

CAHCET

OUTLINE

Electrical Engg
DC Motors

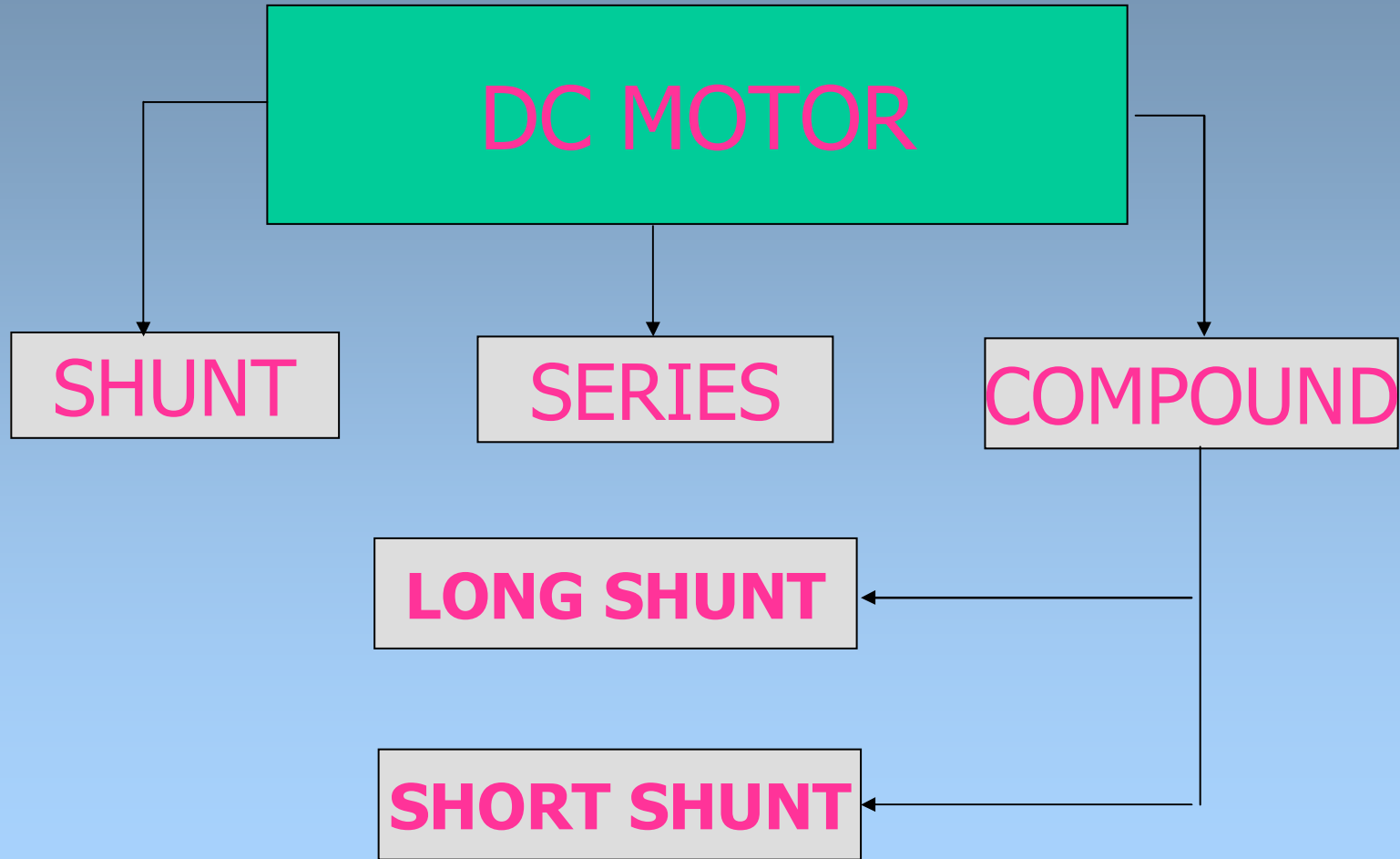
DEPT OF
EEE

Types of dc motors
characteristics of dc motor
starting of dc motors
Applications of dc motor

