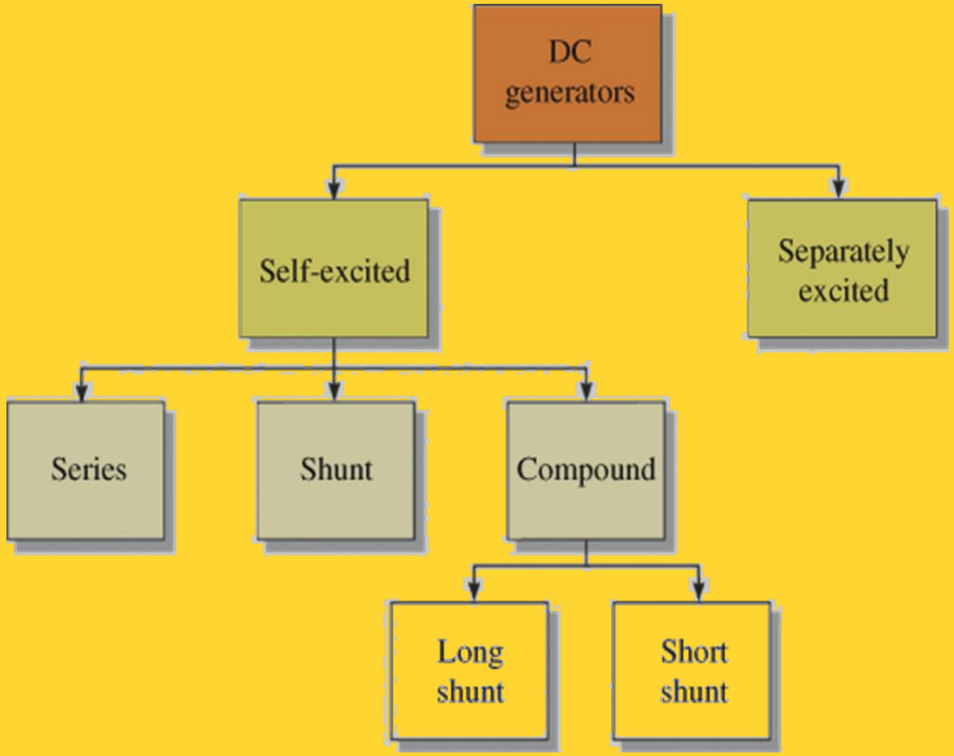
A Case
Classification of DC Generator
Types of Excitation
Assessment

