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| --- | --- | --- | --- | --- | --- | --- |
| Name**:** |  | | | | Number: |  |
| **On True/False questions cross the right answer.** | | | | Teacher: JF□ NCosta □ NCruz □ RR □ TA □ | | **Duration: 1 Hour** |
| Example: T ⃞ | | F ⃞ |

1. Consider the different technologies used in residential Internet access networks and the OSI model:
   1. The use of fiber optics in the DSL modems allows to increase the rate of transmission and noise immunity F
   2. In GPON, throughput isn’t related with the number of users in the same access network
   3. An Internet connection between Porto and Lisbon must involve a Tier 1 ISP operator F
   4. The TCP/IP model (Internet) is composed by 5 layersV
2. For the equipment or protocols mentioned, state the number or designation of the involved OSI model layers:
3. Switch: 1 e 2
4. Router: 1, 2 e 3
5. Ethernet: 1, 2
6. ICMP: 3
7. About HTTP protocol:
   1. By default, the client establishes an UDP or TCP connection to server’s port 80 F
   2. Only messages sent from the server to the client have data inside message’s body F
   3. In an HTTP persistent connection, the server keeps the connection open once it sends the reply message V
   4. The general format from a request message and a reply message is different due to the distinct IETF specifications used in each message F
8. About e-mail:
   1. The SMTP protocol uses TCP, but may use UDP when sending an urgent message F
   2. POP protocol is used in the reception of messages V
   3. The “*download-and-delete*” mode from POP3 protocol deletes the message from the server once it is received by the user agent V
   4. The SMTP protocol uses persistent connections V
9. Consider the Domain Name System:
   1. It is a hierarchical system, being stored in a single location called the Root DNS server F
   2. DNS resolutions are only required during HTTP accesses F
   3. A *resource record* type A translates a name to an IP address V
   4. *DNS registrar* are entities in charge for the insertion of new records in TLDs V
10. The following table intends to demonstrate a transfer of data between two hosts A and B, using the TCP protocol. Complete the table.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SRC | DST | ACK | SYN | FIN | Nº SEQ | Nº ACK | LEN |
| A | B |  | X |  | 222 | 0 | 0 |
| B | A | X | X |  | 110 | 223 | 0 |
| A | B | X |  |  | 223 | 111 | 0 |
| A | B | X |  |  | 223 | 111 | 11 |
| B | A | X |  |  | 111 | 234 | 111 |
| A | B | X |  |  | 234 | 222 | 40 |
| B | A | X |  |  | 222 | 274 | 120 |
| B | A | X |  |  | 342 | 274 | 51 |
| B | A | X |  |  | 393 | 274 | 105 |
| B | A | X |  | X | 498 | 274 | 0 |
| A | B | X |  |  | 274 | 499 | 0 |
| A | B | X |  | X | 274 | 499 | 0 |
| B | A | X |  |  | 499 | 275 | 0 |

1. State the amount of data transmitted in the following directions:

A -> B:151 B -> A: 387

1. Summarize the following sub-networks 10.20.30.0/24, 10.20.31.128/27, 10.20.31.160/28, 10.20.31.176/28, 10.20.31.192/27, 10.20.31.224/27:

10.20.30.0/24 e 10.20.31.128/25

1. Distribute the network 192.168.0.128/25 by 3 subnetworks wasting the least number of IP addresses as possible:

LAN 1: 192.168.0.128/26 LAN 2: 192.168.0.192/27 LAN 3: 192.168.0.224/27

1. Consider the UDP protocol
   1. Requires the establishment of a session between all the entities participating, before starting to send the data F
   2. The checksum field allows you to identify which bits are wrong when an error is detected on the UDP segment F
   3. UDP segments may be received out of order and with duplicate segments V
   4. The length field contains the value of the size of the data carried F
2. Regarding the packet retransmission mechanisms:
   1. In Stop-and-Wait the sender can only send a packet if it receives the delivery confirmation of the previous packet V
   2. In Go-Back-N, if the sender receives an ACK with a number lower than the last one transmitted it always means that there was an error during transmission F
   3. In Selective Repeat, if it is necessary to transmit packets, only packets that have not reached the destination will be retransmitted V
   4. Only Go-Back-N has the time counter, for each packet sent, which is used to control the timeout and trigger the packet retransmission mechanism F
3. Consider the Network layer in the OSI model:
   1. This layer provides services to the layer below F
   2. Guarantees delivery of messages to the recipient, without errors F
   3. Implements messaging routing mechanisms using routersV
   4. Assumes that all interconnected networks have the same connection layer protocol F
4. Consider the following network: 125.23.41.128/25:
   1. Subnetwork 125.23.41.197/29 is a valid subnet for the network F
   2. When summarized with the subnetwork 125.23.41.0/25, it can be summarized as: 125.23.41.0/24 V
   3. The 125.23.42.0/24 subnetwork is a valid subnetwork of this network F
   4. This network summarizes the following subnetworks: 125.23.41.128/26, 125.23.41.192/27, 125.23.41.240/28 F
5. Consider IP Routing equipment’s:
   1. Their main function is: *routing* and *forwarding* V
   2. Some of these devices can be configured to provide additional services, such as DHCP relay agents or DNS forwarders V
   3. Are built to handle data packets as efficiently as possible V
   4. When implementing NAT they can mask a local network behind a single IP address V
6. About medium access protocols:
   1. When devices have a pre-determined schedule for transmission, then we are using a FDMA mechanism F
   2. Packet-switched transmission uses a TDMA-based mechanism with different transmission frequencies for each device F
   3. Whenever two devices transmit simultaneously on the same shared channel, a collision is observed V
   4. When using Full Duplex there are no collisions V
7. Considering the Ethernet protocol:
   1. Ethernet addresses are composed of 48 bits without a subnet structure similar to what happens with IP addresses V
   2. ARP protocol allows a device to obtain the MAC address corresponding to a Unicast IP address V
   3. Ethernet does not check for errors on the payload F
   4. Switches’ learning process always generates frames destined for broadcast MAC addresses F
8. In relation to the physical layers indicate:
   1. The 100BASE-FX interface can operate with Category 5, 6 and 7 copper cable F
   2. Single-mode fibers use a diode or a laser as light source F
   3. OM1 and OM2 multimode optical fibers are used for transmissions above 10Gbps F
   4. The 1000Base-TX interface allows the use of multimode or single mode optical fibers F