



Honor Code of the School of Engineering

"All students taking courses in the School of Engineering agree, individually and collectively, that they will not give or receive unpermitted aid in examinations or other course work that is to be used by the instructor as the basis of grading."

-From the Graduate/Undergraduate Bulletin

I have read, understood, and agree to abide by the Honor Code of the School of Engineering.

Name: _____

ID: _____

Signature: _____

Date: _____

1. [20 points]
2. [20 points]
3. [60 points]
4. [20 points]
5. [20 points]
6. [20 points]
7. [20 points]
8. [20 points]

Total Score:

Final Examination

**COEN 233 Computer Networks
Department of Computer Engineering
Santa Clara University**

Dr. Ming-Hwa Wang
Phone: (408) 525-2564
Course website:
Office Hours:

Winter Quarter 2015
Email address: m1wang@scu.edu
<http://www.cse.scu.edu/~mwang2/network/>
Saturday 4:30-5:00pm

1. [20 points] Please give the whole names for the following acronyms: APSD, ECMP, ICANN, SIPP, LSR, DCCP, ROHC, SACK, SCTP, RPR.
2. [20 points] True or false (yes or no, 1 or 0) problems with wrong-answer penalties:
 - a) Is it possible to determine from the domain names of computers how close they are to one another geographically?
 - b) Is it possible to pass part of the traffic using normal IP forwarding in an MPLS-enabled network?
 - c) Each switch has a special routing table stored on it.
 - d) Assuming that all routers and hosts are working properly and that all software in both is free of all errors, is there any chance, however small, that a packet will be delivered to the wrong destination?
3. [60 points] Simple question or calculation problems:
 - a) Perform CIDR aggregation on the following /24 IP addresses: 200.96.86.0/24; 200.96.87.0/24; 200.96.88.0/24; 200.96.89.0/24.
 - b) Consider building a CSMA/CD network running at 1 Gbps over a 1-km cable with no repeaters. The signal speed in the cable is 200,000 km/sec. What is the minimum frame size?
 - c) A LAN uses Mok and Ward's version of binary countdown. At a certain instant, the ten stations have the virtual station number 8, 2, 4, 5, 1, 7, 3, 6, 9, and 0. The next three stations to send are 4, 3, and 9, in that order. What are the new virtual station numbers after all three have finished their transmissions?
 - d) Sketch the differential Manchester encoding for the bit stream 0001110101. Assume the line is initially in the low state.
 - e) A token bucket scheme is used for traffic shaping. A new token is put into the bucket every 5 μ sec. Each token is good for one short packet, which contains 48 bytes of data. What is the maximum sustainable data rate in Mbps?
 - f) Imagine that a two-way handshake rather than a three-way handshake were used to set up connections. In other words, the

third message was not required. Are deadlocks now possible? Give an example or show that none exist.

4. [20 points] Suppose that a datagram packet-switching network uses headers of length H bytes and a virtual-circuit packet-switching network uses headers of length h bytes. Please determine the length M of a message for which the virtual-circuit switching delivers the packet in less time than datagram switching does. Assume packets in both networks are the same length.

5. [20 points] A router has the following CIDR entries in its routing table :

Address/mask	Next hop
135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1
192.53.40.0/23	Router 1
default	Router 2

For each of the following IP address, what does the router do if a packet with that address arrives? a) 135.46.63.10 b) 135.46.57.14 c) 135.46.52.2 d) 192.53.40.7 e) 192.53.56.7

6. [20 points] Consider the network $(u, v, 1)$, $(u, x, 2)$, $(v, z, 5)$, $(v, y, 15)$, $(z, x, 2)$, $(z, y, 10)$, and $(x, y, 1)$. Assume that each node initially knows the costs to each of its neighbors. Consider the distance vector algorithm and show the distance table entries at node z .
7. [20 points] What is the size of the multicast address space? Suppose now that two multicast groups randomly choose a multicast address. What is the probability that they choose the same address? Suppose now that 1,000 multicast groups are ongoing at the same time and choose their multicast group addresses at random. What is the probability that they interfere with each other?
8. [20 points] Suppose an IP packet is fragmented into 10 fragments, each with 1% (independent) probability of loss. To a reasonable approximation, this means there is a 10% chance of losing the whole packet due to loss of a fragment. What is the probability of net loss of the whole packet if the packet is transmitted twice,
- assuming all fragments received must have been part of the same transmission?
 - assuming any given fragment may have been part of either transmission?
 - explain how use of the IDENT field might be applicable here.