Paper 1 examination-style questions

Chapter 1

1 a) Convert the following binary number into denary (base 10):
0 0 1 1 1 1 0 1 [1]

b) Convert the following denary (base 10) number into binary:
70 [1]

c) How many bytes are there in the following memory sizes (give your answer as a power of 2)?
i 1 KB
ii 1 GB [2]

d) An electronic timing device is microprocessor-controlled. The device uses the 24-hour clock.
Two 8-bit registers, A and B, are used to represent the number of hours and the number of minutes.
i Represent 19:54 using the two registers. [2]

A | | | | | | | | : B | | | | | | | |
hours minutes

Another 8-bit register, C, is used to represent the number of seconds.
ii Represent 29 seconds in register C.

C | | | | | | | | |

As soon as register C reaches the value 0 0 1 1 1 1 0 0, register B automatically increments by 1. As soon as register B reaches the value 0 0 1 1 1 1 0 0, register A automatically increments by 1.
iii What time is represented by the three registers below? [2]

A | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |

B | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |

C | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |

iv Show the contents of all three registers 1 second later. [2]

e) i Convert the hexadecimal number A F 1 to denary. [2]
ii Convert the denary number 3080 to hexadecimal notation. [2]

f) Give **three** reasons why the hexadecimal system is used in computers. [3]

2 a) Describe what is meant by a MAC address. Include in your answer the meaning of the different components in a MAC address. [3]

b) What is the difference between UAA and LAA MAC addresses? Explain why both types are used. [4]

c) What is meant by an ASCII code?
Using the ASCII code table in the textbook, show how:
www. teacher_cd.co.uk/html
would be represented in ASCII using hexadecimal codes from the table. [4]

Chapter 2

3 **a)** What is meant by the terms:
i simplex data transmission
ii full-duplex data transmission? [2]

b) Describe the difference between synchronous and asynchronous data transmission. [3]

c) Explain the difference between an IP address and a MAC address. [3]

4 **a)** The first byte has even parity and the second byte has odd parity. Supply the missing parity bit in each case.
i [1]

	0	1	1	1	1	0	1

ii [2]

	1	1	0	1	1	0	0

b) Describe **two** other methods which can be used to check for errors following data transmission. [4]

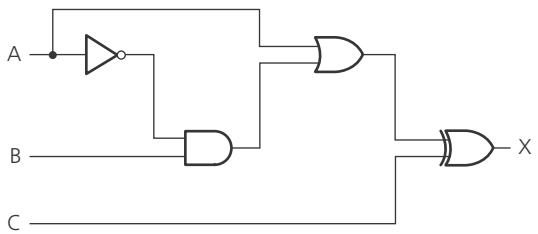
c) A system uses even parity. Seven bytes were transmitted together with a parity byte. The bytes arrive at their destination as shown in Table 2.1.
One of the bits has been altered during the transmission stage. Find the erroneous bit and identify which byte has been corrupted. Explain how you arrived at your answer. Write down the correct value of the byte before corruption. [4]

Table 2.1

	parity bit	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7	bit 8
byte 1	0	1	0	1	0	0	0	0
byte 2	1	1	0	1	1	0	1	1
byte 3	1	0	1	1	1	0	1	0
byte 4	1	0	1	0	0	0	1	1
byte 5	0	1	1	1	0	1	0	0
byte 6	0	0	0	0	1	0	1	0
byte 7	1	1	1	0	0	0	0	1
parity byte	0	0	0	0	1	1	1	1

Chapter 3

5 **a)** Complete a truth table for the following logic circuit: [4]



b) Produce a logic circuit to represent the following logic statement:
X = 1 if (A = 1 OR B = NOT 1) OR (C = 1 AND B = 1)
X = (A + B) + (C . B) [4]

c) A chemical experiment is being monitored by three devices which send binary values 0 or 1 to a logic circuit. The conditions being monitored and binary values produced are shown in Table 3.1.

Table 3.1

Parameter	Description	Binary value	Conditions
T	temperature	0	temperature < 95 °C
		1	temperature >= 95 °C
A	pH (acidity)	0	pH > 10
		1	pH <= 10
S	stirrer speed	0	rotation > 800 rpm
		1	rotation <= 800 rpm

An error, X, is output from the logic circuit if:
either: temperature >= 95 °C AND pH <= 10
or: pH > 10 AND stirrer speed <= 800 rpm
or: temperature < 95 °C AND stirrer speed > 800 rpm
Produce a logic circuit and truth table to represent the above system. [10]

Chapter 4

6 a) Give **three** features of a typical operating system. [3]

b) Explain the two terms:

i buffer

ii interrupt. [2]

c) Describe how buffers and interrupts are used when a document is sent to be printed. [4]

7 a) Describe the structure of the von Neumann model. [3]

b) The part contents of the memory of a computer are shown in Table 4.1.

