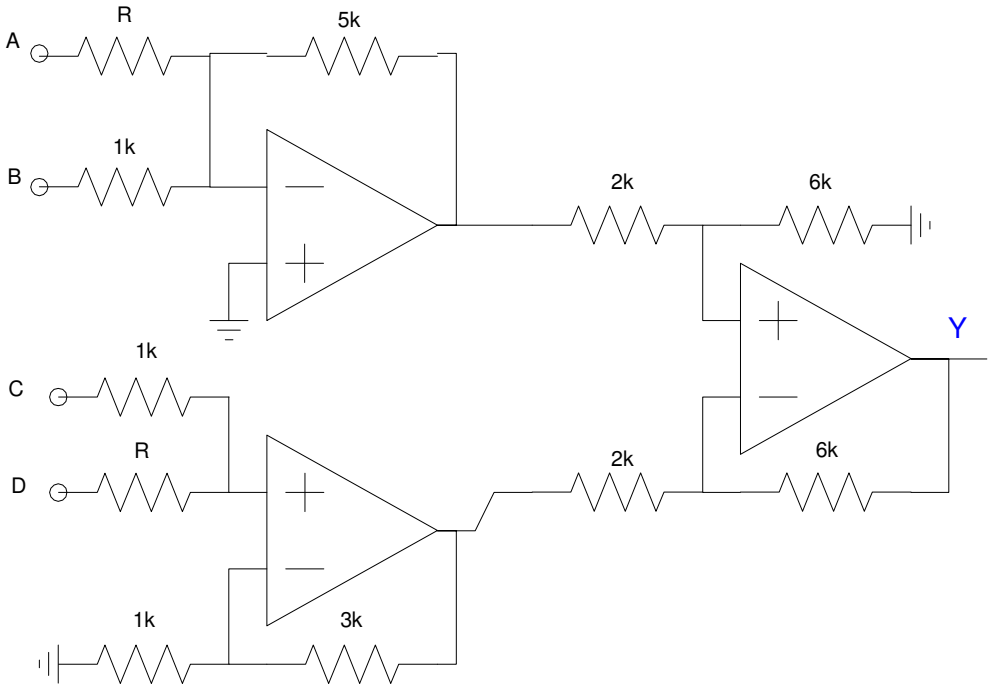
ECE 321 - Final Exam - Name _____

Spring 2023

1. OpAmp Circuits: Determine y as a function of A, B, C, and D. Assume

- Ideal op-amps
- R 800 + 100*(your birth month) + (your birth day).

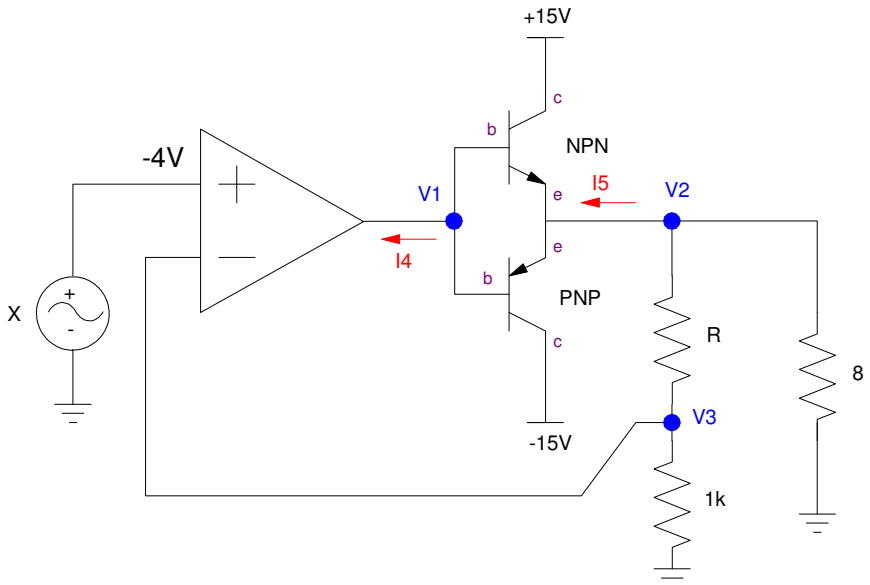
R 800 + 100*mo + day	Y = aA + bB + cC + dD



2. Push-Pull: Determine the voltages and currents for the following push-pull amplifier when X = -4V. Assume

- R = 800 + 100*(birth month) + (birth day).
- | Vce | = 0.7V (ideal silicon diodes)
- $\beta = 30$