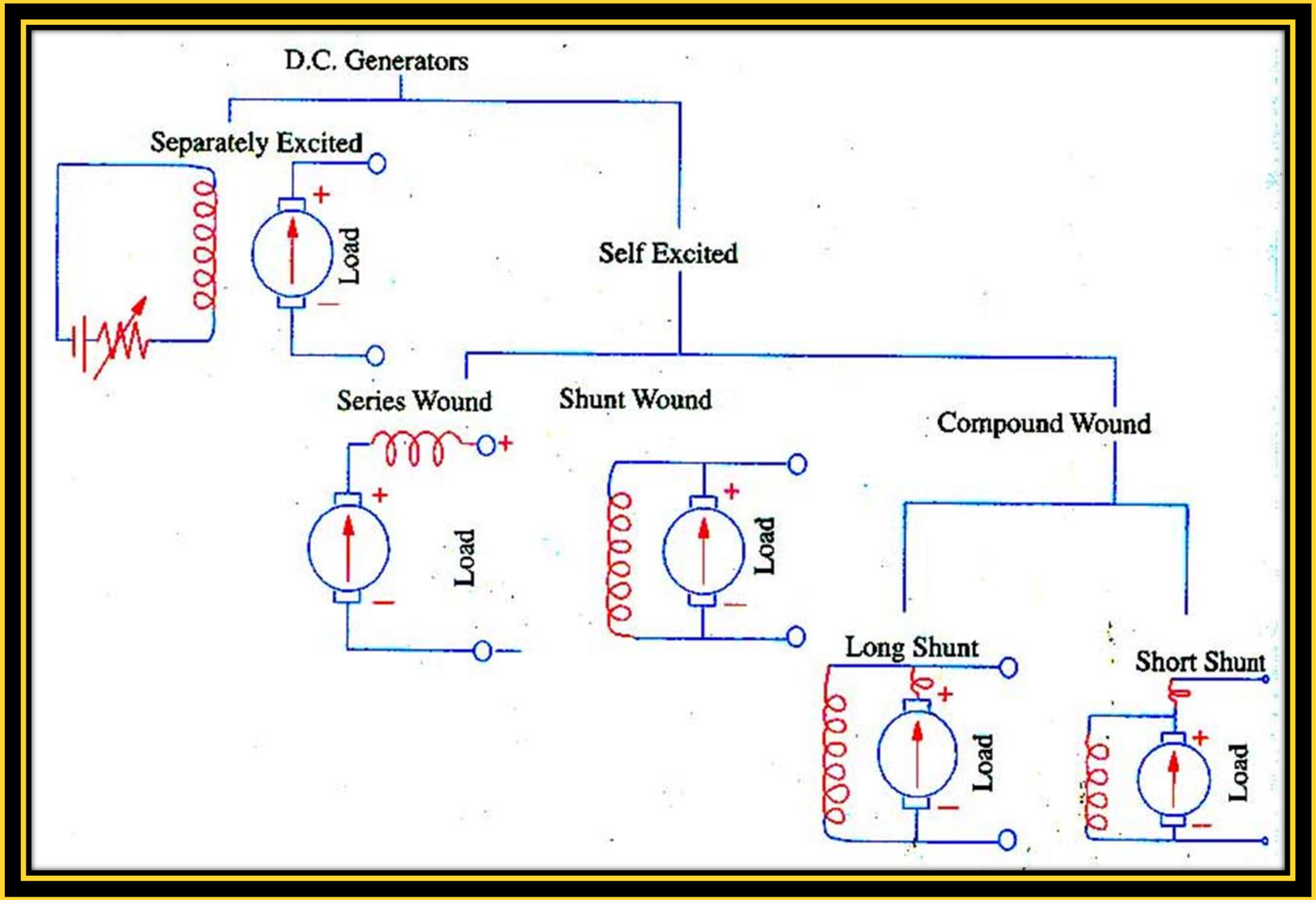
A CASE



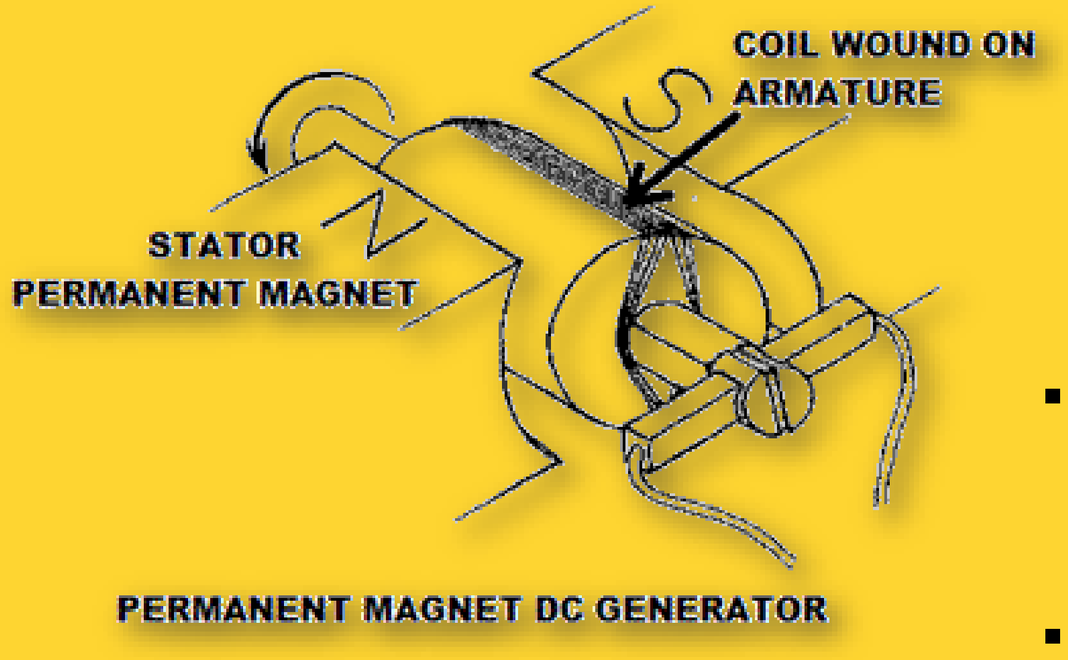
- Identify the types of Generating stations
- Think whether the same types of generator can be used in all these places?

