# Computer Networks II

Curso 17/18 :: 2017/18 :: Test 2

## Escuela Superior de Informática

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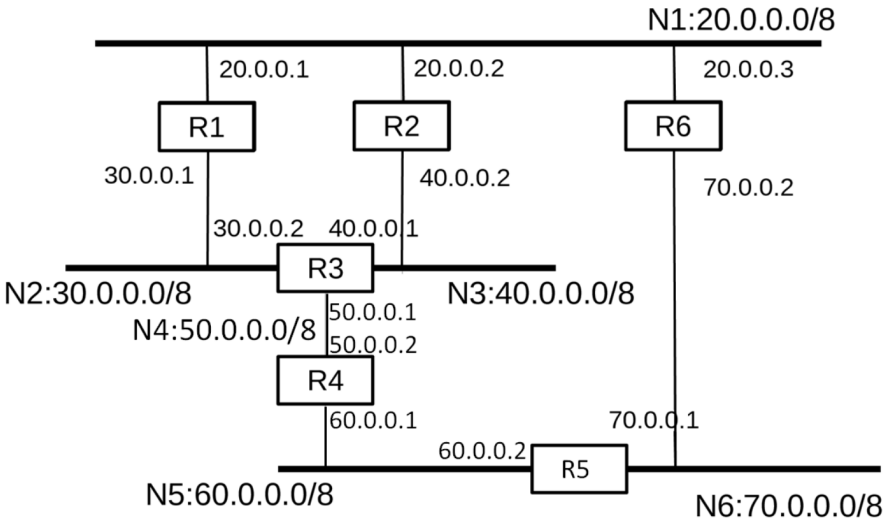
*This exam consists of 25 question totalling 40 points. Three wrong answers substract a point. Only an answer if correct if otherwise not stated. Calculator use is forbidden.*

Apellidos: _____ Nombre: _____ Grupo: _____

1. [6p] Given the following network topology connecting the N1, N2, N3, N4, N5 and N6 networks using the R1-R6 routers. The number of hoops for hosts directly connected is 0. Assume that the updates are received from routers on sorted by the router index (1 to 6). Answer the following questions about the routing algorithm based on distance vector using hop count metric.




(a) Indicate the initial distance vector for routers R1, R3, and R6:

- ☐ **a)** R1=(N1,0,-;N2,0,-), R3=(N2,0,-;N3,0,-;N4,0,-), R6=(N1,0,-;N6,0,-)
- ☐ **b)** R1=(R2,0,-;R6,0,-;R3,0,-), R3=(R1,0,-;R2,0,-;R4,0,-), R6=(R1,0,-;R2,0,-;R5,0,-)
- ☐ **c)** R1=(N1,0,-), R30(N3,0,-), R6=(N6,0,-)
- ☐ **d)** R1=(R2,0,-;R6,0,-;R3,0,-), R3=(R1,0,-;R2,0,-;R4,0,-), R6=(R1,0,-;R2,0,-;R5,0,-)

(b) Indicate the distance vector of R1 after receiving the updates for the two first iterations of the protocol:

- ☐ **a)** R1=(N1,0,-;N2,0,-;N3,1,R2;N4,1,R3;N6,1,R6)
- ☐ **b)** R1=(N1,0,-;N2,0,-;N3,1,R2;N4,1,R3;N6,1,R6;N5,2,R3)
- ☐ **c)** R1=(N1,0,-;N2,0,-;N3,1,R2;N4,1,R3;N6,1,R6;N5,2,R6)
- ☐ **d)** R1=(N1,1,-;N2,1,-;N3,2,R2;N4,2,R3;N6,2,R6)

(c) How many protocol steps are needed for protocol convergence?

