Thursday 17 May 2018  Afternoon  Time allowed: 1 hour 30 minutes

Materials
There are no additional materials required for this paper.

Instructions
• Use black ink or black ball-point pen. Use pencil only for drawing.
• Answer all questions.
• You must answer the questions in the spaces provided.
• Do all rough work in this book. Cross through any work you do not want to be marked.
• You must not use a calculator.

Information
• The total number of marks available for this paper is 80.

Advice
For the multiple-choice questions, completely fill in the lozenge 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.
A bit pattern is shown in Figure 1.

Figure 1

\[10011100\]

Convert the bit pattern shown in Figure 1 into decimal.

\[011.1\]

Convert the bit pattern shown in Figure 1 into hexadecimal.

You should show your working.

\[01.2\]

Add together the following three binary numbers and give your answer in binary:

\[01110101 + 00100100 + 00010001\]
Put the following capacities into size order (where 1 is the smallest and 4 is the largest).

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Order (1–4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 Terabytes</td>
<td></td>
</tr>
<tr>
<td>3500 Kilobytes</td>
<td></td>
</tr>
<tr>
<td>2.5 Gigabytes</td>
<td></td>
</tr>
<tr>
<td>6250 Megabytes</td>
<td></td>
</tr>
</tbody>
</table>

[3 marks]

Figure 2 shows an 8 x 8 black and white bitmap image. The image has been represented as a bit pattern with each bit representing a pixel. Row 3 has been represented as 01011010.

Figure 2

Row 1
Row 2
Row 3
Row 4
Row 5
Row 6
Row 7
Row 8

What is the binary representation of Row 4 in Figure 2?

[1 mark]

Row 4: _______________________________________

The image in Figure 2 is going to be changed so that each pixel can be any one of 16 different colours.

What is the minimum number of bits that would be needed to represent the entire 16-colour image?

You should show your working.

[2 marks]

_____________________________________________

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_____________________________________________
ROM is a type of memory used in computers.

Shade two lozenges to show which statements are true about ROM.

A  Desktop computers usually store application software in ROM
B  Desktop computers typically have more ROM than RAM
C  ROM is commonly used to store start-up instructions
D  ROM is non-volatile
E  ROM is used to increase the quality of graphics on a computer

Explain how a magnetic hard disk drive (HDD) operates.

[4 marks]
Figure 3 shows a logic circuit.

Figure 3

State the type of logic gate labelled $G_1$ in Figure 3.

$G_1$: __________________________

[1 mark]

State the type of logic gate labelled $G_2$ in Figure 3.

$G_2$: __________________________

[1 mark]

State what a NOT gate does.

______________________________________________

[1 mark]
Complete the following truth table for the logic circuit shown in Figure 3 by filling in the grey shaded cells.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Turn over for the next question
State three components of the CPU and describe their purpose. [6 marks]

Component 1: __________________________
Description: __________________________

Component 2: __________________________
Description: __________________________

Component 3: __________________________
Description: __________________________

**Figure 4** shows a simplified diagram of the Fetch-Execute cycle.

Fill in the name of the missing stage in **Figure 4** below. [1 mark]
Computer users will often store their data ‘in the cloud’. State three reasons why you might want to use cloud storage rather than local storage.

[3 marks]

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

Turn over for the next question
10.1 Describe one difference between system software and application software. [2 marks]

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

10.2 Describe two different functions performed by an operating system. [4 marks]

Function 1: ___________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Function 2: __________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
A student was asked to describe what software and hardware are. They gave the following answer:

‘New hardware can be installed by downloading it from the web or an installation disk whereas software requires someone to physically attach it to the computer.’

Explain two mistakes the student has made. [2 marks]

________________________________________________________________________

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Turn over for the next question
11.1 Explain two differences between a LAN and a WAN. [4 marks]

Difference 1: ________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Difference 2: ________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

11.2 HTTP and HTTPS are two application layer protocols. Explain why HTTPS is often used rather than HTTP. [1 mark]

__________________________________________________________________________

__________________________________________________________________________

11.3 The application layer and the network (internet) layer are two of the layers within the TCP/IP stack. What are the names of the other two TCP/IP stack layers? [2 marks]

1 ________________________________________________________________

__________________________________________________________________________

2 ________________________________________________________________

__________________________________________________________________________
What is the purpose of the network (internet) layer within the TCP/IP stack?

[2 marks]

Explain how MAC address filtering works.

[2 marks]
Social engineering is where someone is tricked or manipulated into providing secure information or access to a secure system. Describe each of the following social engineering techniques.

[3 marks]

Blagging: 


Phishing: 


Shouldering (or shoulder surfing): 


There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Turn over ►
The Huffman tree shown in **Figure 6** was created to encode the string shown in **Figure 5**. The frequency of each character is shown in brackets. For example, the letter A appears five times within the string shown in **Figure 5**.

**Figure 5**

AAGHHGGSAASG

**Figure 6**

![Huffman tree diagram]

Complete the code table below for characters G, S and H for the Huffman tree shown in **Figure 6**. The code for character A has already been completed.

<table>
<thead>
<tr>
<th>Character</th>
<th>Binary code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>
The string shown in Figure 5 could also be encoded using ASCII. ASCII uses 7 bits to represent each character.

How many bits are saved by using Huffman coding rather than ASCII to represent the string shown in Figure 5?

You must show your working.  

[4 marks]

Answer: _____________________________

Turn over for the next question
Many organisations provide free public access to a wireless network.

Explain **three** ethical, legal or data privacy issues that an organisation should be aware of when allowing this access.

[6 marks]

________________________________________________________________________
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________________________________________________________________________
AQATravel is a tour operator that sells holidays to places all around the world. They hold all of their customer and business data electronically. Following recent news articles about the effects of malware attacks on businesses, the management of AQATravel have been investigating how they could protect themselves against malware attacks.

Discuss four methods that AQATravel could use to prevent infections from malware and/or to minimise the damage that could be caused by malware.

[12 marks]
END OF QUESTIONS

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