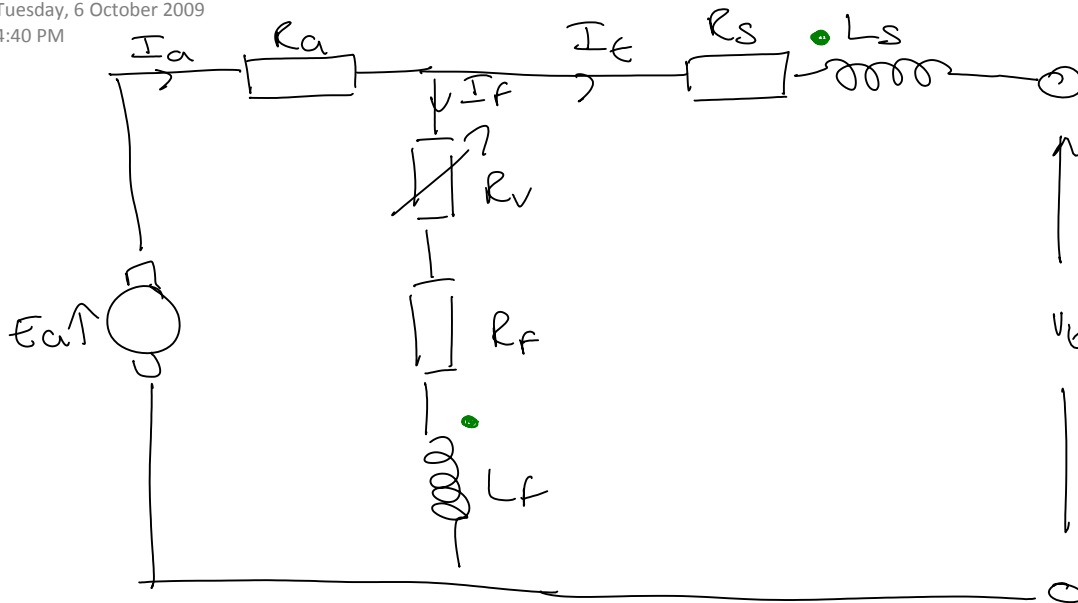


# Lecture 16

Tuesday, 6 October 2009  
4:40 PM



Cumulatively compounded DC Generator with short-shunt connection,

$$\left. \begin{aligned} E_a &= k_a \phi \omega_m \\ \tau &= k_a \phi I_a \end{aligned} \right\} P_a = E_a I_a$$

$$V_t = E_a - I_a R_a - I_t R_s$$

$$I_a = I_f + I_t$$

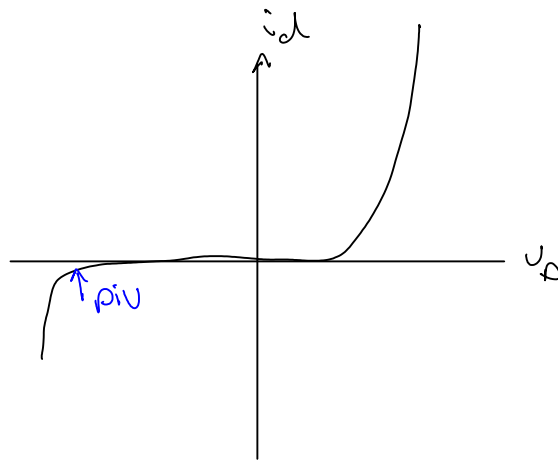
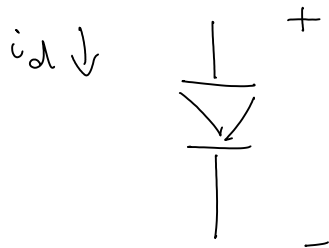
Beware of error in prescribed text,

$$I_f = \frac{V_t + I_t R_s}{R_v + R_f}$$

$$= \frac{E_a - R_a I_a}{R_v + R_f}$$

Power Electronics

1. The diode



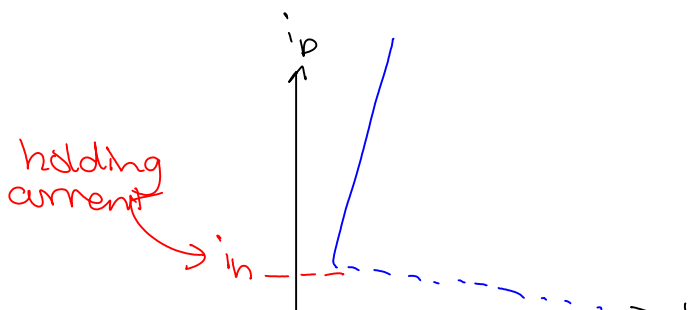
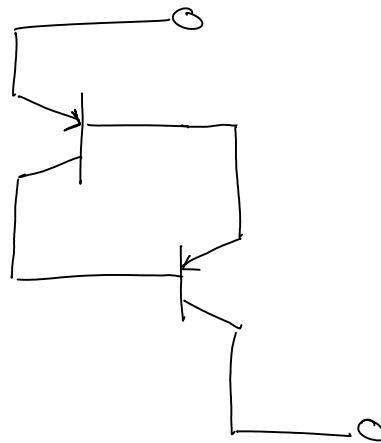
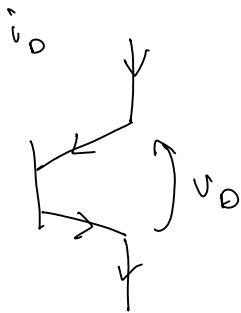
$$i_D = i_{D0} \left( e^{\frac{V_D}{V_T}} - 1 \right)$$

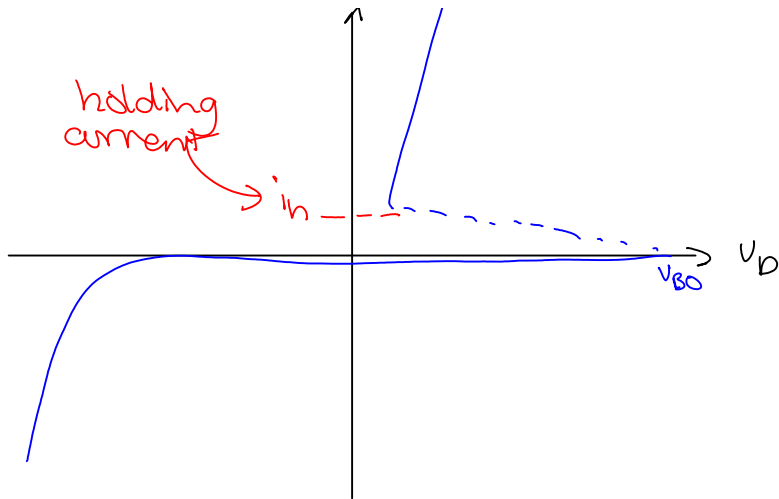
Boltzmann constant  $kT$  temp in kelvin

$$V_T = \frac{kT}{q} \approx 26\text{mV}$$

$$P = V_D i_D$$

2. PNPN diode (2 wire thyristor)





- turns on when the applied voltage  $V_D > V_{BO}$
- turns off when current  $i_d < i_h$
- blocks all current in the reverse direction, until maximum reverse voltage is exceeded

$V_{BO}$  = Break-over voltage

$i_h$  = holding current

### 3. The 3-Wire Thyristor or SCR

SCR = silicon controlled rectifier.

