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 : 19EE303- DC MACHINES & TRANSFORMERS

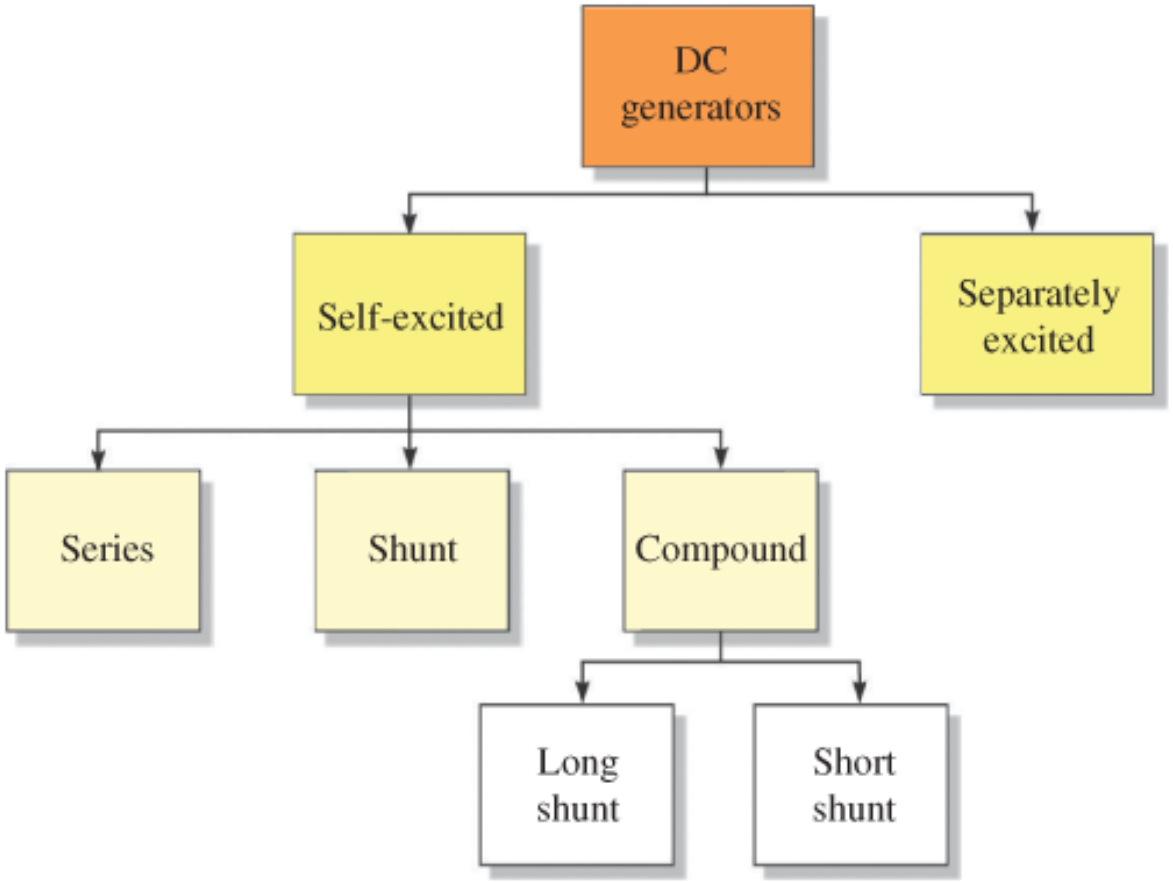
(Theory Integrated Practical)

II YEAR /III SEMESTER EEE

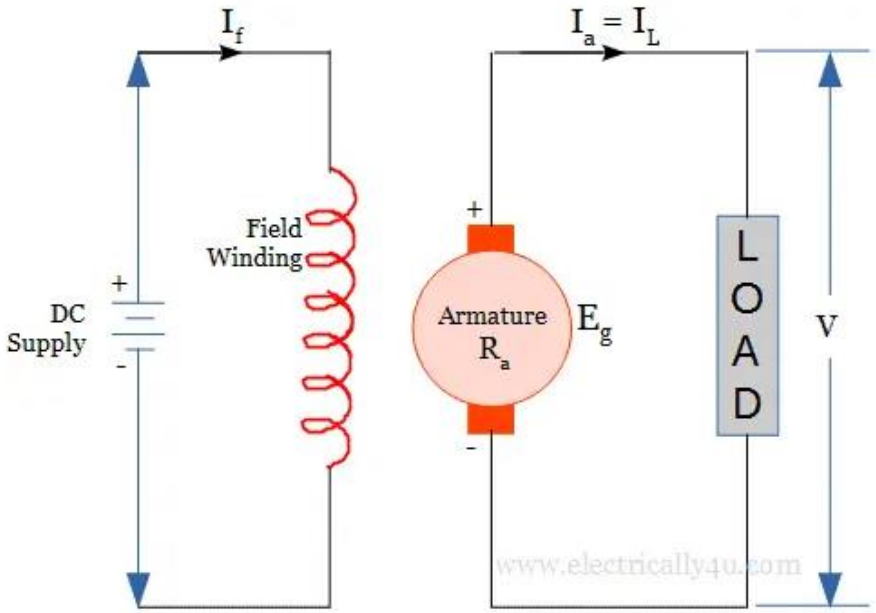
Unit 1 – DC Generator

Types of DC Generator

TYPES OF DC GENERATOR



SEPERATELY EXCITED DC GENERATOR



I_f– Field current, I_a – Armature current, I_L – Load current

R_a – Armature winding resistance

V – terminal voltage

Let V_{br} be the voltage drop at the brush contacts. Armature current is given by, $I_a = I_L$