Classification – DC Generator



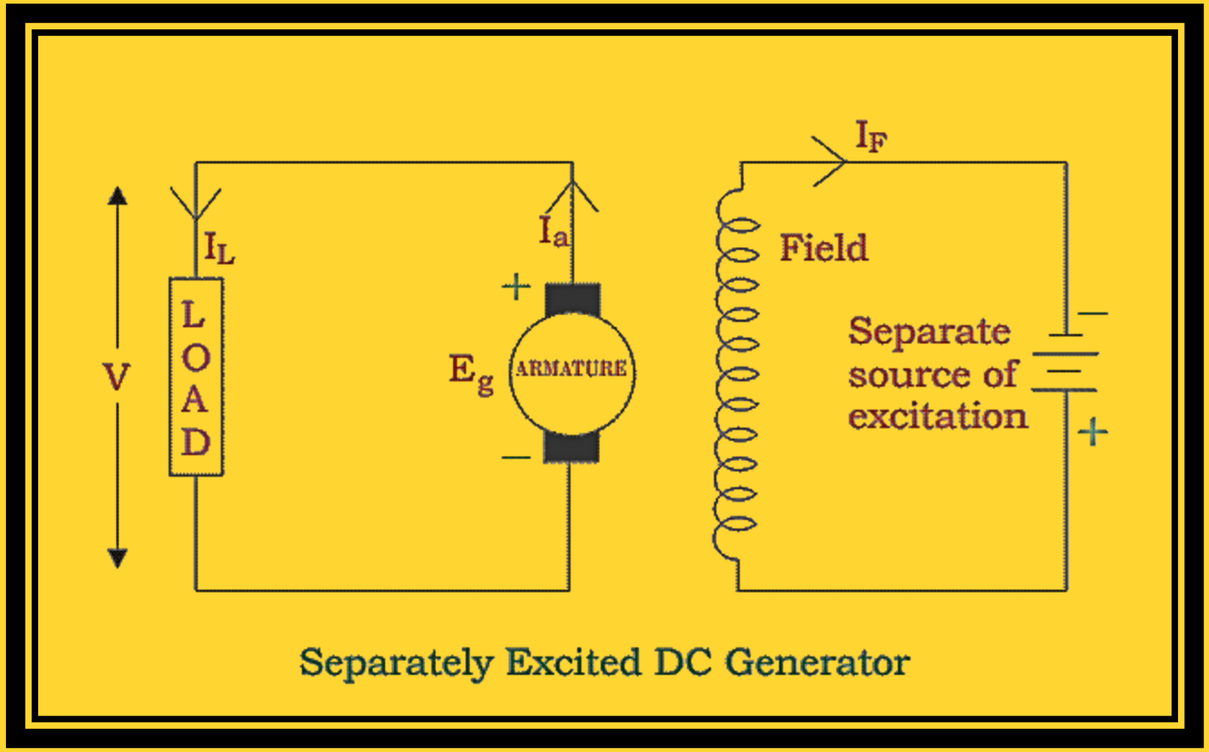


Permanent Magnet DC Generator



- When the flux in the magnetic circuit is created through the use of permanent magnets, then it is known as a Permanent magnet DC generator.
- It consists of an armature and one or several permanent magnets situated around the armature.
- They are normally used in small applications – like dynamos in motorcycles.

