

**Data Communications CS420/520**  
**Spring 2006**

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Final Exam

Name: \_\_\_\_\_ Student ID: \_\_\_\_\_

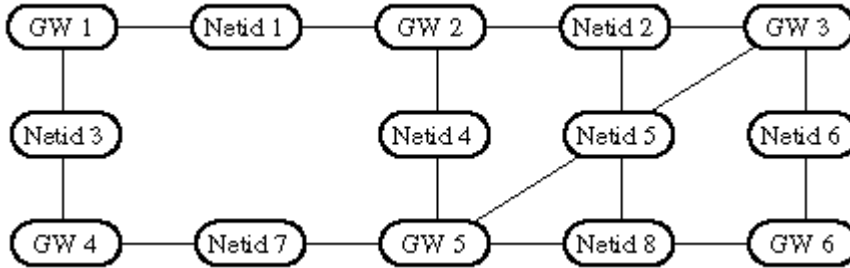
1. This is an *closed* book, *closed* note exam.
2. You may use a calculator but **no computers**.
3. Show **ALL** your work to get full or partial credit for the problem.
4. You have up to 2 hours (this is plenty - you should only need one).
5. Make sure you have **7 questions!**
6. Answer questions **briefly**, do not write long stories!

<b>Problem</b>	<b>Total</b>	<b>-Points</b>
<b>Total:</b>	100	



2. (20 pts) Circle the correct response(s). (Note that **there might be more than one correct answer** - so indicate all of them). Each part is worth 3 points.
- a) Which statements about TCP/IP are true?
- i) TCP is a Data Link Protocol
  - ii) IP is a datagram service
  - iii) UDP is the preferred protocol for FTP
  - iv) UDP and IP are both datagram services
  - v) Most internet traffic utilizes the TCP/IP protocol suite
- b) With respect to packet switching and routing, which statements are true?
- i) The packet size does influence the efficiency of the communication link
  - ii) The best link utilization is achieved if one maximizes the packet length
  - iii) The ARP protocol is a routing protocol implementing a spanning tree
  - iv) IP uses *intranet* fragmentation
  - v) In *internet* fragmentation only the final destination reassembles fragmented packets
- c) Which statements about ATM are true?
- i) The maximum frame size is 64k bytes
  - ii) ATM is primarily used in Local Area Networks
  - iii) LAN Emulation and IP over ATM support internetworking with legacy LANs
  - iv) The network switch is an integral part of the ATM design
  - v) The most common ATM data rates are 10Mbps and 100Mbps.
  - vi) ATM packet sizes vary greatly
- d) Which of the following statements are true?
- i) In wireless networks *handoff* addresses closing a connection
  - ii) 802.3 addresses wireless transport
  - iii) Token ring protocols are wireless protocols
  - iv) To increase channel capacity usually small cells are preferred in metropolitan areas
  - v) Multipath propagation is a problem in wireless
  - vi) TDMA and CDMA are both multiplexing methods used in wireless
- e) Which of the following statements are true?
- i) 459.123.23.119 is a valid IP address
  - ii) The address space of IPv4 and IPv6 are the same
  - iii) The MAC address is supposed to be unique for each network interface
  - iv) Congestion control is not possible in large networks
  - v) 802.5 addresses token ring networks

3. (10 pts) Assume the following network with 6 gateways. Given the initial routing tables of all gateways (the entries in the table contain the netid, the distance and gateway), what are the entries in Gateway GW3, GW5 and GW6 after one exchange of table-updating messages? Next, what is the final table for GW6 after a second message exchange?



Netid	D,G
1	0,1
3	0,1

Netid	D,G
1	0,2
2	0,2
4	0,2

Netid	D,G
2	0,3
5	0,3
6	0,3

Netid	D,G
3	0,4
7	0,4

Netid	D,G
4	0,5
5	0,5
7	0,5
8	0,5

Netid	D,G
6	0,6
8	0,6

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4. (15 pts) Answer the following questions:

a) What do acronyms TCP, UDP and IP stand for?

i) TCP

ii) UDP

iii) IP

b) If both, UDP and IP offer no reliability guarantees, why is UDP needed, since it is a datagram protocol on top of another datagram protocol?

c) What does the acronym ARP stand for?

d) Briefly describe what the ARP protocol is used for. Include the main motivation for having it.

e) What is the IEEE standard that defines the CSMA/CD (Ethernet)?

f) How does TCP implement reliability when it is using an underlying datagram protocol, i.e. IP? Is this a contradiction or can it be done? As usual, justify your answer!

5. (15 pts) With respect to (DoD) IP, TCP and UDP

a) What is a port?

b) What is the maximal length of an IP package?

c) What is the relationship between IP, TCP, UDP, Telnet and FTP? Draw a diagram relating the protocols.

d) What is a socket?

e) List one improvements of IPv6 over IPv4



