0478 | 2210

TOPICAL

Computer Science

Paper 1

All Topical | All Variants | Mark Scheme

According to New CAIE 2023-2025 Syllabus

2015-2022

SYED HASEEB BARI

+923351400368

BSS JT, BSS Garden Town

Roots International, Crescent

STUDENTS® RESOURCE

Airport Road :
Shop 23-24,
Basement Faysal Bank,
Near Yasir Broast,
Airport Road, Lahore.
Mob: 0321-4567519
Tel: 042-35700707

DHA Ph-V:
Plaza No. 52-CCA, Ph-5
DHA Lahore Cantt.
Mob: 0321-4924519
Tel: 042-37180077

Johar Town :
Opp. Beaconhouse JTC
Adjacent Jamia Masjid PIA
Society Shadewal Chowk,
Johar Town Lahore.
Mob: 0313-4567519
Tel: 042-35227007

Bahria Town:
70 - Umer Block
Main Boulevard
Commercial Area
Bahria Town Lahore.
Mob: 0315-4567519
Tel: 042-35342995

studentsresource.net studentsresourc /students.resource /students.resource

Book Title: O Level Computer Science Topical Paper 1
Compiled By: Syed Haseeb Bari Gilani (+923351400368)
Published by: STUDENTS RESUORCE® Airport Road Lahore
Edition: 2023-25
Price: 3150/-

NOTICE (warning)

NO FURTHER NOTICE (Legal Warning) WOULD BE ISSUED FOR THIS PURPOSE.

A CATALOGUE RECORD FOR THIS PUBLICATION IS SUBMITTED AND AVAILABLE in IPO (Intellectual Property Organization of Pakistan)

Hey students!

This topical provides all my wonderful students with all chapter-wise arranged questions for O-Levels Computer Science (2210) Paper 1. I have compiled each and every question according to the latest syllabus which is to be used in 2023-2025 session.

The 2023-2025 syllabus had a lot of major changes and updates. Some new topics were added and there is no resource for those topics in Computer Science (2210). However, some of the new syllabus additions were taken from already existing syllabuses of A-Levels Computer Science (9608/9618) & the rest from IGCSE Information & Communication Technology (ICT)(0417).

Therefore, I spent hours gathering questions from different Cambridge computer related subjects so the questions of every new topic could be collected at one place. All the questions and their answers have been thoroughly matched and checked to confirm that they meet the exact requirements of the new syllabus of Computer Science (2210).

I have been teaching this subject for around 8 years now in well-known institutions like LGS, BSS, BTSC, Kaizen, International School Lahore, The Lahore Lyceum, Roots Millennium and Roots International. With a legacy of 2 Distinctions of my ex-students, the results of my previous and current students speak for themselves and prove my dedication and contribution in this field.

If you were facing problems regarding what questions to expect and where to find the practice questions for the newly added topics then don't worry anymore, it has all been put in one place for all my wonderful students so they can practice and remember that practice makes perfect!

If you have any concerns, feel free to contact me through the following mediums:

 **0335-1400368**  **@gilanihaseeb**

 **Syed Haseeb Bari Gilani CS/IT – O/A Level**

I hope all of you will get perfect grades that you aim for and undoubtedly distinctions too. Good luck champions!

With lots of wishes for your success,

Haseeb Gilani.

Table of Contents

Questions

Number Systems

Understanding, realizing & analyzing your mistakes is the key to improvement. Keep a track of your mistakes and note down your weak concepts, topics & sub-topics so that you can work extra hard in those areas and gradually achieve perfection in all topics.

Tracking your mistakes & improving them is the ultimate tool to strengthening your weak concepts & turning them into your strongest ones.

