Computer Networks II

Test 2

Escuela Superior de Informática

calificación

This test consists of 35 question totalling 35 points. The maximum duration is 90 minutes. Three wrong answers substract a point. Only an answer if correct if otherwise not stated. Calculator use is forbidden. Write legibly and similar to the size of the printed text using only the reserved space.

Apellidos: SOLUCIÓN Nombre: _____ Grupo: _____

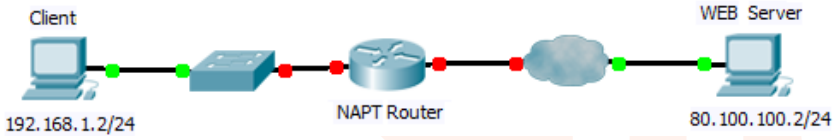
1. (1p) Check the **false** statement regarding VPN:
   - ☐ **a)** It is a private network that uses public infrastructure to create links between sites.
   - ☐ **b)** Tunnels used to create links between sites.
   - ■ **c)** It requires specific transport protocols.
   - ☐ **d)** You may use the same block of addresses for all sites.

2. (1p) Why the *port redirection* is required when a router with NAPT is used?
   - ■ **a)** To get LAN servers be accessible from the public network.
   - ☐ **b)** Because the NAPT table can not include the private network ports.
   - ☐ **c)** The *port forwarding* has no relation to NATP.
   - ☐ **d)** To avoid connections to the outside by LAN users.

3. (1p) What is an IP tunnel?
   - ■ **a)** A point to point virtual channel carrying IP datagrams between two distant networks.
   - ☐ **b)** A security issue that allows access to a port of a computer within a private network.
   - ☐ **c)** A type of Ethernet switch that allows you to define links between their ports through administrative rules.
   - ☐ **d)** A virtual point-to-point link resulting of adding several parallel links between two devices given as to increase the bandwidth, for example a server or a switch.

4. (1p) What it is a VPN?
   - ☐ **a)** A type of logic LAN. It is possible by means of special switches that may create the illusion of isolated LANs over a single network infrastructure.
   - ■ **b)** A private network consisting of several sites connected through tunnels on a foreign network.
   - ☐ **c)** VPN means *Valuable Public Network*, ie, a network capable of apply arbitrary application protocols for each group of people or services.
   - ☐ **d)** A private network that can not be reached if no valid credentials are provided for each user.

5. (1p) A host in the private network in picture establishes a connection to a web server on port 80. The connection in the public network is determined by the tuple (200.100.100.1, 4000, 80.100.100.2, 80). Determine which of these statements is true.



   - ■ **a)** The exterior router interface has the IP address 200.100.100.1.
   - ☐ **b)** The port corresponding to the host 192.168.1.2 is 4000.
   - ☐ **c)** The host socket is (192.168.1.2, 4000).
   - ☐ **d)** None of the other.

6. (1p) What is the relationship between the ISN (Initial Sequence Number) chosen by the client and the one chosen by the server on a TCP connection?
   - ☐ **a)** Both must always be equal.
   - ☐ **b)** The ISN chosen by the server is the chosen by the client plus one.
   - ☐ **c)** The ISN chosen by the server is the same as chosen by the client plus data sent in the first segment; if the first segment contains no data, both ISN are equal.
   - ■ **d)** The ISN chosen by the server has no relation to the chosen by the client.

7. (1p) What does the *sequence number* field (of the TCP header) means?
   - ☐ **a)** It counts messages (from zero) that the server has sent to client in the current connection.
   - ■ **b)** It counts the first byte of the payload, counting from the ISN + 1, from the beginning of the connection.
   - ☐ **c)** It counts the first byte of the segment, counting from 0, relative to start server.
   - ☐ **d)** It counts the payload byte indicated by the *offset*, counting from the ISN, for the current connection.

8. (1p) What does the *window size* (at the header of a TCP segment) means?
   - ☐ **a)** The number of bytes of data that leads this segment.
   - ☐ **b)** The number of bytes of data carrying the last segment received from the other peer.
   - ■ **c)** The remaining buffer space (in bytes), available for receive the data sent by the other peer.
   - ☐ **d)** The number of bytes that remains in the pending buffer to send to the other peer.

