

**IGCSE 0478 & O LEVEL 2210**

# **COMPUTER SCIENCE**

**Paper 1 Topical**

**WITH MARK SCHEME**

**Hj` Bcj Ya Vyf 2022**

**For Examinations to be held in**



**CAIE 2023-2025 Syllabs**




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# IGCSE & O LEVEL COMPUTER SCIENCE P1 TOPICAL

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# Preface

CAIE A Level Information Technology (9626) as a subject helps students come up with current and emerging computing technologies along with applying their learning to develop computer based problems using programming.

This book being need of the hour serves students in dual ways.

It contains a collection of questions arranged chapter-wise so that students have a full opportunity to test their understanding of each chapter and at the end of each section I have provided the solutions to each of those questions.

I hope this book serves its purpose and helps students succeed.

**Topic 1: Number Systems**

**1 0478/11/M/J/18/Q2**

Dheeraj identifies **three** hexadecimal numbers.

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

2A .....

101 .....

21E .....

[3]

Working Space

.....

.....

.....

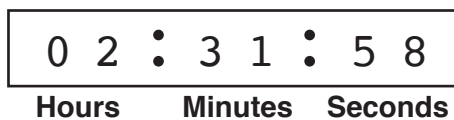
.....

.....

**2 0478/12/M/J/18/Q3**

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

The stopwatch is stopped at:

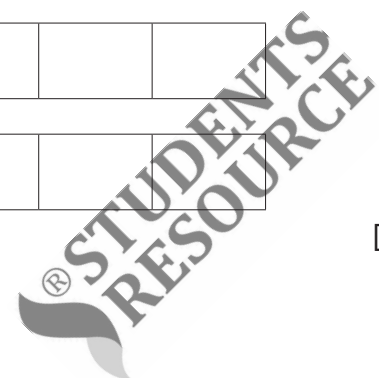


An 8-bit register is used to store each pair of digits.

(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]

**3 0478/12/M/J/18/Q4**

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]

**4 0478/12/M/J/18/Q4(a)**

(a) The Accumulator is a register. The current contents of the Accumulator are:

1	1	0	1	1	0	1	1
---	---	---	---	---	---	---	---

The current contents of the Accumulator represent an unsigned binary integer.

(i) Convert the value in the Accumulator into denary.

.....[1]

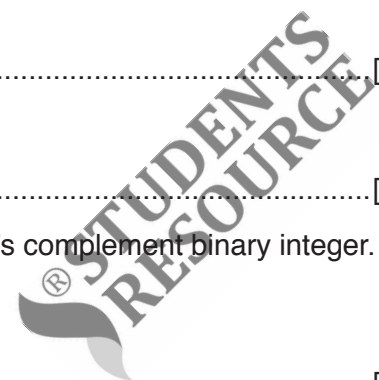
(ii) Convert the value in the Accumulator into hexadecimal.

.....[1]

(iii) The current contents of the Accumulator represent a two’s complement binary integer.

Convert the value in the Accumulator into denary.

.....[1]



**Topic 1: Number Systems**

5 0478/13/M/J/18/Q5

(a) Convert the denary number 107 to binary.

..... [1]

(b) Represent the denary number 300 as it would be stored in a 12-bit binary register.

..... [2]

(c) Convert the denary number 179 to hexadecimal.

..... [2]

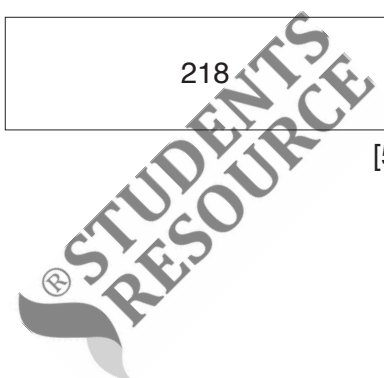
6 0478/11/O/N/18/Q2(a)

(a) Six binary or hexadecimal numbers and six denary conversions are given.

Draw a line to connect each binary or hexadecimal number to the correct denary conversion.

Binary or hexadecimal	Denary
01001011	75
4E	78
11011010	157
10011101	167
A7	25
19	218

[5]



**Topic 1: Number Systems**

**7 0478/12/O/N/18/Q1**

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]

**8 0478/13/O/N/18/Q4**

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]



Topic 1: Number Systems

9 0478/12/F/M/19/Q3(a)

(a) A long distance running race uses an electronic counter that counts each competitor who finishes the race.

The count is stored as binary in a 12-bit register.

A denary value of the count is displayed on a screen above the finish line.

(i) The screen currently displays:

0	0	3	9
---	---	---	---

State the binary value that is currently stored to display the count shown.

.....

..... [2]

(ii) More competitors cross the finish line and the screen now displays:

0	3	5	0
---	---	---	---

State the binary value that is currently stored to display the count shown.

.....

..... [2]

(iii) At the end of the race the binary value stored is:

011011000111

Give the denary value that would be displayed on the screen at the end of the race.

