



# **SNS COLLEGE OF ENGINEERING**

Kurumbapalayam (Po), Coimbatore – 641 107

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE NAME : 19EE301 BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

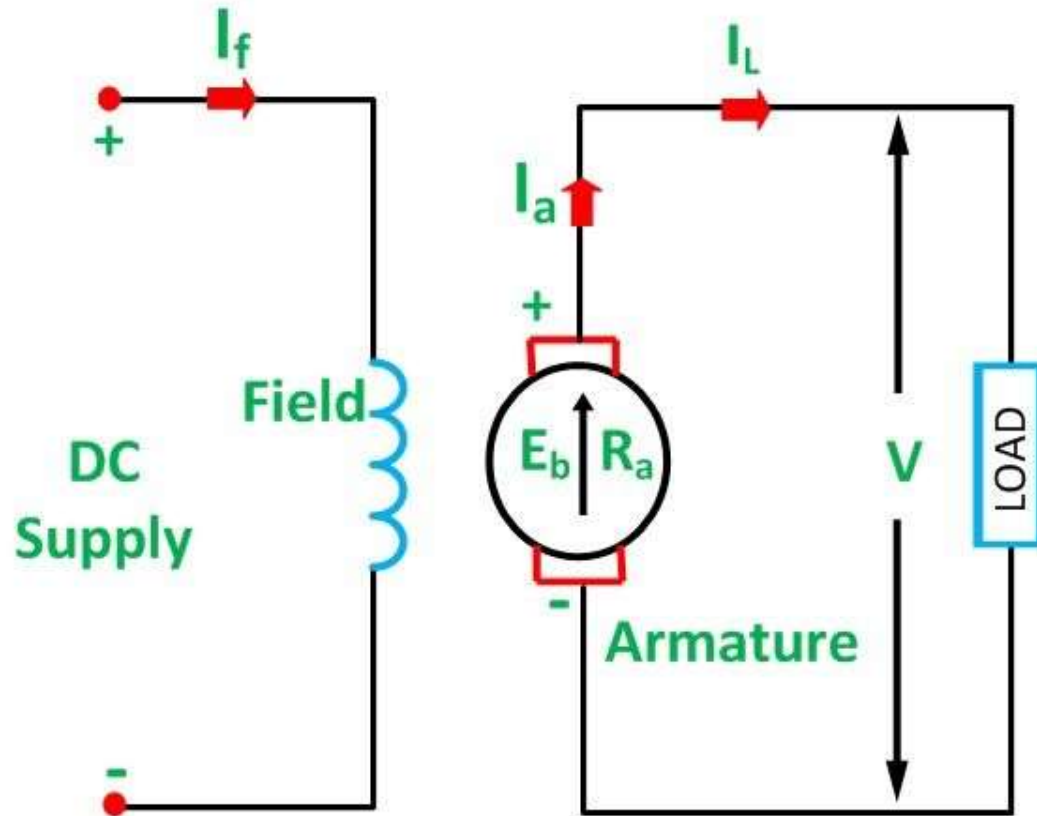
**IYEAR /I SEMESTER MECHATRONICS**

**Unit 1 – DC MACHINES**

**Voltage Equation & Characteristics of DC Generator**



# GENERAL REPRESENTATION OF DC GENERATOR



Field Winding – Electromagnet

$I_f$ - Field current

Armature Winding – Motor shape

