ECEN 325 – Electronics

Fall 2020

Lab 7: Prelab

Submitted by:

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Due: October 13th, 2020

1a.) $I_C = 1mA$, $V_{CC} = 5V$, $V_C = 3.5V$

$$R_C = \frac{V_{CC} - V_C}{I_C} = \boxed{1.5k\Omega}$$

$I_E \approx I_C$, $V_{RE} = 1V$

$$R_E = \frac{V_{RE}}{I_E} = \boxed{1k\Omega}$$

$V_B = V_{RE} + 0.7 = 1.7V$

$I_{supply} = 2mA$, $I_{RB1} = I_{supply} - I_C = 1mA$

$$R_{B1} = \frac{V_{RB1}}{I_{RB1}} = \frac{V_{CC} - V_B}{I_{RB1}} = \boxed{3.3k\Omega}$$

$V_2 = V_B$, $I_{RB2} = I_{RB1}$

$$R_{B2} = \frac{V_2}{I_{RB2}} = \boxed{1.7k\Omega}$$

1b.) $I_C = 1mA$, $V_{CC} = 5V$, $V_C = 1.5V$

$$R_C = \frac{V_{CC} - V_C}{I_C} = \boxed{3.5\,k\Omega}$$

$I_E \approx I_C$, $V_{RE} = 1V$

$$R_E = \frac{V_{RE}}{I_E} = \boxed{1k\Omega}$$

$V_B = V_{RE} + 0.7 = 1.7V$

$I_{supply} = 2mA$, $I_{RB1} = I_{supply} - I_C = 1mA$

$$R_{B1} = \frac{V_{RB1}}{I_{RB1}} = \frac{V_{CC} - V_B}{I_{RB1}} = \boxed{3.3k\Omega}$$

$V_2 = V_B$, $I_{RB2} = I_{RB1}$

$$R_{B2} = \frac{V_2}{I_{RB2}} = \boxed{1.7k\Omega}$$

2a) $V_c = 3.5V$, $V_{cc} = 5V$, $I_c = 2mA$

$$R_c = \frac{V_{cc} - V_c}{I_c} = \boxed{750\,\Omega}$$

$V_{EC} = 1.5V$, $V_x = 1.5V$

$V_2 = 0.7 + V_x = 2.2V$

$I_{supply} = 5mA$, $I = I_{supply} - I_c = 3mA$

$R_{B1} = \frac{V_{EC}}{I} = \boxed{500\,\Omega}$, $I_B = \frac{I_c}{\beta} = 20uA$

$I_{RB2} = I - I_B = 3.02\,mA$, $I_x = (1 + \frac{1}{\beta})I_c = 1.01mA$

$R_{B2} = \frac{V_2}{I_{RB2}} = \boxed{728\,\Omega}$

2b) $V_C = 1.5V$, $V_{cc} = 5V$, $I_c = 2mA$

$$R_c = \frac{V_{cc} - V_c}{I_c} = \boxed{1.75k\Omega}$$

$V_{EC} = 1.5V$, $V_X = 1.5V$

$V_2 = 0.7 + V_X = 2.2V$

$I_{supply} = 5mA$, $I = I_{supply} - I_c = 3mA$.

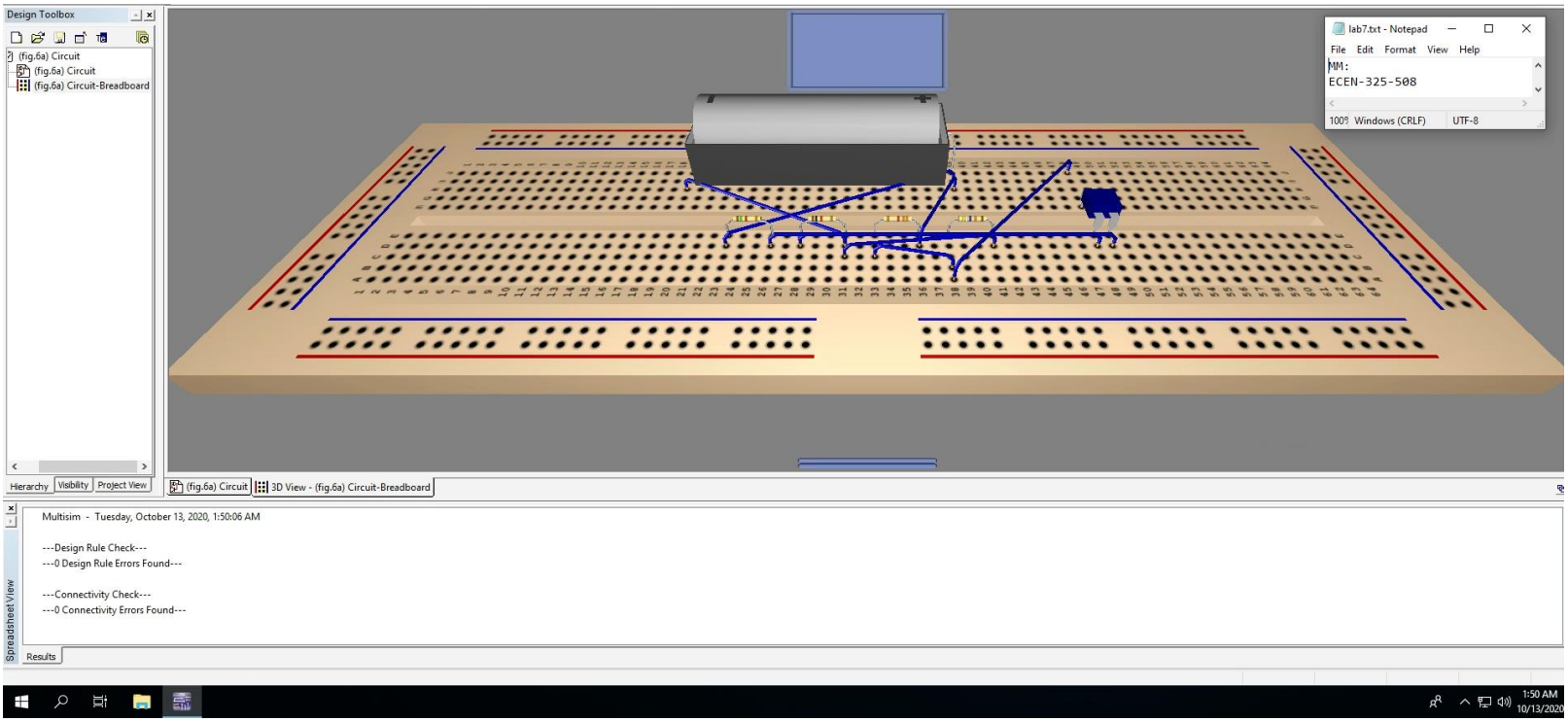
$R_{B1} = \frac{V_{EC}}{I} = \boxed{500\Omega}$, $I_B = \frac{I_c}{\beta} = 20uA$

$I_{RB2} = I - I_B = 3.02mA$, $I_x = (1 + \frac{1}{\beta})I_c = 1.01mA$

$R_{B2} = \frac{V_2}{I_{RB2}} = \boxed{728\Omega}$

3.)

Circuit (fig.6a) breadboard



Circuit (fig.7b) breadboard