TYPES OF DC MOTOR

Electrical Engg
DC Motors

DEPT OF
EEE

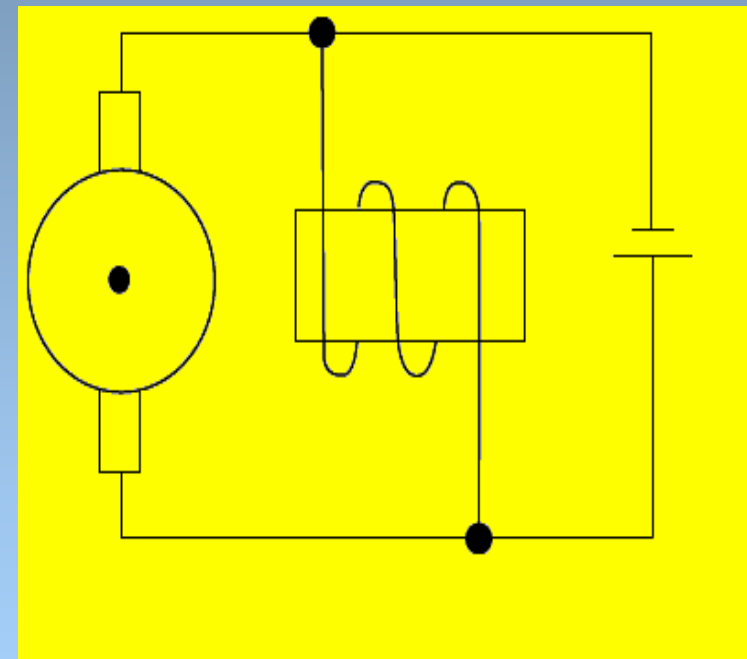
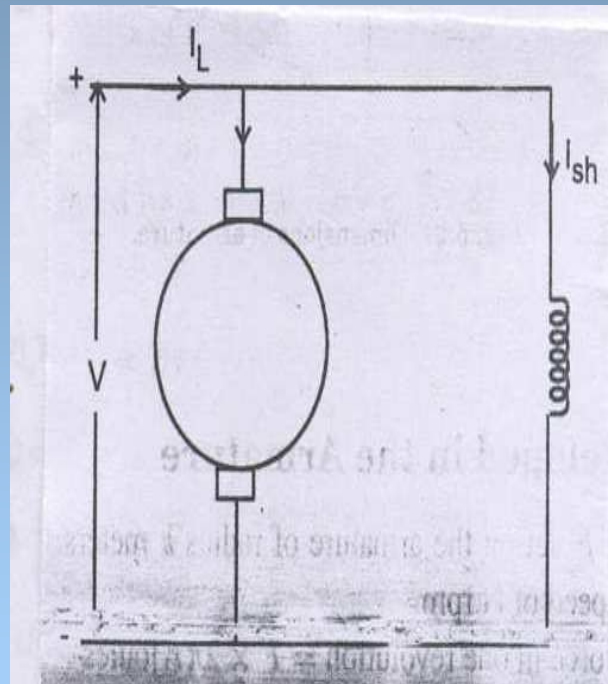


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DC SHUNT MOTOR

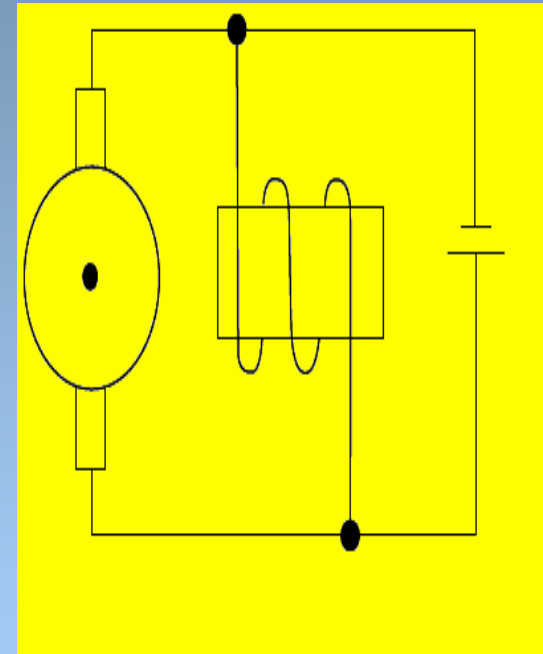
Electrical Engg
DC Motors

DEPT OF
EEE



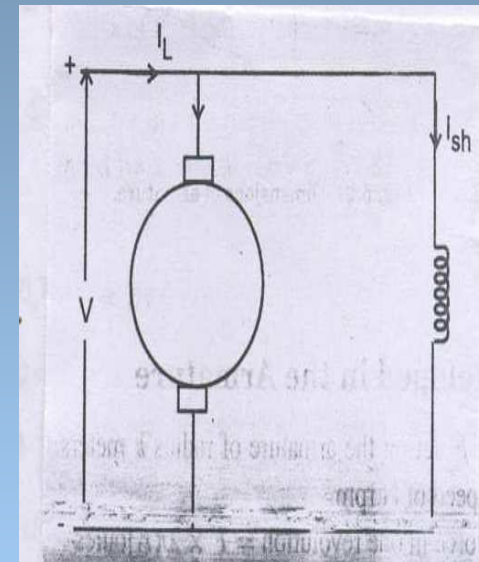
DC SHUNT MOTOR

- **Field winding & armature winding**
- **connected in parallel**
- **Hence called shunt motor**
- **Both the windings are connected across the supply**



