



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 : 19EE308 ELECTRICAL ENGINEERING & INSTRUMENTATION

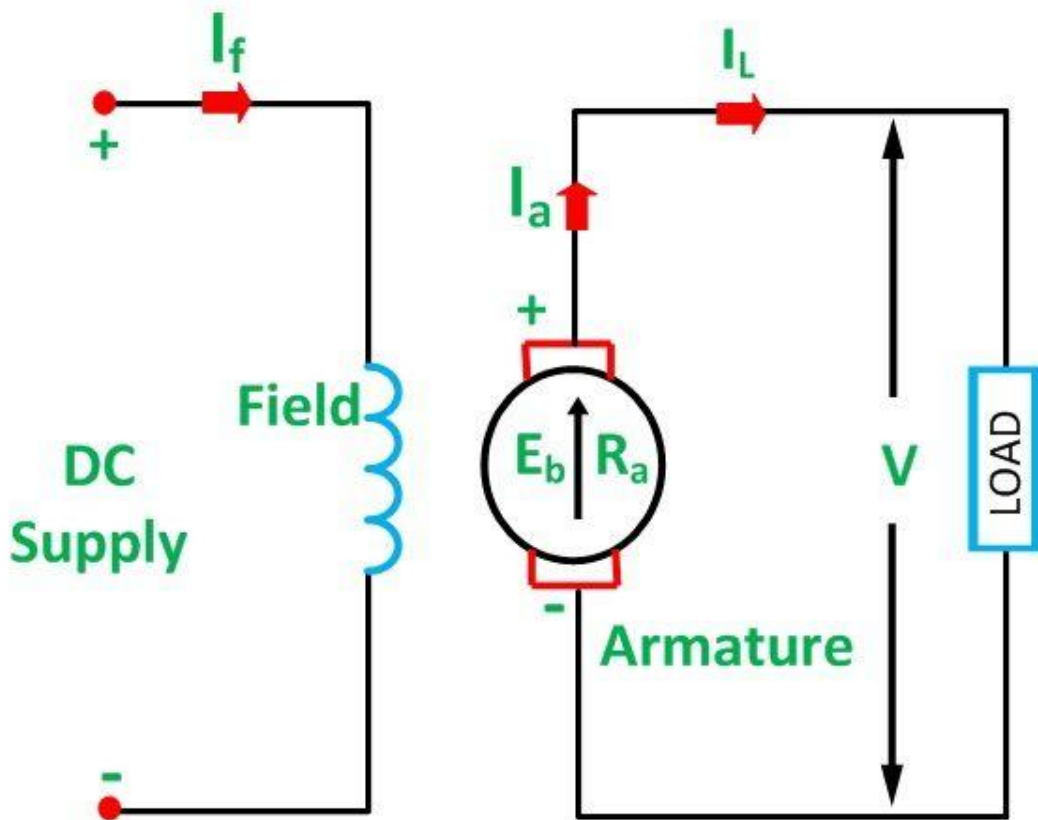
II YEAR /III SEMESTER ECE

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

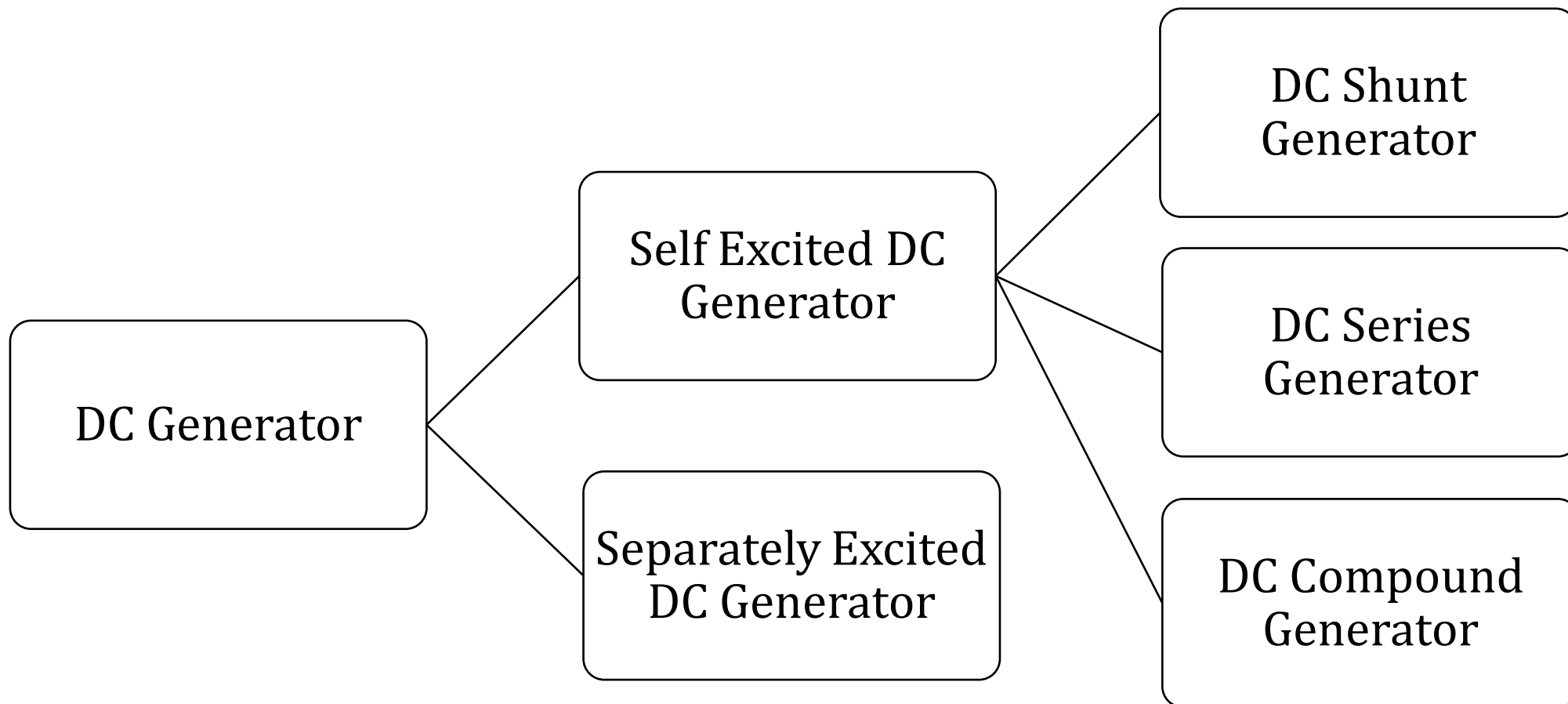
I_L - Load Current

V -Voltage across the load

Circuit Globe



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

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

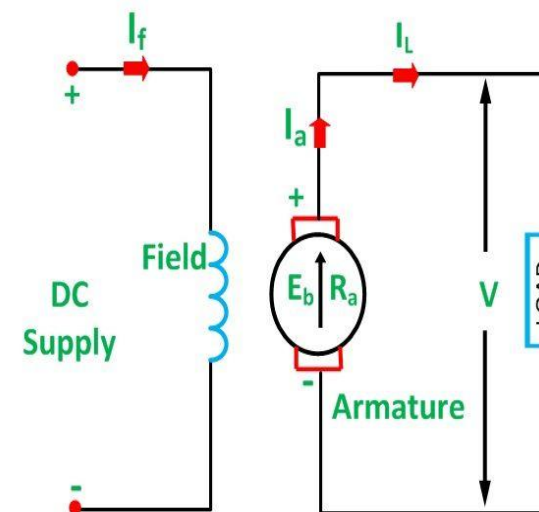
If the contact brush drop is known, then the equation (1) is written as