9. (1p) Which of the following TCP features are also present in UDP?
   - ☐ **a)** Connection/Disconnection
   - ☐ **b)** Flow control
   - ■ **c)** Multiplexing
   - ☐ **d)** Lost data retransmission

10. (1p) When a client tries to establish a TCP connection to a server and it does not receive response, keep trying sending new segments SYN. What TCP header field is modified in each sent connection attempt?
    - ☐ **a)** The source port number
    - ☐ **b)** the sequence number
    - ☐ **c)** The acknowledgement number
    - ■ **d)** None

11. (1p) What field of the TCP header it is used to establish the control congestion mechanism known as *slow-start and congestion avoidance*?
    - ☐ **a)** Window size
    - ☐ **b)** MSS
    - ☐ **c)** Fields *sequence number* and *ACK*
    - ■ **d)** It use no header fields

12. (1p) The sending window of a TCP process is calculated as:
    - ☐ **a)** The maximum between the congestion and reception windows.
    - ■ **b)** The minimum between congestion and reception windows.
    - ☐ **c)** Half of the congestion window after the slow start.
    - ☐ **d)** Double of the receive window.

13. (1p) How TCP sender mechanism calculates the size of the destination receive window?
    - ☐ **a)** The sum of the congestion and sending windows.
    - ☐ **b)** Half of the congestion window if no selective retransmission is enabled.
    - ☐ **c)** The sender does not consider the receiving window.
    - ■ **d)** It is not calculated, the receiver explicitly notifies it.

14. (1p) Who can terminate a TCP connection?
    - ☐ **a)** Only the server if the connection was initiated by it.
    - ☐ **b)** Only the client.
    - ☐ **c)** Only the server.
    - ■ **d)** Any of them.

15. (1p) What is NOT a retransmission situation in TCP?
    - ☐ **a**) The segment has reached the destination but it's corrupt.
    - ☐ **b**) The segment has not reached the destination.
    - ☐ **c**) Three duplicated ACKs are received (total: 4)
    - ■ **d**) The *keep alive* timer is enabled.

16. (1p) In a TCP connection, at a given time, 3 segments with same ACK sequence number and receive window (2 MMS) are received. What is the network state?
    - ☐ **a**) Nothing undesirable.
    - ■ **b**) Congestion detected, congestion avoidance phase initiated.
    - ☐ **c**) Receiver saturation, flow control active.
    - ☐ **d**) Congestion detected, slow-start phase initiated.

17. (1p) A host receives TCP segments with sequence numbers 100, 100, 100, 100, 110 and ack 4001, 5001, 6001, 7001, 8001 respectively. And then, it sends another segment with sequence 9000 and ack 1101. In total, it received:
    - ☐ **a**) 4000 bytes
    - ☐ **b**) 8000 bytes
    - ■ **c**) 1000 bytes
    - ☐ **d**) 100 bytes

18. (1p) A client connects to a TCP server. Their ISNs are 3000 and 4000 respectively. After connecting, the server sends a first data segment:
    - ☐ **a**) seq = 3000 y ack = 4001
    - ☐ **b**) seq = 4000 y ack = 3001
    - ☐ **c**) seq = 3001 y ack = 4001
    - ■ **d**) seq = 4001 y ack = 3001

19. (1p) A client connected to a TCP server. The sequence numbers of the last TCP segments for client and server are respectively 3000 and 4000. They have been validated with ack 4101 and 3101 respectively. The server initiates the disconnection and then the client does the same. What sequence number and final ack was sent by the server?
    - ☐ **a**) 3001 4001
    - ☐ **b**) 3002 4002
    - ☐ **c**) 4101 3011
    - ■ **d**) 4102 3102

20. (1p) A TCP server has requested a disconnection with sequence number 3000 and receives a disconnection request with sequence number 4000. But it has not received the previous client segment with number 3900.
    - ☐ **a**) The server sends the ack 4001
    - ☐ **b**) The server queries the retransmission of segment 3900.
    - ☐ **c**) The server sends a FIN + ack 4001.
    - ■ **d**) None

21. (1p) A TCP client receives an duplicated ACK 3000. What next?
    - ☐ **a**) It retransmit the segment.
    - ☐ **b**) The server is failing and an ICMP error packet is sent.
    - ■ **c**) This time he ignored, but if it get two additional ack it will retransmit the segment.
    - ☐ **d**) None of the other.

22. (1p) In a TCP connection, a retransmission occurs due a segment timeout.
    - ☐ **a**) The receiving window is reduced to minimum
    - ■ **b**) The congestion window is reduced to minimum.
    - ☐ **c**) The receiving window is reduced by half.
    - ☐ **d**) The congestion window is reduced by half.

23. (1p) A given TCP segment is known to belong to a particular connection due to:
    - ☐ **a**) The segment identifier field.
    - ☐ **b**) The sequence number is consecutive to the previous one.
    - ■ **c**) The combination of certain fields of datagram and segment.
    - ☐ **d**) The virtual circuit number is unique.

