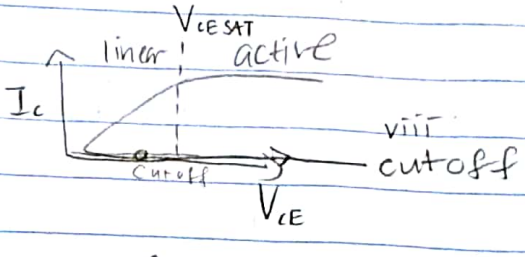
Colleen Lau
Jan 10, 2017
EE307 - Tin

HW 1

1. a switch
   b. Adding a capacitor makes it useful for timing info
   c. speed, size, power

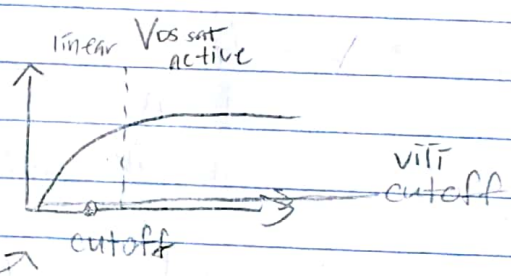
2.
   a i V_{CE} - x axis
   ii I_c y axis
   iii V_{BE} held cst
   iv V_{CE} swept
   v, vi,
   vii.



Cutoff : $|V_{BE}| < |V_{BE\,ON}| \rightarrow I_c \approx 0A$
active : $I_c = I_{SE}\left(\frac{V_{BE}}{V_T}\right)\left(1 + \frac{V_{CE}}{V_A}\right)$

ix. The information in this section tells you how a transister behaves when you keep V_{BE} cst & sweep V_{CE} BJT's ↗

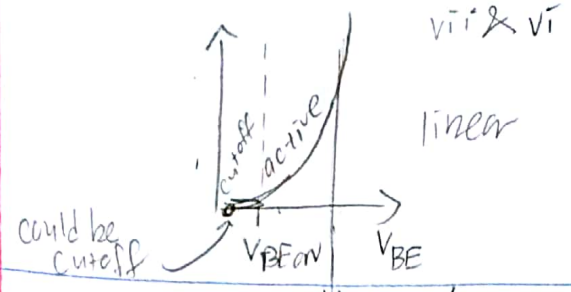
b.
   i V_{DS} x axis
   ii I_{DS} y axis
   iii V_{GS} held cst
   iv. V_{DS} swept
   v, vi



vii. $I_{DS} = \frac{K'}{2}\frac{W}{L}(V_{GS} - V_{TP})^2(1 + \lambda \cdot V_{DS})$

ix. The information in this section tells you how a transist behaves when you keep V_{GS} cst & sweep V_{DS} MOSFETs ↗

c. If my transister was biased in the active region, the graph would be good for knowing what happens when you the input current is too low & goes to cutoff.



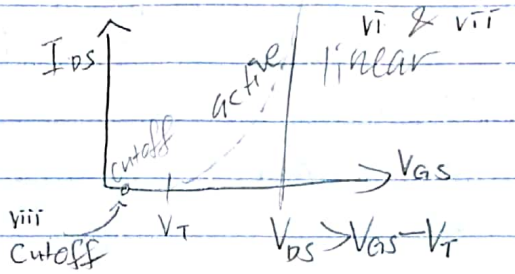
3. $V_{CE} = 3V_{CESAT} \leq V_{BE}$

i. V_{BE} x axis
ii $-I_C$ y axis
iii V_{CE} cst
iv V_{BE} swept
vii $V_{CE} = 3V_{CESAT} > V_{BE} - V_{BE\_on}$

iv. The info. in this section tells you how a BJT transistor behaves when you keep V_{CE} cst & sweep V_{BE}.

b.

i V_{GS} xaxis
ii I_{DS} y axis
iii V_{DS} cst
iv V_{GS} swept

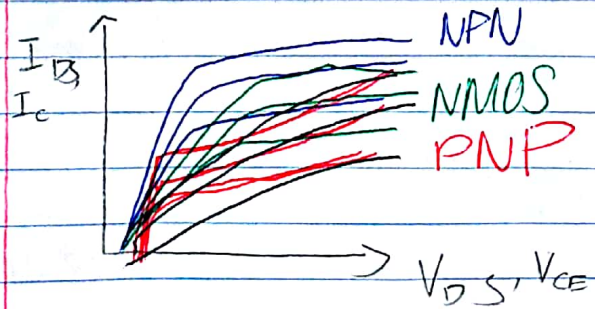


vii. $V_{DS} > V_{GS} - V_T$

ix. The information in this section tells us how a MOSFET behaves when you keep V_{DS} cst & sweep V_{GS}.

c. If my transistor was biased in the active region this would be useful when keeping V_{CE} / V_{DS} constant.

4.



PMOS

b). for NMOS / npn I_{DS} & I_C positive
c). for PMOS / pnp I_{DS} & I_C negative

5. BJTs

a $I_c = I_s e^{\left(\frac{V_{BE}}{V_T}\right)}\left(1+\frac{V_{CE}}{V_A}\right)$ active $|V_{CE}| > |V_{CE\_SAT}|$

$I_c \approx 0A$ cut off $|V_{BE}| > |V_{BE\_ON}|$, A
$|V_{BE}| < |V_{BE\_ON}|$

b. inputs V_{CE}, V_A, V_{BE}, V_T

c. output I_c

d.

e.

6. Mosfets

a $I_{DS} = \frac{K'}{2}\frac{W}{L}(V_{GS} - V_{TP})^2(1+\lambda \cdot V_{DS})$ active

$|V_{GS}| > |V_T|, |V_{DS}| > |V_{GS} - V_T|$ active

$I_{DS} \approx 0A$ cutoff

b inputs V_{GS}, V_{TP}, V_{DS}

c. output I_c

d

e

7.