Number of Total Questions	
Number of Correctly Attempted Questions	
Number of Wrongly Attempted Questions	

Fill this table at the end after you have practiced all the given questions:

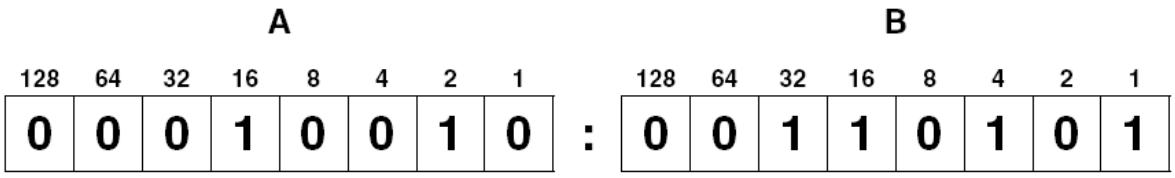
#	Topic/Subtopic/Mistake	Lessons/Guidelines
	e.g.	*e.g.*
1.	*Conversion of denary numbers*	*Read notes of conversions again and practice at least 10 questions.*
	---	---

#	Topic/Subtopic/Mistake	Lessons/Guidelines

Q1. [MJ/15/11]

An alarm clock is controlled by a microprocessor. It uses the 24 hour clock. The hour is represented by an 8-bit register, **A**, and the number of minutes is represented by another 8-bit register, **B**.

(a) Identify what time is represented by the following two 8-bit registers.

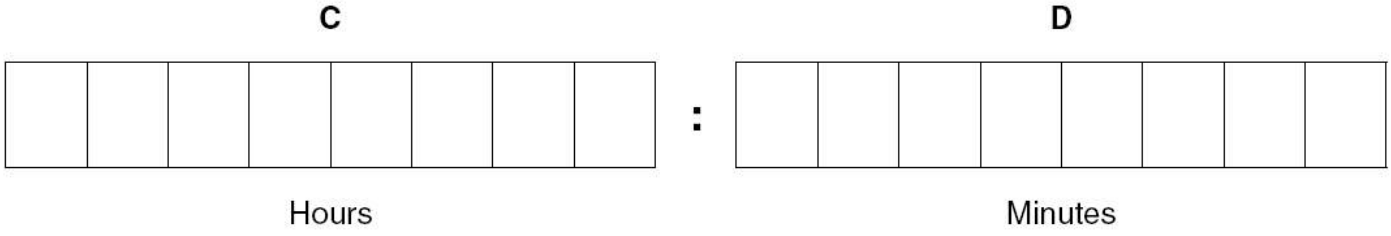


Hours ..... Minutes .....

[2]

(b) An alarm has been set for 07:30. Two 8-bit registers, **C** and **D**, are used to represent the hours and minutes of the alarm time.

Show how 07:30 would be represented by these two registers:



[2]

(c) Describe how the microprocessor can determine when to sound the clock alarm.

.....

.....

.....

.....

.....

.....[3]

Q2. [MJ/15/11]

Draw a line to connect each question to the correct answer.

Question	Answer
What is the denary (base 10) equivalent to the hexadecimal digit **E**?	8
If 1 GB = 2^X then what is the value of X?	12
How many bits are there in one byte?	14
If the broadband data download rate is 40 megabits per second, how many seconds will it take to download a 60 MB file?	19
What is the denary (base 10) value of the binary number 0 0 1 0 0 1 0 0 ?	30
What hexadecimal value is obtained when the two hexadecimal digits **C** and **D** are added together?	36

[5]

Q3. [MJ/15/12]

Letters from the alphabet are represented in a computer by the following denary (base 10) values:

A = 97
G = 103
I = 105
L = 108
N = 110

The word "**A L I G N**" is stored as: 97 108 105 103 110

(a) Convert each of the five values to binary. The first one has been done for you.

Letter	Denary value							
A (97):	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**
L (108):								
I (105):								
G (103):								
N (110):								

[2]

(b) An encryption system works by shifting the binary value for a letter one place to the left. "A" then becomes:

1	**1**	**0**	**0**	**0**	**0**	**1**	**0**

This binary value is then converted to hexadecimal; the hexadecimal value for "A" will be:

C 2

For the two letters "L" and "G", shift the binary values one place to the left and convert these values into hexadecimal:

hexadecimal

L:									.....
G:									.....

[4]

Q4. [ON/15/12]

(a) (i) Convert the following **two** hexadecimal numbers into binary:

F A 7
D 3 E

F A 7 | | | | | | | | | | | |

D 3 E | | | | | | | | | | | |

[4]

(ii) Now perform the AND (logic) operation on each corresponding pair of binary bits in the two numbers from **part (i)**.

| | | | | | | | | | | | |

[2]

(iii) Convert your answer in **part (ii)** into hexadecimal.

.....

.....

