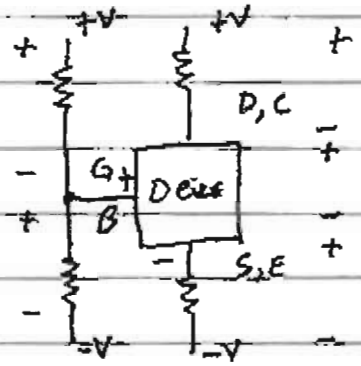
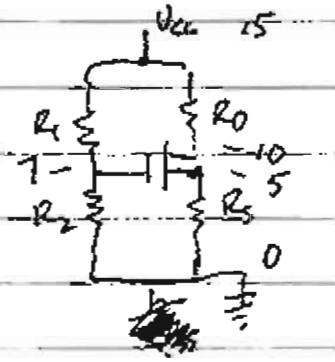


BJT, FET

n-channel or npn
'n-device'

V_{BE}, V_{GS}

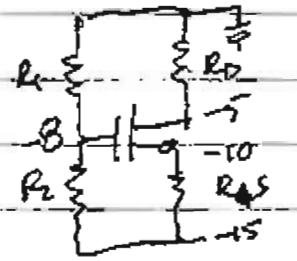


$V_G = 7$

$V_D = 10$

$V_S = 5$

+15 supply

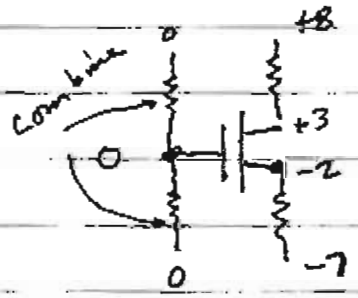


$V_G = -8$

$V_D = -5$

$V_S = -10$

-15 supply



$V_G = 0$

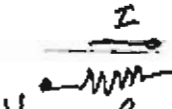
V_D

$V_S = -2$

~~$V_D = R_D I_D$~~

$V_{R_D} = R_D I_D$

$V_{R_S} = R_S I_D$

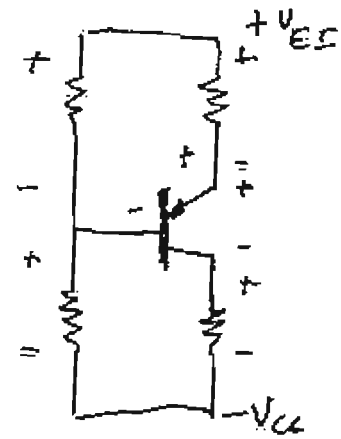