Separately Excited DC Generator



These are the generators whose field magnets are energized by some external DC source, such as a battery.

- I_a = Armature current
- I_L = Load current
- V = Terminal voltage
- E_g = Generated EMF (Electromagnetic Force)

Voltage drop in the armature = Ia × Ra

- E=Vt+ IaRa +BCD

Self Excited DC Generator

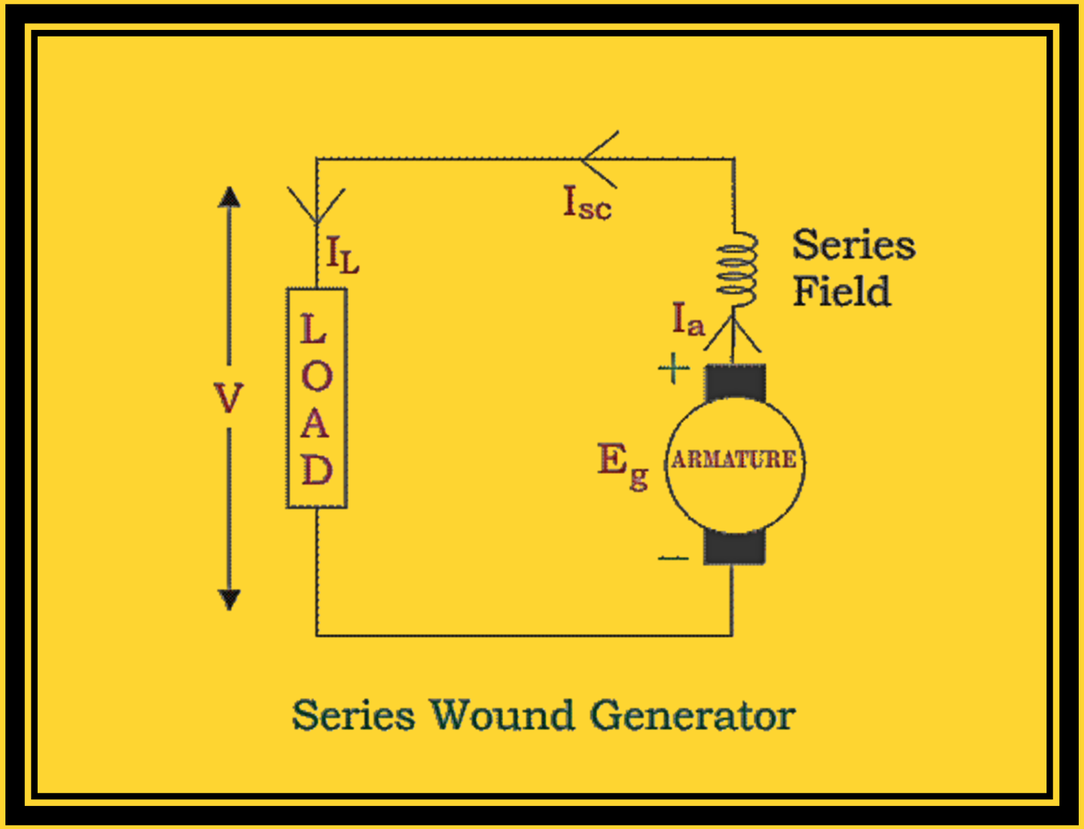
- Field magnets are energized by the current supplied by themselves.
- In these type of machines, field coils are internally connected with the armature.
- Due to residual magnetism, some flux is always present in the poles.
- When the armature is rotated, some EMF is induced. Hence some induced current is produced.
- This small current flows through the field coil as well as the load and thereby strengthening the pole flux.
- As the pole flux strengthened, it will produce more armature EMF, which cause the further increase of current through the field.
- This increased field current further raises armature EMF, and this cumulative phenomenon continues until the excitation reaches the rated value.

