Name _____

Student number _____

CS 3CN3 and SE 4C03 Winter 2008

Midterm Test Answer Key

Instructor: William M. Farmer

You have 50 minutes to complete this test consisting of 30 questions. You may use your notes and textbooks, but you may not use any calculators or other electronic devices. Circle the *best* answer for the multiple choice questions, and write the answer in the space provided for the other questions. Good luck!

(1) [2 pts.] An application based on the UDP protocol cannot provide reliable communication. Is this statement true or false?

(a) True.
(b) [False.]

(2) [2 pts.] Exactly one IP address is assigned to each host on the Internet. Is this statement true or false?

(a) True.
(b) [False.]

(3) [2 pts.] Two computers having NICs can be networked together using an Ethernet patch cable. Is this statement true or false?

(a) [True.]
(b) [False.]

(4) [2 pts.] ARP messages are usually encapsulated in IP datagrams. Is this statement true or false?

(a) True.
(b) [False.]

(5) [2 pts.] RARP is a protocol that enables a diskless host to learn the IP addresses assigned to its network interfaces. Is this statement true or false?

(a) [True.]
(b) False.

Test continues on next page.

(6) [2 pts.] The mechanism in the TCP protocol for dealing with congestion collapse is generally effective over wired networks. Is this statement true or false?

(a) [True.]
(b) False.

(7) [2 pts.] The fragments of an IP datagram that has undergone fragmentation cannot be further fragmented. Is this statement true or false?

(a) True.
(b) [False.]

(8) [2 pts.] TCP/IP is intellectual property belonging to the U.S. Government. Is this statement true or false?

(a) True.
(b) [False.]

(9) [2 pts.] An IP address is always in exactly one subnet. Is this statement true or false?

(a) True.
(b) [False.]

(10) [2 pts.] A typical desktop computer that is running TCP/IP and is connected to the Internet has IP forwarding turned off. Is this statement true or false?

(a) [True.]
(b) False.

(11) [2 pts.] A typical desktop computer that is running TCP/IP and is connected to the Internet has at least _____ direct route(s) and at least _____ indirect route(s) in its routing table.

(a) 1, 1.
(b) 1, 2.
(c) [2, 1.]
(d) 3, 0.

(12) [2 pts.] Which of the following IP options is a major security risk?

(a) Record route.
(b) [Source route.]
(c) Timestamp.
(d) Traceroute.

Test continues on next page.

(13) [2 pts.] Which of the following causes TCP segments to be lost?

(a) Congestion collapse.
(b) Silly window syndrome.
(c) Ambiguous acknowledgments.
(d) All of the above.

(14) [2 pts.] When an IP datagram's time-to-live value expires

(a) The IP datagram is dropped.
(b) The IP datagram is sent back to the sender.
(c) A beginning portion of the IP datagram is sent back to the sender.
(d) The IP datagram is forwarded to the next hop.

(15) [2 pts.] Which protocol is used to report failures in delivering IP datagrams?

(a) IP.
(b) ICMP.
(c) UDP.
(d) TCP.

(16) [2 pts.] How many faults can an FDDI network withstand?

(a) 0.
(b) 1.
(c) 8.
(d) Any finite number.

(17) [2 pts.] Which of the following addresses should never be assigned to a network interface on the Internet?

(a) Addresses reserved for zero configuration networking.
(b) Addresses reserved for private networks.
(c) Class E network addresses.
(d) All of the above.

(18) [2 pts.] How many collision domains are there in an Ethernet network consisting of three NICs connected to one hub?

(a) 1.
(b) 2.
(c) 3.
(d) 6.

Test continues on next page.

(19) [2 pts.] An *IP router* can be defined as a host running TCP/IP that has

(a) At least two network interfaces.

(b) At least one network interface and IP forwarding turned on.

(c) At least one network interface and an IP routing table.

(d) All of the above.

(20) [2 pts.] The loopback network needs only one IP address but it is assigned _____ IP addresses.

(a) 2.

(b) 2^8.

(c) 2^{16}.

(d) 2^{24}.

(21) [2 pts.] Which network technology is not connectionless?

(a) Ethernet.

(b) ATM.

(c) WLAN.

(d) None of the above.

(22) [2 pts.] Which network technology does not use optical cable?

(a) Ethernet.

(b) ATM.