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

- The power developed is given by the equation shown below

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

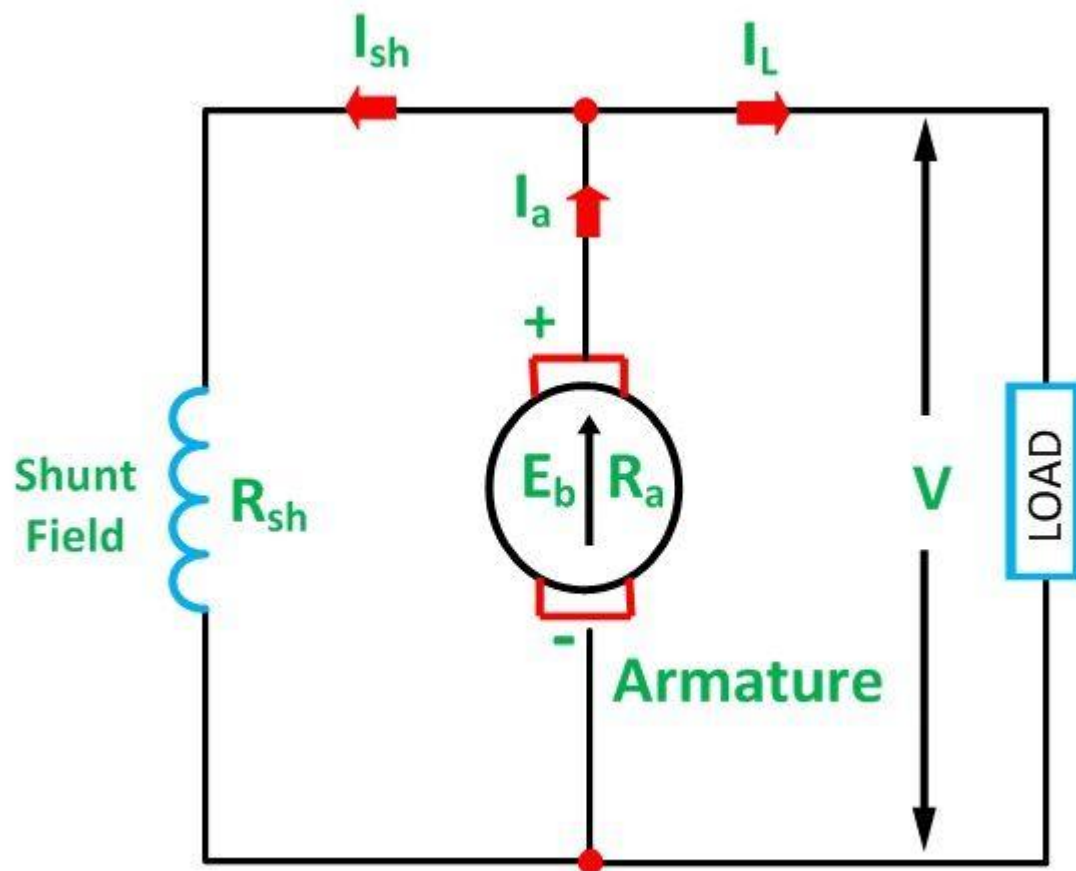
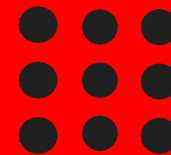
$$\text{Power output} = V I_L = V I_a \dots\dots\dots(4)$$