[2]

(b) (i) The following code shows HTML 'tag' pairs on either side of the text stating the colour that each creates.

```
<font color " # F F 0 0 0 0 " > RED </font>
<font color " # 0 0 F F 0 0 " > GREEN </font>
<font color " # 0 0 0 0 F F " > BLUE </font>

<font color " #      X      " > YELLOW </font>
<font color " #      Y      " > MAGENTA </font>
<font color " #      Z      " > CYAN </font>
```

Yellow is a combination of red and green, magenta a combination of red and blue and cyan a combination of green and blue.

State what 6-digit hexadecimal values should replace X, Y and Z in the above code.

X .....

Y .....

Z .....

[3]

(ii) Describe how other colours, such as a darker shade of blue, are created.

.....

.....

.....

[2]

(c) 1A – 16 – C5 – 22 – FF – FF is an example of a MAC address.

(i) Identify what the first six and last six hexadecimal digits represent.

First six digits .....

.....

.....

Last six digits .....

.....

.....

[2]

(ii) State why MAC addresses are used.

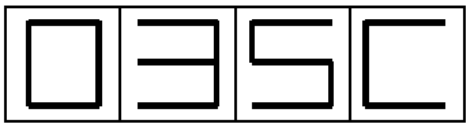
.....

.....

[1]

Q5. [MJ/16/11]

Each seat on a flight is uniquely identified on an LCD above the seat. For example, seat 035C is shown as:



The first three characters are digits that represent the row.
The fourth character is the seat position in that row. This is a single letter, A to F, that is stored as a hexadecimal value.

Each of the four display characters can be stored in a 4-bit register. For example, 0 and C would be represented as:

	8	4	2	1
0:	**0**	**0**	**0**	**0**
C:	**1**	**1**	**0**	**0**

(a) Show how the 4-bit registers would store the remaining two characters, 3 and 5.

3 | | | | |

5 | | | | |

[2]

(b) Identify which seat is stored in the following 4-bit registers.

0	0	0	1	→ .....
1	0	0	1	→ .....
0	1	0	0	→ .....
1	1	1	0	→ .....

[2]

Q6. [MJ/16/11]

(a)

(b) The barcode in **part (a)** contains the denary value 2 6 4 0

Convert this value to hexadecimal.

.....

.....

Write the value as a 12-bit binary number.

[4]

Q7. [MJ/16/12]

(a) Convert the following hexadecimal number into 12-bit binary:

4 A F

[3]

(b) The 2016 Olympic Games will be held in Rio de Janeiro. A timer that counts down to the opening of the Games is shown on a microprocessor-controlled display.

The number of hours, minutes and seconds until the Games open are held in three 8-bit registers.

The present register values are:

0	1	1	0	1	0	0	1	105 hours
0	0	1	0	0	0	0	0	32 minutes
0	0	0	1	0	1	0	0	20 seconds

The timer will count **down** in seconds.

(i) Show the values in each 8-bit register **30 seconds** after the time shown above:

								hours
								minutes
								seconds

[3]

(ii) Write the hexadecimal value of the **minutes** register from **part (b)(i)**.

.....[1]

Q8. [ON/16/12]

A computer uses an 8-bit register.

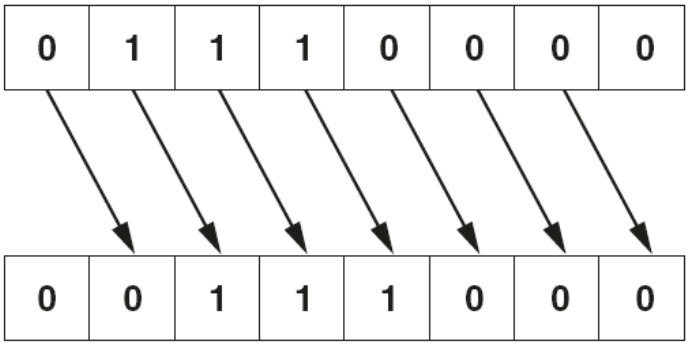
The 8-bit register contains binary integers.

(a) Write the denary (base 10) value represented by:

128	64	32	16	8	4	2	1
0	1	1	1	0	0	0	0

.....[1]

(b) All the bits in the register are shifted **one** place to the **right** as shown below.



Write the denary number that is represented after this shift.