(c) CDDI.

(d) FDDI.

(23) [2 pts.] Suppose (1) a sequence of 5 TCP segments, s_1, s_2, s_3, s_4, s_5, is sent from a process on host A to a process on host B over a TCP connection, (2) segments s_1, s_2, s_4, s_5 are received by the process on B, and (3) segment s_3 is lost in route. Which of the five TCP segments will most likely be retransmitted.

(a) s_1, s_2, s_3,

(b) s_3.

(c) s_3, s_4, s_5.

(d) s_1, s_2, s_3, s_4, s_5.

Test continues on next page.

(24) [2 pts.] Which layer of the TCP/IP Internet Layering Protocol handles communication between processes running on hosts?

(a) Network Interface Layer.
(b) Internet Layer.
(c) Transport Layer.
(d) Application Layer.

(25) [2 pts.] A default route is the same as

(a) A route to a "next hop".
(b) The last route in a routing table.
(c) A route to an Internet service provider.
(d) A route to the subnet of all IP addresses.

(26) The IP address 213.158.241.89 belongs to a class network N.

(a) [4 pts.] Write this address in base 2.

Answer: 11010101.10011110.11110001.01011001

(b) [2 pts.] Write this address in base 16.

Answer: D5.9E.F1.59

(c) [4 pts.] What is the network address of N.

Answer: 213.158.241.0

(27) (a) [4 pts.] How many subnets have the submask 255.255.224.0?

Answer: $2^{8+8+3} = 2^{19}$.

(b) [4 pts.] How many addresses are in a subnet that has the submask 255.255.224.0?

Answer: $2^{5+8} = 2^{13}$.

(28) [6 pts.] In a TCP segment header, what is the difference between having the RST code bit set to 1 and having the FIN code bit set to 1?

Answer: The RST code bit is a signal to immediately end a TCP connection without waiting for acknowledgment from the receiver. The FIN code bit is a signal to gracefully close one direction of a TCP connection in which an acknowledgment is expected from the receiver.

(29) [6 pts.] What can happen if the maximum segment size (MMS) for one direction of a TCP connection is set to a value that is too high?

Answer: If the MMS is set too high, the IP datagrams in which the TCP segments are encapsulated (1) will have to be fragmented or (2) will not fit in the receiver's buffer.

Test continues on next page.

(30) [20 pts.] Below is a diagram of a conventional internet using the TCP/IP protocols.

THE DIAGRAM IS NOT SHOWN.

$\mathsf{H}_1, \ldots, \mathsf{H}_6$ are hosts. $\mathsf{I}_1, \ldots, \mathsf{I}_9$ are interfaces to the single physical networks $\mathsf{SPN}_1, \ldots, \mathsf{SPN}_4$. $\mathsf{J}_1, \ldots, \mathsf{J}_6$ are interfaces to loopback networks. There are other hosts and interfaces that are not shown. The following table shows what IP addresses and subnet masks are assigned to the $\mathsf{I}_1, \ldots, \mathsf{I}_9$ interfaces.

Interface	**IP Address**	**Subnet Mask**
I_1	210.18.183.10	255.255.255.248
I_2	210.18.183.11	255.255.255.248
I_3	210.18.183.130	255.255.255.248
I_4	210.18.183.134	255.255.255.248
I_5	210.18.183.135	255.255.255.248
I_6	210.18.183.146	255.255.255.248
I_7	210.18.183.149	255.255.255.248
I_8	210.18.183.202	255.255.255.248
I_9	210.18.183.205	255.255.255.248

Recall that a route in a subnet routing table has the form (a, m, r, i) where:

- a is the address of a subnet S.
- m is the mask of S.
- r is an IP address for the "next hop" ($r = *$ for direct routes).
- i is an interface.

Write down an appropriate routing table for H_1 as a list of (a, m, r, i) tuples. *Do not use a default route or any host-specific routes.*

Answer:

(127.0.0.0,	255.0.0.0,	$*$,	J_1)
(210.18.183.8,	255.255.255.248,	$*$,	I_1)
(210.18.183.128,	255.255.255.248,	210.18.183.11,	I_1)
(210.18.183.144,	255.255.255.248,	210.18.183.11,	I_1)
(210.18.183.200,	255.255.255.248,	210.18.183.11,	I_1)

Test ends here. **6/6**