- ☐ **a)** 1
- ☐ **b)** 2
- ☐ **c)** 3
- ☐ **d)** 4

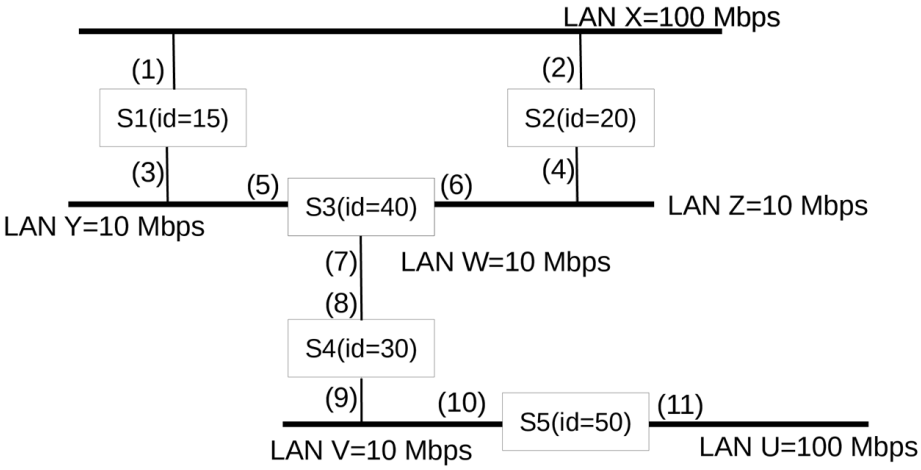
(d) After protocol convergence, through which router and interface does R6 route packets destined for the N4 network?

- ☐ **a)** R2, 20.0.0.2
- ☐ **b)** R5, 70.0.0.1
- ☐ **c)** R1, 20.0.0.1
- ☐ **d)** R6, 0.0.0.0

2. [1p] A network consists of 1000 routers. To decrease the size of the tables The routing system plans to divide the network into 5 regions of 200 routers each of which, how many entries will the hierarchical routing tables have?

☐ **a)** 1000 ☐ **b)** 1005 ☐ **c)** 200 ☐ **d)** 204

3. [6p] Given the following network topology that connects the LANs U, V, W, X, Y and Z through the S1-S5 switches. Ports are numbered using the number n (n).




(a) Root switch:

- ☐ **a**) S1
- ☐ **b**) S2
- ☐ **c**) S5
- ☐ **d**) S3

(b) Root ports:

- ☐ **a**) 3,4,8,9,11
- ☐ **b**) 2,5,8,10
- ☐ **c**) 2,4,8,9
- ☐ **d**) 1,2,7,9

(c) Designated ports::

- ☐ **a**) 1,3,4,7,9,11
- ☐ **b**) 2,3,6,7,9,11
- ☐ **c**) 1,5,6,8,10,11
- ☐ **d**) 2,3,7,9,11

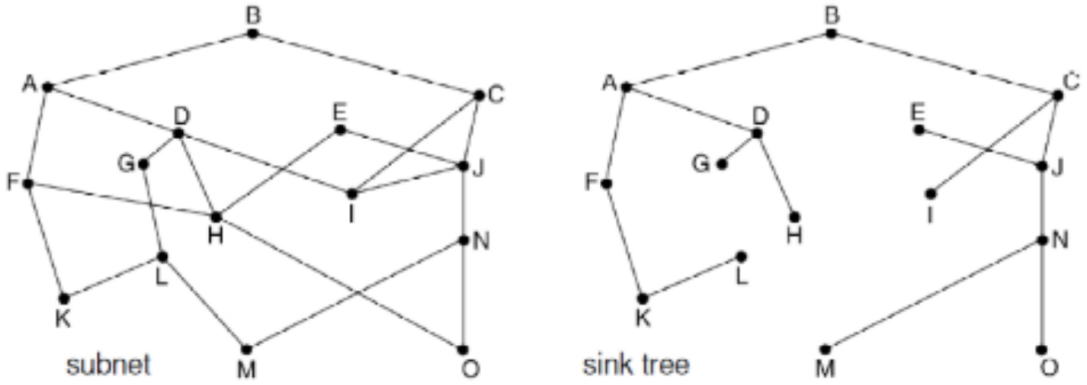
(d) Blocked ports:

- ☐ **a**) 1
- ☐ **b**) 6
- ☐ **c**) 9
- ☐ **d**) 2

4. [1p] Indicate what is the content of an LSP (or Link Status Packet):
   - ☐ **a**) Identifier origin, sequence number, age and list of neighbors (neighbor and cost identifier).
   - ☐ **b**) Origin identifier, destination identifier, number of hoops.
   - ☐ **c**) Target network, mask, next hop, and output interface.
   - ☐ **d**) Neighbor identifier and cost to neighbor.

5. [1p] What is the cause of the *count to infinity* problem?
   - ☐ **a**) There is no valid path to route a packet to its destination.
   - ☐ **b**) A node A sends an update of its distance vector to B before B can propagate an update of a bug in the topology of the network.
   - ☐ **c**) The hop counter increases to infinity.
   - ☐ **d**) The node A sends an update of its distance vector to node B after it B has submitted an update due to a network topology failure.