.....[1]

(c) State the effect the shift to the right had on the original denary number from **part (a)**.

.....[1]

(d) The original number in **part (a)** is shifted **three** places to the **right**.

(i) Show the new binary number:

[1]

(ii) Write the equivalent denary number.

.....[1]

(e) Describe the problems that could be caused if the original binary number in **part (a)** is shifted **five** places to the **right**.

.....

.....

.....

.....

.....[2]

Q9. [ON/16/12]

A security system is installed in a house. A hexadecimal number is entered to activate or deactivate the alarm.

(a) The alarm code is set to hexadecimal number **2 A F**

Show how this number would be stored in a 12-bit binary register.

[3]

Q10. [ON/16/13]

(a) A manufacturer of aeroplane engines assigns a denary identification number (ID) to each engine.

One engine has the ID: 0431

(i) Convert this denary number to a 12-bit binary format.

[2]

(ii) Show how this number would be represented in hexadecimal.

.....

.....

[3]

Q11. [MJ/17/11]

The memory of a computer contains data and instructions in binary.

The following instruction is stored in a location of the memory.

0	0	1	0	1	0	0	1	1	1	1	1	1	1	0	0

(a) Convert the instruction into hexadecimal.

.....

.....

..... [2]

(c) Give **two** other uses of hexadecimal.

Use 1 .....

.....

Use 2 .....

.....

[2]

Q12. [MJ/17/12]

(a) The denary number 57 is to be stored in two different computer registers.

Convert 57 from denary to binary and show your working.

.....

.....

.....

.....[2]

(b) Show the binary number from **part (a)** as it would be stored in the following registers.

Register 1

Register 2

[2]

(c) A binary number stored in a register can have many different uses, for example an address in main memory.

Give **two** other uses for a binary number stored in a register.

Use 1 .....

Use 2 .....

[2]

(d) A register in a computer contains binary digits.

0	**0**	**1**	**1**	**1**	**0**	**1**	**0**

The contents of the register represent a binary integer.

Convert the binary integer to hexadecimal.

.....

.....[1]

Q13. [ON/17/12]

A robot arm in a factory is programmed to move products.

The binary instructions to operate the robot arm are:

Operation	Binary Instruction			
UP	1	1	1	1
DOWN	0	0	0	1
LEFT	1	0	0	1
RIGHT	0	1	1	0
OPEN	1	1	0	0
CLOSE	0	0	1	1

The instructions are entered as hexadecimal values.

An operator enters the values:

9 1 C 3 F

Convert the values and write down the operation (e.g. RIGHT) carried out by the robot arm.

9 .....

1 .....

C .....

3 .....

F .....

[5]

Q14. [ON/17/12]

(a) Explain the differences between the binary number system and the denary number system.

.....

.....

.....

.....

.....

.....

.....

.....[4]

(b) Explain the process of converting the binary number 1010 into a denary number.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[5]

Q15. [ON/17/13]

A washing machine has a small display screen built into it.

One use of the display screen is to show an error code when a problem has occurred with a washing cycle.

(b) The display screen shows a hexadecimal error code:

E04

This error code means that the water will not empty out of the washing machine.

Convert this error code to binary.

[3]

(c) State why hexadecimal is used to display the error code.

.....

.....

.....

.....[1]

Q16. [MJ/18/11]

Jane answers an examination question about computers and data correctly.
Six different words or numbers have been removed from her answer.

Complete the sentences in Jane's answer, using the list given. Not all items in the list need to be used.

- 2
- 10
- 16
- analogue
- binary
- denary
- digital
- hexadecimal

As humans, we process …… data, but a computer cannot

process this type of data. For a computer to be able to process data it needs to be

converted to …… data.

As humans, we mostly use a …… number system;

this is a base …… number system.

Computers use a …… number system;

this is a base …… number system.

[6]

Q17. [MJ/18/11]

Dheeraj identifies **three** hexadecimal numbers.

Write the **denary** number for each of the three hexadecimal numbers:

2A .....

101 .....

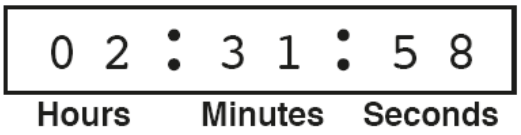
21E .....