According to the position of the field coils, self-excited DC generators may be classified as:

1.Series Wound Generators
2.Shunt Wound Generators
3.Compound Wound Generators

Series Wound Generator

- In these type of generators, the field windings are connected in series with armature conductors



Here:

R_{sc} = Series winding resistance

I_{sc} = Current flowing through the series field

R_a = Armature resistance

I_a = Armature current

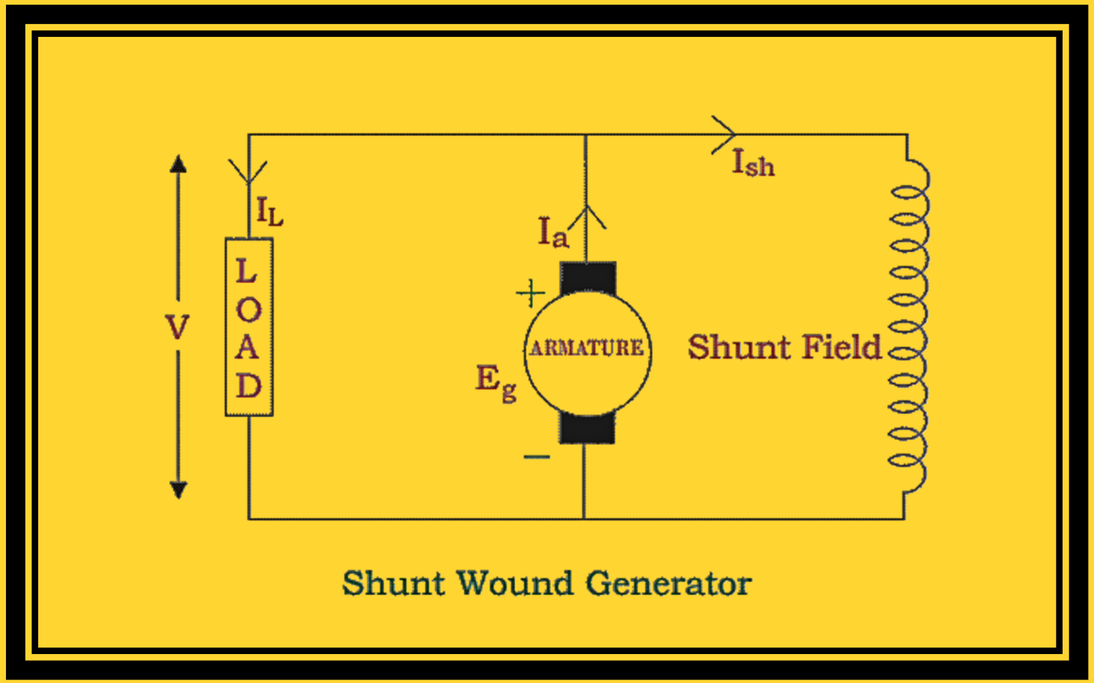
I_L = Load current

V = Terminal voltage

E_g = Generated EMF

Shunt Wound Generator

