

Last name		Student Identification number	
First name			

You are only allowed to use a pen and a pocket calculator

Please write in a clear language and use a READABLE writing; it is important to MOTIVATE THE ANSWERS YOU GIVE.

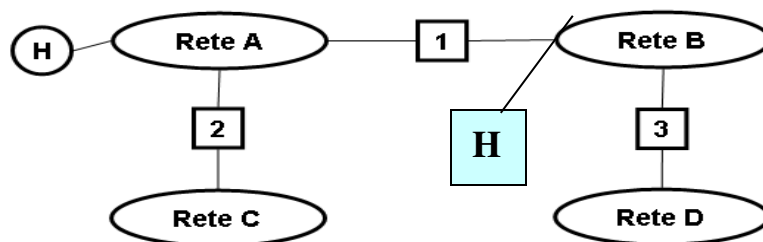
Please only use the blank spaces at the bottom of every question

At the end of your exam, please return THESE sheets and those possibly received by the teacher to write a draft copy of your answers. The latter WILL NOT be considered during the process of correction.

Students copying or consulting course material will be expelled from the exam.

Assignment 1. [7 points]

Consider the following scenario and assume the routing table at host H is the one given below



Destination	Mask	Next hop
192.100.5.7	255.255.255.255	-
192.100.5.0	255.255.255.0	-
150.100.8.0	255.255.255.0	192.100.5.4
150.200.1.0	255.255.255.0	192.100.5.3
150.200.235.0	255.255.255.0	193.100.5.3

- Assuming the routing table given above, fill in the table below, proposing a possible and *consistent* assignment of addresses to subnets and, when possible, to router interfaces [if you assign an address to a router interface, explicitly indicate the interface]

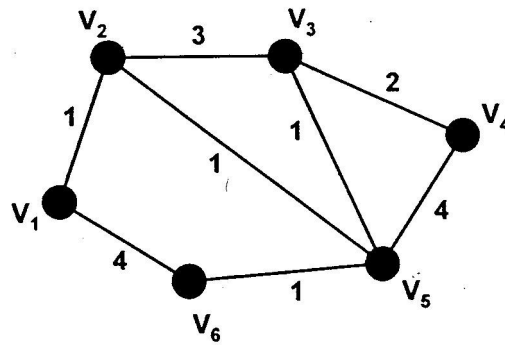
(assignment 1 – continued)

Network	Address	Subnet mask	Router	Address
Network A			Router 1	
Network B			Router 2	
Network C			Router 3	
Network D				

b. How can addresses be aggregated, so as to compress the routing table at H?

Destination	Mask	Next hop

Consider the graph in the picture, in which links are bi-directional and the weight is thus the same for both directions.



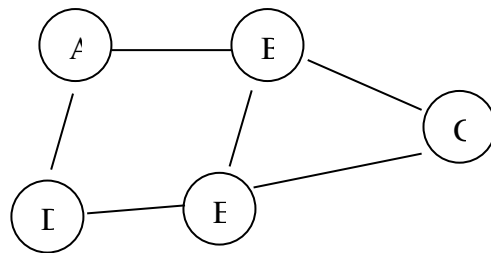
- Assume V_6 is the root. Fill in the table below, applying Dijkstra's algorithm. During the generic k -th iteration of the algorithm, if more than one node achieve the same value for $L(k)$, you should select the node with lowest index (e.g., V_3 comes before V_4).
- Draw the minimum cost spanning tree rooted at V_6
- Discuss the asymptotic complexity of the algorithm, comparing it to that of Bellmann and Ford's one

[illegible]

(Assignment 2 - continued)

Assignment 3. [7 points]

Consider the following scenario, where A, B, C, D and E are 5 routers executing the RIP protocol.



Assuming the **Initial condition**:

- a. Complete the messages sent from routers A and E, specifying the routers to which each message is sent

A	Address					
	Metric					

E	Address					
	Metric					

(assignment 3 - continued)

- b. Specify how B's routing table is modified upon receipt of the 2 messages described before.

B	Destination	A	B	C	D	E
	Distance					
	Next Hop					

- c. Considering RIP messages' receipt, how can a router acquire knowledge about the network topology and thus the identity of its neighbours?

Assignment 4. [2 points]

Consider the OSPF protocol.

- Describe the 2 following LSA types: Summary Link and External Link
- Which packet type is used in the “Discovering Neighbors” procedure?
- Which protocol is used to transport OSPF packets? How does the protocol address the issue of transport reliability? I

Use OSPF terminology.

(continua quesito 4)

Assignment 5. [2 points]

Considering the BGP protocol, briefly discuss the following procedures: “**Neighbor Acquisition**”, “**Neighbor Reachability**” and “**Network Reachability**”.

(assignment 5 - continued)

Assignment 6. [2 points]

Consider QoS policies in IP networks:

- Describe the 2 approaches that allow to **guarantee** given QoS requirements
- Discuss pros and cons of both approaches

Assignment 7. [3 points]

Consider a scenario in which private IP addressing is used and access to the Internet occurs over an IP router implementing a port-based NAT service.

- a. Discuss the differences between Symmetric and Port Restricted NAT
- b. Discuss the Virtual Server service and its relationship to mechanisms for binding keep alive

I herewith authorize, in compliance with law number 675 of 31/12/96, the teacher to publish the results of my exam on the Web.

**Readable
signature**