6. [1p] Given the following network topology and its corresponding sink tree with root in K. Indicate the branch of the tree containing N (from root to N) in the reverse path routing algorithm used in broadcast:




- ☐ **a**) K-L-M-N
- ☐ **b**) K-F-A-B-C-J-N
- ☐ **c**) K-F-H-O-N
- ☐ **d**) K-F-A-D-I-J-N

7. [1p] Indicate which of the following is false in multicast routing:
   - ☐ **a**) Usually, there is a group management protocol that allows to routers know which nodes are subscribed to which multicast groups.
   - ☐ **b**) Routers generally propagate multicast group information to all routers in the network.
   - ☐ **c**) The routing of multicast messages is done by flooding.
   - ☐ **d**) In the expansion tree trimmed for a group *g* cannot exist routers whose nodes are not part of the *g* group.

8. [1p] Private network addressing is possible by:
   - ☐ **a**) A range of private addresses specified by Internet authorities.
   - ☐ **b**) A range of public addresses specified by Internet authorities.
   - ☐ **c**) A range of public and private addresses specified by Internet authorities.
   - ☐ **d**) All of the above are correct.

9. [1p] Given the following NAT translation table, please indicate which of the following entries corresponding to a client-server communication cannot be converted correctly by the NAT software:
   - local IP - remote IP
   - A:161.67.0.15 - 80.80.80.80
   - B:192.168.0.11 - 80.80.80.80
   - C:192.168.0.12 - 80.80.80.80
   - D:192.168.0.12 - 81.81.81.4

   - ☐ **a**) A
   - ☐ **b**) A, B
   - ☐ **c**) A, B, C
   - ☐ **d**) A, B, C, D

10. [1p] Say what is false about port forwarding:
    - ☐ **a**) NAT software changes both the destination IP address and the destination port (TCP/UDP) of the packet.
    - ☐ **b**) This is used to allow access to a server in a private network from the public network.
    - ☐ **c**) The NAT software modifies the destination and source IP address and the destination port (TCP/UDP) of the packet.
    - ☐ **d**) Implemented with a static entry in the NAT table.

11. [1p] Indicate what is false about a Virtual Private Network:
    - ☐ **a**) It provides privacy of resources without the need to deploy a dedicated network.
    - ☐ **b**) Allows access to local network resources and to Internet.
    - ☐ **c**) Data is sent encrypted through a tunnel.
    - ☐ **d**) Intermediate routers can view the content of datagrams sent through the tunnel.

12. [1p] Indicate which of the following is not the responsibility of a NAS server:
    - ☐ **a**) Packet Routing.
    - ☐ **b**) Authentication.
    - ☐ **c**) Session maintenance.
    - ☐ **d**) Flow control.

13. [1p] What IP addresses, in addition to those assigned to each of the interfaces of the network nodes, must exist on any network?
    - ☐ **a**) Network address and broadcast address.
    - ☐ **b**) Network address, broadcast address, and multicast.
    - ☐ **c**) Loopback address.
    - ☐ **d**) Address 0.0.0.0.

14. [1p] What is the meaning of the address 0.0.0.151/24?
    - ☐ **a**) The host 151 within my network.
    - ☐ **b**) The broadcast address within my network.
    - ☐ **c**) Host 0.0.0.0 within the network 151.
    - ☐ **d**) It is not a valid address.

15. [1p] In classless addressing, what does the notation /18 indicate?
    - ☐ **a**) It refers to the number of bits to the left of the mask whose value is 1.
    - ☐ **b**) It refers to the number of bits to the right of the mask whose value is 1.
    - ☐ **c**) Refers to the number of addressable networks.
    - ☐ **d**) Refers to number of addressable hosts.

16. [1p] An organization plans to divide the network address 161.25.45.128/25 into 8 subnets applying the subnetting technique. Specify the number of bits intended for NETID, to SUBNETID, and to HOSTID:
    - ☐ **a**) NETID=25, SUBNETID=3, HOSTID=4
    - ☐ **b**) NETID=22, SUBNETID=3, HOSTID=7
    - ☐ **c**) NETID=16, SUBNETID=8, HOSTID=8
    - ☐ **d**) NETID=25, SUBNETID=5, HOSTID=3

17. [1p] Say what is false about the subnetting technique (without VLSM):
    - ☐ **a**) The number of subnets and the number of addresses will always be a power of 2.
    - ☐ **b**) The mask used for each subnet has a variable size.
    - ☐ **c**) The border router must know the subnetwork division to know how to route packets.
    - ☐ **d**) There can be no overlapping of addresses in different subnets.

