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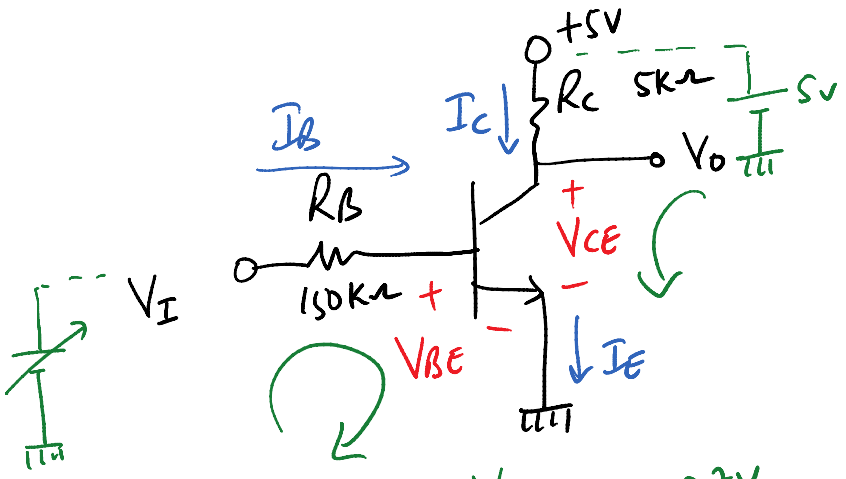
LECTURE -28

VOLTAGE TRANSFER CURVES

V_o Vs V_I



ACTIVE

$V_{BE(ON)} = 0.7V$ $\beta = 120$ $V_{CE(SAT)} = 0.2V$

IF $V_I \leq 0.7V$ TRANSISTOR IS OFF $\therefore I_B = 0A$

$I_C = 0$

LOAD LINE EQ. $V_{CE} = V_{CC} - I_C R_C$

$V_{CE} = V_{CC}$

$V_o = V_{CE} = 5V$

FOR $V_I > 0.7V$ TRANSISTOR IS ON, INITIALLY IN ACTIVE REGION

KVL BE LOOP

$-V_I + I_B R_B + V_{BE(ON)} = 0$

$$I_B = \frac{V_I - 0.7}{R_B}$$

ONLY FOR ACTIVE REGION

$$I_C = \beta I_B = \frac{\beta (V_I - 0.7)}{R_B}$$

$I_C = \beta I_B = \frac{\beta (V_I - 0.7)}{R_B}$

KVL CE LOOP

$-5 + I_C R_C + V_o = 0$ ($V_o \rightarrow V_{CE}$)

$V_o = 5 - I_C R_C$

$V_I \uparrow \quad V_o \downarrow$ $\longrightarrow$ $V_o = 5 - \frac{\beta (V_I - 0.7)}{R_B} R_C$

V_{CE}

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Now $V_{CE} = V_o = 0.2V$ → THEN TRANSISTOR IS IN SATURATION

[∵ OF LOTS OF I_c, LOTS OF DROP ACROSS R_c ∴ V_{CE}↓]