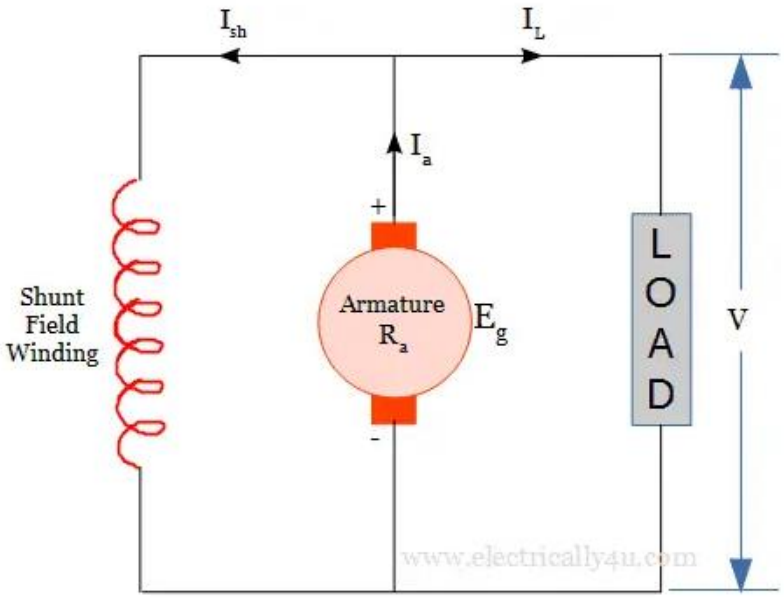
Applying Kirchoff's Voltage Law to the armature circuit, $E_g - I_a R_a - V - V_{br} = 0$

Thus, the generated Emf equation $E_g = I_a R_a + V + V_{br}$

Power developed in the DC generator = $E_g I_a$

Power delivered to the load = $V I_a$

SHUNT WOUND DC GENERATOR



I_{sh} – Shunt field current, I_a – Armature current, I_L – Load current

R_a – Armature resistance, V – terminal voltage, V_{br} – Brush contact drop

Armature current is given by, $I_a = I_L + I_{sh}$

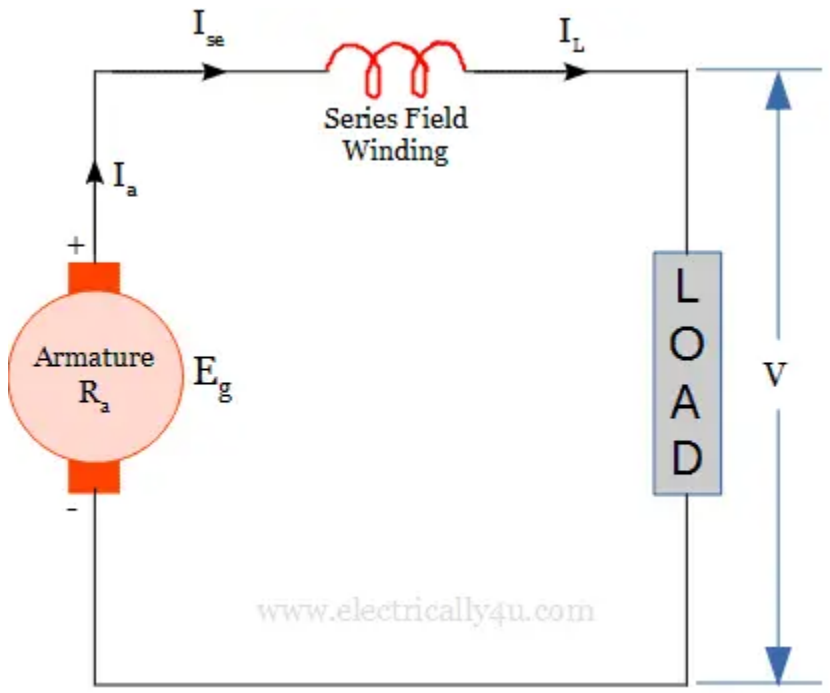
Shunt field current $I_{sh} = V/R_{sh}$, Where R_{sh} – shunt field resistance