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SELF EXCITED DC GENERATOR



Field winding is self excited



Circuit Globe



ASSESSMENT 1

1. Classify the types of DC Generators



Voltage Equation & Characteristics of DC Generator



SHUNT GENERATOR

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

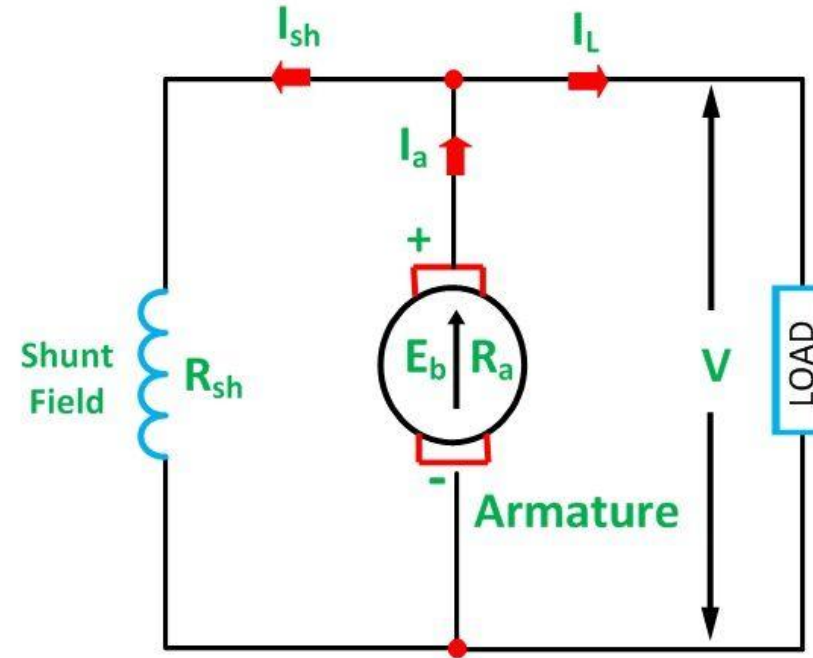
$$I_a = I_L + I_{sh}$$

$$V = E_g - I_a R_a$$

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

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