∴ ACTIVE REGION $0.2 \leq V_o < 5V$

FOR $V_o = 0.2V$ = $5 - \frac{(120)(V_I - 0.7) R_c}{R_B}$

$V_I =$ 1.9V ∴ FOR $V_I \geq 1.9V$ TRANSISTOR IS IN SATURATION

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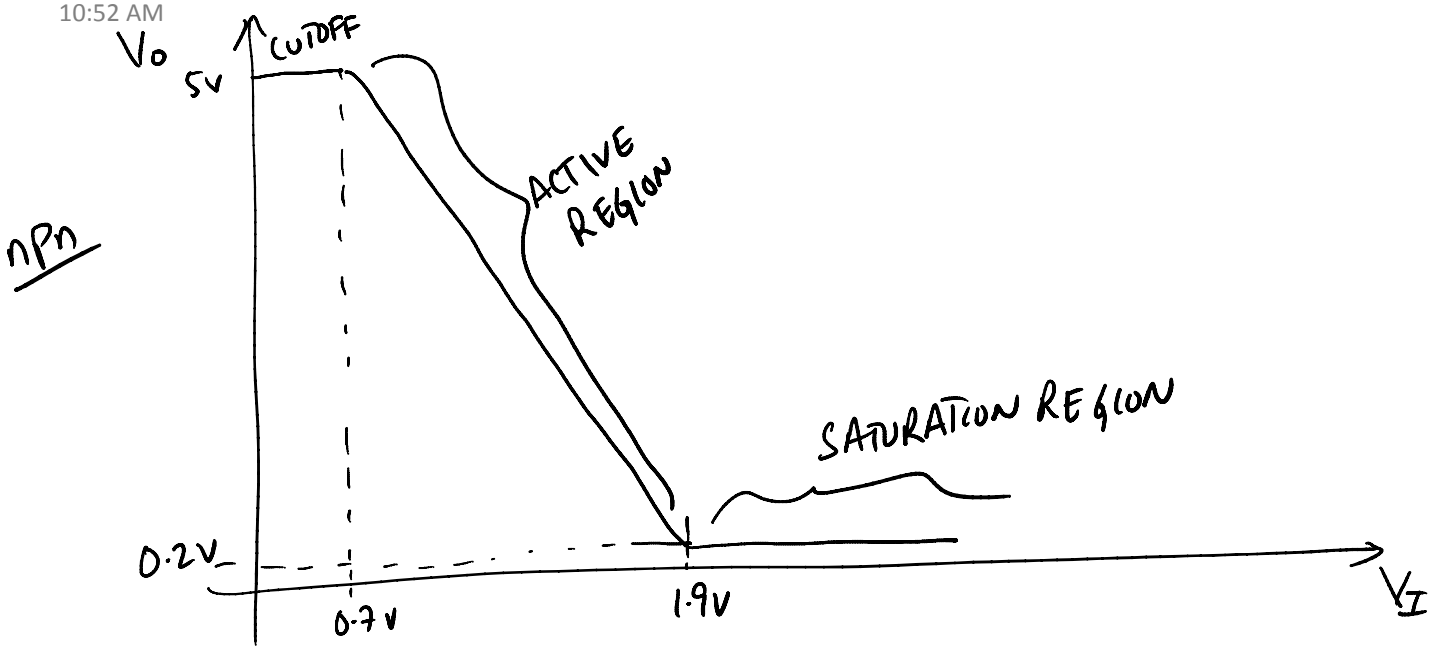

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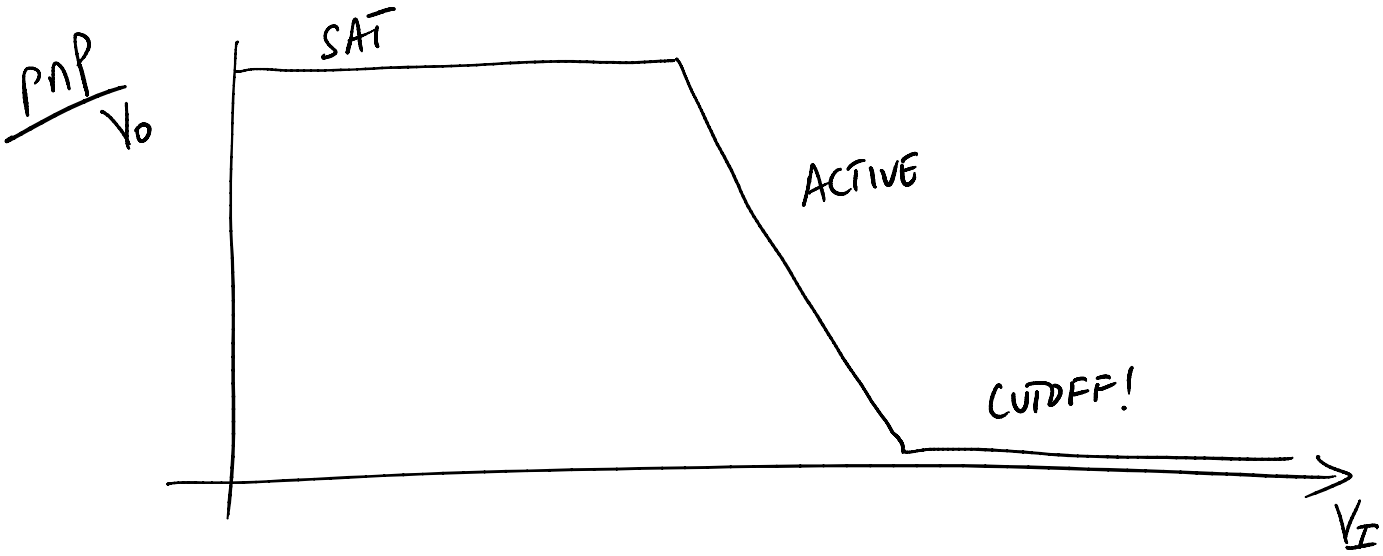