Terminal voltage equation is given by, $V = E_g - I_a R_a - V_{br}$

Power developed in the DC generator = $E_g I_a$

Power delivered to the load = $V I_L$

SERIES WOUND DC GENERATOR



I_{se} – SERIES field current, I_a – Armature current, I_L – Load current

R_a – Armature resistance, V – terminal voltage,

V_{br} – Brush contact drop

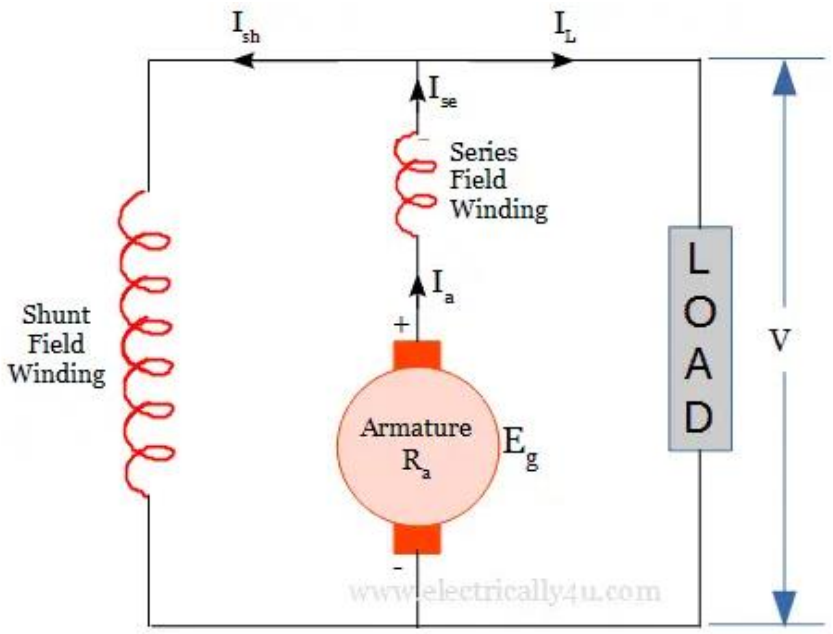
Armature current is given by, $I_a = I_{se} = I_L$

Terminal voltage equation is given by, $V = E_g - I_a R_a - I_a R_{se} - V_{br}$

Power developed in the DC generator = $E_g I_a$

Power delivered to the load = $V I_L$

LONG SHUNT COMPOUND DC GENERATOR



I_{sh} – Shunt field current, I_{se} – series field current, I_a – Armature current, I_L – Load current,

R_a – Armature resistance, V – terminal voltage,

V_{br} – Brush contact drop

Armature current is given by, $I_a = I_{se} = I_L + I_{sh}$

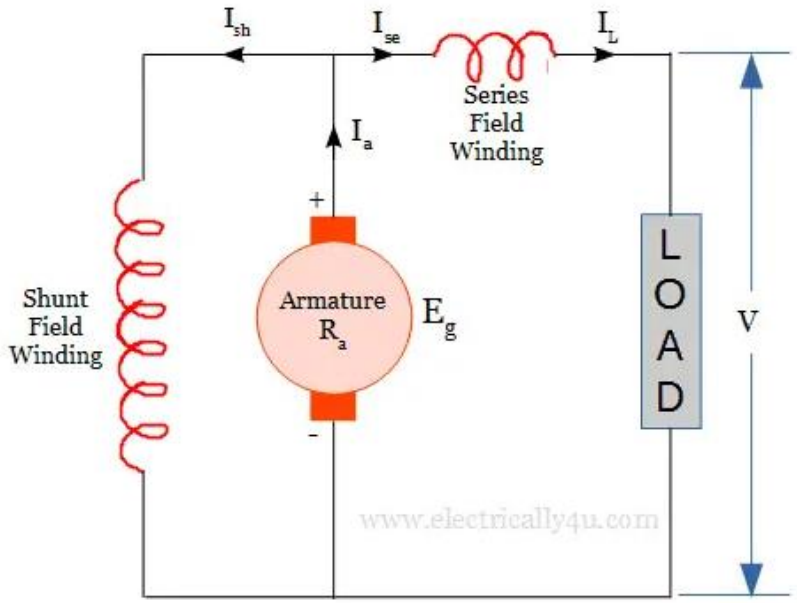
Shunt field current $I_{sh} = V/R_{sh}$, Where R_{sh} – shunt field resistance

Terminal voltage equation is given by, $V = E_g - I_a R_a - I_a R_{se} - V_{br}$

Power developed in the DC generator = $E_g I_a$

Power delivered to the load = $V I_L$

SHORT SHUNT COMPOUND DC GENERATOR



R_a – Armature resistance, V – terminal voltage, V_{br} – Brush contact drop

Armature current is given by, $I_a = I_L + I_{sh}$ where $I_L = I_{se}$

Terminal voltage equation is given by, $V = E_g - I_a R_a - I_{se} R_{se} - V_{br}$

Generated Emf equation, $E_g = V + I_a R_a + I_{se} R_{se} + V_{br}$
Voltage drop across shunt field winding = $I_{sh} R_{sh}$
Shunt field current $I_{sh} = (E_g - I_a R_a - V_{br})/R_{sh}$, Where R_{sh} – shunt field resistance

By substituting the value of E_g in the above equation, we get shunt field current $I_{sh} = (V + I_{se} R_{se})/R_{sh}$

Power developed in the DC generator = $E_g I_a$

Power delivered to the load = $V I_L$

REFERENCES

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THANK YOU