R 800 + 100*mo + day	V1	V2	V3	I4	I5



3. Instrumentation Amplifier: Assume an RTD has the temperature - resistance relationship of

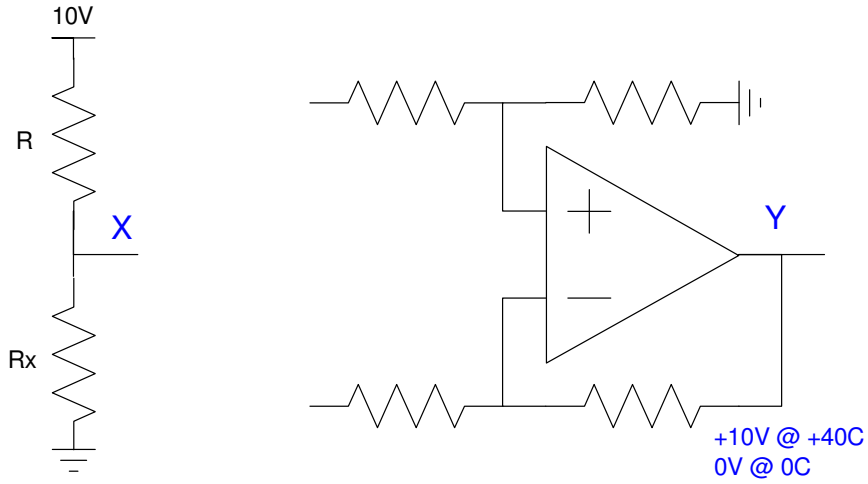
$$R_t = 1000 \cdot (1 + 0.0043T)\Omega$$

where T is the temperature in degrees C. Design a circuit which outputs

- +10V at +40C, and
- 0V at 0C

Assume

- R = 800 + 100*(your birth month) + (your birth date)

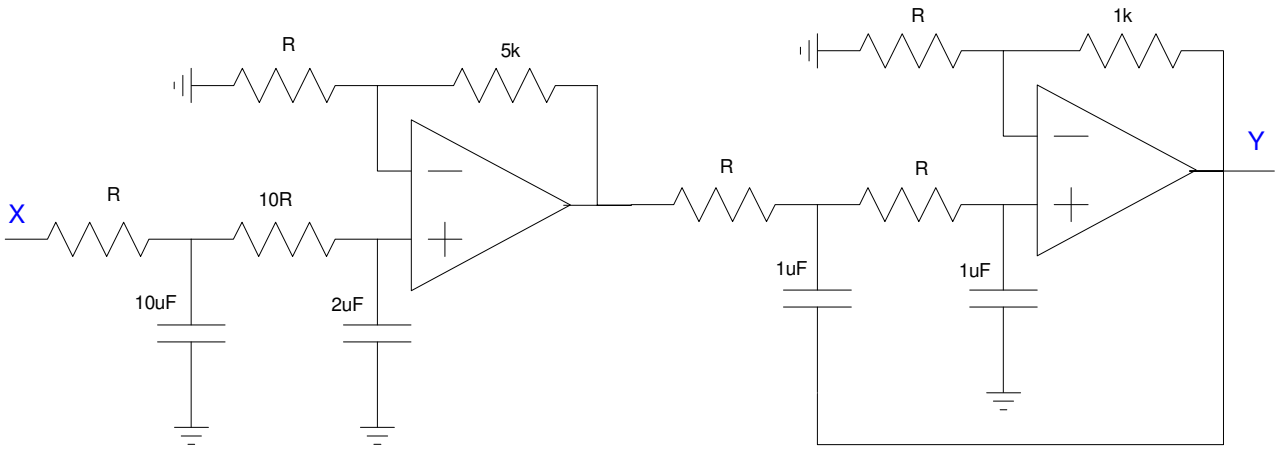


4. Filters: Let

- R 800 + 100*(your birth month) + (your birth day).

