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

Wednesday 6 June 2018 Morning Time allowed: 2 hours

**Materials**

For this paper you may use:
- 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

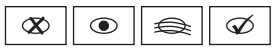
Answer **all** questions in this section.

**Total for this section: 50 marks**

In the multiple choice questions only **one** answer per question is allowed.

For each answer completely fill in the circle alongside the appropriate answer.

CORRECT METHOD 

WRONG METHODS 

If you want to change your answer you must cross out your original answer as shown. 

If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown. 

You may do your working in the blank space around each question but this will not be marked. Do **not** use additional sheets for this working.

**0 1** Which **one** of the following describes the Universal Serial Bus 3.0 (USB 3.0) standard?

**[1 mark]**

**A** a 64-bit parallel connection ⬭

**B** four wires that send a number of bits simultaneously ⬭

**C** a high-speed serial connection ⬭

**D** a logic gate within a circuit ⬭

**0 2** Which **one** of the following is a common transfer protocol?

**[1 mark]**

**A** CSMA ⬭

**B** HTTP ⬭

**C** WEP ⬭

**D** WPA ⬭

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**0 3** Which **one** of the following is a protocol for securing a network?

**[1 mark]**

**A** CSMA ⬭

**B** HTTP ⬭

**C** IP ⬭

**D** WPA2 ⬭

**0 4** In network communications, which **one** of the following describes bandwidth?

**[1 mark]**

**A** the difference between upper and lower frequencies ⬭

**B** the speed of a particular transmission ⬭

**C** a shift of waveform ⬭

**D** a time delay ⬭

**0 5** In modern computing, which **one** of the following is a byte?

**[1 mark]**

**A** a set of 4 bits ⬭

**B** a binary digit ⬭

**C** a set of 8 bits ⬭

**D** a decimal prefix ⬭

5

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**0 6** There are advantages to having the workstations in a small office supported as a network rather than having stand-alone PCs.

List **two** potential disadvantages such a network could introduce.

**[2 marks]**

1 _____

_____

2 _____

_____

2

**0 7** The TCP/IP model provides a 4-layer conceptual model and a set of communications protocols for use with the Internet and computer networks.

**0 7 . 1** The TCP/IP model is named because of the two protocols in the suite.

State the full names of these **two** protocols.

**[2 marks]**

TCP _____

IP _____

**0 7 . 2** Some layers of the TCP/IP model correspond to more than one layer of the 7-layer OSI conceptual model.

The application layer of the OSI model is one of the layers that correspond with the application layer of the TCP/IP model.

List the other **two** layers of the OSI model that correspond with the application layer of the TCP/IP model.

**[2 marks]**

1 _____

2 _____

**0 7 . 3** Name the only other layer of the TCP/IP model that corresponds to more than one layer of the OSI model.

**[1 mark]**

_____

5

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**0 8** In **Table 1**, list the layers of the OSI model that match the descriptions.

**[4 marks]**

**Table 1**

| OSI LAYER | DESCRIPTION |
|---|---|
| | defines reliable/unreliable delivery |
| | addresses logically |
| | changes packets of data into frames |
| | moves bits between devices |

4

**0 9** An Internet-enabled office consists of the following:

- router
- modem
- Internet
- laptop.

In the space provided, draw a network diagram.

**[2 marks]**

2

**Turn over ▶**

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**1 0** Wired transmission media and wireless transmission media are both used to transfer data over a network.

**1 0 . 1** State another term for wired media and for wireless media.

**[2 marks]**

wired _____

wireless _____

**1 0 . 2** In twisted pair cable, what benefit does the twisting produce?

**[1 mark]**

_____

_____

**1 0 . 3** Twisted pair cable is available in two formats.

What is the advantage of shielded twisted pair cable compared with unshielded twisted pair cable?

**[1 mark]**

_____

_____

4

**1 1** Data converted into a form suitable for transmission is called a signal.

There are two types of signal: analogue and digital.

Using suitable examples, define each signal.

**[4 marks]**

analogue _____

_____

_____

digital _____

_____

_____

4

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**1 2** Data transmitted across a network is split into separate units.

A Protocol Data Unit (PDU) is a specific block of data transferred over a network.

Complete **Table 2** with the PDU at each layer of the OSI model.

**[6 marks]**

**Table 2**

| PDU | OSI LAYER |
|---|---|
| | Physical |
| | Datalink |
| | Network |

6

**1 3** Packets of data are sent over the internet with additional information, including the destination address. Packets of data are re-assembled on arrival using the package sequence number.

Explain how a **checksum** identifies packet transmission errors.

**[3 marks]**

3

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**1 4** International Mobility Equipment Identity (IMEI) is a unique number given to every mobile phone.

**1 4 . 1** Where would you expect to find the IMEI number?

**[1 mark]**

**1 4 . 2** Explain the purpose of the IMEI when the phone is in everyday use.

**[2 marks]**

**1 4 . 3** The purchaser is told to keep a record of their phone's IMEI number.

Explain how and when having the IMEI number might be essential.

**[3 marks]**

6

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**1 5** Two main topologies (layouts) are used by networks: one topology connects each client to a central server using an individual cable; the other topology connects all clients to one main cable.

**1 5 . 1** Name the **two** topologies described above.

**[2 marks]**

1 _____

2 _____

**1 5 . 2** Describe the layout and some of the key features associated with each of the **two** topologies named in Question **15.1**

You may wish to use diagrams in your answer.

**[4 marks]**

1 _____

_____

_____

_____

2 _____

_____

_____

_____

6

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**1 6** Most computers have a network adapter. This is known as a Network Interface Card (NIC).

Explain what characteristics you would expect a NIC to have.

**[3 marks]**

3

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## Section B

Answer **all** questions in this section.

**1 7** Wi-Fi is wireless technology that allows connection to a local network or to the Internet.

All wireless technologies use electromagnetic frequencies or airwaves to transmit and receive data.

Some companies pay a licensing fee to get channels that only the company is allowed to use for transmission. These channels are called licensed bands.

**1 7 . 1** List **three** advantages of using licensed data communication.

**[3 marks]**

1 _____

_____

2 _____

_____

3 _____

_____

**1 7 . 2** "Interference is always going to affect unlicensed technologies."

Discuss this statement using examples of interference in the home or in the workplace.

**[12 marks]**

_____

_____

_____

_____

_____

_____

_____

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**1 8** "Point-to-Point Protocol (PPP) enables communication between two points. PPP supports both synchronous and asynchronous connections. It can also provide on-demand authentication using, for example, the Password Authentication Protocol (PAP) or Challenge Handshake Authentication Protocol (CHAP)."

Explain your understanding of each feature of this statement using real-world examples.

You may make use of diagrams to show your understanding of the on-demand authentication protocols, specifically the 2-way handshake and the 3-way handshake.

**[15 marks]**

**Extra space is available on the next page if required**

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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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