

ECE 320 - Quiz #7 - Name _____

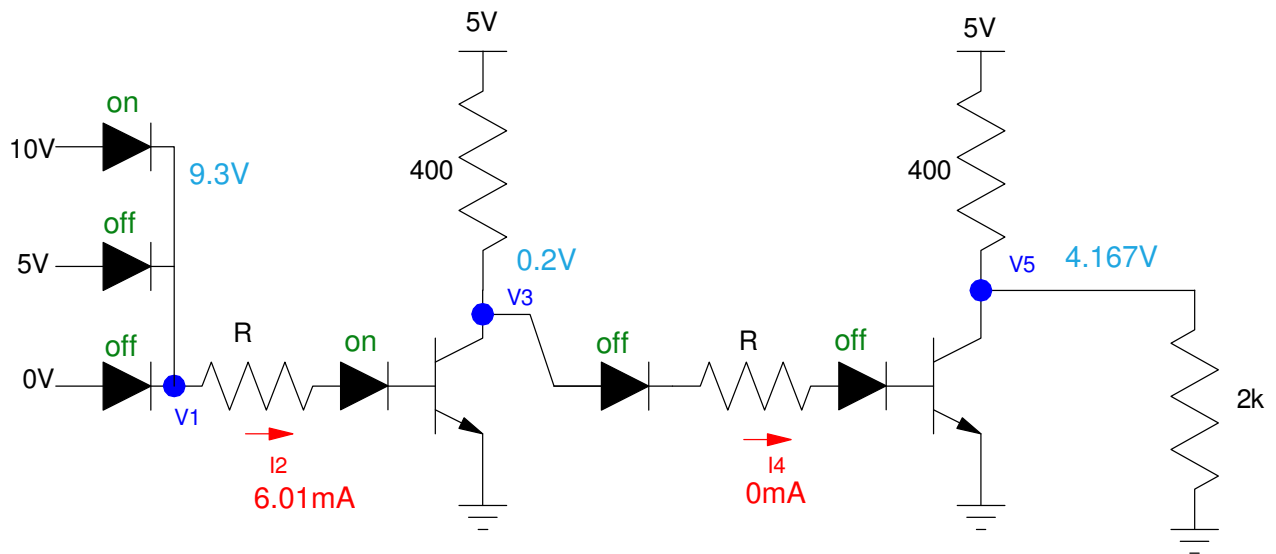
DTL, TTL Logic - Spring 2023

DTL: 10V Logic Logic

1) Determine the voltages and currents for the following DTL gate. Assume

- Ideal transistors ($V_{be} = 0.7V$, $V_{ce(sat)} = 0.2V$, gain = 100)
- Ideal silicon diodes ($V_f = 0.7V$)
- $R = 800 + 100(\text{Birth Month}) + (\text{Birth Day})$.

