

C3 solutions

1 a $275 \mu A$

1 b $V_D = 0.628 V$ $I_D = 311 \mu A$

1 d var met $10^{-16} A$, $300 K \Rightarrow 0.743 V$, $253 \mu A$
 $10^{-14} A$, $350 K \Rightarrow 0.728 V$, $261 \mu A$

2 a $I_D = 0$ $V_D = -V_S = -3.3 V$

b reverse

c $w_j = 110.75 \times 10^{-6} \text{ cm}$

e plates closer together

NMOS

PMOS

3 a sat $283.3 \mu A$ sat $0.17 \mu A$

b lin $447.8 \mu A$ lin $64.8 \mu A$

c lin $1.38 \mu A$ lin $36.75 \mu A$

6 $V_{to} = 0.44 V$ $\gamma = 0.3 V^{1/2}$ $\lambda = 0.08 V^{-1}$
 $2|\phi_f| = 0.6 V$ $W/L = 15$

7 a PMOS

b $0.5 V$

c $\gamma = 0.538 V^{1/2}$

d $\lambda = 0.05 V^{-1}$

e 1 = vel sat 2 = cut-off 4,5,6 = vel sat 7 = lin

8 a saturation, $V_D = 2 V$ $V_S = 1.3 V$

b linear $1 V$ $0.93 V$

c increase