[3]

Q18. [MJ/18/12]

A stopwatch uses six digits to display hours, minutes and seconds.

The stopwatch is stopped at:



An 8-bit register is used to store each pair of digits.

(a) Write the 8-bit binary numbers that are currently stored for the **Hours**, **Minutes** and **Seconds**.

Hours								
Minutes								
Seconds								

[3]

(b) The stopwatch is started again and then stopped.

When the watch is stopped, the 8-bit binary registers show:

Hours	0	0	0	0	0	1	0	1
Minutes	0	0	0	1	1	0	1	0
Seconds	0	0	1	1	0	1	1	1

Write the denary values that will now be shown on the stopwatch.

[3]

Q19. [MJ/18/12]

Jafar is using the Internet when he gets the message:

"D03, page is not available"

Jafar remembers that hexadecimal is often used to represent binary values in error codes.

Convert the hexadecimal number in the error message into 12-bit binary.

[3]

Q20. [ON/18/12]

Computers use a character set to convert text into binary.

One character set that can be used is ASCII.

Each letter in ASCII can also be represented as a denary value.

(a) The word BUS has the denary values:

B	U	S
66	85	83

Convert the denary values into 8-bit binary.

66

85

83

[3]

(b) Each letter in ASCII can also be represented as a hexadecimal value.

The word KEY has the 8-bit binary values:

K	E	Y
01001011	01000101	01011001

(i) Convert the three 8-bit binary values into hexadecimal.

01001011 .....

01000101 .....

01011001 .....

[3]

(ii) Give **three** other uses of hexadecimal notation in computer science.

1 .....

2 .....

3 .....

[3]

(iii) State **two** benefits of using hexadecimal notation to represent binary values.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

Q21. [ON/18/13]

The MAC address of a device is represented using hexadecimal.

A section of a MAC address is shown. Each pair of hexadecimal digits is stored using 8-bit binary.

(a) Complete the table to show the 8-bit binary equivalents for the section of MAC address. The first number has already been converted.

6A	FF	08	93
01101010			

[3]

(b) Explain why data is stored as binary in computers.

.....

.....

.....

.....[2]

Q22. [MJ/19/11]

Hexadecimal is used for MAC addresses.

Part of a MAC address is given:

97 – 5C – E1

Each pair of digits is stored as binary in an 8-bit register.

(a) Show what the binary register stores for each pair of the given digits.

97								
5C								
E1								

[6]

(c) Give **two** other examples where hexadecimal can be used.

Example 1 .....

.....

Example 2 .....

.....

[2]

Q23. [ON/19/12]

An 8-bit binary register contains the value:

0	0	1	1	0	1	0	0

(a) Convert the binary value to denary.

.....

..... [1]

(b) The contents of the register shifted one place to the right would give the result:

0	0	0	1	1	0	1	0

The contents of the register shown at the start of question 4 are shifted two places to the left.

Show the contents of the register after this shift has taken place.

[1]

(c) State the effect this shift has on the denary value in **part (a)**.

.....

..... [1]

Q24. [ON/19/13]

(c) The library has a website that customers can use to search for a book.

(i) The website has a background colour with the hexadecimal colour code #F92A10

The colour code is stored in two 12-bit binary registers.

Show how the colour code would be stored in the registers.

F92												
A10												

[6]

Q25. [MJ/20/11]

(d) A low-level language needs to be converted to binary before it can be processed by a computer.

(i) Give the **8-bit binary** value of the two denary values:

180 .....

201 .....

[2]

Working space

.....

.....

.....

.....

(ii) Give the **12-bit binary** value of the denary value **250**.

..... [1]

Working space

.....

.....

.....

.....

(iii) Binary can be represented as hexadecimal to make it easier to read.

Give the **hexadecimal** values of the 8-bit binary values:

10010011 .....

00011101 .....

[2]

Q26. [MJ/20/12]

(a) Give the **denary** value of each of the three 12-bit binary values.

(i) 000000001100

..... [1]

(ii) 000011000110

..... [1]

(iii) 010011000001

..... [1]

Working space

.....

.....

.....

.....

.....

.....

.....

(b) 12-bit binary values can also be represented as hexadecimal values.

Give the **hexadecimal** value of the 12-bit binary value.

