Multiple choice/True and False
Each question in this section is worth 1pt.
For every wrong answer an additional 1/4 is deducted

1. (1pt) In IP, the decision on which outgoing link to forward a given packet depends on the source address and destination address of the packet.

   (a) True

   (b) False

2. (1pt) In the 182.61.150.64/255.255.255.192 network, the default router should be assigned the address 182.61.150.128

   (a) True

   (b) False

3. (1pt) An IP packet can be forwarded a maximum of 64 times

   (a) True

   (b) False

4. (1pt)ICMP packets are encapsulated in IP packets.

   (a) True

   (b) False

5. (1pt) ICMP is a transport protocol.

   (a) True

   (b) False

6. (1pt) OSPF is a link state protocol.

   (a) True

   (b) False

7. (1pt)The count-to-infinity problem occurs when using

   (a) Distance Vector protocol

   (b) Link State Protocol

   (c) Path Vector Protocol

   (d) OSPF Protocol

   (e) None of the above

8. (1pt) Poisoned reverse is used

(a) To fix the count-to-infinity problem in RIP

(b) To fix the count-to-infinity problem in OSPF

(c) To fix the ageing problem in OSPF

(d) To fix the ageing problem in RIP

(e) None of the above

9. (1pt) The length of an IP address is

(a) 32 bits

(b) 4 bytes

(c) all of the above

(d) none of the above

10. (1pt) The maximum number of hosts (assignable IP addresses) in the network 12.12.12.0 with mask 255.255.255.224 is

(a) 255

(b) 256

(c) 32

(d) 30

(e) none of the above

11. (1pt)The maximum length of an IP header is

(a) 20 bytes

(b) 40 bytes

(c) 60 bytes

(d) 80 bytes

(e) none of the above

12. (1pt)The minimum length of an IP header is

(a) 20 bytes

(b) 40 bytes

(c) 60 bytes

(d) 80 bytes

(e) none of the above

13. (1pt)When an IP packet reaches a router the TTL field in the packet header is

(a) incremented by one

(b) decremented by one

(c) incremented by two

(d) decremented by two

(e) none of the above

14. (1pt) Let P1 be a packet as received by a router R1, P2 be the same packet forwarded by R1 to R2 and P3 is the same packet forwarded by R2 to the destination . How many fields in the IP header are different between P1 and P3

(a) 0

(b) 1

(c) 2

(d) 3

(e) None of the above

15. (1pt) When the TTL field in an IP packet reaches 0 the router drops the packet and

(a) Sends an ICMP packet, "destination unreachable", to the source.

(b) Sends a UDP error packet to the source.

(c) Sends an ICMP packet, "destination unreachable", to the previous router.

(d) Sends an IP packet with an option field that contains the error to the source.

(e) None of the above.

Problems

1. You have been assigned the 1.1.1.0/24 address range.

(a) (15pts)Use subnetting to divide the 1.1.1.0/24 into 8 blocks. List the resulting subnets and the subnet masks.

(b) (0pts)Assign the first 7 smallest IP blocks to the networks in Figure 1. Network 1 should be assigned the first block, network 2 the second...,etc. Also within the same network IPs are assigned to devices alphabetically: A gets the first assignable IP... etc.

(c) (15pts) Give the forwarding table for routers A and B.

(d) (10pts) Optimize the forwarding table for A by using only 5 entries.

(e) (5pts) The forwarding table for A can be optimized further to include only 4 entries. This can be done by changing, for only one network, the IP block assignment done in 1b. (Hint: This chosen network can be assigned any of the 8 blocks obtained in 1a).

(f) (5pts) Modify A's forwarding table so that of all hosts on Network 1 (we could add other hosts later on), only host X is reachable from A.

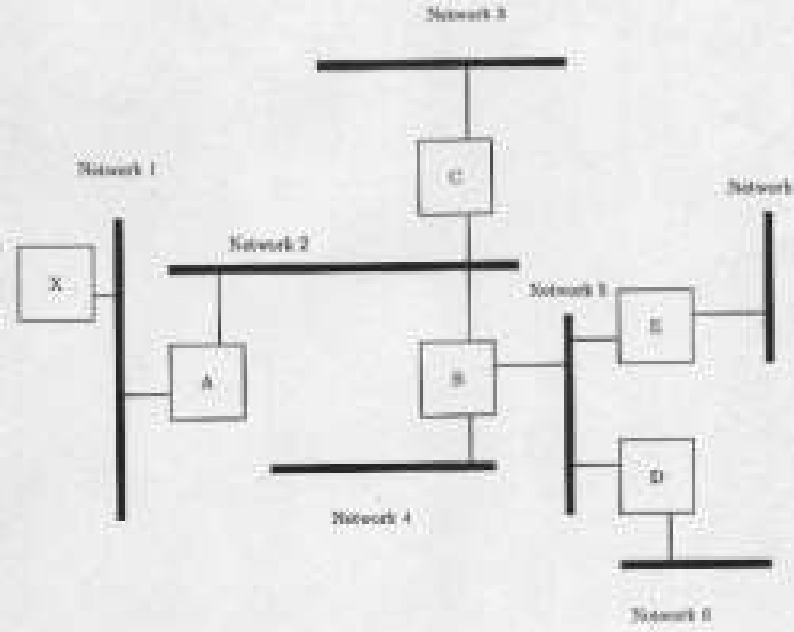

Figure 1:

2. (10pts)Consider the network in Figure 2. Use Dijkstra's shortest path algorithm to fill A's forwarding table shown below. Show all your work.

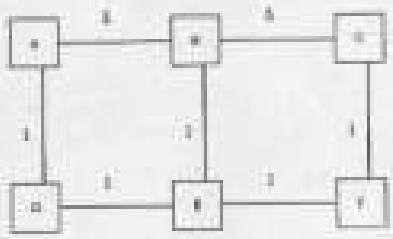

Figure 2:

destination	next hop	cost
B		
C		
D		
E		
F		

3. Consider the network shown in Figure 3.

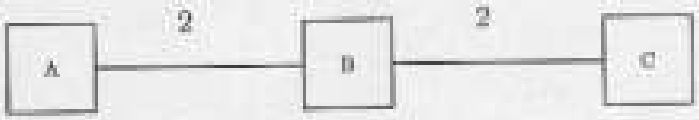

Figure 3:

(a) (15pts) Show the routing table for routers A, B and C when you run a distance vector protocol. Show all your work.

(b) (5pts)Suppose that the cost of link A-B changes to 8. Without doing the calculation again explain in a few clear words if there is a count-to-infinity problem.

(c) (5pts)Suppose that the cost of link A-B changes to 1. Without doing the calculation again explain in a few clear words if there is a count-to-infinity problem.