Table 4.1

Address	Contents
1 0 0 0 0 0 0 0	1 1 1 1 0 0 0 0
1 0 0 0 0 0 0 1	0 1 1 1 0 0 1 1
1 0 0 0 0 0 1 0	1 1 1 1 0 0 1 1
1 0 0 0 0 0 1 1	0 0 0 0 1 1 1 0
1 0 0 0 0 1 0 0	0 0 1 1 1 1 0 0
1 0 1 1 1 1 1 0	
1 0 1 1 1 1 1 1	
1 1 0 0 0 0 0 0	

i The WRITE operation is carried out on location: 1 0 0 0 0 0 1 0.
What are the contents of MAR and MDR?

ii Value 0 1 1 0 0 1 1 1 is to be written into location 1 0 1 1 1 1 1 1.
What are the contents of MDR and MAR? Also show the updated memory contents. [5]

c) Put the following fetch–execute cycle stages into their correct sequence.

1 address is then copied from PC to MAR using the address bus
2 contents of MDR are copied and placed into the CIR
3 contents of memory location in MAR are copied temporarily into MDR
4 instruction is finally decoded and executed by sending signals to components in the computer system
5 PC contains the address of the memory location of next instruction to be fetched
6 value in PC is incremented by 1 so it now points to the next instruction to be fetched [6]

Chapter 5

8 a) Name **two** input and **two** output devices used at a point-of-sale terminal (checkout) at a supermarket. Give a reason for your choice in each case. [4]

b) Describe the operation of a barcode reader.
What are the advantages to customers of supermarkets using barcode technology? [6]

c) Barcodes are made up of alternate dark and light lines. Describe how the computer can interpret these lines. [4]

d) Explain how barcodes are used in automatic stock control systems. [4]

9 a) What are QR codes? [2]

b) Describe how 2D/3D scanners are used as part of the security system at an airport. [4]

c) Describe the differences between *voice recognition* and *speech recognition* systems. [4]

10 a) Name suitable sensors for:
i monitoring the environment in a greenhouse
ii monitoring for intruders in a burglar alarm system. [3]

b) Explain the main differences between *monitoring* and *control* with reference to sensors and microprocessors. [3]

c) Describe how sensors and a microprocessor are used to monitor for intruders in a burglar alarm system. Consider all the inputs and outputs in the system. [6]

11 a) Give **two** applications of 3D printers. [2]

b) Describe the differences between 3D printers and inkjet printers. [3]

c) Describe how a blueprint design is made into a solid object using a 3D printer. [4]

Chapter 6

12 a) i A music file is 40 MB in size. The file is being stored in MP3 format which reduces the file size by 90%. What will be the size of the music file in MP3 format? [1]

ii How many MP3 files (assuming they are all the same size as calculated in part i) could be stored on a CD with a capacity of 800 MB? [2]

b) i MP3 is an example of lossy file compression. Explain the terms:
lossy file compression
lossless file compression.

ii Explain why a jpeg file will lose its sharpness if enlarged too much. [4]

c) Explain why MP3 files retain music quality even though their file size is only 10% of the original file size. [3]

13 a) Explain the differences between RAM and ROM memories.
Give a use for each type of memory in a computer system. [4]

b) Describe the advantages of using solid state memories rather than hard disk drives. [4]

c) Compare the technology that underpins DVDs, Blu-ray™ disks and DVD-RAM. [6]

Chapter 7

14 Use the words below to complete the following sentences.
assembler compiler interpreter
To translate a program written in a high-level language, you can use a/an _____ or a/an _____ . To translate a program written in a low-level language you must use a/an _____ . [3]

15

Program A

```
BEGIN
    VAR First, Second: INTEGER
    READ First, Second
    First:= First + Second
    WRITE First
END
```

Program B

```
INP
STA FIRST
INP
STA SECOND
LDA FIRST
ADD SECOND
STA FIRST
OUT
FIRST DAT
SECOND DAT
```

a) Which program is easier to understand? [1]

b) Why is it easier to understand? [1]

c) Which program is written in a high-level language? [1]

16 Give **three** advantages of writing a program in a high-level language rather than using a low-level language. [3]

17 Give **three** advantages of writing a program in a low-level language rather than using a high-level language. [3]

18 Explain what a *compiler* does and what an *interpreter* does. In your explanation include a description of the differences between them. [2]

19 Choose which type of translator you would use to develop a program written in a high-level programming language. Give **three** reasons to support your choice. [4]

20 Look at these two pieces of code:

A

```
        CLC
        LDX #0
        LDA #0
loop1:  ADC B,X
        STA C
        INX
        CPX #A
        BNE loop1
```

B

```
        Sum = 0
        FOR Counter = 1 TO 10
        INPUT Number
        Sum = Sum + Number
        NEXT
        PRINT Sum
```

a) Which of these pieces of code is written in a high-level language? [1]

b) Discuss the benefits of writing code in a high-level language or a low-level language. [2]

c) There are **two** types of translator used with high-level languages. Name each type of translator and describe **two** differences between them. [4]

Chapter 8

21 a) Name **three** security issues when using the internet and explain ways to overcome these issues. [6]

b) i Describe **two** ways to guard against accidental data loss.

ii Firewalls are used to protect a user's computer. Describe **three** tasks carried out by a firewall. [5]

c) Describe what happens when a user logs on to a website which uses SSL protocols. [5]

22 a) **i** What is meant by encryption?

ii What is meant by:
freeware
shareware? [4]

b) **i** What is meant by asymmetric encryption?

ii What is the benefit of using a 128-bit key rather than a 32-bit key? [3]

c) Explain, with examples, the following terms:

i digital signatures

ii biometrics. [6]