ECE 327 Final

2009t1 (Winter)

Instructions and General Information

- 100 marks total
- There are extra pages for scratch work at the end of the exam.
- If you need *additional scratch* paper, request some from a proctor. The work done on the *additional scratch* paper will not be marked. **All answers to be marked must be on the exam paper.**
- The proctors and instructors will **not answer questions**, except in cases where an error on the exam is suspected. If you are confused about a question, write down your assumptions or interpretation.
- **Justifications** of answers will be marked according to correctness, clarity, and concision.
- To earn part marks, you must show the formulas you use and all of your work.

ECE-327 Potentially Useful Information

$$\mathsf{P} = \frac{1}{2}(\mathsf{A}\times\mathsf{C}\times\mathsf{V}^2\times\mathsf{F}) + (\tau\times\mathsf{A}\times\mathsf{V}\times\mathsf{ISh}\times\mathsf{F}) + (\mathsf{V}\times\mathsf{IL})$$

$$\mathsf{T} = \frac{\mathsf{Ins}\times\mathsf{C}}{\mathsf{F}}$$

$$\mathsf{F} \propto \frac{(\mathsf{V}-\mathsf{Vt})^2}{\mathsf{V}}$$

$$\mathsf{P} = \mathsf{V}\times\mathsf{I}$$

$$\mathsf{P} = \frac{\mathsf{W}}{\mathsf{T}}$$

$$\mathsf{IL} \propto e^{\frac{-q\times\mathsf{Vt}}{k\times T}}$$

$$\mathsf{S} = \frac{\mathsf{T1}}{\mathsf{T2}}$$

$$\mathsf{M} = \frac{\mathsf{F}/10^6}{(\sum_{i=0}^{n}\mathsf{PI}_i\times\mathsf{C}_i)}$$

$$\mathsf{A}' = (1-\mathsf{E}(1-\mathsf{Pb}))\mathsf{A}$$

$$q = 1.60218\times10^{-19}\mathrm{C}$$

$$k = 1.38066\times10^{-23}\mathrm{J/K}$$

$$\log_x y = \frac{\log y}{\log x}$$

$$(x^y)^z = x^{(yz)}$$

$$(x^y)(x^z) = x^{(y+z)}$$

$$a = b^c \quad \text{is equivalent to:}$$
$$a^{1/c} = b$$

Q0 (1 Mark) !!Almost Free!!

(*estimated time: 0 minutes*)

Ten years from now, what, if anything, will you remember about this course, other than TimBits?

Q1 (100 Marks) Waterluvian Filter

(*estimated time: 149 minutes*)

Design a Waterluvian filter and calculate its optimality. **For full marks, you must justify your answer.**

The optimality of my Waterluvian filter is: