ECE 320 - Quiz #8 - Name _____

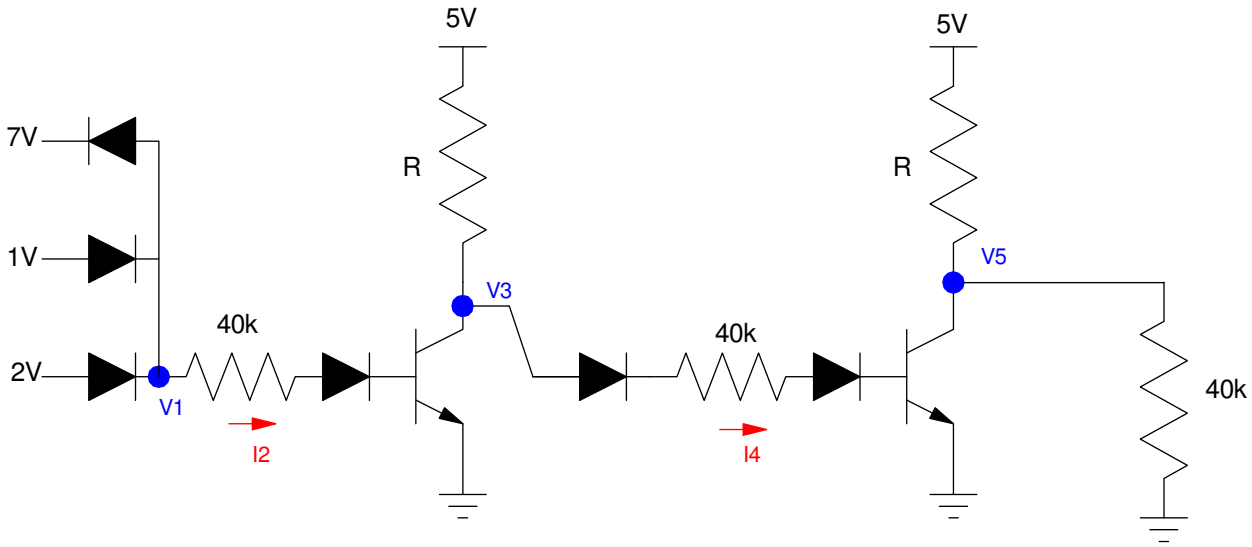
DTL, TTL Logic, MOSFETs.

DTL Logic Gate:

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

- Ideal 3904 transistors (Vbe = 0.7V, Vce(sat) = 0.2V, gain = 100)
- Ideal silicon diodes (Vf = 0.7V)
- R = 1000 + 100(Birth Month) + (Birth Day). For example, May 14th gives R = 1514 Ohms.

