# Start of Assessment

DISCLAIMER: this assessment paper has been prepared to provide a sample of the style and content of questions students may find in the Final Written Assessment. Please note that this is an **abbreviated** paper, containing only one or two questions from each of the 8 main question categories, hence being only out of 26.5 marks.

The actual Final Written Assessment paper will contain more questions, and will typically be marked out of:

* **TNE10006** – 90 to 100 marks
* **TNE60006** – 100 to 110 marks

**Q1** Consider the 802.3 Ethernet Protocol.

**a)** Do collisions occur in a switched network? Why/Why Not?

=> From my perspective, collisions do not occur in a switched network because switches create separate domain collisions for each port and commonly use full-duplex communication, allowing simultaneous sending and receiving data.

(3 marks)

## (3 marks)

**Q2** Consider the IP Protocol

1. Answer each of the following questions **TRUE** or **FALSE**:
   1. FALSE 57.69.168.31/27 is a valid host IP address (1 mark)

* IT’S the BROADCAST ADDRESS
  1. TRUE 205.64.87.17 is in the 205.64.87.0/26 subnet (1 mark)

1. An IP Packet of size 5,730 bytes is sent over a link with a 600 byte MTU
   1. How many IP fragments are sent?

- IP Header: 20 bytea => 600 – 20 =580 -> 5730/580 ≈ 10 fragments

(1 mark)

* 1. Fragment 3 is lost, will the IP layer request a retransmission?
* If Fragment 3 is lost, the IP layer will not request a retransmission. If the packer is a TCP segment, the TCP will request a retransmission. If the packet is a UDP, there would be no automatic retransmission.

(1 mark)

1. Write the following IPv6 addresses in abbreviated form:
   1. 48a4:00b4:0000:0000:0000:0000:cd00:0a7b

* 48a4:b4:0:0:0:0:cd00:a7b

(1 mark)

1. Consider the host with the IPv6 Address 2001:16d4:b:4:13a1:18ee:ed2b:8f7b/64
   1. What is the Site Address Space ID with prefix?

* 2001:16d4:b:4/64

(1 mark)

## (6 marks)

**Q3** Question 3 is a VLSM question worth 15 marks. You should understand the type of question without a sample

**Q4** This question concerns Transport Layer Protocols

1. Consider the TCP Three-Way Handshake depicted in the figure below, the se- quence number of the first **SYN** packet is 1,543



* 1. How many bytes of data are contained within the first SYN Packet?
* There is zero byte of data are contained within the first SYN Packet Packet
* **Explanation:** The SYN packet's primary purpose is to initiate the connection. It doesn't carry actual application data

(1 mark)

* 1. In the **SYN-ACK** response, what is the Acknowledgement number?
* In the **SYN-ACK** response, the Acknowledgement number is 1544

(1 mark)

* 1. What is the sequence number in the **SYN-ACK** response?
* We don't know the exact sequence number. We can only say that it will be a **new sequence number chosen by the server**.

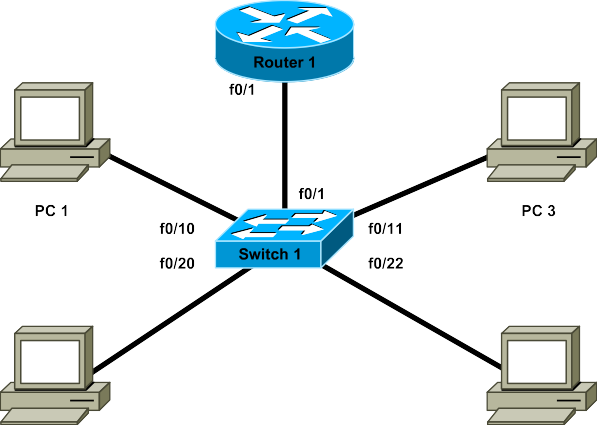
(2 marks)

* 1. How many bytes of data may the sender include in the final **ACK** packet?
* The final ACK packet can also contain **zero** bytes of data.
* **Explanation:** The primary purpose of this ACK is to complete the handshake. While it *can* carry data, it's not required. Usually, the data transfer starts after the handshake is complete.