~~$V_1 = IR$~~

~~$V_2 = IR$~~

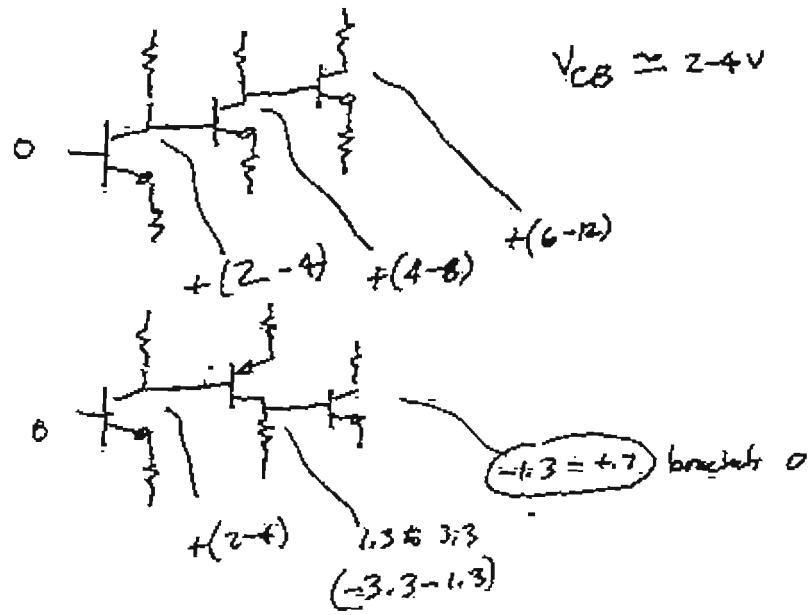
$V_1 - V_2 = IR$

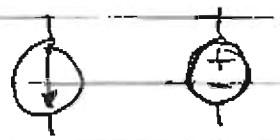
datum



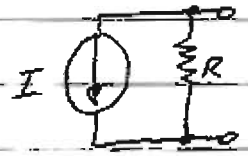
Direct Coupled

Caps $, reliability, space

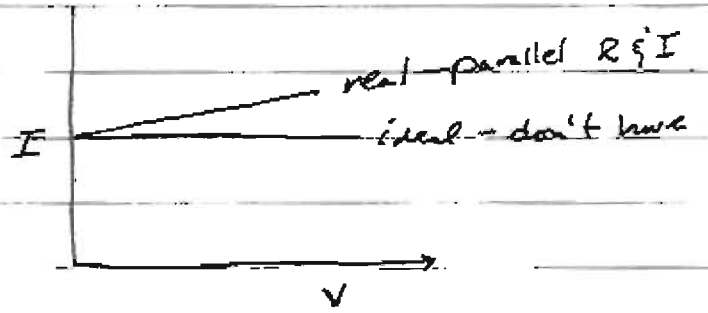


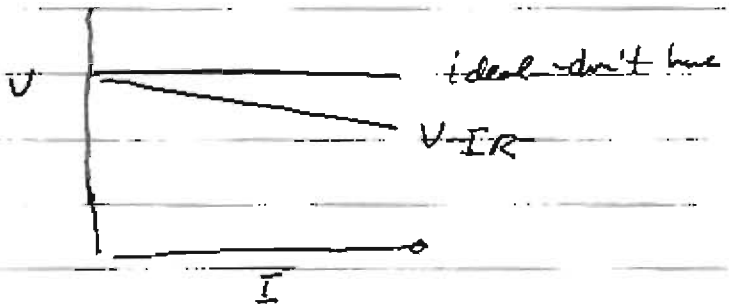


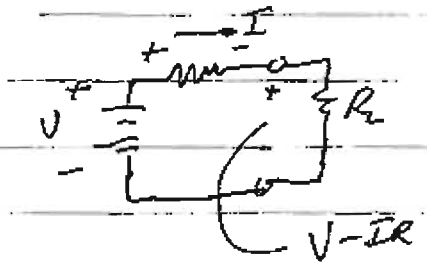
don't exist isolated



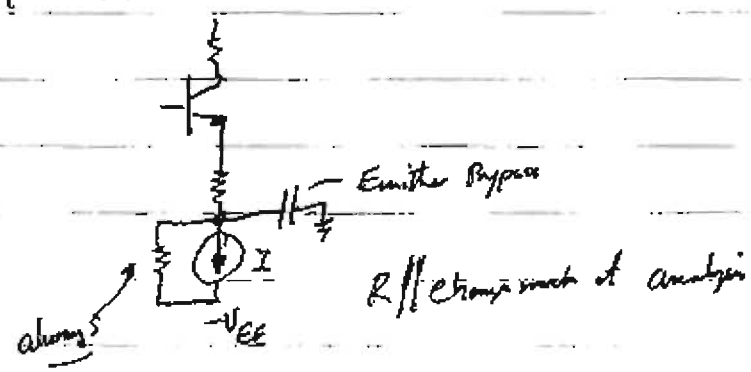
$\frac{V}{I} = R$



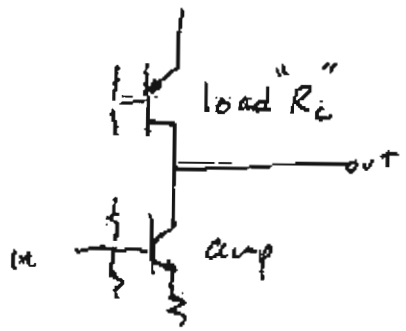




