

BCS THE CHARTERED INSTITUTE FOR IT
BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

COMPUTER NETWORKS

Friday 8th October 2021 – Morning

Answer **any** FOUR questions out of SIX. All questions carry equal marks

Time: TWO hours

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Only non-programmable calculators are allowed in this examination.

Section A
Answer Section A questions in Answer Book A

A1.

- a) Each of the following TCP/IP applications are used to help monitor and troubleshoot the use of computer networks.

For each of these applications, describe:

- their relationship to the TCP/IP reference model
- their operation
- how each is used to troubleshoot
- their typical syntax.

- i) Ping; **(5 marks)**
- ii) Traceroute; **(5 marks)**
- iii) Telnet. **(5 marks)**

- b) Explain the operation of the FTP application and its **THREE** distinct transmission modes. **(6 marks)**

- c) Explain how the use of legacy applications such as FTP and Telnet are fundamentally flawed for modern communications and how their shortcomings can be simply addressed. **(4 marks)**

A2.

- a) Below is a partial packet dump, detailing UDP header in hexadecimal format.

06 32 00 A1 00 1C E2 17

Using this information, answer the following questions.

- i) What is the source port number? **(2 marks)**
 - ii) What is the destination port number? **(2 marks)**
 - iii) What is the length of user datagram? **(2 marks)**
 - iv) What is the length of the data? **(2 marks)**
 - v) Is the packet directed from a client to server or vice versa? Justify your answer. **(3 marks)**
 - vi) What is the client process? Detail how this application is used in TCP/IP based networks with regards to the UDP payload? **(4 marks)**
- b) Explain and justify whether TCP or UDP should be used as the transport layer of choice for real time communication applications? **(10 marks)**

A3.

- a) Consider a router that has dynamically learnt and constructed the routing table shown below.

Subnet Network Address	Subnet Mask	Next Hop
195.194.96.0	/25	Interface 0
195.194.96.128	/25	Interface 1
195.194.45.0	/25	Router 3
208.6.155.0	/26	Router 4
Default		Router 5

The router can deliver packets directly over interfaces 0 and Interface 1, or it can forward packets to routers Router 3, Router 4 or Router 5.

Describe what the router does with a packet addressed to each of the following destinations.

- i) 195.194.96.22 **(2 marks)**
 - ii) 195.195.96.253 **(2 marks)**
 - iii) 195.194.45.88 **(2 marks)**
 - iv) 195.194.45.133 **(2 marks)**
 - v) 195.194.45.255 **(2 marks)**
 - vi) 12.23.45.67 **(2 marks)**
 - vii) 241.10.20.30 **(2 marks)**
- b) Explain why packets addressed to any of the following IPv4 addresses will not be routed to the Internet and will be discarded at the Internet boundary. Explain what the significance of these addresses is;
- 10.0.0.0/8
 - 172.16.0.0/12
 - 192.167.0.0/16
- (11 marks)**

[Turn Over]

Section B
Answer Section B questions in Answer Book B

B4.

- a) What is the difference between open-loop and closed-loop congestion control?
(4 marks)
- b) Detail the policies that can prevent congestion under both open-loop and closed loop congestion control.
(8 marks)
- c) Apart from scheduling, what are the other **THREE** main techniques to improve quality of service?
(3 Marks)
- d) Explain how packets should be treated when they arrive at a switch or router with respect to scheduling. With supporting diagrams, explain the **THREE** main types of scheduling mechanisms used in routers and switches to improve quality of service.
(10 marks)

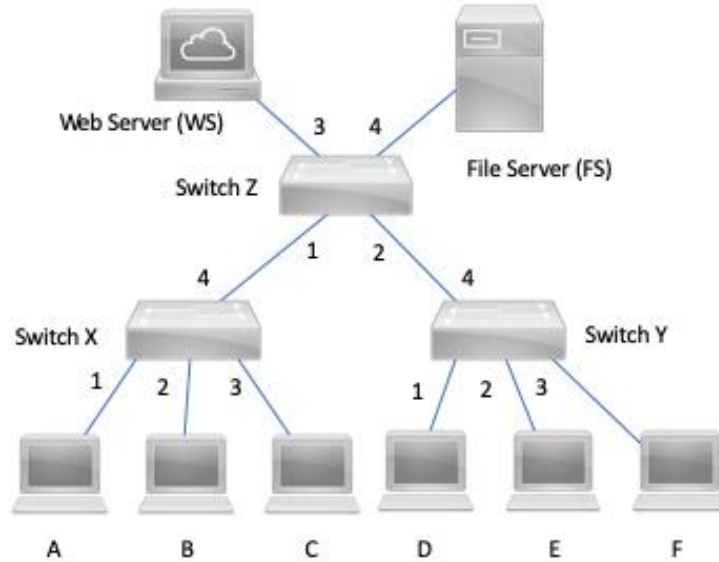
B5.

For both LAN and WAN Layer 2 protocols Media Access Control (MAC) is used in three ways:

1. Partitioning
 2. Random Access
 3. Taking Turn
- a) Classify the following MAC protocols into one of these categories and justify your choice:
- i) Ethernet **(4 marks)**
 - ii) WiFi **(4 marks)**
 - iii) Bluetooth **(4 marks)**
 - iv) 2G **(4 marks)**
- b) Identify the **THREE** main topologies deployed in Wide Area Networks and outline a key advantage/disadvantage for each one.
(9 marks)

B6.

- a) Consider the following campus network connecting three access layer (layer 2) switches (Switch X, Switch Y and Switch Z) connecting host clients (A, B, C, D E and F) with a Web Server (WS) and File Server (FS).



Using the table provided, update the switch table on each of the switches after each of the following communication:

- i) After A sends a web request to the Web Server (WS).
- ii) After the Web Server (WS) replies to A.
- iii) After F sends a web request to the Web Server (WS).
- iv) After the Web Server (WS) replies to F.
- v) After C sends a web request to the File Server (FS).
- vi) After the File Server (FS) replies to C.
- vii) After E sends a web request to the File Server (FS).
- viii) After the File Server (FS) replies to E.

Scenario	Switch X		Switch Y		Switch Z	
	MAC (Device)	Port	MAC (Device)	Port	MAC (Device)	Port
1						
2						
3						
4						
5						
6						
7						
8						

(16 marks)

- b) In Ethernet based Switched LAN's, explain with the aid of supporting diagrams why unmanaged loops are not a good design feature in such networks. Outline how such limitations can be overcome.

(9 marks)

End of Examination