$I_a$ - Armature current

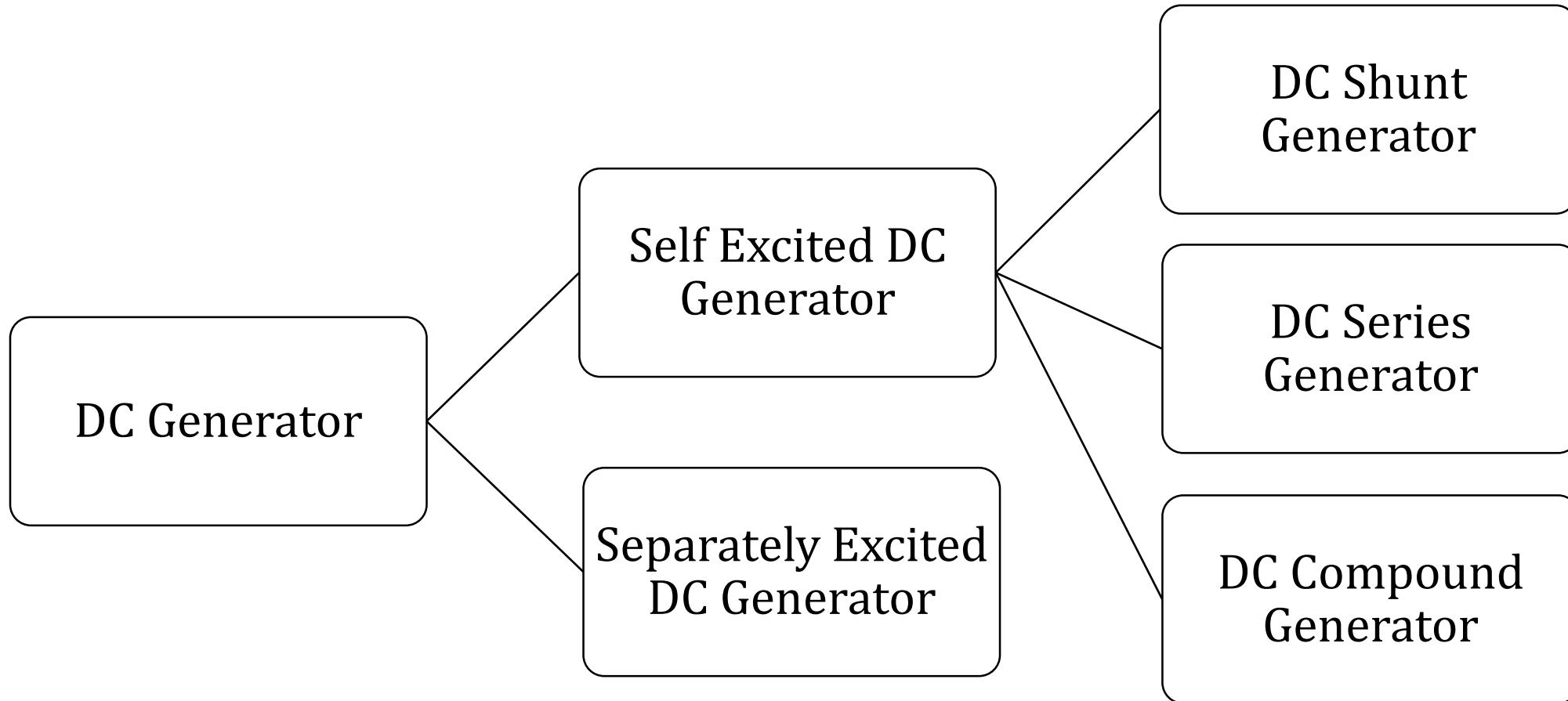
$I_L$ - Load Current

$V$ -Voltage across the load

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# TYPES OF DC GENERATOR





# SEPERATELY EXCITED DC GENERATOR

$I_a = I_L$  where  $I_a$  is the armature current and  $I_L$  is the line current.

Terminal voltage is given as

$$V = E_g - I_a R_a \dots\dots (1)$$

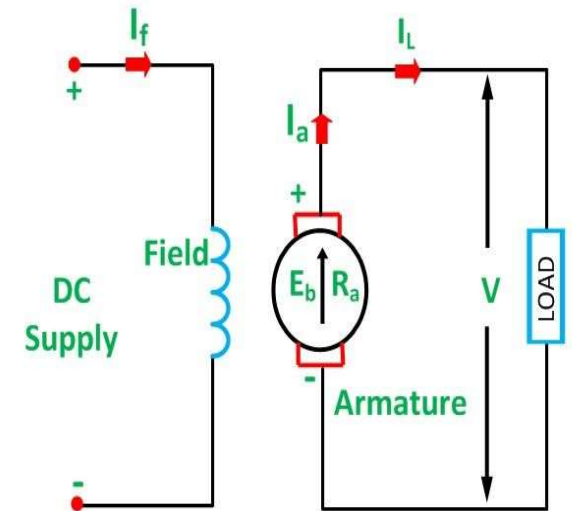
If the contact brush drop is known, then the equation (1) is written as