R 1000 + 100*mo +day	V1	I2	V3	I4	V5



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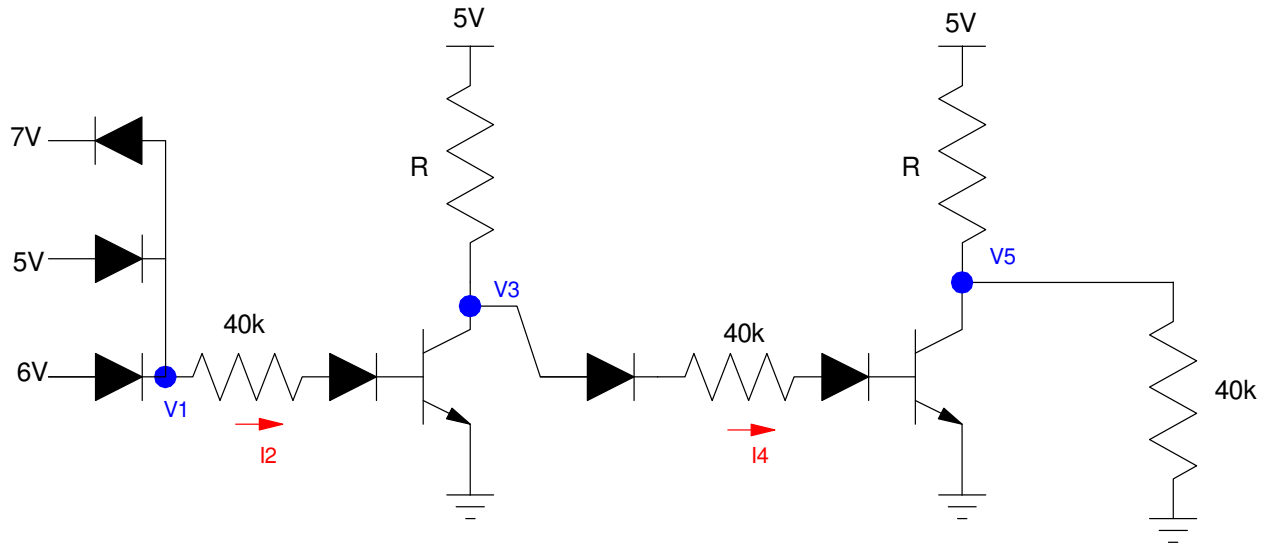
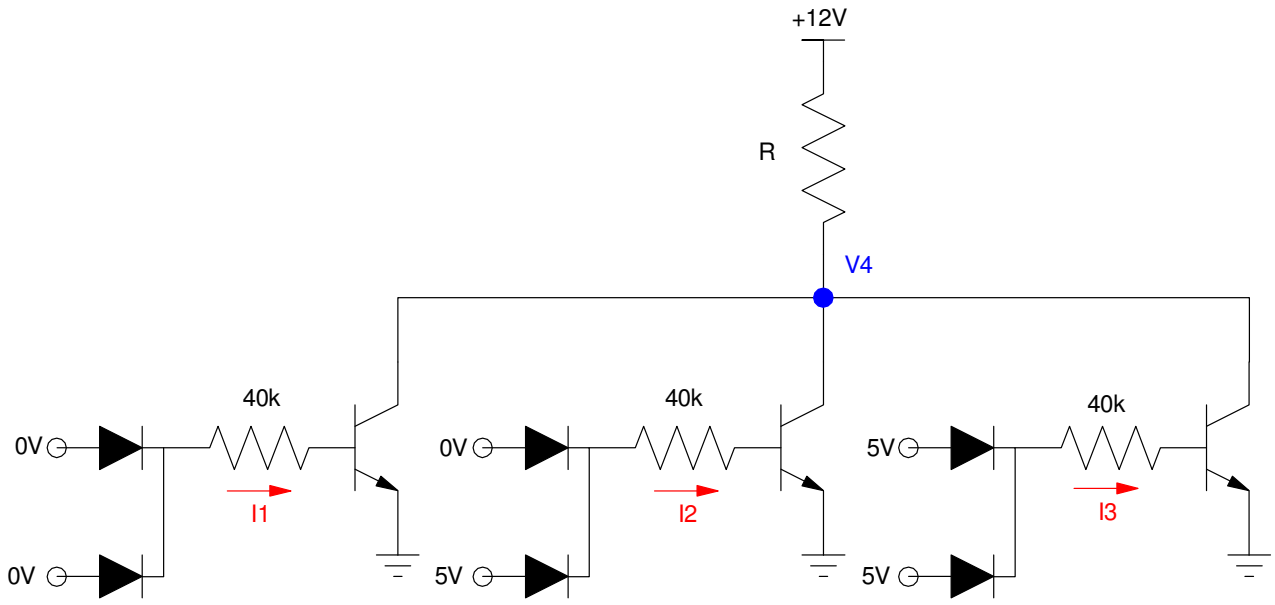


Open Collector Logic

Determine the voltages and currents for the following circuit. Assume

- Ideal silicon diodes (Vf = 0.7V)
- Vbe = 0.7V
- β = 100
- R = 1000 + 100(Birth Month) + (Birth Day). For example, May 14th gives R = 1514 Ohms.

R 1000 + 100*mo +day	I1	I2	I3	V4

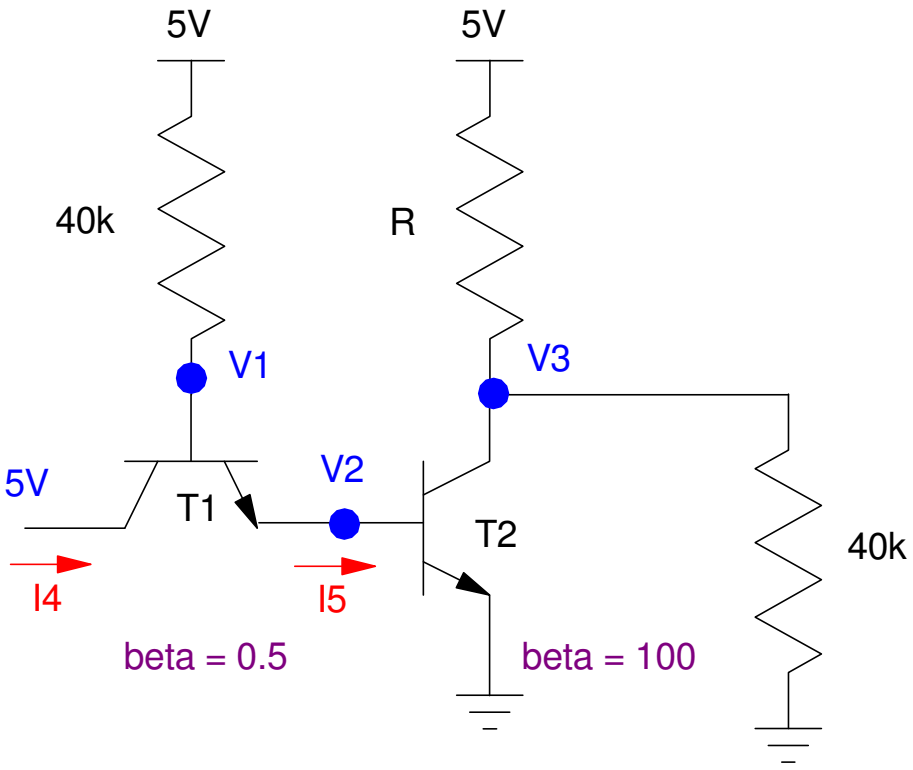


TTL Logic

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

- Ideal 3904 transistors (Vbe = 0.7V, Vce(sat) = 0.2V, β = 2 (left) or 100 (right) transistor
- R = 1000 + 100(Birth Month) + (Birth Day). For example, May 14th gives R = 1514 Ohms.

