

This test has 16 questions for a total of 35 points. Every three wrong test answers 1 point will be subtracted. Only one option is correct. Calculators are not allowed.

Apellidos: _____ **SOLUCIÓN** _____ Nombre: _____ Grupo: _____

1. (1p) TCP messages are encapsulated over ...

☐ a) Ethernet frames
☐ b) TCP segments

☒ c) IP datagrams
☐ d) none of the above
2. (1p) What are ephemeral or dynamic ports?

☒ a) They're ports used by the client to receive incoming messages
☐ b) They're ports created by the server whose length is bound in time
☐ c) They're ports in the range 1024-49151
☐ d) All previous assertions are false
3. (1p) UDP is a ... transport protocol

☐ a) connectionless, reliable
☐ b) connection-oriented, unreliable

☒ c) connectionless, unreliable
☐ d) none of the above
4. (1p) UDP does not add anything to the services of IP except for providing ... communication

☐ a) node-to-node
☒ b) process-to-process

☐ c) host-to-host
☐ d) none of the above
5. (1p) The value of the acknowledgment field in a TCP segment defines the number of the ...

☐ a) last byte expected in the next transmission
☐ b) last byte correctly received in previous transmissions

☐ c) first byte correctly received in previous transmissions
☐ d) first byte expected in the next transmission
6. (1p) When using the Go Back N reliable protocol with modulo 8, the size of the windows for the sender and receiver are:

☐ a) The same, and equal to 4
☐ b) The same, and equal to 7
☒ c) Different, being the reception window 1
☐ d) Different, being the emitter window 1
7. (1p) Which of the following assertions about IP datagrams is false?

☐ a) The maximum header length is 60 bytes.
☐ b) The value in the header size length must be multiplied by 4 to get the real number of bytes
☒ c) The total length field tells the size of the payload of the datagram
☐ d) All fragments from the same datagram have the same identification number
8. (1p) An IPv4 datagram is divided into three smaller fragments. Which if the following assertions is true?

☐ a) The 'no fragmentation' bit is set to 1 in all 3 fragments
☐ b) The 'more fragments' bit set to 0 in all 3 fragments
☐ c) The 'offset' field is the same for all three fragments
☒ d) none of the above
9. (1p) Which of the following masks is illegal?

☐ a) 255.255.255.254
☐ b) 255.255.224.0

☒ c) 255.148.0.0
☐ d) all are legal

10. (1p) In a block, the prefix length of the mask is /18. Which is that mask?
- ☒ a) 255.255.192.0 ☐ c) 255.255.252.0
☐ b) 255.252.0.0 ☐ d) none of the above
11. (1p) If the net prefix length is /25, what is the maximum number of subnets of 30 hosts that can be obtained?
- ☐ a) 2 ☐ c) 8
☒ b) 4 ☐ d) none of the above
12. (1p) A router discards a packet because the output LAN requires fragmentation, but the "don't fragment" bit is set to 1. As a consequence it sends the ICMP message "fragmentation required". Who is this message sent to?
- ☐ a) to the default router ☐ c) To the next router («next hop» column)
☒ b) To the original host ☐ d) To the destination host
13. (1p) Which of the following assertions is true, if we consider an IP datagram sent from a host to another in a different network?
- ☐ a) The IPs in the datagram header are the ones from the source and destination hosts
☐ b) The IP datagram is encapsulated over an Ethernet frame whose source MAC will belong to the source host, while the destination will belong to the gateway
☐ c) More than one Ethernet frame is required to take the IP datagram, and in each hop physical addresses will change
☒ d) All assertions are true
14. (2p) Describe the sequence of messages that take place, and the highest level protocol they belong to, if you run the command `ping www.google.es` from your host. Include only those that you could capture with Wireshark from your host. Assume there is no information cached in your machine.
1. ARP request (broadcast) to locate the MAC of the gateway, since the DNS is not on the same network
 2. ARP reply from the gw
 3. DNS request to the Name Server for the translation of `www.google.es`
 4. IP reception (DNS reply) from the server
 5. ICMP echo request message to the IP previously obtained
 6. ICMP reply message