$$V = E_g - I_a R_a - 2v_b \dots\dots (2)$$

- The power developed is given by the equation shown below

$$\text{Power developed} = E_g I_a \dots\dots\dots (3)$$

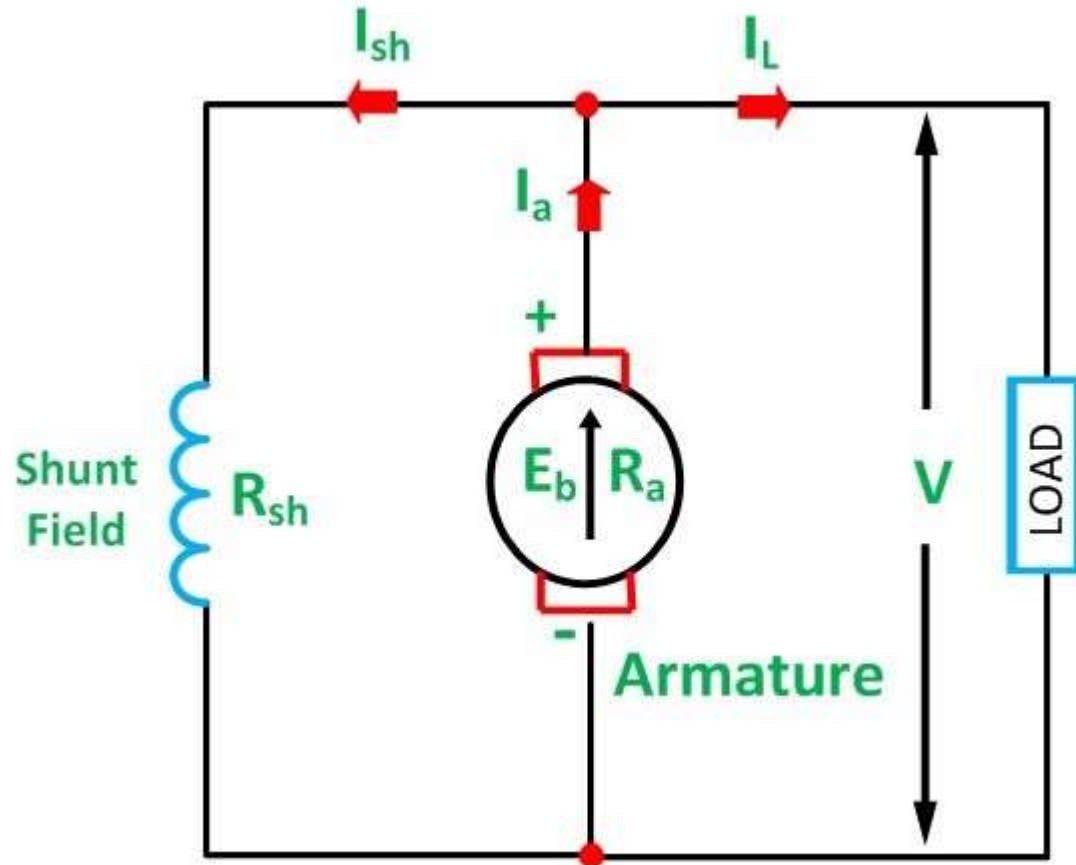
$$\text{Power output} = V I_L = V I_a \dots\dots\dots (4)$$