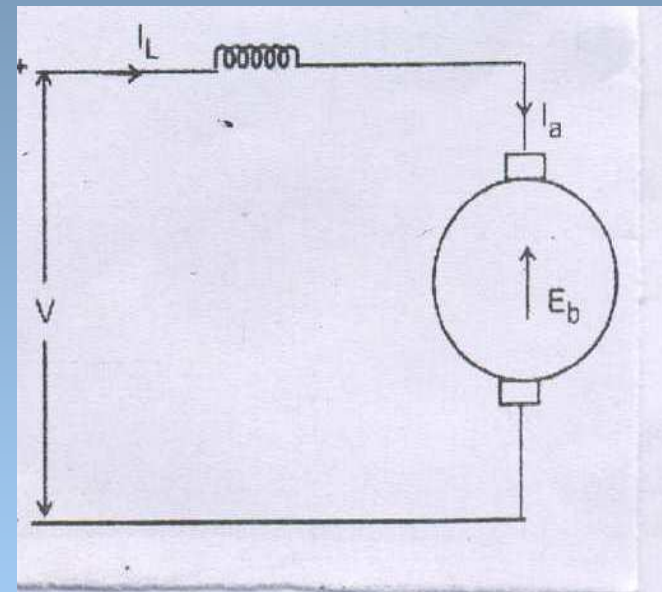
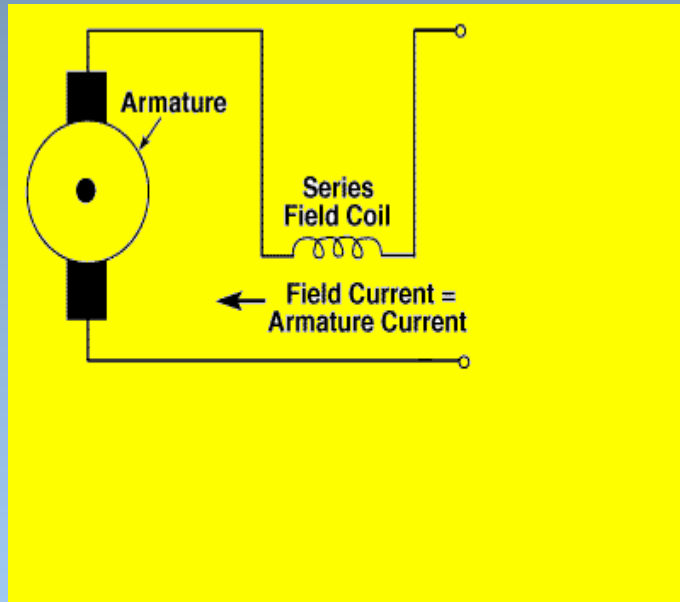
DC SHUNT MOTOR

- $I_L = I_a + I_{sh}$
- $V = E_b + I_a R_a$
- $\Phi \propto I_{sh}$
- **Since supply voltage is constant the flux produced is also constant**
- **constant flux motor (flux is constant)**