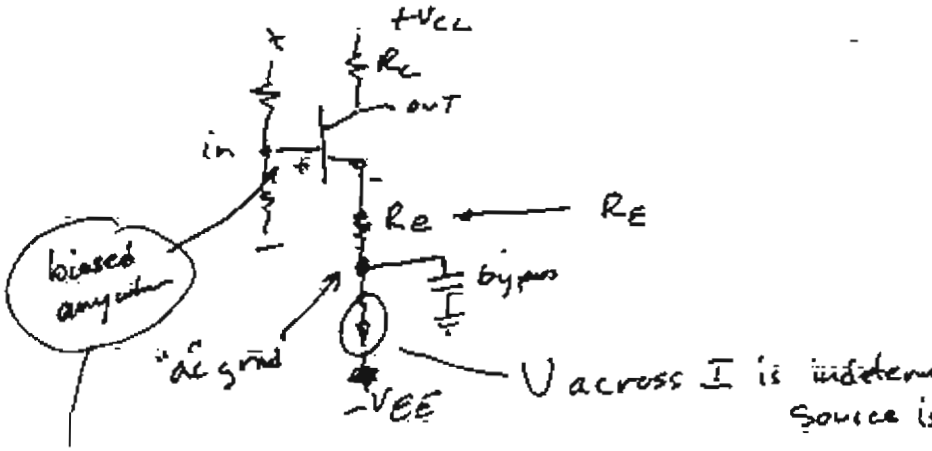
P471



I_Q or I_C set by external current source



Common-emitter



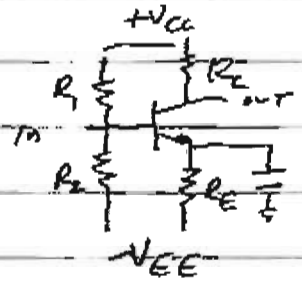
Suppose $V_{EE} = 12$, $V_B = 0$

$V_E = 0.7$ and $I_E \simeq I_C$

$V_{R_E} = R_E I_C$

V @ top of I-source $= 0 - V_{BE} - R_E I_C = V_1$

$V(\text{I-source}) = -(V_{EE} - V_1)$



$\beta_{dc} >>$

$V_B = 0$

$V_E = -0.7$

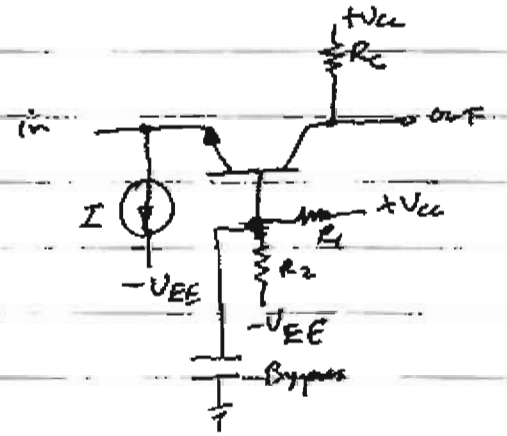
$R_E = \frac{V_{EE} - 0.7}{I_E} \quad (I_E \times I_E)$