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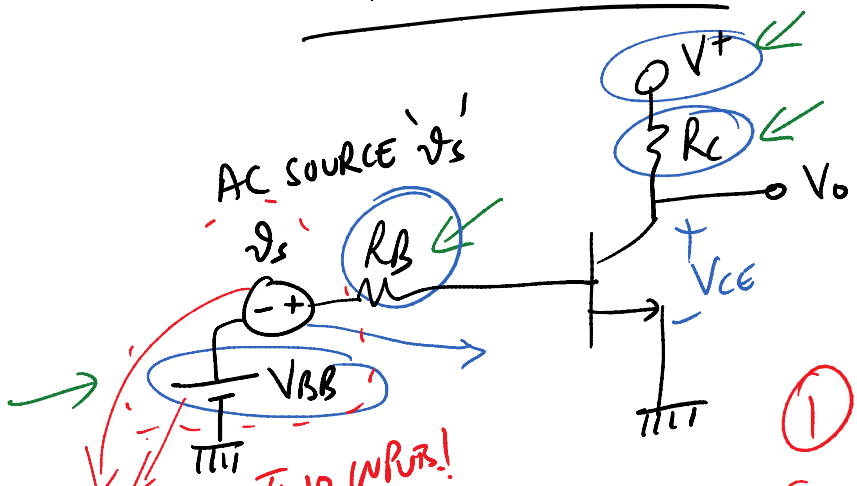
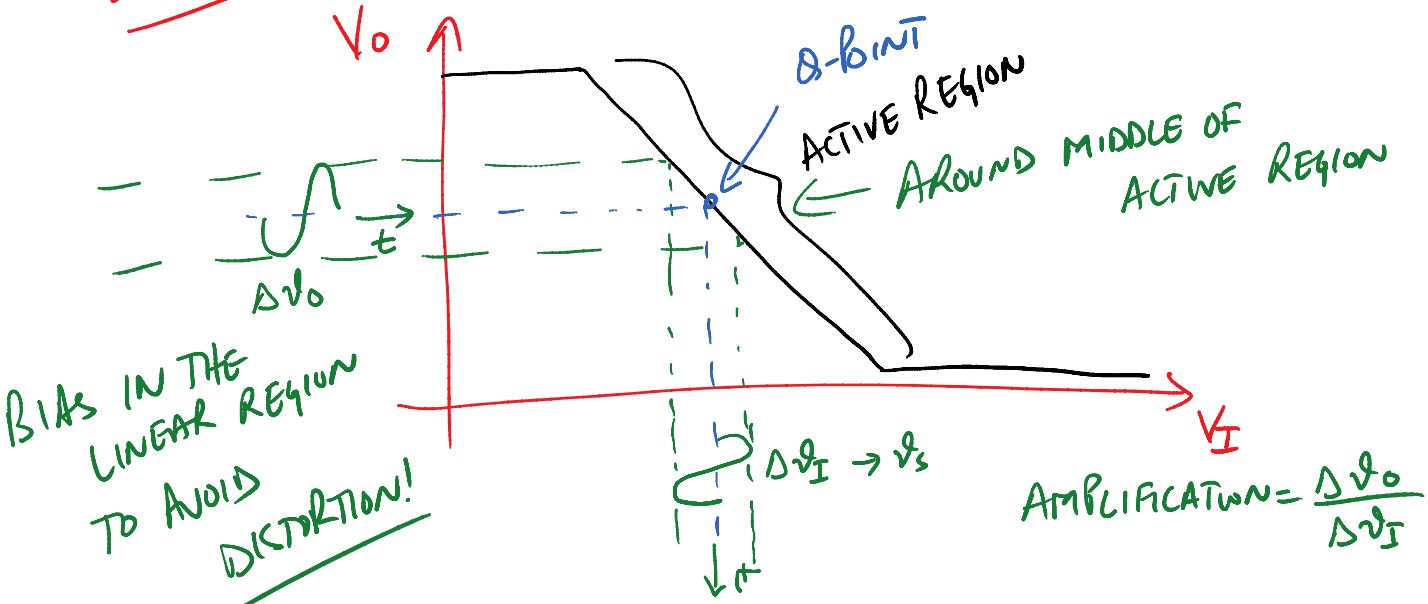
AMPLIFIER

