Name Surname: No:

BLG433E-Bilgisayar Computer Communications, Fall 2009
Final Exam., Jan.22,2010.

1	2	3	Total

Name Surname:
Student Number:
Department:
Signature:

KEY

Write your answers in the space provided for them.
Show all your work and write neatly.
Good luck.....

Duration: 100 minutes

1) (10 points) a) Describe the basic idea behind the *link state routing* technique by giving the necessary parts.

- Each node keeps the info. for the links of which it is the source point (A → B)
- Each node floods link info to the network
- By getting link info from the other nodes, every node constructs the topology
- on the constructed topology shortest paths to every other node are calculated.

b

b)What is the main problem of the technique? Mention about the solutions.

Link state packages could be out of date: use of sequence number

OR

Flooding increases the number of packets in the network: "# of hops" field can be used.

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2) (24 points) For the subnets whose CIDR representations given below, find *the number of hosts* that can be addressed (disregarding the special addresses), *subnet mask*, and *subnet broadcast address* and give the necessary explanation.

22.0.0.0/18

A class addr. 32-18 = 14 # of hosts = 2^{14} = 16384

b Subnet mask: 11111111.11111111.11000000.00000000
255 . 255 . 192 . 0

Subnet broadcast addr: 22.0.00111111.11111111
63 255

50.0.0.0/15

A class addr. 32-15 = 17 # of hosts = 2^{17} = 131072

Subnet mask: 11111111.1111111 0.0.0
255 . 254 .0.0

b Subnet broadcast addr: 50.1.255.255

128.1.0.0/21

B class addr. 32-21 = 11 # of hosts: 2^{11} = 2048

b Subnet mask: 11111111.11111111.11111000.00000000
255 . 255 . 248 . 0

Broadcast addr : 128. 1 . 7 . 255

198.4.12.0/28

C class addr. 32-28 = 4 # of hosts = 2^4 = 16.

b Subnet mask: 11111111.11111111.11111111.11110000
255 255 255 240

Broadcast addr. 198.4.12.00001111
15

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3) (6x11 points) Solve the following six questions giving necessary explanations..

3.1) (~~10 points~~) A router has the following entries in its routing table

Route	Interface	Route AND MASK
10.0.0.0/8	e0	→ 10
10.0.0.0/16	e1	→ 10.0
10.0.1.0/24	s0	→ 10.0.1
10.1.1.0/24	s1	→ 10.1.1
10.1.0.0/16	s0	→ 10.1
10.1.0.0/24	e1	→ 10.1.0
10.1.1.1/32	s2	→ 10.1.1.1
Default	e1	

e0 → 7 points

A packet arrives to the router with a destination address of 10.0.4.1. Which interface will the router use to transmit this packet? Give the necessary explanation.

e1
Both "10" and "10.0" match. However since 10.0 is longer, it is selected.

3.2) Give two techniques that could be employed in order to reduce the number of packets transmitted in *flooding*. Explain them briefly.

1) Using hop counter

2) Sending and copying the packet not through all the other outgoing interfaces but some.

3.3) What is *count to infinity problem*? Where could we observe it? Mention about a possible solution.

6+3+2
- Distance for a destination keeps increasing and reaches very high values.
- Distance vector routing.

No solution yet. Problem: when X tells Y that it has a path somewhere, Y has no way of knowing whether it itself is on the path

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AODV - Adhoc On-demand Distance Vector

3.4) What is the difference between the AODV protocol and the classical routing techniques like the shortest path routing? Where is it used? Explain the purpose of keeping active neighbours in the tables when the AODV protocol is employed?

AODV is introduced for ad hoc networks. Ad hoc networks are very dinamic due to mobility and energy loss.

Purpose of keeping active neighbours: when a link fails, the other nodes using that link to reach some other nodes need to be informed.

3.5) What happens as the traffic (number of frames to be transmitted) generated by different nodes in a classical Ethernet network increases with respect to the delay observed for the successful transmission of a frame? (give your answer as "frame transmission delay increases" or "frame transmission delay decreases" by also giving the reason behind it).

Frame transmission delay increases.

When multiple stations (nodes) want to transmit nearly at the same instant frames collide. Both stations back off and retry after some random period. When the collisions increase the back off duration gets longer. So delay for successful transmission gets larger.

Remember, waiting interval is between $(\emptyset - (2^{(L)\ \#\ of\ collisions} - 1)) * 51.2\ \mu sec$

3.6) In a university campus network, 12 subnets will be connected by using three routers of each having five interfaces. Give a topology for this campus network in order to keep the number of hops between subnets minimum.