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



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SERIES GENERATOR

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

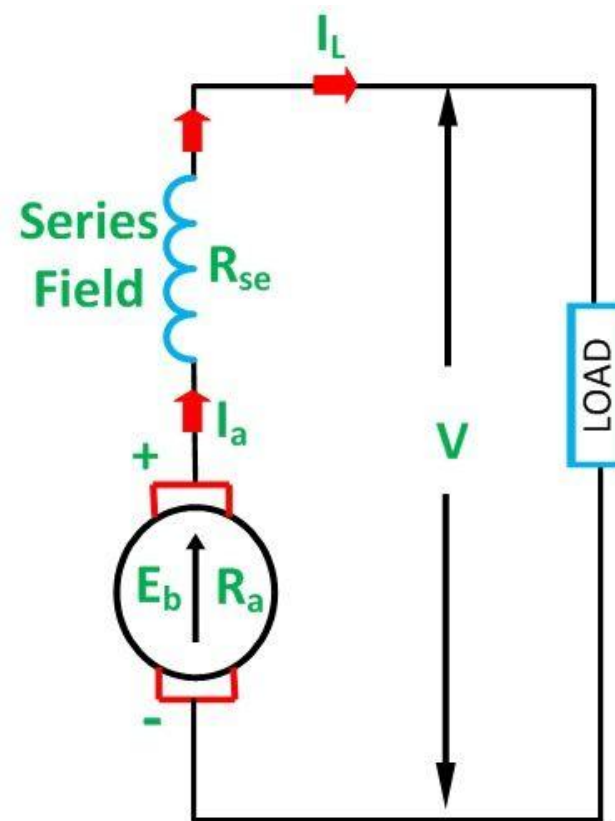
$$V = E_g - I_a R_a - I_{se} R_{se}$$

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

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

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

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

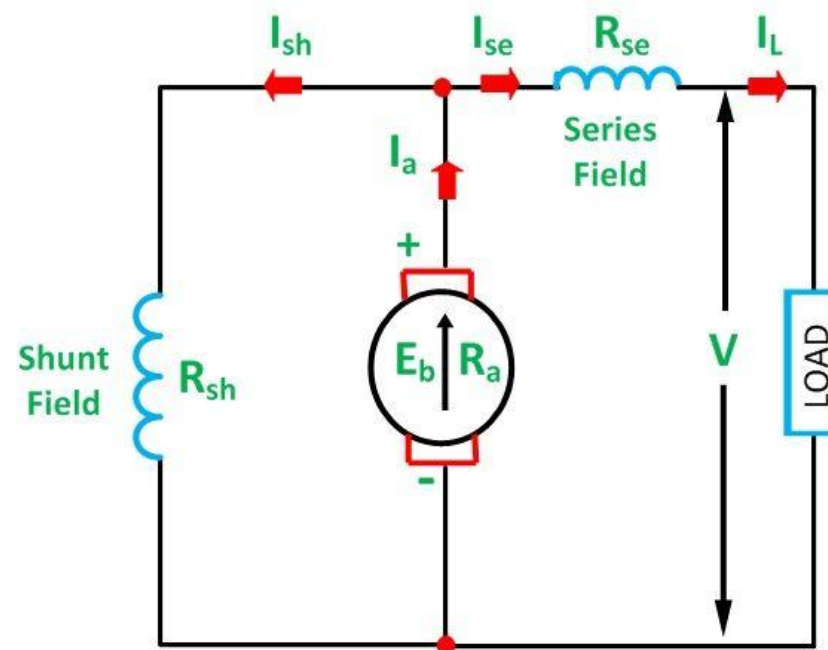
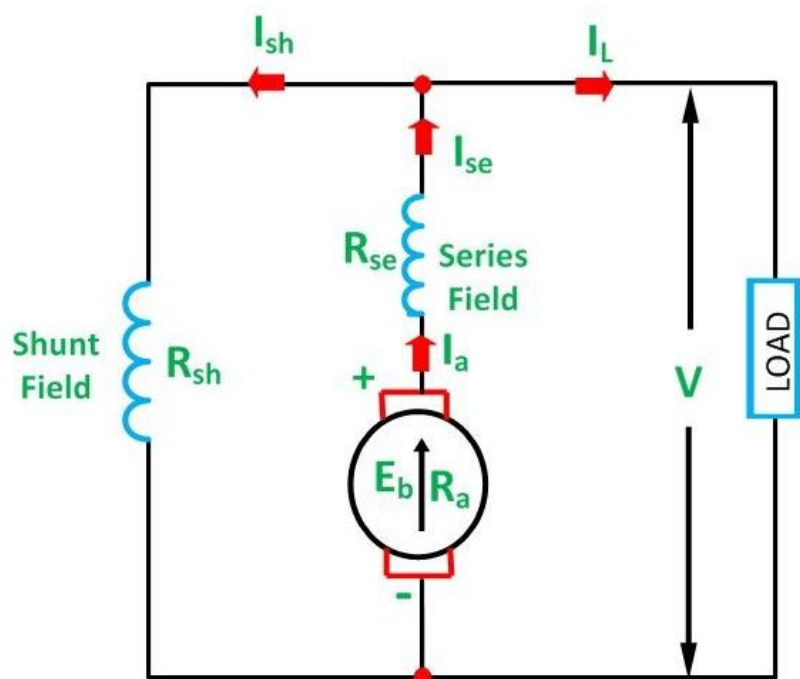