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# SELF EXCITED DC GENERATOR



Field winding is self excited

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# ASSESSMENT 1

1. Classify the types of DC Generators





# SHUNT GENERATOR

$$I_{sh} = \frac{V}{R_{sh}}$$

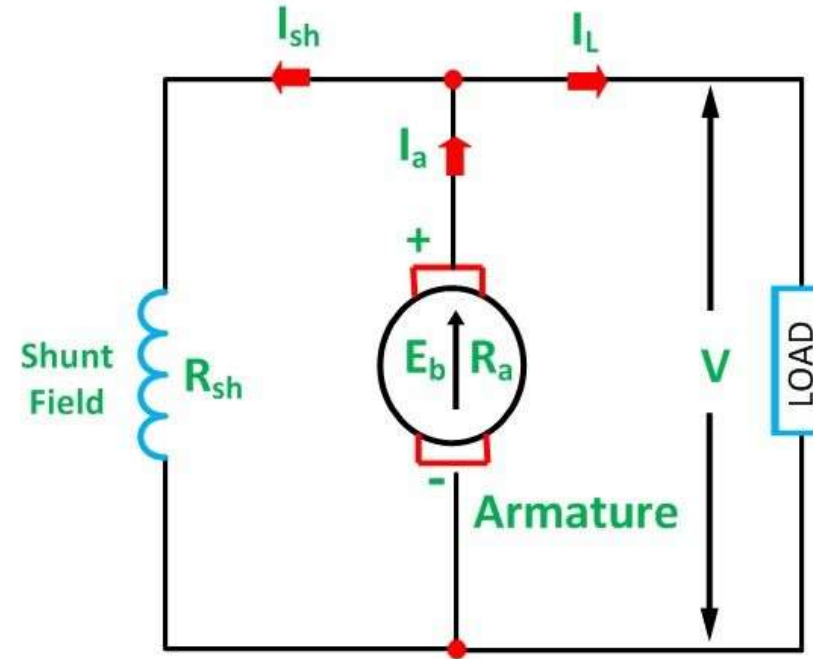
$$I_a = I_L + I_{sh}$$

$$V = E_g - I_a R_a$$

$$V = E_g - I_a R_a - 2v_b$$

$$\text{Power developed} = E_g I_a$$

$$\text{Power output} = V I_L$$



