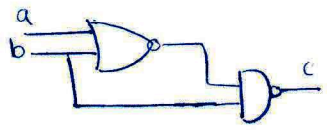
University of New Mexico
Department of Electrical and Computer Engineering

ECE 321 – Electronics I (Fall 2012) **Homework Solution # 1**

1.9



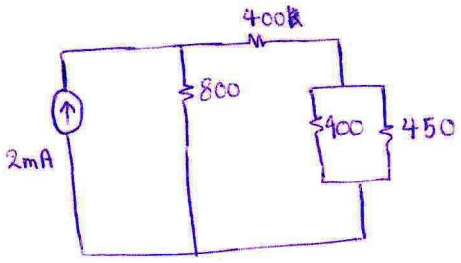
$c = ((a+b)'b)' = ((a'b')b)' = (a'0)' = (0)' = 1$

1.11 $R_{eq} = R_1 + R_7 + \{(R_5 + R_6) \,||\, (R_2 + (R_3 \,||\, R_4))\}$

1.13 a) $V_o = (1.8) * \dfrac{15k}{15k + (4k \,||\, 6k)} = 1.55\ V$

b) $V_o = 1.8 * \dfrac{4k \,||\, 6k}{(4k \,||\, 6k) + 15k} = 0.248\ V$

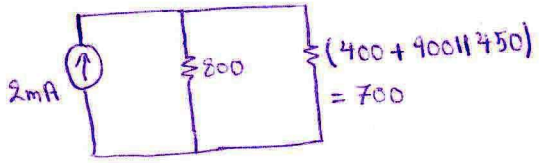
1.17



a) $I_{400} = 2mA * \dfrac{800}{800 + 400 + (900 \,||\, 450)} = 1.07\ mA$

$I_{450} = I_{400} * \dfrac{400}{400 + 450} = 0.715\ mA$

b)



$V_{800} = 2mA * (700 \,||\, 800) = 476.67\ mV$

c)

$I_{800} = 2mA * \dfrac{700}{700 + 800} = 0.93mA$ $\quad I_{800} + I_{400} = 1.07mA + 0.93mA = 2mA$

1-20

$$I_{15k} = 3.3\,V \,/\, [(25k \| 45k) + 15k + 5k \| 2k] = 0.102\,mA$$

$$I_{2k} = I_{15k} \cdot \frac{5k}{2k+5k} = 72.5\,mA$$

1-25 $W = \frac{1}{2} C V^2$

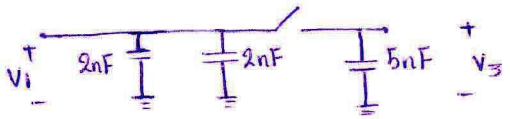
$$\Rightarrow W = 1.51\,nJ$$

$$C = 100pF + \frac{1}{\frac{1}{25pF} + \frac{1}{40pF+80pF}} = 120.69\,pF$$

$$V_o = 5V \frac{25pF}{25pF + (40pF+80pF)} = 862\,mV$$

1-27

@ $t<0$



$$Q_1 = C_1 V_1 = (2\times10^{-9}F)(3V) = 6\times10^{-9}C$$

$$Q_2 = C_2 V_1 = (2\times10^{-9}F)(3V) = 6\times10^{-9}C$$

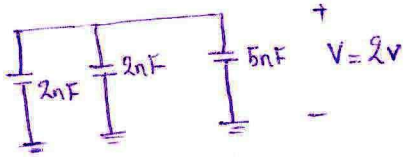
$$Q_3 = C_3 V_3 = (5\times10^{-9}F)(1.2V) = 6\times10^{-9}C$$

@ $t>0$

$$C_{eq} = C_1 + C_2 + C_3 = 9\,nF$$

$$Q_{total} = Q_1 + Q_2 + Q_3 = 18\,nC$$

$$\Rightarrow$$



$$V = \frac{Q_{total}}{C_{eq}} = \frac{18nC}{9nF} = 2V$$