Determine the poles and the DC gain

R 800 + 100*mo + day	Transfer Function Y = G(s) * X



5) Filter Analysis: Determine y(t) given

$$Y = \left(\frac{20s}{s^2+2s+100} \right) X$$

$$x(t) = 4 + m\cos(10t) + d\sin(10t)$$

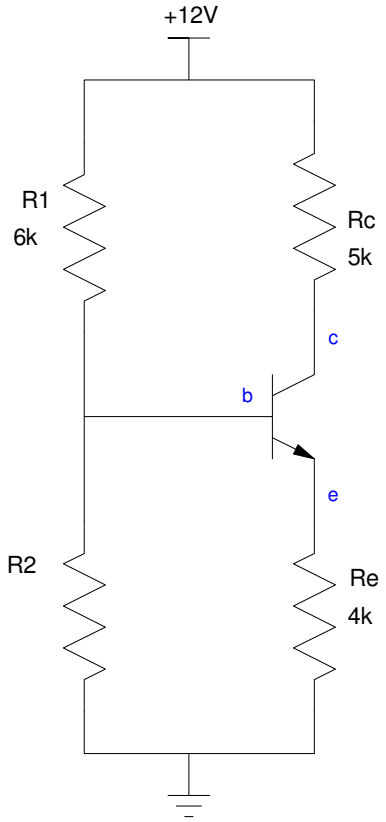
where

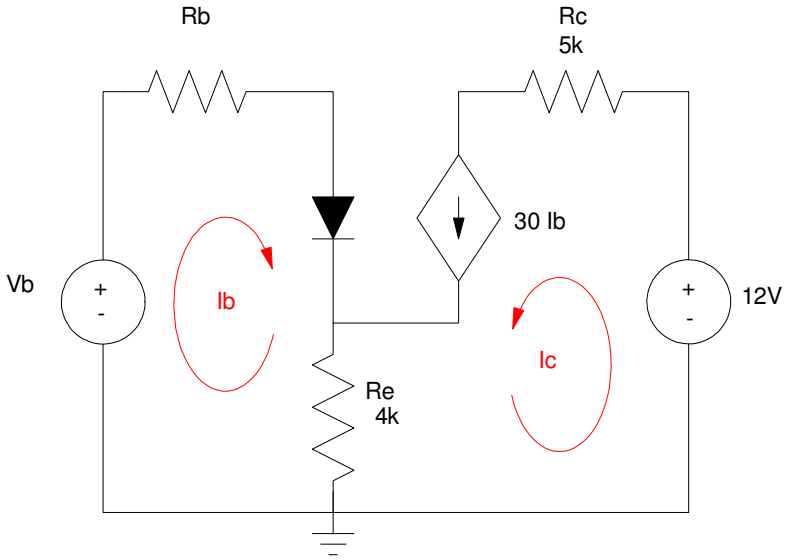
- m is your birth month(1..12) and
- d is your birth date (1..31)

6. CE Amplifiers (DC analysis): Determine the Q-point for the following circuit. Assume

- R2 = 800 + 100*(your birth month) + (your birth date)
- $\beta = 30$
- | Vbe | = 0.7V (ideal silicon diode)

R2 800 + 100*mo + day	Vb	Rb	Vce	Ic

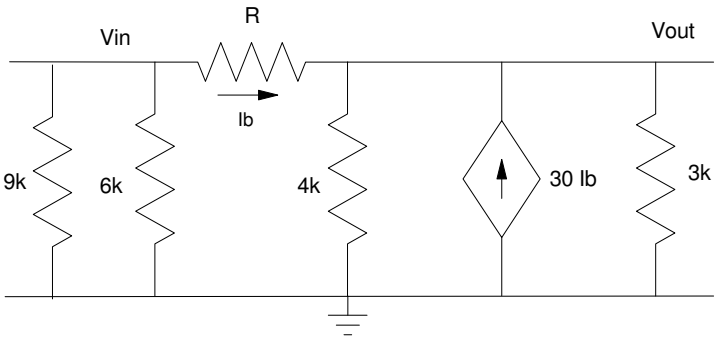


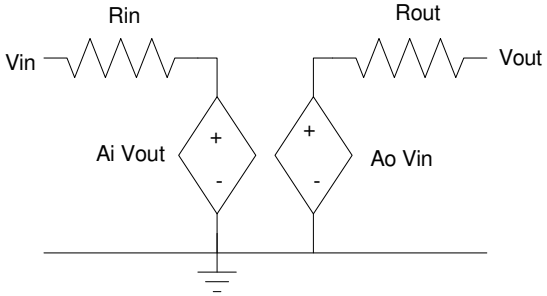


7. 2-Port model: Determine the 2-port parameters for the following circuit. Assume

- R = 800 + 100*(your birth month) + (your birth date) Ohms

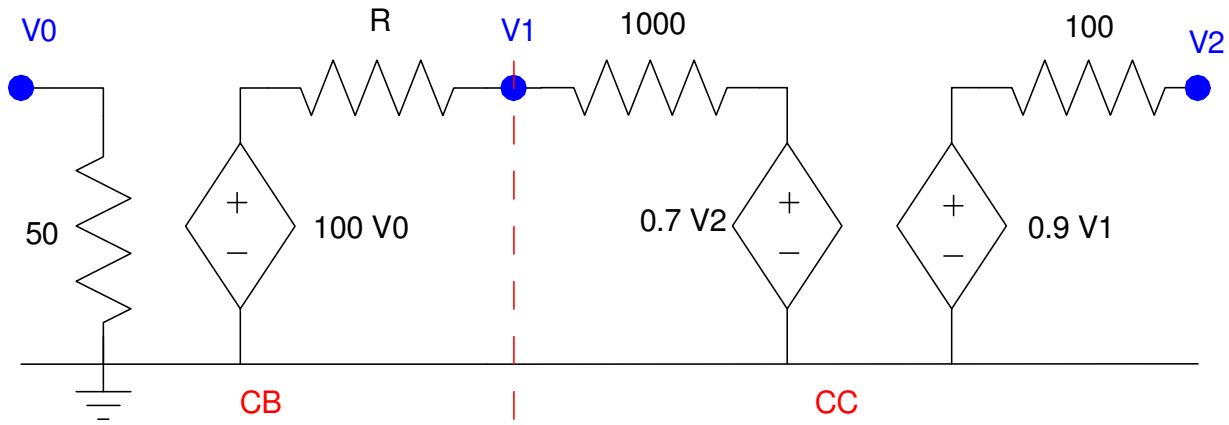
R 800 + 100*mo + day	Rin	Ai	Rout	Ao





8. 2-Port model: Determine the 2-port parameters for a Common-Base amplifier cascaded with a Common Collector amplifier. Assume

- R = 800 + 100*(your birth month) + (your birth date) Ohms



R 800 + 100*mo + day	Rin	Ain	Rout	Aout