First control de Xarxes de Computadors (XC), Bachelor Degree in Informatics Engineering		2/11/2015	Autumn 2015
NAME:	**SURNAME:**	**DNI**	

Duration: 1h15m. The quiz will be collected in 25 minutes. Answer in the same questions sheet.

Quiz. (3 points) All questions are multi-answer: 0.5 points if correct, 0.25 if one error, 0 otherwise.

1. Which of the following sentences are correct about the IP protocol.

- ☐ 147.83.20.10 is a class B address.
- ☐ 127.0.0.0 is the "loopback" network of the host (it communicates a client/server in the same host).
- ☐ With a 30 bits mask, there are only two addresses available for assigning interfaces.
- ☐ The IP "broadcast" address in network 147.83.32.0/28 is 147.83.32.15

2. Which of the following subnetworks are valid if the base address is 80.80.80.0/24.

- ☐ A subnetwork with 200 hosts and another with 30 hosts.
- ☐ 80.80.80.240/27 and 80.80.80.224/27.
- ☐ 80.80.80.240/28 and 80.80.80.224/27.
- ☐ 80.80.80.240/27 and 80.80.80.224/28.
- ☐ 80.80.80.240/28 and 80.80.80.224/28.

3. Among the following sentences, which ones are correct about the DHCP protocol?

- ☐ The client must be configured with the IP address of the DHCP server.
- ☐ The client sends always a "DHCP DISCOVER" message for renewing the association.
- ☐ The configuration of a client may require the exchange of 4 messages DHCP (2 from the client and 2 from the server).
- ☐ DHCP may be used to configure the IP address of the default router.
- ☐ The client must use the "well known" port of the server.

4. Among the following sentences, which ones are correct about NAT?

- ☐ NAT is a protocol that translates IP addresses.
- ☐ Using PAT ("Port and Address Translation) more IP public addresses may be spared than when using NAT.
- ☐ With a single public IP address, NAT allows connecting more than a host simultaneously.
- ☐ DNAT is used when a host in the private network must be accessible from outside the network.

5. Among the following sentences, which ones are correct about the RIP protocol?

- ☐ RIP routing tables converge always in 4 steps at most.
- ☐ The mechanism "Split Horizon" prevents the announcement of the private prefix 10.0.0.0/8.
- ☐ RIPv1 and RIPv2 announce network prefixes with a variable mask length.
- ☐ RIP messages use UDP when they are sent to the neighbour routers.

6. Which of the following sentences are correct about routing protocols?

- ☐ OSPF may be used in larger networks than RIP.
- ☐ A network using RIP may have a maximum of 16 routers.
- ☐ An OSPF router announces the link states and their metric to all the routers of the network.
- ☐ A RIP router announces its subnetworks to all the routers of the network.

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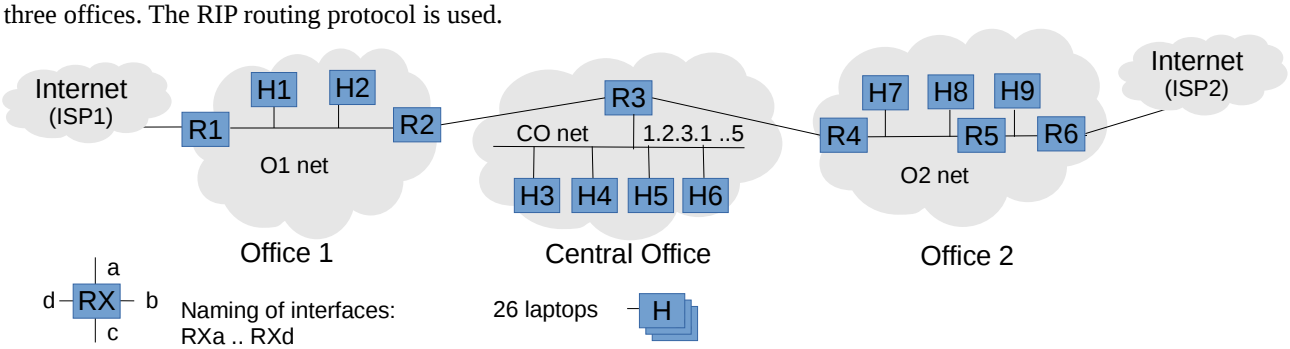
An organization has two IPv4 Internet connections shared by several offices at three locations. There are several routers (R1-R5) in the network, several desktop computers as hosts (H1-H7). There are also 26 laptop PC that can be connected to any of the three offices. The RIP routing protocol is used.



1) (0.9 points) Describe an addressing plan with valid ranges for the subnet 192.168.0.0/16 for the O1, CO and OC networks having the fewest host bits to allow future growth in number of offices:

2) (0.9 points) Years after the initial design the number of computers exceeds the initial plan and 40 additional hosts must be accommodated in the central office. Without changing any previously assigned address in offices, you should propose how to expand the number of hosts in the central office and propose an addressing plan to allocate these.

3) (0.9 points) The public servers in the organization are H3..H6, and in addition to their internal addresses, they also have public addresses 1.2.3.1 ... 5 allocated. Explain how to separate the public traffic from the internal traffic among offices to avoid security problems and hide the internal network structure.

4) (0.9 points) Complete the table for R3 so that the H3..H6 servers can reach the Internet through any of the two exits without being able to reach any other PC in the offices, except allow incoming requests to the DNS (UDP 53) and HTTP (TCP 80) servers and so prevent security incidents. The rules apply to any packet reaching the router.

Protocol	IP-src	Port-src	IP-dst	Port-dst	Action (accept, deny)

5) (0.9 points) The central office has two mail servers, two for web and and one for the DNS of the organization, with a range of Internet addresses 1.2.3.0/29. For these services can run continuously, you should describe the set up of DNS Resource Records so that: a host serves the web and another the wiki, a host receives mail and another when the first fails, there are three name servers: a primary in one of the hosts and two secondary (ns.isp1.net and ns.isp2.net) at the premises of the two ISPs (ISP1 and ISP2):

Name	Type	Value
h3.o.org.	A	1.2.3.2
h4.o.org.	A	1.2.3.3
h5.o.org.	A	1.2.3.4
h6.o.org.	A	1.2.3.5
www.o.org.	CNAME	
wiki.o.org.	A	
o.org.	MX	
o.org.	MX	
o.org.	NS	
o.org.	NS	
o.org.	NS	

6) (0.9 points) If we setup a DHCP server in R1:
Can host H1 find out the MAC address of H2 and H5 using ARP? (Describe the reason)

7) (0.9 points) RIP routing is used to interconnect the internal network among offices O1 and O2.
To access the Internet there is a static default route in R1 to ISP1 and another in R6 to ISP2. Write down the routing table for R1: Interface: name as indicated in the figure: a..d.
Gateway: The name RXa..RXd used to refer to its IP address.

Net/mask	Gateway	Interface	Metric
O1			
R2R3			
OC			
R3R4			
O2			
ISP1	-	d	1
R5R6			
0.0.0.0/0	ISP1	d	1

8) (0.7 points) Considering that we use RIP routing and there are two available ISPs (ISP1 and ISP2):
Please indicate which Internet exit is preferable in every office and why.