ECE 3040 Homework #8

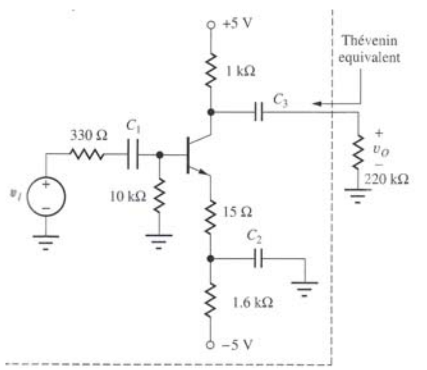
Note: there are several versions of Jaegers book so I have listed the equivalent problem in each edition. Only 5 problems are assigned.

1.) Jaeger Ed. 1 problem 13.17 or
Jaeger Ed. 2 problem 13.20 or
Jaeger Ed. 3 problem 13.23 or
Jaeger Ed. 4 problem 13.24 (except use VDD=15Volts not 16 Volts)

2.) Jaeger Ed. 1 problem 13.23 or
Jaeger Ed. 2 problem 13.28 or
Jaeger Ed. 3 problem 13.31 or
Jaeger Ed. 4 problem 13.32 (except use VDD=12Volts and VSS=-12Volts not +/-15 Volts)

3.) Jaeger Ed. 1 problem 13.90 or
Jaeger Ed. 2 problem 13.101 or
Jaeger Ed. 3 problem 13.98 or
Jaeger Ed. 4 problem 13.106

4.)



Use 0.7 V turn on voltage and β=65 and V_A=50V. Use V_A only to calculate r_o but assume r_o is large and thus negligible in the AC gain solution (if you do not, the math is difficult but the problem is still doable-see class notes for details leaving r_o in the circuit).

5.) Use ideal opamps to design a filter (show work) that has 2 zeros at DC, and poles at 100 Hz, 10KHz, and 500 kHz and to have a bandpass gain of 1000 v/v. b.) Simulate this filter in PSPICE using ideal voltage controlled voltage amplifiers (setting gain to ~1e9). Plot the 20xLOG(Voltage Gain) verses Log(frequency) up to 10 MHz. c.) Simulate this filter in PSPICE using the u741 Operational amplifier model. Plot the 20xLOG(Voltage Gain) verses Log(frequency) up to 10 MHz. d.) Explain the differences between your results in b and c.

Note: Sample lowpass filter circuits are available on the web page illustrating how to model the op amps. Basically use an ideal "E-part" which is an ideal voltage amplifier.