(1 mark)

## (5 marks)

**Q5** Consider the following network with assiciated IP Address, MAC Address and ARP/MAC table information

**PC 1**

**PC ARP Tables**

|  |  |
| --- | --- |
| **IP** | **MAC** |
| 192.168.10.1 | aa:bb:cc:dd:ee:99 |

**Interface Configuration Details**

**PC 2**

|  |  |
| --- | --- |
| **IP** | **MAC** |
| Empty |  |

**PC 3**

|  |  |
| --- | --- |
| **IP** | **MAC** |
| Empty |  |

**PC 4**

|  |  |
| --- | --- |
| **IP** | **MAC** |
| Empty |  |

**Router 1**

|  |  |
| --- | --- |
| **IP** | **MAC** |
| 192.168.10.6 | aa:bb:cc:dd:ff:01 |

**Switch 1 MAC Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Interface** | **VLAN** | **MAC** | **IP** |
| **Router 1** | f0/1.10 | 10 | aa:bb:cc:dd:ee:99 | 192.168.10.1 |
| f0/1.20 | 20 | aa:bb:cc:dd:ee:99 | 192.168.20.1 |
| f0/1.99 | 99 | aa:bb:cc:dd:ee:99 | 192.168.99.1 |
| **Switch 1** | f0/1 | Trunk | – | – |
| f0/10 | 10 | – | – |
| f0/11 | 10 | – | – |
| f0/20 | 20 | – | – |
| f0/22 | 20 | – | – |
| vlan99 | 99 | aa:bb:cc:dd:00:99 | 192.168.99.5 |
| **PC 1** | – | – | aa:bb:cc:dd:ff:01 | 192.168.10.6 |
| **PC 2** | – | – | aa:bb:cc:dd:ff:02 | 192.168.20.7 |
| **PC 3** | – | – | aa:bb:cc:dd:ff:03 | 192.168.10.8 |
| **PC 4** | – | – | aa:bb:cc:dd:ff:04 | 192.168.20.9 |

|  |  |
| --- | --- |
| **MAC** | **Port** |
| aa:bb:cc:dd:ee:99 | f0/1 |
| aa:bb:cc:dd:ff:01 | f0/10 |

1. When a packet from PC1 to PC4 traverses the trunk link from **Switch 1** to

**Router 1**, fill in the following information as seen in the packet headers

|  |  |  |
| --- | --- | --- |
|  | **Source** | **Destination** |
| **MAC** | aa:bb:cc:dd:ee:99 | aa:bb:cc:dd:ff:01 |
| **IP** | 192.168.10.1 | 192.168.20.9 |

(2 marks)

1. Nominate one advantage and one disadvantage of a layered network protocol architecture?
   * Advantage: Modularity and Abstraction
   * Disadvantage: Overhead.

(2 marks)

## (4 marks)

**Q6** This question relates to the Spanning Tree Protocol

1. How is it possible to configure Cisco Switches such that a different switch be- comes the root bridge for each VLAN?

* You configure Cisco switches to have different root bridges for each VLAN by adjusting the Spanning Tree Protocol (STP) priority on each switch, per VLAN, using the spanning-tree vlan [vlan-id] priority [priority-value] command, or by using the spanning-tree vlan [vlan-id] root primary/secondary commands.

(2 marks)

## (2 marks)

**Q7** This question refers to aspects of the design of Switched networks

1. At which layer(s) in a Heirarchical network (*Core, Distribution or Access*) are the following switch features most important (*you may tick more than one layer* )

|  |  |  |  |
| --- | --- | --- | --- |
| **Switch Feature** | **Core** | **Distribution** | **Access** |
| Power over Ethernet |  | Yes | Yes |

(1*/*2 mark)

1. Describe briefly what the term **Converged Network** means?

* **Converged Network:** A converged network is a network infrastructure that integrates multiple types of traffic, such as voice (telephony), video, and data, onto a single IP-based network.

(1 mark)

**(1**1*/*2 **marks)**

**Q8** This question is about Ethernet Switching and VLANs

1. Nominate one advantage and one disadvantage to using trunking instead of Access Ports when connecting a Switch to another Switch or Router?

## Advantage

* **Increased Bandwidth and Efficiency.**

(1 mark)

## Disadvantage

**Increased Complexity and Potential Security Risks**

(1 mark)

1. Briefly explain how each of the following benefits are realised through the use of VLANs

## Cost Reduction

* **VLANs reduce costs by logically segmenting a network without requiring physical rewiring or additional hardware. Instead of purchasing separate switches or routers for each department or group, you can use VLANs to create virtual networks on existing hardware.**
* **This reduces the need for extra cabling and network devices, and also simplifies network management, leading to lower operational costs.**
* **Vlans allow for the reuse of existing infrastructure. For example, a single switch can be used for multiple departments, each on its own vlan.**

(2 marks)

## (4 marks)

**Q9** Consider a wireless network

**a)** What purpose does the SSID serve in a Wireless network?

=> Allows devices to find and connect to the correct wireless network.

=> Differentiates one wireless network from another in areas with multiple Wi-Fi networks.

(1 mark)

**(1 marks)**

# End of Assessment

**Student Marks – Staff Use Only**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Total |
| Points: | 3 | 6 | 0 | 5 | 4 | 2 | 11*/*2 | 4 | 1 | 261*/*2 |
| Score: |  |  |  |  |  |  |  |  |  |  |