AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

Level 3 Technical Level

IT: CYBER SECURITY
IT: NETWORKING
IT: USER SUPPORT

Unit 2 Communication technologies

Thursday 17 January 2019 Morning Time allowed: 2 hours

Materials

For this paper you must have:
- a ruler
- a scientific calculator (non-programmable)
- stencils or other drawing equipment (eg flowchart stencils).

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer each question in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- If you need more space use the additional pages at the back of this booklet.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- There are 50 marks in **Section A** and 30 marks in **Section B**. Both sections should be attempted.

Advice
- In all calculations, show clearly how you work out your answer.
- Use diagrams, where appropriate, to clarify your answers.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1–5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
TOTAL	

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Section A

Answer **all** questions in this section.

0 1 Bluetooth connects devices using

Tick (✓) **one** box.

[1 mark]

- infrared radiation. ☐
- microwaves. ☐
- short-range radio waves. ☐
- X-ray radiation. ☐

0 2 Which of the following cables is least affected by electromagnetic interference?

Tick (✓) **one** box.

[1 mark]

- coaxial ☐
- fibre optic ☐
- television transmitter ☐
- unshielded twisted pair ☐

Do not write outside the box

0 3 Bandwidth is the

Tick (✓) **one** box.

[1 mark]

amount of data transmitted in a fixed amount of time. ☐

connection between server and client. ☐

energy waves propagated by a material substance. ☐

unwanted information that interferes with a transmission signal. ☐

0 4 Which of the following is also referred to as line topology?

Tick (✓) **one** box.

[1 mark]

bus topology ☐

mesh topology ☐

ring topology ☐

tree topology ☐

Turn over for the next question

Do not write outside the box

0 5 The IEEE 802 defines

Tick (✓) **one** box.

[1 mark]

equal access to online information. ☐

Internet access over local area networks. ☐

networking layer protocols in TCP/IP. ☐

standards for local and metropolitan area networks. ☐

5

Do not write outside the box

0 6 Information can be transmitted in analogue or digital form.

Give **one** example of each type of signal.

[2 marks]

Analogue _____

_____

_____

Digital _____

_____

_____

2

0 7 Download times depend on file size and Internet speed.

Define Mbps and MBps.

[2 marks]

Mbps _____

_____

_____

MBps _____

_____

_____

2

Turn over for the next question

Do not write outside the box

0 8 A hub, a switch, and a router can all now be found in one device.

Define each of these three network components.

Provide an example of how each operates in a network.

[6 marks]

Hub

Example

Switch

Example

Router

Example

6

Do not write outside the box

0 9 The Internet has been described as an international network of networks.

State the role of the following in connecting one device to another across the Internet.

[2 marks]

Internet Protocols (IP) _____

Transmission Control Protocols (TCP) _____

2

1 0 Explain when and where wireless networks might not work as effectively as wired networks.

[4 marks]

4

Turn over for the next question

Do not write outside the box

1 1 ‘Data transfer speed increases as signal strength increases.’

Discuss this statement.

[4 marks]

4

Do not write outside the box

1 2 A protocol is a standard or set of rules used for exchanging data over a computer network.

1 2 . 1 Provide **one** protocol for each Open Systems Interconnection (OSI) layer listed in **Table 1**.

[3 marks]

Table 1

OSI layer	Protocol
Data link layer	
Network layer	
Transport layer	

1 2 . 2 The Internet Message Access Protocol (IMAP) is a standard email protocol that resides at the application layer in the OSI model.

Explain how IMAP has improved mobile email communication.

[3 marks]

6

Turn over for the next question

Do not write outside the box

1 3 Describe how Layer 2 (Data link layer) and Layer 3 (Network layer) of the OSI conceptual model enable packets of data to reach their destination address.

[3 marks]

3

Do not write outside the box

1 4 Electromagnetic interference (EMI) is electrical noise. EMI can scramble images and cause errors in data.

Identify **three** other causes of EMI.

Suggest a possible solution for each.

[6 marks]

1 _____

Solution _____

_____

_____

_____

_____

_____

2 _____

Solution _____

_____

_____

_____

_____

_____

3 _____

Solution _____

_____

_____

_____

_____

_____

6

Turn over for the next question

Do not write outside the box

1 5 Explain the risk to a business of a cyber-attack and what the impact to the business might be.

Give examples in your answer.

[6 marks]

6

Do not write outside the box

1 6 Many mesh networks use wireless routers installed at fixed outdoor locations.

Explain the advantages of mesh networking, and why wireless mesh networking has become popular.

[4 marks]

4

Turn over for Section B

Do not write outside the box

Section B

Answer **all** questions in this section.

1 7 Transmission media make data transfer and communication possible across a network. They are the physical pathways connecting computers and other devices.

Each transmission requires specialised hardware. Some hardware operates better than other hardware in particular environments.

1 7 . 1 Complete **Table 2** using the information from each of the boxes.

[3 marks]

variable	easier to connect multiple devices	great
probably faster and less expensive in challenging locations	good	costly to buy and install

Table 2

Transmission media	Set up	Includes	Relative performance
Twisted pair cable		UTP, STP, coaxial	
Wireless		radio frequencies, microwave, infrared	
Fibre optic		bundles of 400 or 500 pairs	

Do not write outside the box

1 7 . 2 Online high-definition gaming is played in the home across Internet links, most of which still use twisted pair copper-based cable.

Discuss the advantages and disadvantages of using copper-based cable.

Use examples in your answer.

[9 marks]

Extra space is available on the next page if required

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1 7 . 3 Describe attenuation and how this affects cable design.

[3 marks]

15

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1 8 ‘Subscriber Identity Module (SIM) cards were first introduced in 1991 and were the size of a credit card. Today, an electronic SIM card (eSIM) is replacing the physical, plastic SIM card.’

Discuss this statement.

In your answer, you should include:

- how SIM cards have evolved
- a description of the uses of SIM cards
- the advantages and disadvantages of an eSIM or virtual SIM card.

[15 marks]

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END OF QUESTIONS

15

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If needed, use the following pages to continue your answers. Write the question number beside your answer.

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