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# SERIES GENERATOR

$$I_{se} = I_L = I_a$$

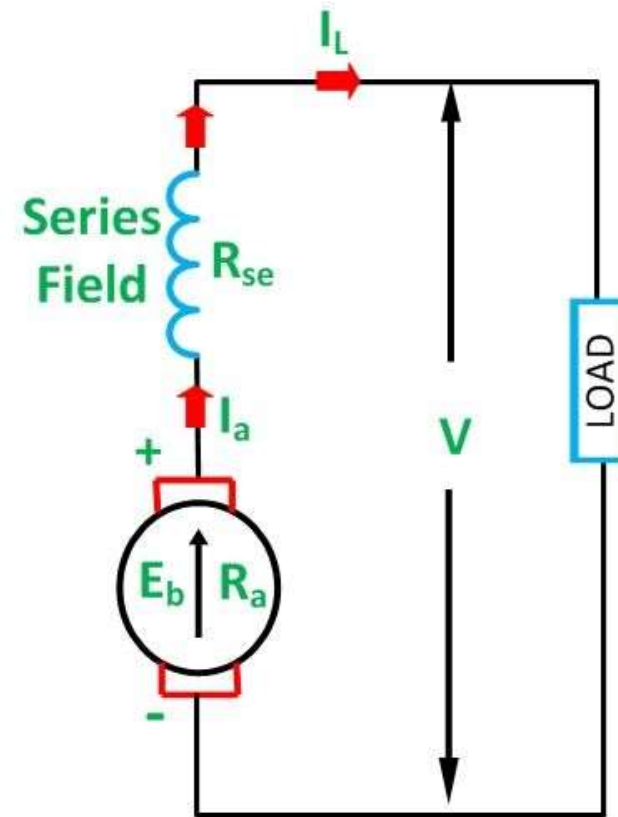
$$V = E_g - I_a R_a - I_{se} R_{se}$$

$$V = E_g - I_a (R_a + R_{se})$$

$$V = E_g - I_a (R_a + R_{se}) - 2V_b$$

$$\text{Power developed} = E_g I_a$$

$$\text{Power output} = V I_L = V I_a$$



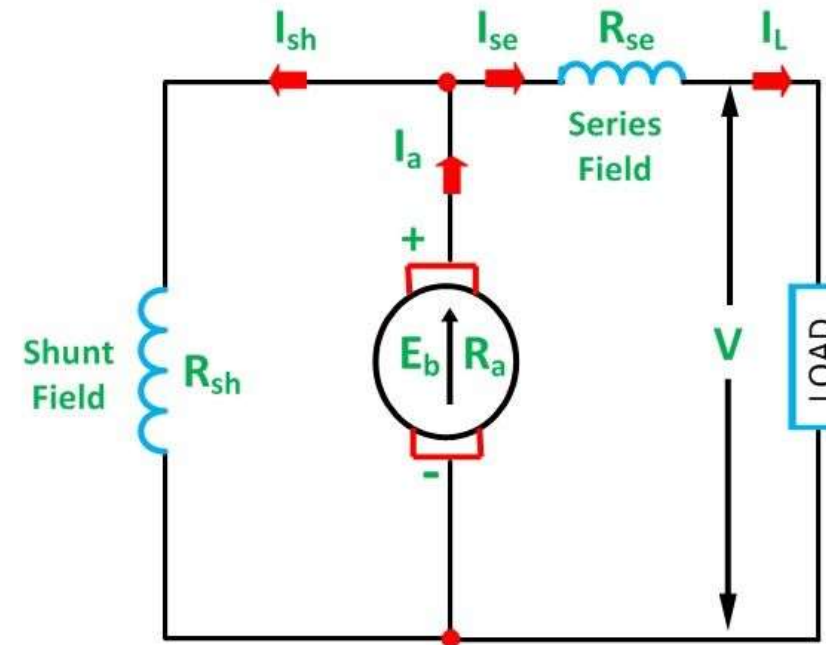
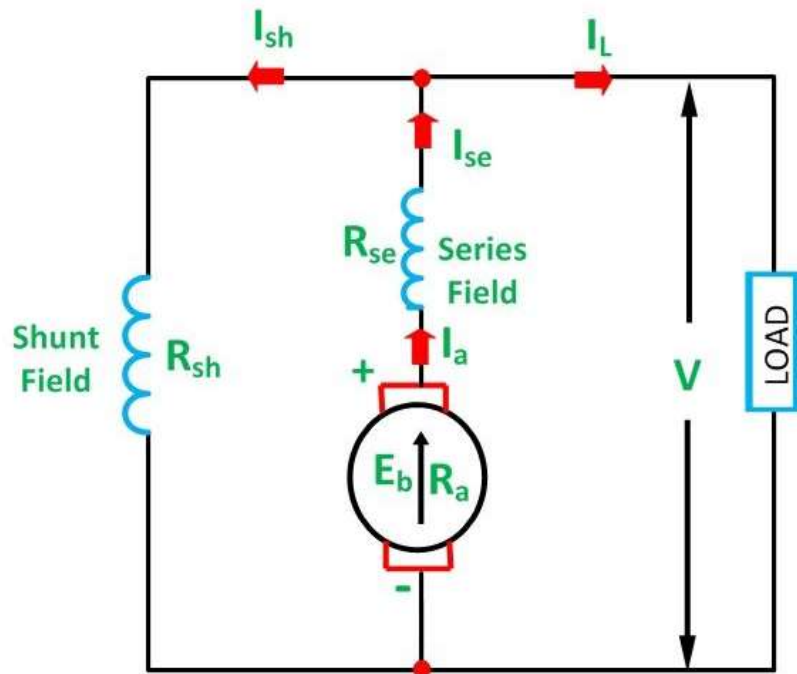
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# COMPOUND GENERATOR