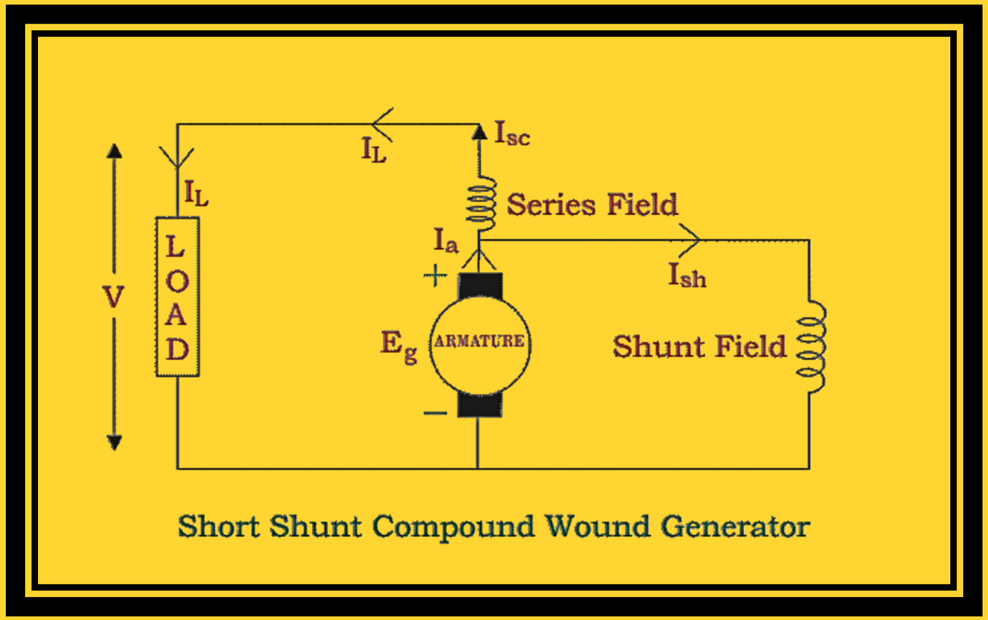
- In these type of generators, the field windings are connected in parallel with armature conductors



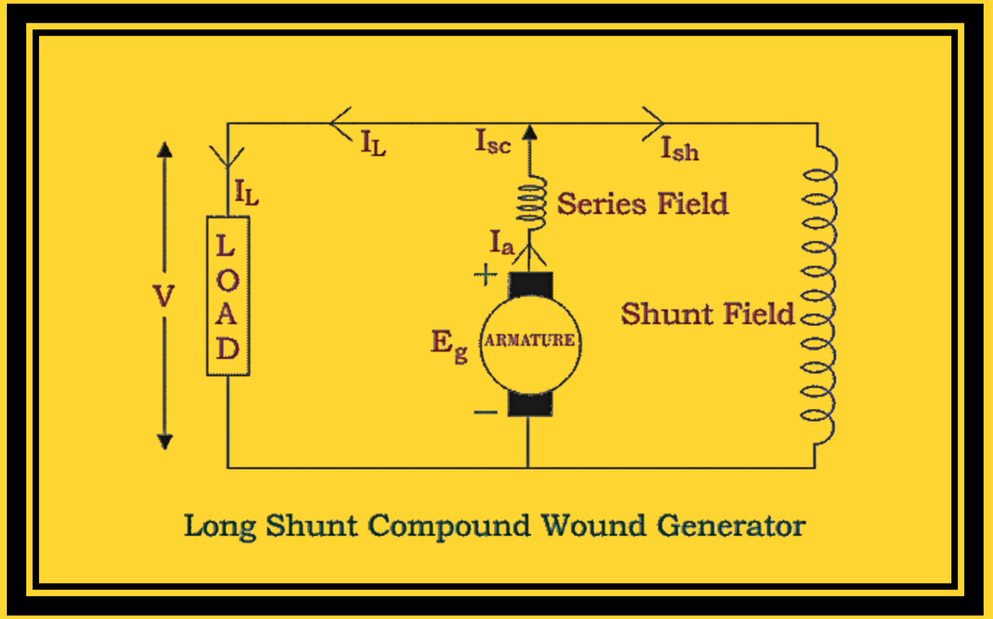
Here:
R_{sh} = Shunt winding resistance
I_{sh} = Current flowing through the shunt field
R_a = Armature resistance
I_a = Armature current
I_L = Load current
V = Terminal voltage
E_g = Generated EMF

Compound Wound Generator

- Compound wound generators have both series field winding and shunt field winding. One winding is placed in series with the armature, and the other is placed in parallel with the armature.



