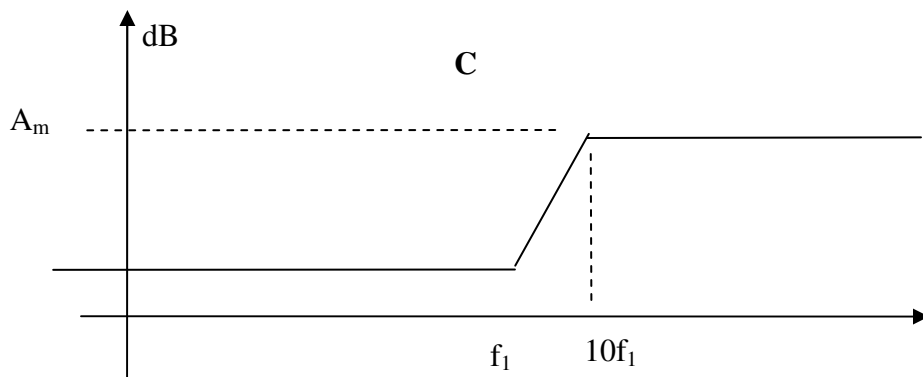
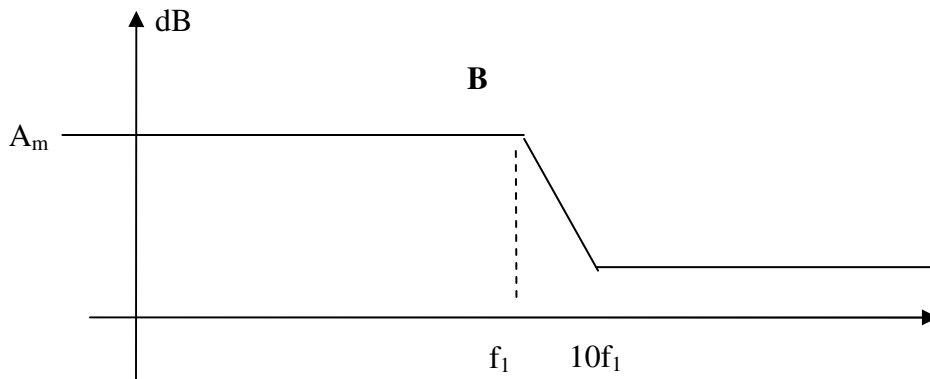
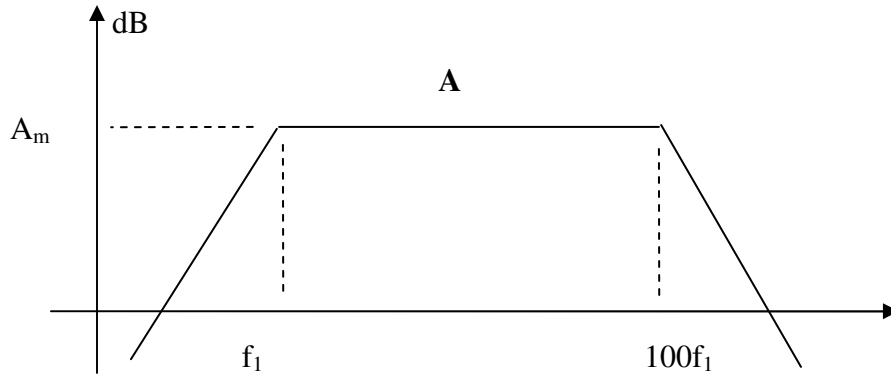


ELEE 3302 – DESIGN/SIMULATION PROJECT #1
Spring 2009

Design a circuit, assuming ideal op-amps, that has an asymptotic Bode Amplitude plot with the appearance of one of the following:



The type of circuit, gains and cutoff frequencies will depend on the 6th, 7th and 8th digits of your student ID number

| 6 th digit of ID | Type |
|-----------------------------|------|
| 0 | A |
| 1 | B |
| 2 | C |
| 3 | A |
| 4 | B |
| 5 | C |
| 6 | A |
| 7 | B |
| 8 | C |
| 9 | A |
| | |

| 7 th digit of ID | A _m |
|-----------------------------|----------------|
| 0 | 14dB |
| 1 | 20dB |
| 2 | 26dB |
| 3 | 32dB |
| 4 | 14dB |
| 5 | 20dB |
| 6 | 26dB |
| 7 | 32dB |
| 8 | 14dB |
| 9 | 20dB |

| 8 th digit of ID | f ₁ |
|-----------------------------|----------------|
| 0 | 100Hz |
| 1 | 200Hz |
| 2 | 300Hz |
| 3 | 500Hz |
| 4 | 100Hz |
| 5 | 200Hz |
| 6 | 300Hz |
| 7 | 500Hz |
| 8 | 100Hz |
| 9 | 200Hz |

(a) Sketch a design for your circuit and find component values that will give the correct gains and corner frequencies, assuming ideal op-amps. Give a summary of your calculations, showing how you obtained the element values.

(b) Again assuming an ideal op-amp, compute the step response for your circuit, and make a sketch or Matlab plot of the response to an 0.1V step.

(c) Use PSpice to simulate the amplitude Bode plot for your circuit, from 1 Hz to 10 kHz. It is recommended that you find a relatively high-speed op-amp in the PSpice library (e.g. LM318). It is likely (particularly with circuits B and C) that the simulations will show some discrepancies from the ideal case, if this is the case, give an explanation.

(d) Use PSpice to simulate the response to an 0.1V step, from t=0 to t=10ms. Again, it is likely that the simulations will show some discrepancies from the ideal case, if this is the case, give an explanation.

To turn in:

- Hand drawn schematic
- Pencil and paper design calculations
- Pencil and paper calculation of step response
- Plot of calculated step response
- PSpice schematic
- PSpice Bode plot, with comments
- PSpice step response, with comments