Assignment 5 Solve:

1(a) a. 7.6 mA
b. 1.69 mA
c. 1.68 mA
d. 18.5 mA

(b) Cut off.
Sat.
Sat.
Cut-off/Sat.
Triode.

(c) Sat
Triode
Cut off.

2(a) $P_{NMOS} = 0.2\ mW$
$I_{DS} = 0.05\ mA$
$V_{DS} = 4\ V$

(b) ×

3 a. $\sqrt{\frac{W}{L}} = \frac{2.5}{V_s + 0.8}$ || $\frac{W}{L} = \frac{6.25}{(V_s+0.8)^2} = \frac{25}{4}\frac{1}{(V_s+0.8)^2}$

b. $V_o = 0.35\ V$
$I_{DL} = I_{DD} = 0.0667\ mA$.

c. $\frac{W}{L} = 231$
$R_D = 271\ \Omega$

4. Active
Sat.
Active
Active

5. a. $R_c = 10\ k\Omega$
$R_E = 6.93\ k\Omega$

b.

(mA)	(i)	(ii)
I_E	1.49	0.318
I_c	1.46	0.312
I_B	0.03	0.006

(V)	(i)	(ii)
V_E	0.7	−0.8
V_c	1.54	0.8
V_B	1.5	0

6. (a) (i) $\longrightarrow$ $I_B = 0.0046\ mA$

$V_C = 1.5\ V$

(ii) $\longrightarrow$ $I_B = 0.0232\ mA$

$I_C = 1.74\ mA$

$I_E = 1.766\ mA$

$V_{CE} = 1.973\ V$

$V_C = 1.04\ V$

$V_E = -0.933\ V$

(b) $\beta = 134.42$

$\alpha = 0.992$

7 a. $I_B = I_C = I_E = 0$

$V_C = 10\ V$.

b. $I_{DS2} = 3.31\ mA$

$V_0 = 0.074\ V$