R 800 + 100*mo +day	V1	I2	V3	I4	V5
1314	9.3V	6.01mA	0.2V	0mA	4.167V

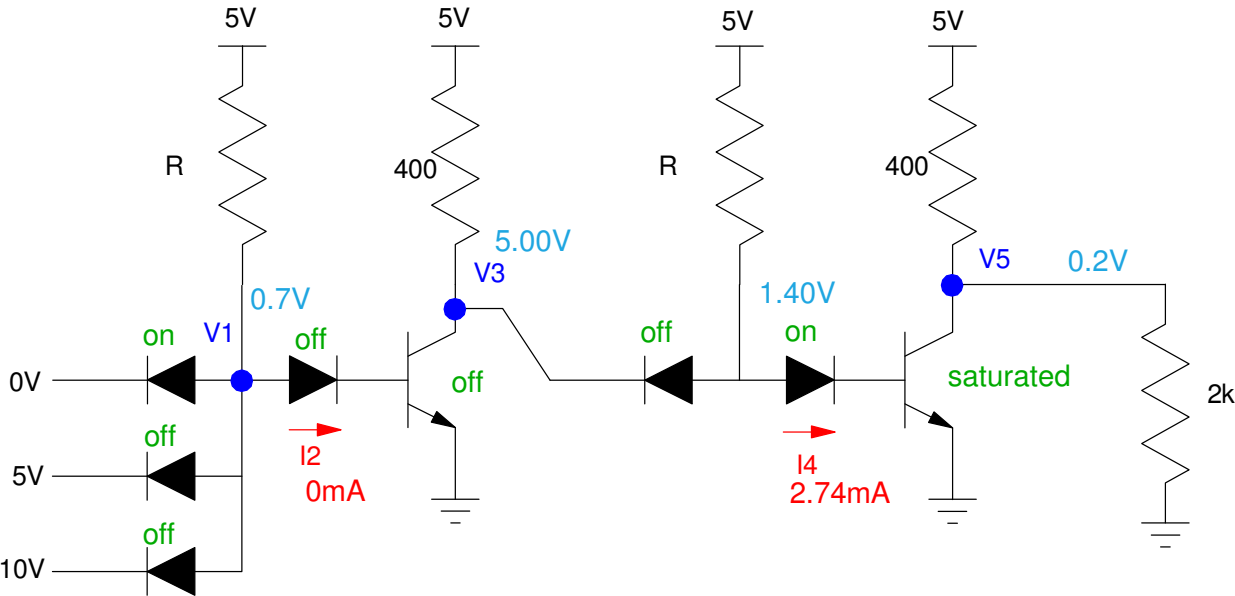


DTL 10V Logic Gate:

2) Determine the voltges and currents for the following DTL gate. Assume

- Ideal transistors ($V_{be} = 0.7V$, $V_{ce(sat)} = 0.2V$, gain = 100)
- Ideal silicon diodes ($V_f = 0.7V$)
- $R = 800 + 100(\text{Birth Month}) + (\text{Birth Day})$.