18. [1p] Given the /21 mask, what is the maximum number of IP addresses that can be assigned?
    - ☐ **a**) $2^{21}$
    - ☐ **b**) $2^{11}$
    - ☐ **c**) 2046
    - ☐ **d**) 2044

19. [1p] CANCELED

20. [1p] What is the size of the global unicast IPv6 address space?
    - ☐ **a**) $2^{64}$
    - ☐ **b**) $2^{32}$
    - ☐ **c**) $2^{128}$
    - ☐ **d**) $2^{112}$

21. [1p] How are the IPv4 *Options* implemented in IPv6?
    - ☐ **a**) By means of the extension headers mechanism.
    - ☐ **b**) They are included in the payload of the message.
    - ☐ **c**) They are included in the mandatory header of the IPv6 message.
    - ☐ **d**) They are negotiated between source and destination of the message.

22. [1p] Given a frame t1 = (origin=A, destination=D) and a forwarding table TR = (interface=i1, hosts list=[A,B,C]; interface=i2, hosts list=[D,E]), What decision will the bridge make when receiving t1?
    - ☐ **a**) Flood
    - ☐ **b**) Discard t1
    - ☐ **c**) Resend to i2
    - ☐ **d**) Resend to i1

23. [1p] Which of the following is not an advantage of VLANs?
    - ☐ **a**) Security
    - ☐ **b**) User Mobility
    - ☐ **c**) Performance
    - ☐ **d**) Larger bandwidth

24. [1p] Indicate what is false about a trunk port that connects 2 VLANs to 2 switches:
    - ☐ **a**) Avoid setting a separate port for each VLAN that connects the switches.
    - ☐ **b**) Frames incorporate a header to identify which VLANs a frame should be delivered to.
    - ☐ **c**) 802.1Q standard is used for the labelling of the frames.
    - ☐ **d**) Its goal is to reduce traffic between the 2 switches.

25. [6p] An organization has an address block 201.100.0.0/18 and wants to split it using VLSM as follows:
    - 1 subnet A with 40 hosts
    - 1 subnet B with 400 hosts
    - 1 subnet C with 4100 hosts

    To connect to subnets A, B and C, the R1 organization's frontier router is in turn connected to the R2, R3 and R4 routers respectively, via dedicated serial lines.

    (a) Indicate which of the following is the network address, mask and broadcast address for subnet A:
    - ☐ **a**) Network=201.100.34.0, Mask=/26, Broadcast=201.100.34.63
    - ☐ **b**) Network=201.100.40.0, Mask=/27, Broadcast=201.100.40.31
    - ☐ **c**) Network=201.100.0.0, Mask=/26, Broadcast=201.100.0.63
    - ☐ **d**) Network=201.100.0.0, Mask=/27, Broadcast=201.100.0.31

    (b) Indicate which of the following is the address space for subnet B:
    - ☐ **a**) [201.100.32.0,201.100.33.255]
    - ☐ **b**) [201.100.32.0,201.100.41.255]
    - ☐ **c**) [201.100.40.0,201.100.47.255]
    - ☐ **d**) [201.100.0.0,201.100.7.255]

    (c) Indicate which of the following is the network address, mask and broadcast address for subnet C:
    - ☐ **a**) Network=201.100.40.0, Mask=/20, Broadcast=201.100.240.255
    - ☐ **b**) Network=201.100.40.0, Mask=/19, Broadcast=201.100.71.255
    - ☐ **c**) Network=201.100.0.0, Mask=/18, Broadcast=201.100.63.255
    - ☐ **d**) Network=201.100.0.0, Mask=/19, Broadcast=201.100.31.255

    (d) Indicate which of the following is the network address, mask and broadcast address for the R1-R2 subnet:
    - ☐ **a**) Network=201.100.40.0, Mask=/31, Broadcast=201.100.40.1
    - ☐ **b**) Network=201.100.40.0, Mask=/30, Broadcast=201.100.40.3
    - ☐ **c**) Network=201.100.40.64, Mask=/31, Broadcast=201.100.40.127
    - ☐ **d**) Network=201.100.34.64, Mask=/30, Broadcast=201.100.34.67