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COMPOUND GENERATOR

Long Shunt Compound Wound Generator

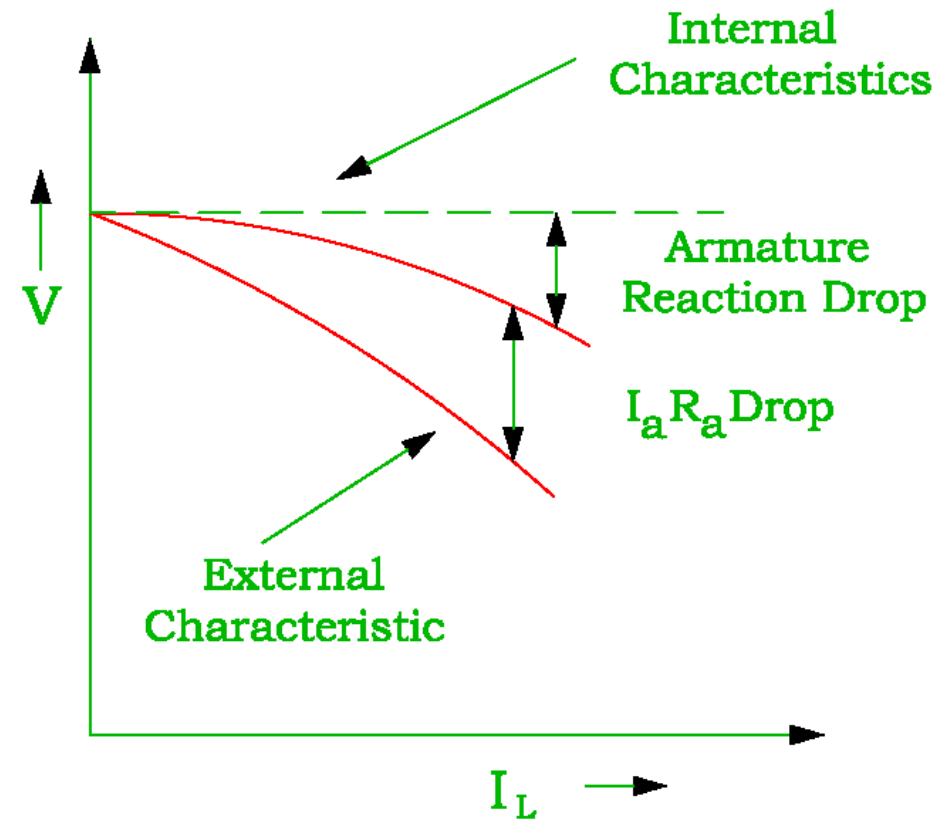
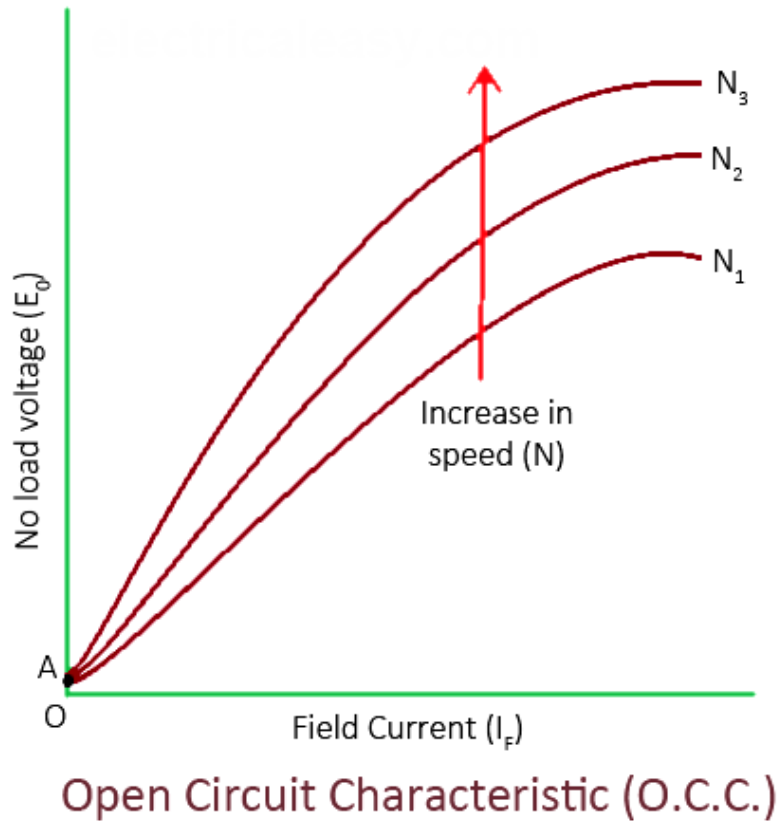


Short Shunt Compound Wound Generator



Characteristics of DC Generator

- Open Circuit Characteristics
- Load Characteristics





Assessment 2

1. Write the Voltage equation of DC Series Generator.





REFERENCES

1. Bhattacharya. S.K, “Basic Electrical and Electronics Engineering”, Pearson Education , (2017)
2. Muthu Subramanian R, Salivahanan S,“ Basic Electrical and Electronics Engineering”, Tata McGraw Hill Publishers, (2009)
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THANK YOU