Computer Networks Final Exam.
Date: 2012.06.18

1. Give the full name of the following acronyms. (12%)

   (a) WAN

   (b) DHCP

   (c) PAN

   (d) ARP

   (e) MTU

   (f) ICMP

2. If an ISP assigned you a /25 address block, how many computers could you assign an address? (5 %)

3. What subnet mask would you use to summarize only the following networks? (5%)
   192.168.4.0   192.168.5.0   192.168.6.0   192.168.7.0

4. Consider the network in Figure 1(a). Please use Dijkstra's shortest-path algorithm to compute and list the shortest path from A to all network nodes $(B, C, \ldots, F)$. (10 %)

5. Please give the time complexity analysis for Dijkstra's algorithm. (6 %)
   (Hint: the worst case running time for Dijkstra's algorithm is $O(|V|^2)$.)

6. Consider the network shown in Figure 1(b), and assume that each node initially knows the costs to each of its neighbors. Consider the distance vector algorithm and show the distance tables for every node in each iteration step. (15 %)

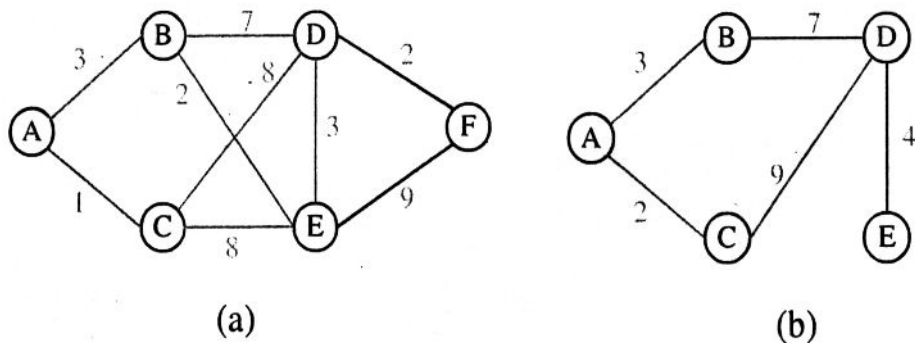(a)   (b)

Figure 1:

7. Consider sending a 2,420-bytes datagram into a link that has an MTU of 500 bytes (includes 20 bytes of header). Suppose the original datagram is stamped with the identification number $ID = 473$. How many fragments are generated? (4 %) What are their identification number and the offset values of each fragments? (6 %)

8. Explain the store and forward paradigm. (7 %)

9. What is the hidden terminal (station) problem in wireless networks? (6 %)

10. Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 11111111 11111111 11111111	0
11100001 00000000 00000000 00000000 through 11100001 00000000 11111111 11111111	1
11100001 00000001 00000000 00000000 through 11100001 11111111 11111111 11111111	2
otherwise	3

   (a) Provide a forwarding table that has four entries, use longest prefix matching, and forwards packets to the correct link interfaces. (6 %)

   (b) Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses: 11001000 10010001 01010001 01010101 (4 %)

11. The following data is a portion of a packet that captured during the connection setup phase (IP header + TCP header). (14%)

   45 00 00 2c b2 4e 40 00 3e 06 (xx xx) 8c 7f 51 12 c0 a8 00 99 00 17 04 60 b2 38 ea 36 4b 85 05 b8 60 12 e0 00 27 1f 00 00 02 04 05 b4

   (a) What is the source IP address? (3 %)
   (b) What is the destination IP address? (3 %)
   (c) What is the IP checksum? (5 %)
   (d) What is the source port number? (3 %)