R 800 + 100*mo +day	V1	I2	V3	I4	V5
1314	0.70V	0mA	5.00V	2.74mA	0.2V

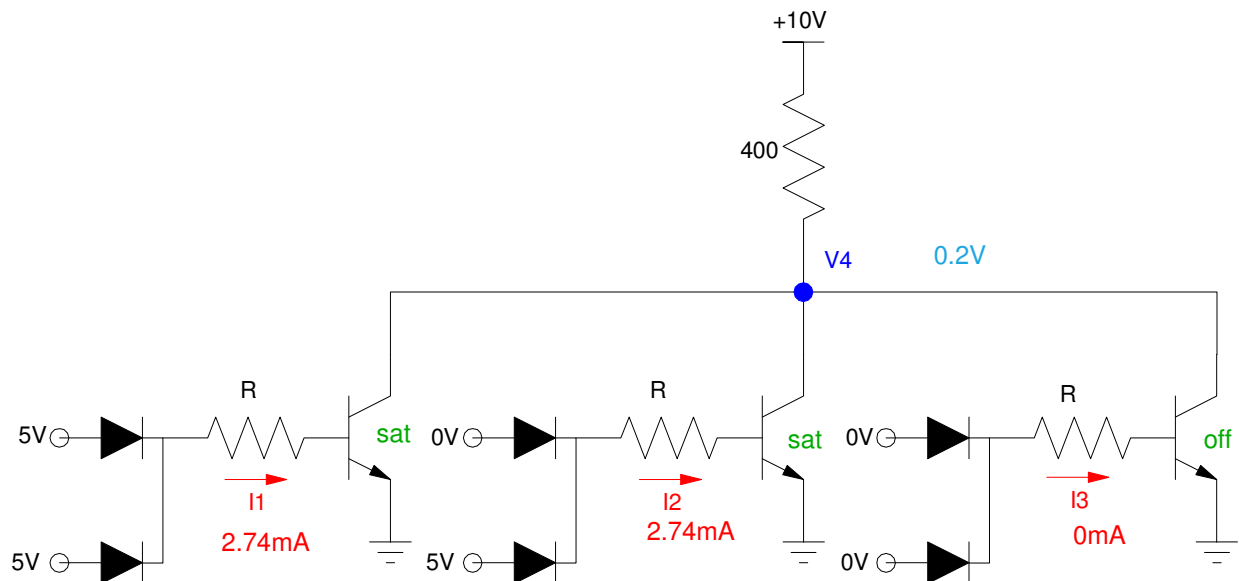


10V Open Collector Logic

3) Determine the voltages and currents for the following circuit. Assume

- Ideal transistors ($V_{be} = 0.7V$, $V_{ce(sat)} = 0.2V$, gain = 100)
- Ideal silicon diodes ($V_f = 0.7V$)
- $R = 800 + 100(\text{Birth Month}) + (\text{Birth Day})$.

R 800 + 100*mo +day	I1	I2	I3	V4
1314	2.74mA	2.74mA	0mA	0.2V

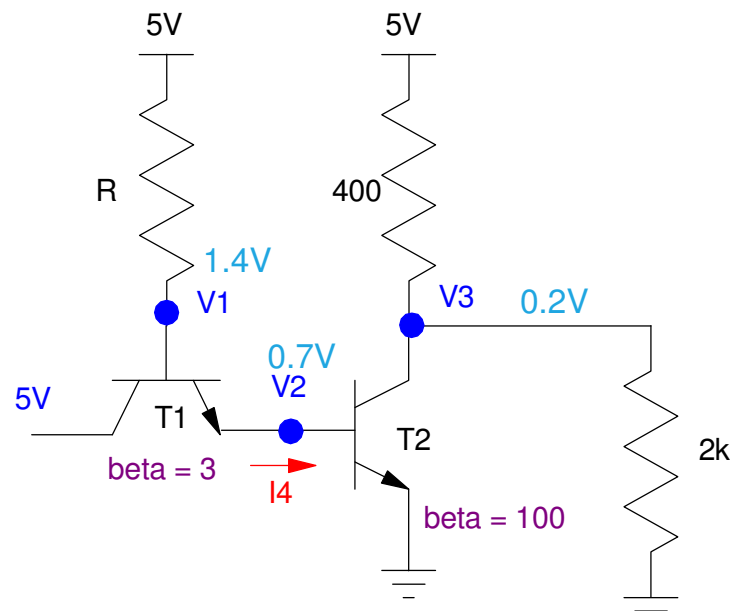


TTL Logic

4) Determine the voltages and currents for the following TTL gate. Assume

- Ideal transistors ($V_{be} = 0.7V$, $V_{ce(sat)} = 0.2V$)
- Ideal silicon diodes ($V_f = 0.7V$)
- $R = 800 + 100(\text{Birth Month}) + (\text{Birth Day})$.