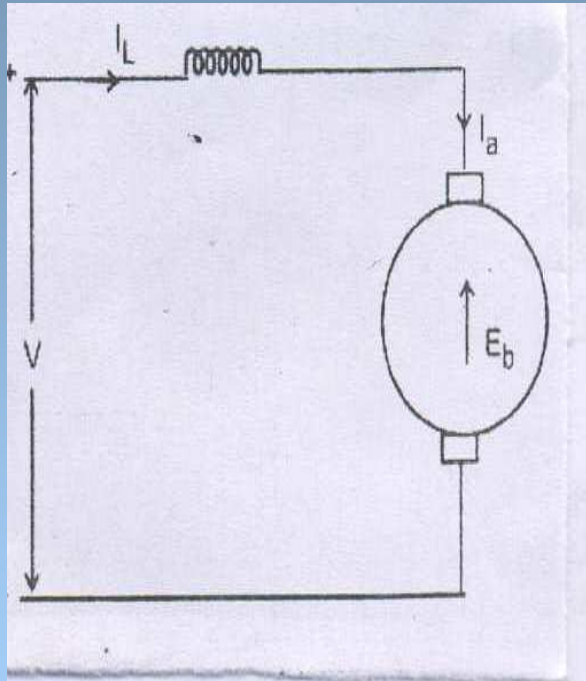


DC SERIES MOTOR

Electrical Engg
DC Motors



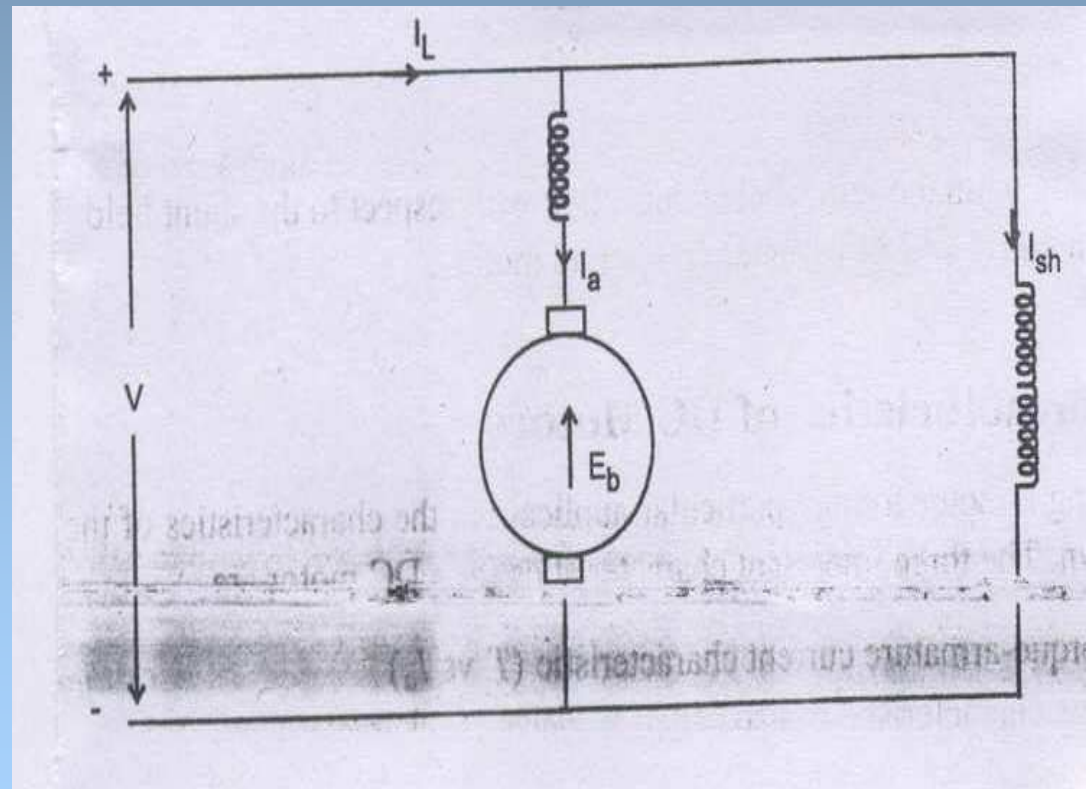
DC SERIES MOTOR



- Both the windings are connected in series
- $I_L = I_a = I_{se}$
- $V = E_b + I_a(R_a + R_{se})$
- $\Phi \propto I_{se} \propto I_a$
- flux is not constant

DC COMPOUND MOTOR

LONG SHUNT COMPOUND MOTOR



Electrical Engg
DC Motors

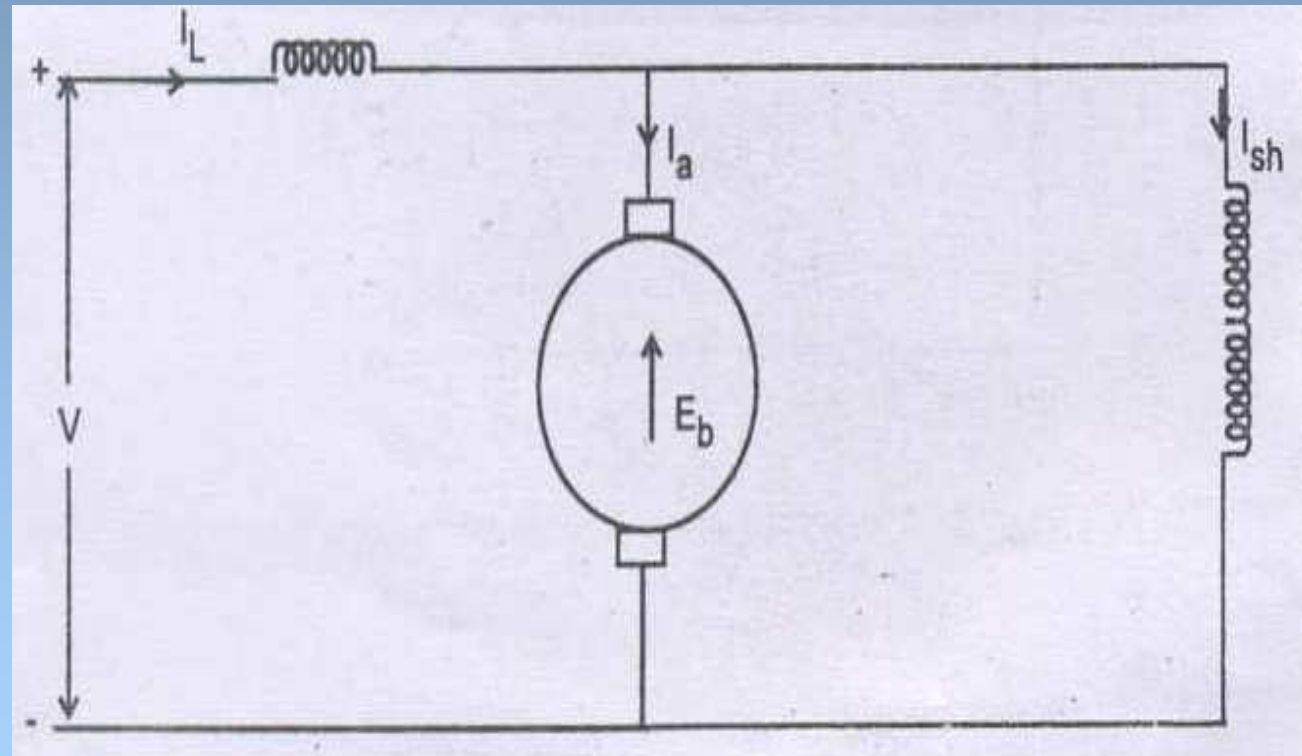
DEPT OF
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DC COMPOUND MOTOR

