Name ______________________

Multistage Interconnection Networks

EE 7700-3

Midterm Examination

26 October 1992, 13:40–14:30 C.S.T.

Open Papers, Open Notes

This exam has been modified so that the notation is consistent with EE 7725 Fall 1994.

Problem 1	______	(34 pts)
Problem 2	______	(33 pts)
Problem 3	______	(33 pts)
Exam Total	______	(100 pts)

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Problem 1: Consider a MIN using 3×3 cells with one-slot queues. Using the non-iterative technique described in class (for 2×2 cells) write an equation for the probability that a slot in stage i is occupied, $p(i)$, in terms of $p(i)$, v_i, and $p(i-1)$. Using the equation, it should be possible to find $p(i)$ given $p(i-1)$ and λ. (That is, $p(i) = p(i)$ is not acceptable.) It is not necessary to simplify your result. (34 pts)

Problem 2: The prime network is the MIN described by five-tuple $(4, (2, 3, 5, 7), -, S, T)$.

(a) Give the description of the minimum cost modified omega network with the same number of inputs. (9 pts)

(b) Find all routing tag(s) for request $(137, 101)$ for the modified omega network. (9 pts)

(c) Show which cells and links request $(137, 101)$ will be routed through in the prime network. (Give the cell number, as well as the cell input and output used at each stage.) (15 pts)

Problem 3: Briefly answer the following. Correct but long answers will not receive full credit.

(a) Rank the following simulation methods on the amount of memory (disk and main memory) needed (1=most, 3=least): (8pts)

Stochastic Model

Trace Driven

Execution Driven

Material not covered for 94 midterm.

(b) Could a fast crossbar be used in a circuit switched MIN? If so, explain what problem is solved in the circuit switched network, and how it is solved. If not, explain why not. (8 pts) *Material not covered for 94 midterm.*

(c) To determine the effect of dimension (n) on cost and performance fixed bisection width $N = k^n$ node k-ary n-cube networks were compared. Would a similar comparison make sense for $m \times m$ omega networks? Explain. (9 pts)

(d) An infinite queue is fed by (Bern(λ),Geo(μ),D) traffic with $\lambda = 0.50$ and $\mu = 0.55$. What is the probability that there will be 3 items in the queue? (8 pts)