R 800 + 100*mo +day	V1	V2	V3	I4
1314	1.40V	0.70V	0.20V	10.96mA



$$I_b = \left(\frac{5V - 1.4V}{1314\Omega} \right) = 2.740mA$$

$$I_c = \beta I_b = 8.219mA$$

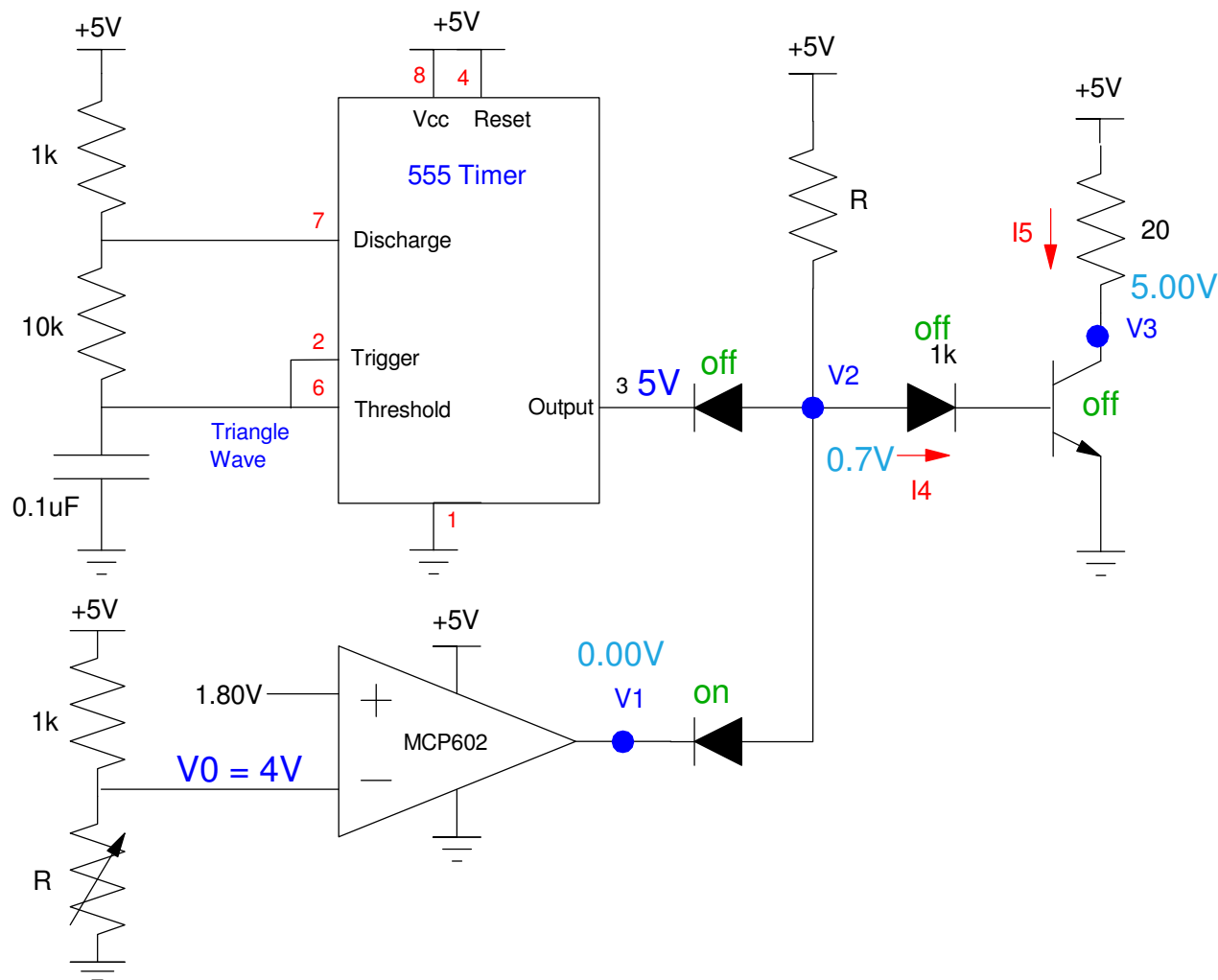
$$I_e = I_c + I_b = 10.96mA$$

DTL Logic

5) Determine the voltages and currents when $V_0 = 4V$. Assume

- Ideal transistors ($V_{be} = 0.7V$, $V_{ce(sat)} = 0.2V$, gain = 100)
- Ideal silicon diodes ($V_f = 0.7V$)
- $R = 800 + 100(\text{Birth Month}) + (\text{Birth Day})$.

R 800 + 100*mo +day	V1	V2	V3	I4	I5
1314	0.00V	0.70V	5.00V	0mA	0mA



DTL Logic

6) Determine the voltages and currents when $V_0 = 1V$. Assume

- Ideal transistors ($V_{be} = 0.7V$, $V_{ce(sat)} = 0.2V$, gain = 100)
- Ideal silicon diodes ($V_f = 0.7V$)
- $R = 800 + 100(\text{Birth Month}) + (\text{Birth Day})$.

R 800 + 100*mo +day	V1	V2	V3	I4	I5
1314	5.00V	1.40V	0.20V	2.74mA	240mA
			saturated: 0.2V active: 5 - 20*I5		min(I4*100, 240mA) active / saturated