SHORT SHUNT COMPOUND MOTOR

Electrical Engg
DC Motors



DEPT OF
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CHARACTERISTICS OF DC MOTORS

DC motor characteristics

- Direct current (DC) motors use direct-unidirectional current
- Direct current is supplied to both the stator (field) and the rotor (armature)
- Used in special applications that requires high torque starting or broad speed range
- Greatest advantage is speed control by adjustment of the armature voltage and/or field current

CHARACTERISTICS OF DC MOTORS

characteristics

- ✓ Speed Vs armature current (N vs I_a)
- ✓ Electrical characteristics
 - ✓ torque Vs armature current (T Vs I_a)
- ✓ mechanical characteristics
 - ✓ speed Vs Torque (N Vs T)

CHARACTERISTICS OF DC MOTORS

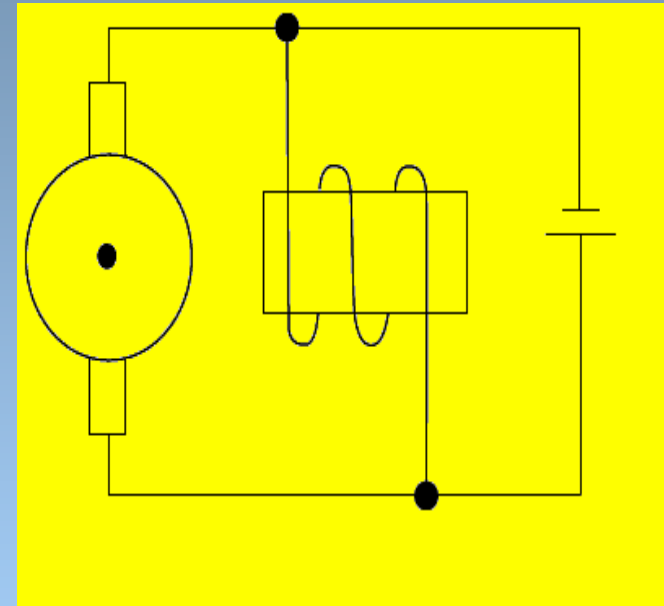
Electrical Engg
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$$T = k_m \phi I_A$$

$$N \propto \frac{E_b}{\phi}$$

DC SHUNT MOTOR

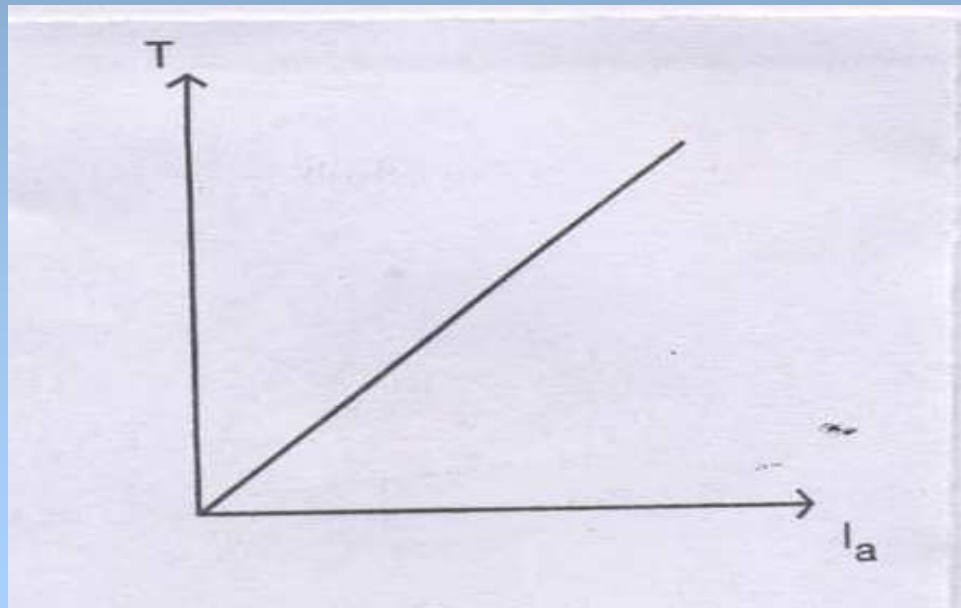
➤ Since supply voltage is constant the flux produced is also constant