000011101001

..... [3]

Q27. [ON/20/12]

(ii) The hexadecimal colour code **#43B7F0** is stored in three **8-bit** registers.

Give the **8-bit binary** values for each part of the hexadecimal code.

43								
B7								
F0								

[6]

Q28. [ON/20/13]

(a) **Four** denary to 8-bit binary conversions are given.

Tick (✓) to show if each denary to 8-bit binary conversion is **Correct** or **Incorrect**.

Denary	Binary Conversion	Correct (✓)	Incorrect (✓)
145	10010001		
179	10110101		
11	00010011		
100	01100010		

[4]

(b) Convert the **12-bit** binary number into hexadecimal.

1	1	0	0	0	1	0	0	0	0	0	0

..... [3]

Q29. [MJ/21/11]

Benedict has a computer that is assigned an Internet Protocol (IP) address. The IP address is:

198.167.214.0

The IP address is represented as denary values.

(a) Convert the denary values 167 and 214 from the IP address to 8-bit binary.

167								
214								

Working space

.....

.....

.....

.....

[2]

Q30. [MJ/21/12]

A denary value can be converted into hexadecimal and binary.

(a) Complete the table to show the hexadecimal and 8-bit binary values of the given denary values.

Denary	Hexadecimal	8-bit binary
49		
123		
200		

[6]

Working space

.....

.....

.....

.....

.....

(b) Give **two** benefits, to users, of converting binary values to hexadecimal.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(c) Hexadecimal is used to represent Hypertext Markup Language (HTML) colour codes in computer science.

Identify **three** other ways that hexadecimal is used in computer science.

1 .....

2 .....

3 .....

[3]

Q31. [ON/21/12]

(a) Denary is a number system that is used by programmers.

Tick (✓) **one** box to show whether denary is a base-2, base-10 or base-16 number system.

Tick (✓)	
☐	Base-2
☐	Base-10
☐	Base-16

[1]

(b) Hexadecimal values can be used to represent denary values.

Convert these **four** hexadecimal values into denary values.

05 .....

20 .....

1A .....

AB .....

[4]

Working space

.....

.....

.....

.....

.....

(c) Hexadecimal values can also be converted to binary values.

Tick (✓) **one** box to show the correct 8-bit binary value for each hexadecimal value.

(i) Hexadecimal value 25

Tick (✓)	
☐	00011001
☐	00100101
☐	10100001

[1]

(ii) Hexadecimal value 1B

Tick (✓)	
☐	00011011
☐	10110001
☐	00011010

[1]

(d) **(i)** Give **one** way that hexadecimal is used in website development.

..... [1]

(ii) Give **one** way that hexadecimal is used in low-level programming.

..... [1]

Q32. [ON/21/13]

A sports stadium has an electronic counter that counts each person that enters the stadium.

The count is stored as binary in a 16-bit register.

A denary value of the count is displayed on a screen at the entrance.

(a) The screen currently displays:

0	0	7	1

Give the binary value that is stored in the register to display the count shown.

Binary value: .....

Working space

.....

.....

.....

[2]

(b) More people enter the sports stadium and the screen now displays:

0	2	5	7

Give the binary value that is stored in the register to display the count shown.

Binary value: .....

Working space

.....

.....

.....

[2]

(c) After everyone has entered the stadium, the register stores the binary value:

0000001000000100

Show what the screen will display when this binary value is stored.

Display:

[1]

Working space

.....

.....

.....

.....

(d) Sensors are used at the entrance to count the number of people entering the stadium.

(i) Identify **two** sensors that could be used to count the number of people entering the stadium.

Sensor 1 .....

Sensor 2 .....

[2]

(ii) Tick (✓) **one** box to show if a sensor is an example of an input device, storage device or output device.

Device	Tick (✓)
input	
storage	
output	

[1]

Question from Specimen Paper 2023

(according to new & updated Syllabus)

Q33. [Specimen/2023]

A school network has several computers.

Each computer in the network has a media access control (MAC) address.

Hexadecimal is used for MAC addresses.

Part of a MAC address is given.

97–5C–E1

Each pair of digits is stored as binary in an 8-bit register.

(a) Complete the binary register for these two pairs of digits.

97								
5C								

[4]

(b) Describe what is meant by a MAC address.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Give **two other** uses of hexadecimal in computer science.

1 .....

2 ..... [2]