## Long Shunt Compound Wound Generator

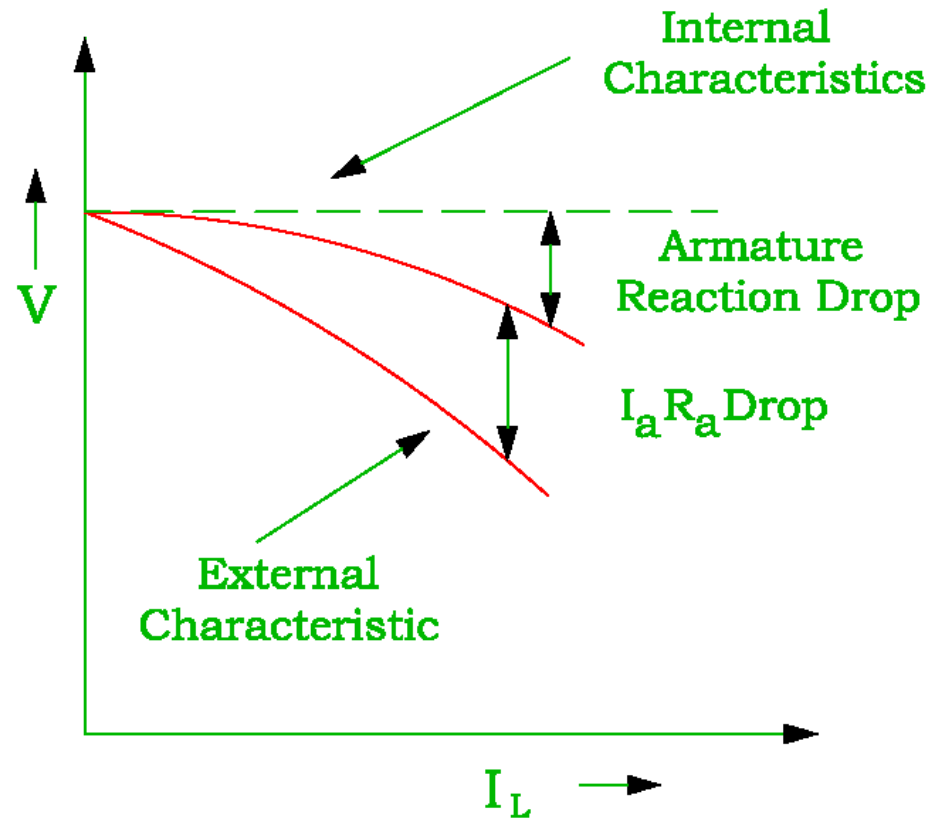
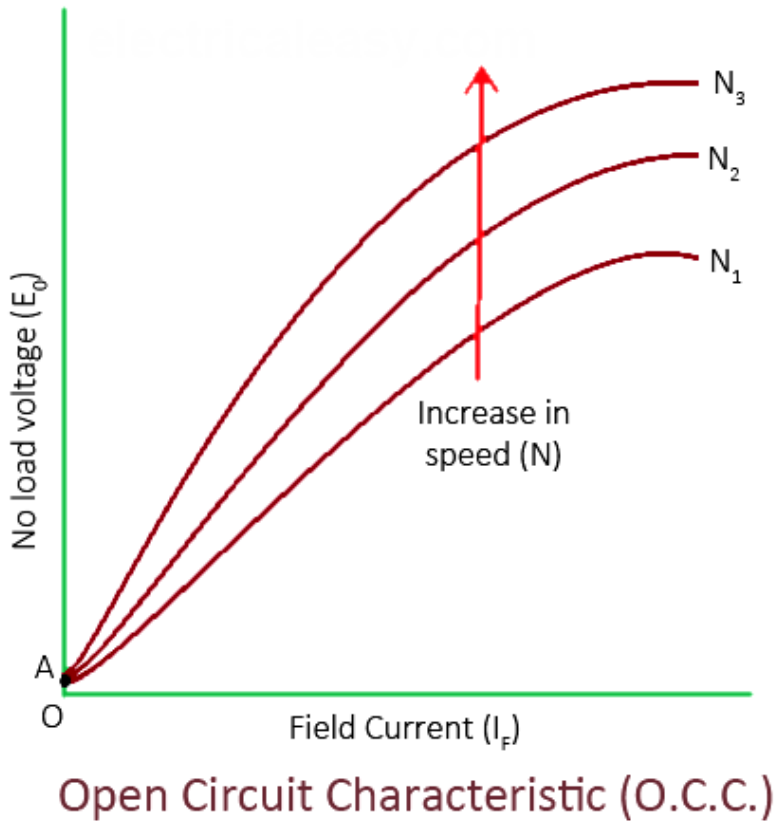


## Short Shunt Compound Wound Generator



# Characteristics of DC Generator

- Open Circuit Characteristics
- Load Characteristics





# Assessment 2

1. Write the Voltage equation of DC Series Generator.





# REFERENCES

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2. Muthu Subramanian R, Salivahanan S,“ Basic Electrical and Electronics Engineering”, Tata McGraw Hill Publishers, (2009)
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4. Nagrath. I.J, “Electronics: Analog and Digital”, Prentice Hall India Pvt. Ltd., (2013)

## THANK YOU