DC SHUNT MOTOR

1. $T \text{ vs } I_a$

$$T \propto I_a$$

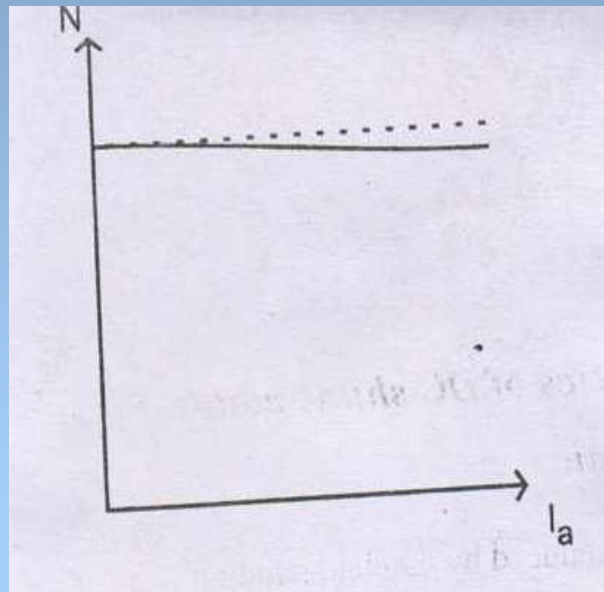


LINEAR

DC SHUNT MOTOR

$$2.N \ v_s \ I_a$$

$$N \propto \frac{E_b}{\phi}$$



$$N \propto E_b$$

$$N \propto (V - I_a R_a)$$

Under no load N is constant.

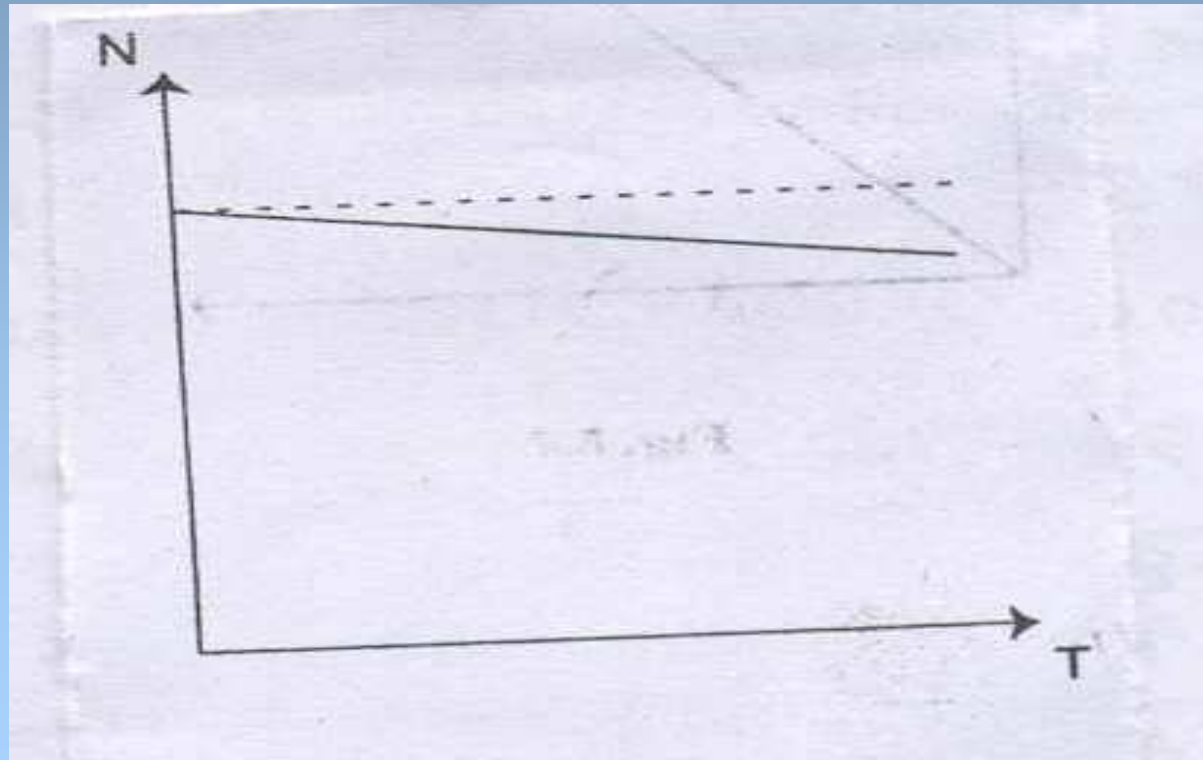
Armature drop is increase. Speed curve drop.(5 – 10%) of no load speed