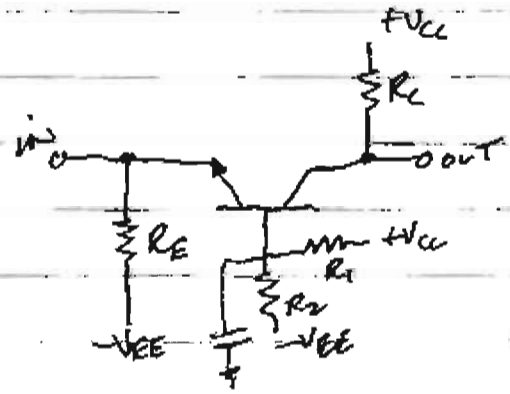
Suppose R_E is fixed

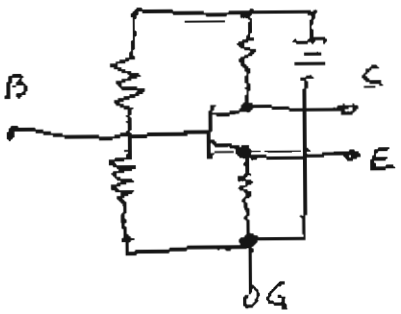
$I_E = \frac{V_{EE} - 0.7}{R_E}$

$1 + \beta \simeq \beta$

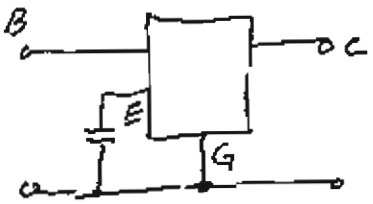
common-base



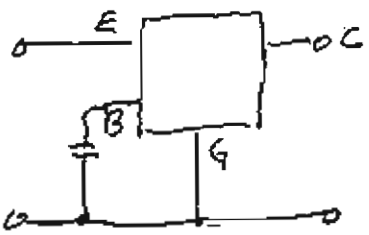




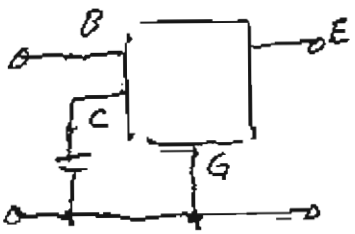
CE



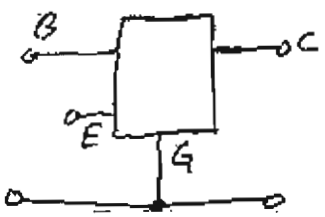
CB



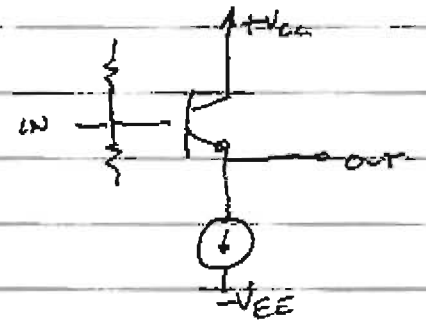
CC



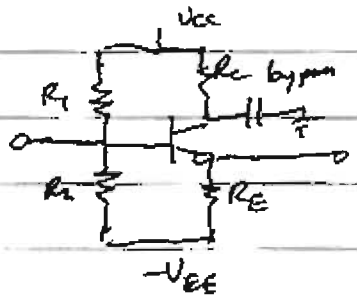
Almost CE



7/8



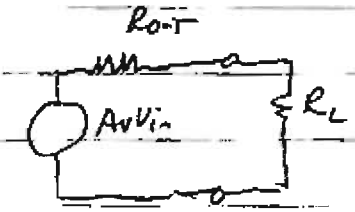
text:
no R_C, bypass



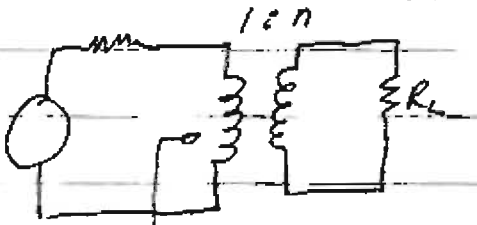
Why R_C? P dissipation
small transistor 100 mW
180 V & V_{CE} @ 10mA = 180 mW X
split 180 V into 9+9, V_C = 9
4V x 10mA = 90mW in each ✓
bypass req'd

Type	Input	Output	Purpose
CE	V_B	V_C	A_V
CB	~~V_B~~ I_E	V_C	I (transimpedance) & impedance xform
CC	V_B	V_E	impedance xform
CC	V_B	I_E	I (transistance)

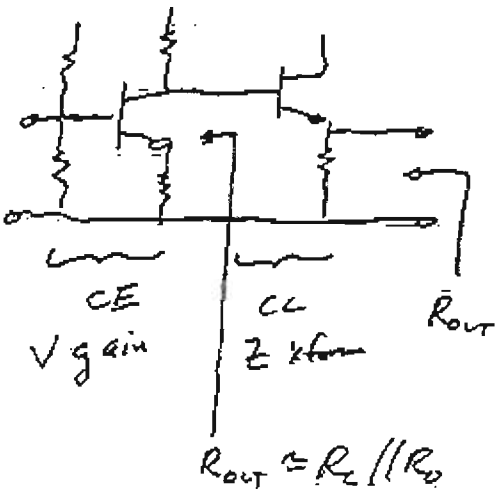
impedance transformer suppose



$R_L \gg R_{out}$
$Z \doteq$ signal loss
desire $R_{out} \ll R_L$



$\frac{R_L}{n^2}$ lower or smaller than R_L depending on n


"emitter follower"
CE
V gain
CC
Z xform
$R_{OUT} \simeq \frac{R_C \| R_0}{1+\beta} << R_C \| R_0$
$R_{OUT} \simeq R_C \| R_0$