15. (10p) An international company in Europe needs to divide its root network, 114.12.160.0 / 20, into two levels of hierarchy. In the first level, the network will be divided into 4 subnetworks of equal size for Spain, Portugal, Italy and France. In a second level, for each country another subdivision will be performed for a set of different cities. In Spain 8 cities will be considered. In Portugal only 7 are requested for the moment. There are 4 cities for France, and 2 for Italy (Rome and Florence), but in this last case an exception will be made, since the network for Rome should be larger than the one for Florence

Answer the following questions:

- a) Network and range of valid host addresses for the root network before subnetting

: From 114.12.160.1 to 114.12.175.254

- b) Network and range of valid host addresses for each country subnetwork

Spain:

- 114.12.160.0 / 22 : From 114.12.160.1 to 114.12.163.254

Portugal:

- 114.12.164.0 / 22 : From 114.12.164.1 to 114.12.167.2544

France:

- 114.12.168.0 / 22 : From 114.12.168.1 to 114.12.171.2544

Italy:

- 114.12.172.0 / 22 : From 114.12.172.1 to 114.12.175.2544

- c) Network and range of valid addresses for one of the cities in each country, but for Italy

Spain:

- City: 114.12.160.0 / 25 : From 114.12.160.1 to 114.12.160.126

Portugal

- City: 114.12.164.0 / 25 : From 114.12.164.1 to 114.12.164.126

France

- City: 114.12.168.0 / 24 : From 114.12.168.1 to 114.12.168.254

- d) Network and range of valid addresses for each of the two cities in Italy

Rome:

- 114.12.172.0 / 23 : From 114.12.172.1 to 114.12.173.254

Florence:

- 114.12.174.0 / 24 : From 114.12.174.1 to 114.12.174.254

- e) Not used networks, if there are any (2p).

One in Portugal:

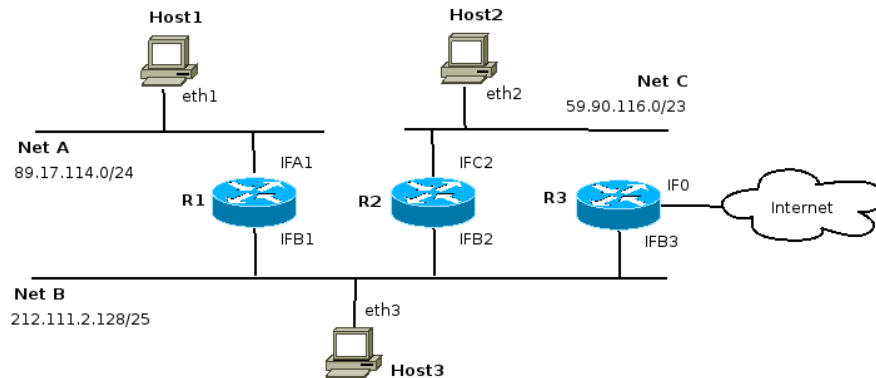
- 114.12.167.128 / 25 : From 114.12.167.129 to 114.12.167.254

A part in Italy:

- 114.12.175.0 / 24 : From 114.12.175.1 to 114.12.175.254



16. (10p) Answer the following questions from the information shown in the figure. Take into account that all devices must allow sending data to the Internet.



- a) Assign IP addresses to all interfaces of the hosts

- eth1: 89.17.114.5
- eth2: 59.90.116.5
- eth3: 212.111.2.140

- b) Assign IP addresses to all interfaces of the routers

- IFA1: 89.17.114.1
- IFB1: 212.111.2.129
- IFB2: 212.111.2.130
- IFB3: 212.111.2.131
- IFC2: 59.90.116.1

- c) Write down the routing table for Host 2

- network | mask | next hop | interface
- 59.90.116.0 | 23 | 0.0.0.0 | eth2
- 0.0.0.0 | 0 | 59.90.116.1 | eth2

- d) Write down the routing table for Router R1

- network | mask | next hop | interface
- 89.17.114.0 | 24 | 0.0.0.0 | IFA1
- 212.111.2.128 | 25 | 0.0.0.0 | IFB1
- 59.90.116.0 | 23 | 212.111.2.130 | IFB1
- 0.0.0.0 | 0 | 212.111.2.131 | IFB1