DC SHUNT MOTOR

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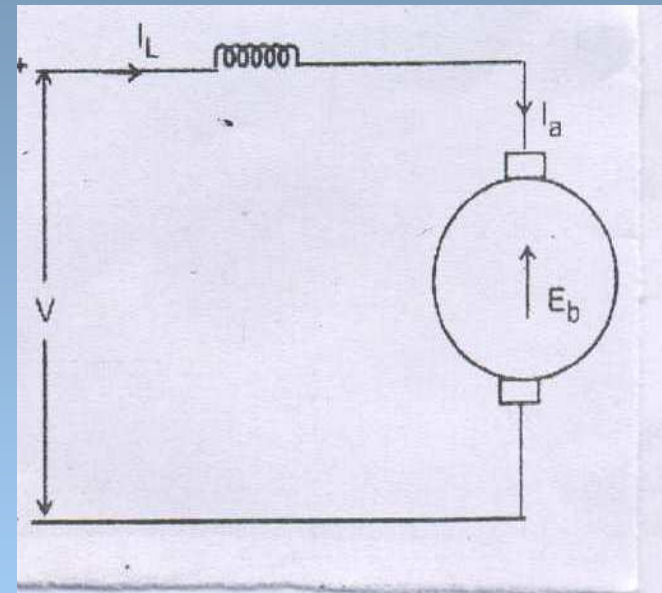
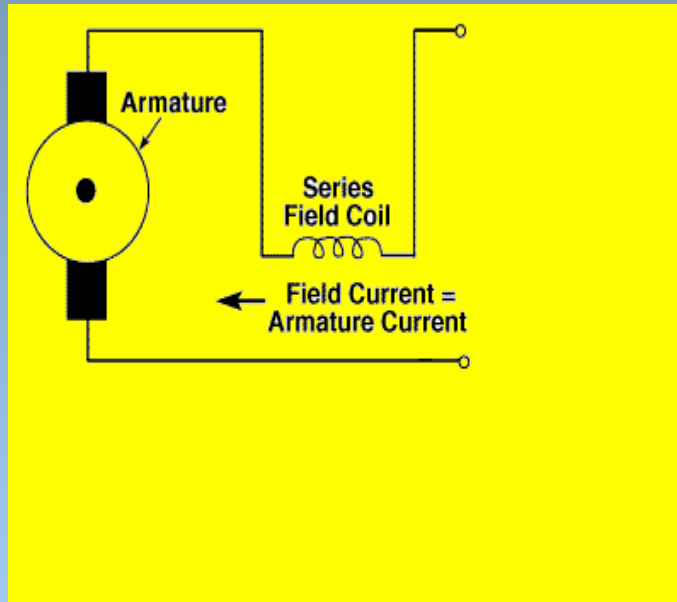
DEPT OF
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3. N vs T



