Chemistry 332
First Exam
2017

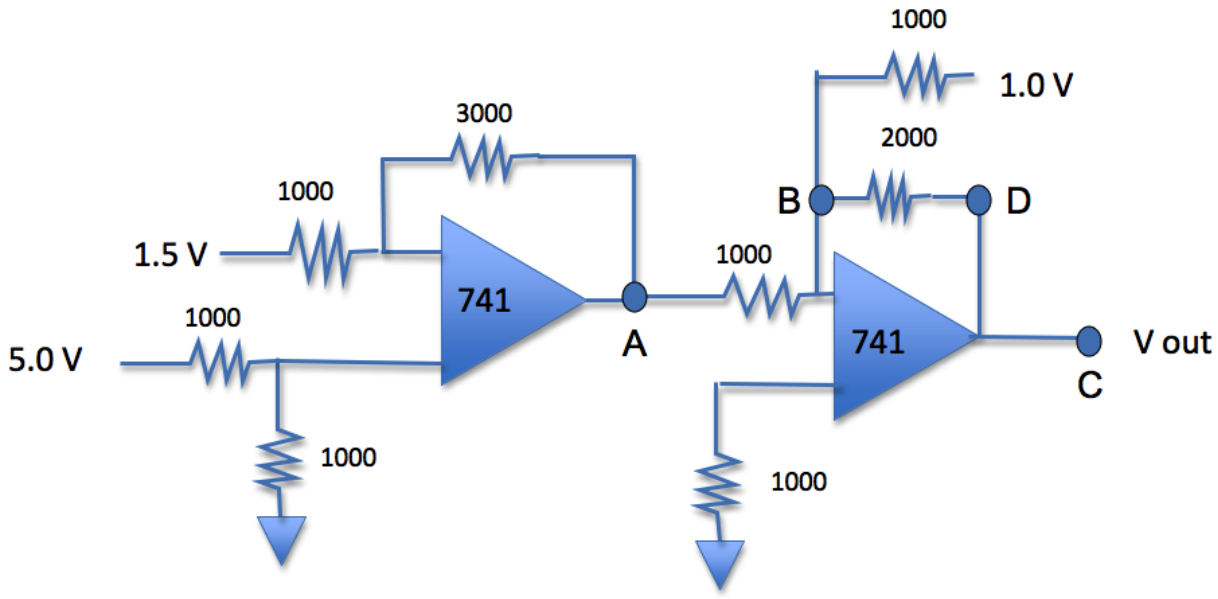
You must answer all questions. You have 1.5 hours for the exam

Physical Constants:

Speed of Light (c) 2.9979 x 10^{8} m/s Plank's Constant (h) 6.6262 x 10^{-34} j-s

Faraday Constant (F) 9.6485 x 10^{4} C/mol Gas Constant (R) 8.314 j/mol K

1) Determine the voltages at points A, B, and C and the current at point D. Each amplifier is powered with +/- 30 volts.



2) Astronomers often use the UV-Visible emission spectra of stars to determine the elemental composition of a star. Describe how you would get composition data from emission spectra **and** design an instrument to perform these measurements.

3) What are the physical characteristics of a grating monochromator responsible for determining the spectral resolution?

4) $^{12}CO_2$ or $^{13}CO_2$ can both be detected spectroscopically. What wavelength range would you expect to see the carbon dioxide vibration and which molecule would absorb the longer wavelength light?

5) Describe a detector capable of measuring low levels of 500 nm light.

6) Why do atomic emission instruments use source temperatures of 6,000-10,000 K as compared to atomic absorption instruments that use source temperatures of 2,000-3,000 K.