Short Shunt Compound Wound Generator

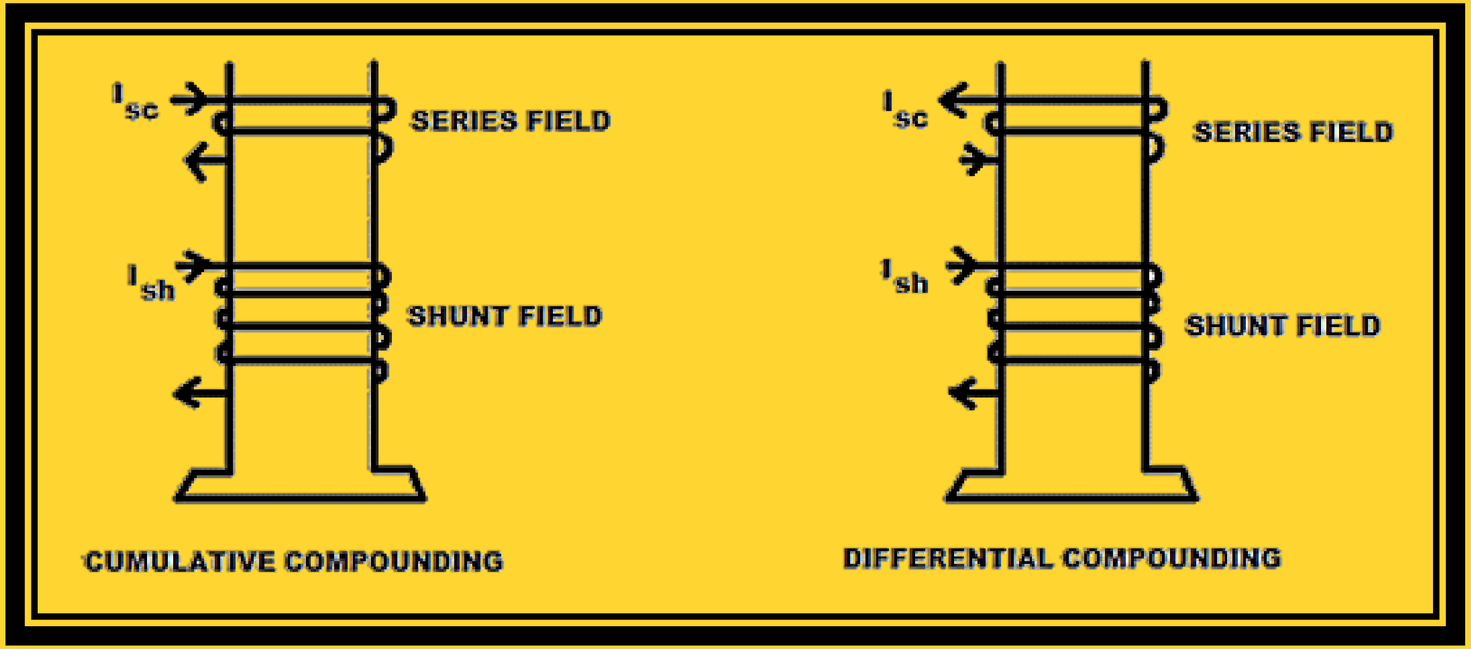


Long Shunt Compound Wound Generator

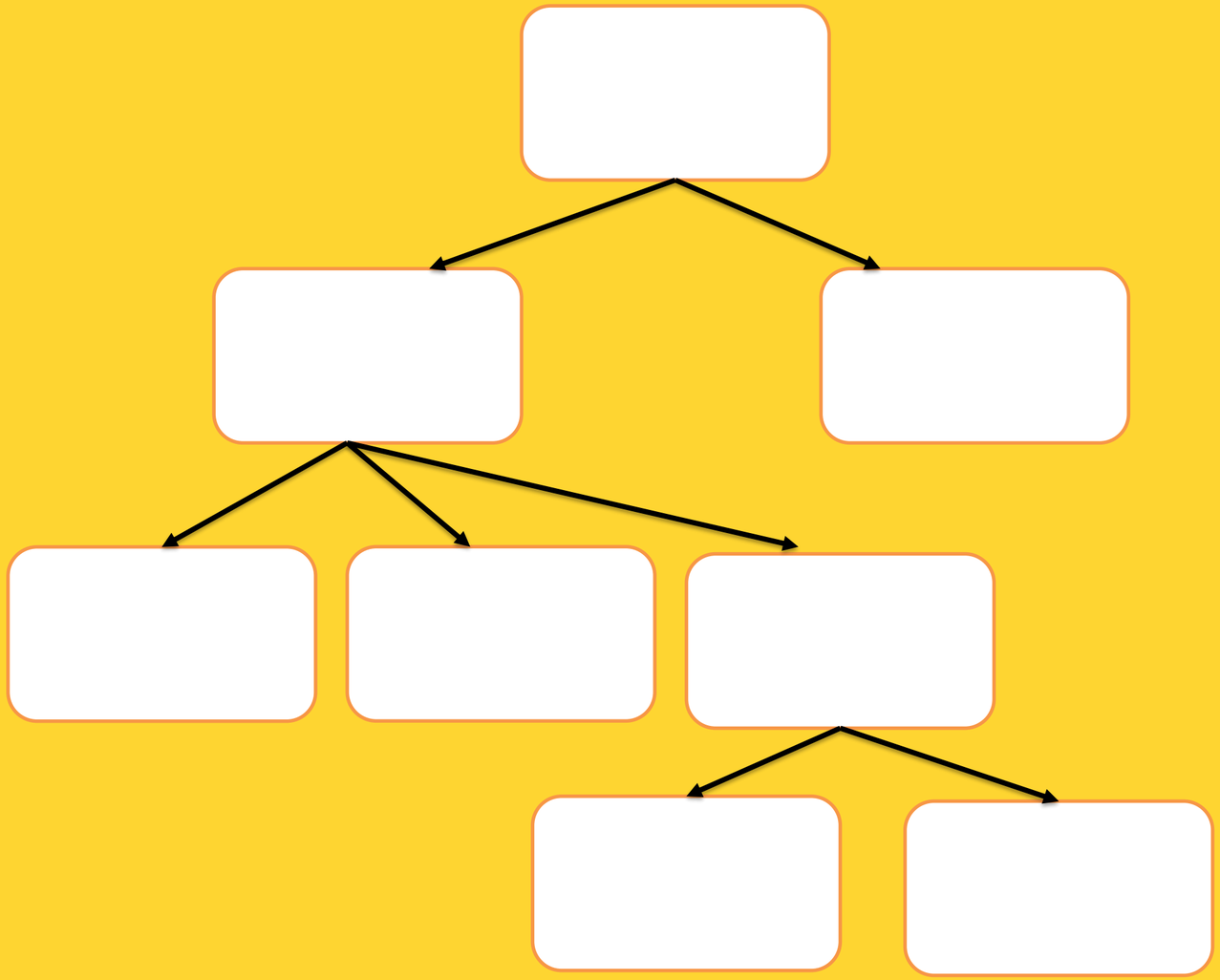
Compound Wound Generator

In a compound wound generator, the shunt field is stronger than the series field. When the series field assists the shunt field, generator is said to be **commutatively compound wound**.

On the other hand, if the series field opposes the shunt field, the generator is said to be **differentially compound wound**.



Recall the types of DC Generator



THANK YOU