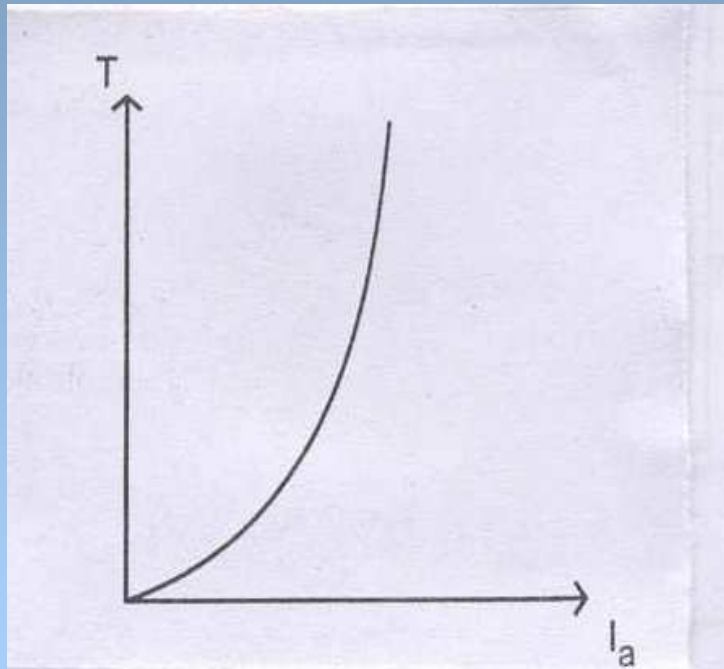
DC SERIES MOTOR

Electrical Engg
DC Motors



➤ flux is not constant

DC SERIES MOTOR

1. T vs I_a 

$$\checkmark T \propto \Phi I_a$$

$$\checkmark \Phi \propto I_{se} \propto I_a$$

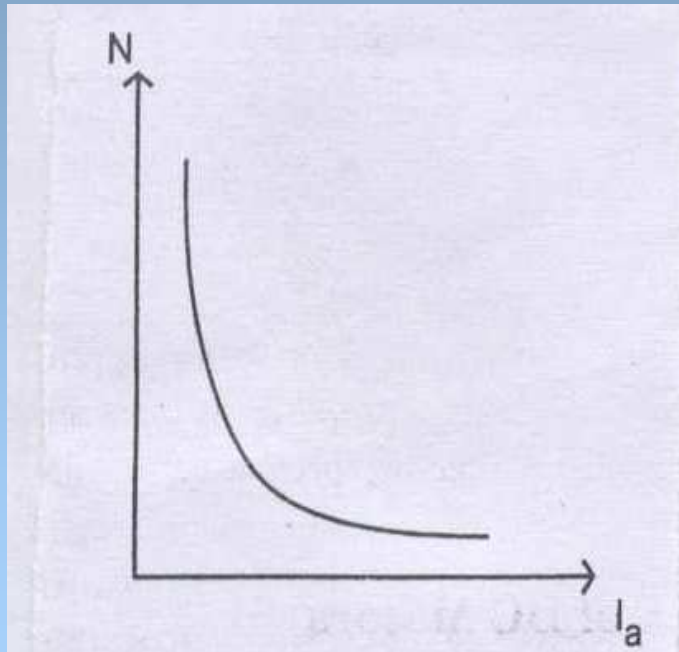
$$\checkmark T \propto I_a^2 \text{ (upto saturation)}$$

$$\checkmark T \propto I_a$$

DC SERIES MOTOR

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$2.N \propto I_a$



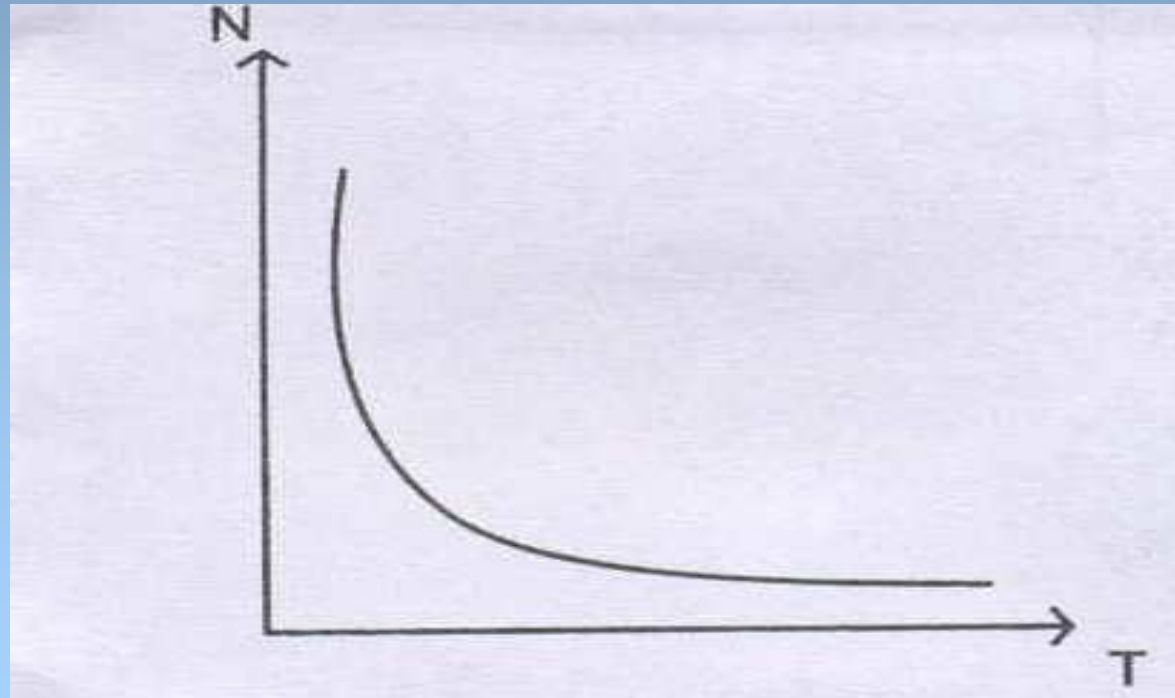
$$N \propto \frac{E_b}{\phi}$$

$$N \propto \frac{1}{\phi}$$

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DC SHUNT MOTOR

3. N vs T



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D.ELANGO VAN

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DC MOTOR

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Electric Motors



**THANK YOU
FOR YOUR ATTENTION**

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