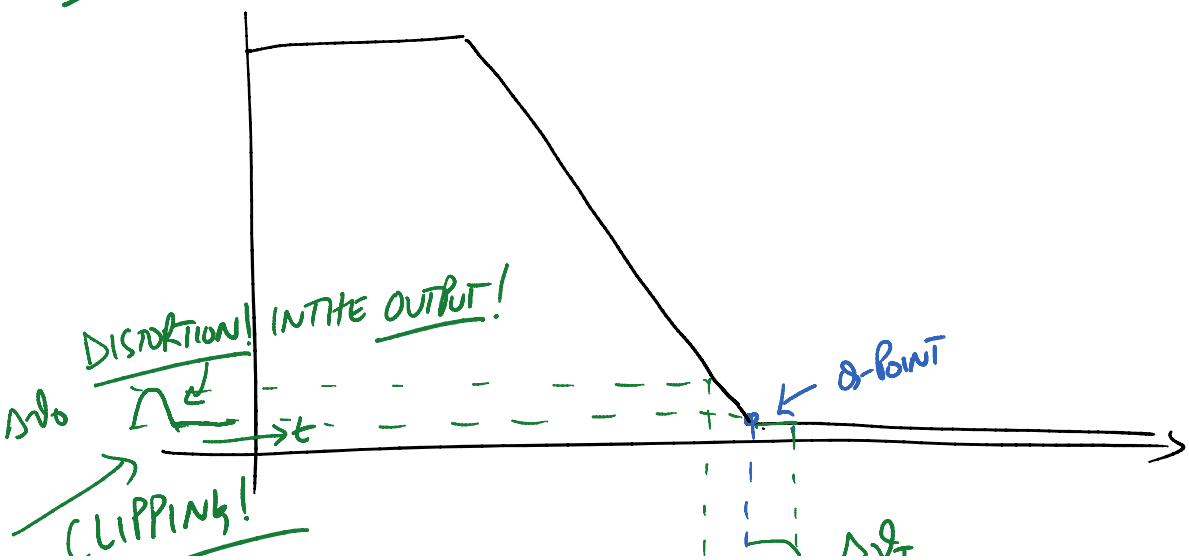


SUPER POSITION! TWO INPUT!

① SET Q-POINT USING DC SOURCES

② THEN DO AC ANALYSIS





CLIPPING!!

* BIASING FOR AMPLIFICATION IS IMPORTANT
"DONE BY USING EXTERNAL DC SUPPLY AND RESISTOR CIRCUIT"

* Q- POINT SHOULD LIE IN THE ACTIVE REGION

HOW TO??