24. (1p) What is the goal of the dynamic routing protocols?
    - [x] **a)** Recalculate the routing tables of the routers as subnet conditions change.
    - [ ] **b)** Coordinate routers to avoid congestion.
    - [ ] **c)** Generate topology maps for the ISP network management tools.
    - [ ] **d)** To get latency, delay and performance measures of the subnet.

25. (1p) In the context of dynamic routing. What the expression *sink tree* means?
    - [x] **a)** The set of optimal routes to a given router from the other routers in the subnet.
    - [ ] **b)** The tree used by routers to discard traffic that can not be delivered on time.
    - [ ] **c)** It is the set of metrics that is applied to calculate the route table of a node after the fail of one or more links.
    - [ ] **d)** It does not apply in the context of dynamic routing.

26. (1p) What is the main feature of *vector distance* protocols?
    - [ ] **a)** It stores and distributes the distance (hop metric) of each router to all others.
    - [ ] **b)** It scales perfectly to networks with many thousands of routers.
    - [x] **c)** Each router creates its table considering only the information provided by its neighbors.
    - [ ] **d)** It can route IP packets of any size.

27. (1p) What is the main feature of protocols *state link* protocols?
    - [ ] **a)** The only metric that it supports is the hop count.
    - [x] **b)** Each router builds a topology of the entire subnet and calculates optimal routes to all other routes.
    - [ ] **c)** It is functionally equivalent to the distance vector protocols.
    - [ ] **d)** It can route IP packets of any size.

28. (1p) In relation to link state protocols. Which of the following statements is false?
    - [ ] **a)** A package including link states is created for each router.
    - [x] **b)** Infinity is defined for each router.
    - [ ] **c)** Status packets to each router link are spread
    - [ ] **d)** A shortest-path tree is built for each router.

29. (1p) What is the cause of the *count to infinity* effect of *distance vector* routing protocols?
    - [ ] **a)** it is produced by the overflowing of the variable that counts the number of hops.
    - [x] **b)** The routers indirectly use reachability data that provide themselves.
    - [ ] **c)** When a RIP router sends a test message it still counts indefinitely after receiving the answer.
    - [ ] **d)** The çount to infinityïs a routing problem by *link-state*, not *distance vector*.

30. (1p) The *distance vector* protocols respect to the *link state* ones...
    - [x] **a)** They generate larger messages.
    - [ ] **b)** They generate more messages.
    - [ ] **c)** They are less likely to create routing loops.
    - [ ] **d)** They require more computing power.

31. (1p) Check the **false** statemente regarding the RIP protocol
    - [ ] **a)** It is a *distance vector* routing protocol.
    - [ ] **b)** It is an internal gateway protocol.
    - [ ] **c)** Version 1 does not support *classless addressing*.
    - [x] **d)** It is a complex protocol that was never applied on the Internet.

32. (1p) What is the hierarchical routing based on?
    - ☐ **a)** Routers with more number of links group other routers with less links.
    - ☐ **b)** Routers are grouped according to the number of hosts that offer access.
    - ■ **c)** Regions are defined. Routers only have information to get to the other routers in their region and to each other regions.
    - ☐ **d)** There is a root router, all others will forward their packages but have direct links to their neighbors.

33. (1p) What are the OSI layers that OSPF and RIP belong to? (multiple answers possible)
    - ■ **a)** layer 3
    - ☐ **b)** application
    - ■ **c)** red
    - ☐ **d)** Transportation

34. (1p) In view of the next execution of `ping`, makes the right choice:

```
$ ping -c1 192.168.0.0
PING 192.168.0.0 (192.168.0.0) 56(84) bytes of data.

--- 192.168.0.0 ping statistics ---
1 packets transmitted, 0 received, 100 % packet loss, time 0ms
```

    - ☐ **a)** The command has succeeded but it could not calculate the RTT.
    - ☐ **b)** The response reaches after the indicated maximum time.
    - ■ **c)** The command makes no sense.
    - ☐ **d)** The command failed because you have not included the network mask.

35. (1p) What are the minimum requirements to have a dynamic IP on a host?
    - ☐ **a)** It should request to IANA or correspondiente regional agency a global address dynamic address.
    - ☐ **b)** You will need to have a DHCP server within the same network. It will provide an IP address once it makes the request.
    - ☐ **c)** You will need to have configured the network interface to the host requesting IP dynamically using DHCP.
    - ■ **d)** A DHCP server is required in the network and a client on the host.