R 1000 + 100*mo +day	V1	V2	V3	I4	I5

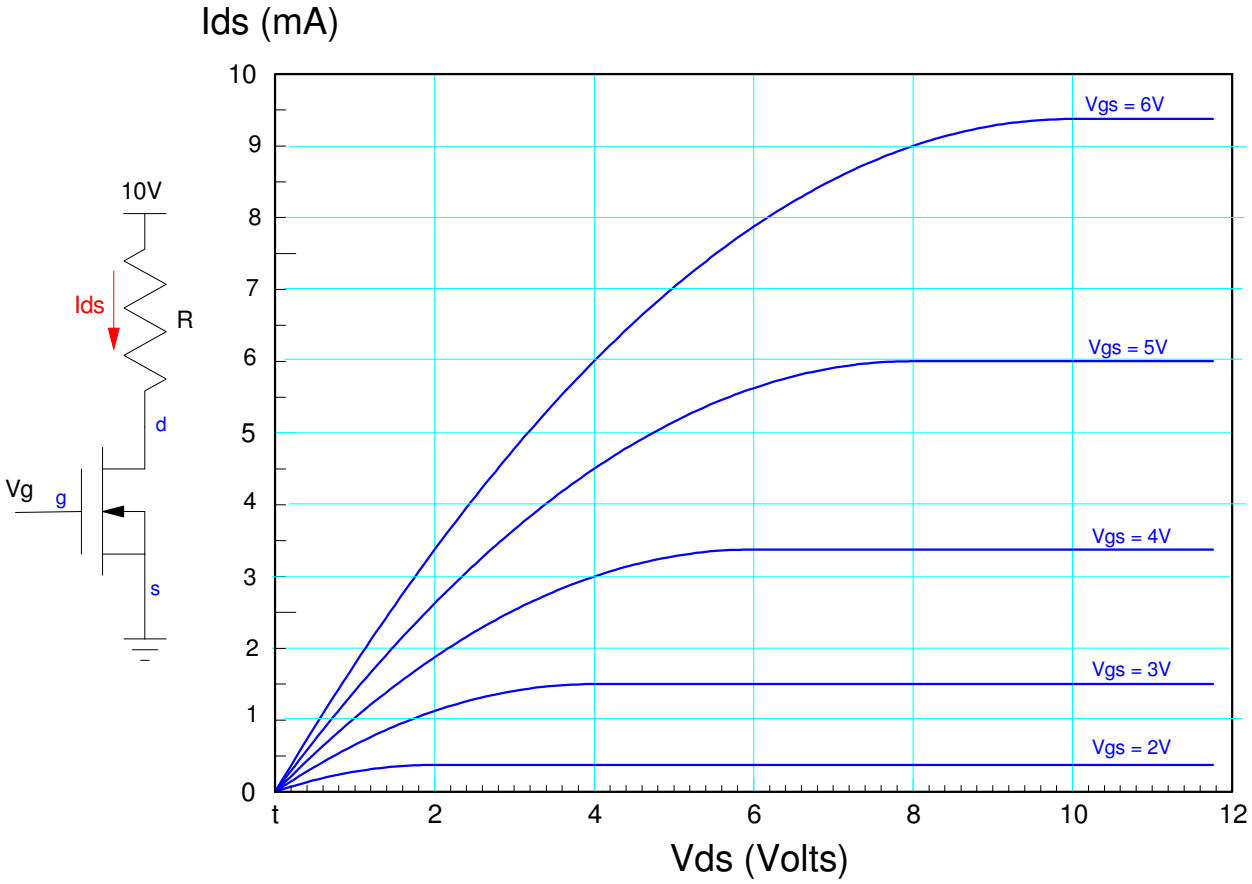


MOSFET & Load Lines

For the following MOSFET

- Determine the transconductance gain, kn,
- Draw the load line for the following circuit.
- Mark the operating point for Vgs = 5V

R 1000 + 100*mo + day	kn A / V2	Load Line show on graph	Vds Vg = 5V	Ids Vg = 5V



MOSFETs

For the following MOSFET circuit, assume

- $k_n = 0.5\ A/V^2$
- $V_{th} = 2.00V$

Determine the operation point (Vds, Ids) for Vg = 10V

R 1000 + 100*mo + day	Vds Vg = 10V	Ids Vg = 10V

Ohmic Region: $V_{ds} < V_{gs} - V_{th}$

$$I_{ds} = k_n\left(V_{gs} - V_{th} - \frac{V_{ds}}{2}\right)V_{ds}$$

Saturated Region: $V_{ds} > V_{gs} - V_{th}$

$$I_{ds} = \frac{k_n}{2}(V_{gs} - V_{th})_2$$