Show your working.

.....

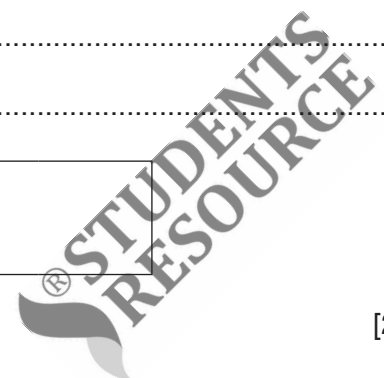
.....

.....

.....

Screen display:

--



[2]

**Topic 1: Number Systems**

10 0478/11/M/J/19/Q1(a)

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]

11 0478/11/O/N/19/Q1(a,c)

Andrew wants to produce advertising material for his company.

(a) Andrew can use an **Inkjet printer** or a **Laser printer**.

Draw lines to connect each printer to a correct statement. More than one line may be used to connect to each printer or statement.

Printer	Statement
<div style="border: 1px solid black; width: 150px; height: 40px; margin: 10px auto; text-align: center; padding: 5px;">Inkjet printer</div>	<div style="border: 1px solid black; width: 250px; height: 40px; margin: 10px auto; text-align: center; padding: 5px;">Can print in colour</div> <div style="border: 1px solid black; width: 250px; height: 40px; margin: 10px auto; text-align: center; padding: 5px;">Uses a charged drum to create the printed item</div>
<div style="border: 1px solid black; width: 150px; height: 40px; margin: 10px auto; text-align: center; padding: 5px;">Laser printer</div>	<div style="border: 1px solid black; width: 250px; height: 40px; margin: 10px auto; text-align: center; padding: 5px;">Uses powdered toner</div> <div style="border: 1px solid black; width: 250px; height: 40px; margin: 10px auto; text-align: center; padding: 5px;">Creates output line by line using a print head</div>

[2]

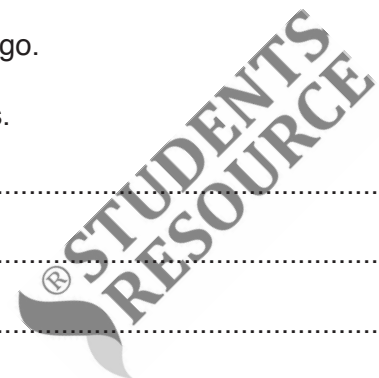
(c) Andrew wants to produce small 3D models of the company logo.

Explain how a 3D cutter could be used to produce the models.

.....

.....

.....



Topic 1: Number Systems

12 0478/12/O/N/19/Q4

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]

13 0478/13/O/N/19/Q1(c-i)

(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.

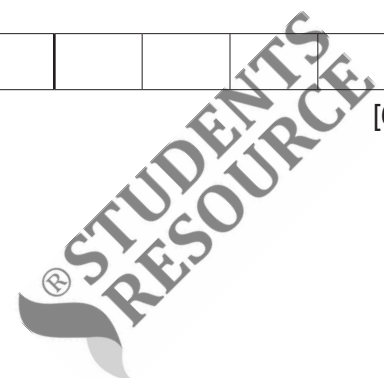
F92 

--	--	--	--	--	--	--	--	--	--	--	--

A10 

--	--	--	--	--	--	--	--	--	--	--	--

[6]



**14 0478/13/O/N/19/Q4**

(a) Convert the unsigned binary number 0101 1111 1100 into denary.

..... [1]

(b) Convert the denary number -239 into 12-bit two's complement.

..... [1]

(c) Convert the two's complement number 0110 0101 into denary.

..... [1]

(e) Convert the denary number 222 into hexadecimal.

..... [1]



Topic 1: Number Systems

15 0478/12/F/M/20/Q5

Programmers can use denary and hexadecimal values. These values are stored in a computer system using binary.

(a) Explain why binary is used to store data in a computer system.

.....

.....

.....

..... [2]

(b) Complete the table to show how the denary value would be stored as binary in an 8-bit register.

Denary value	8-bit register
129	
56	

[2]

Working space

.....

.....

.....

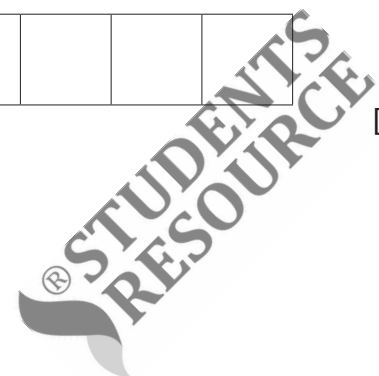
.....

.....

(c) Complete the table to show how the hexadecimal value **3A9** would be stored as binary in a 12-bit register.

--	--	--	--	--	--	--	--	--	--	--	--

[3]



Topic 1: Number Systems

16 0478/11/M/J/20/Q9(d)

(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]



**Topic 1: Number Systems**

17 0478/12/M/J/20/Q7

(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]





**Topic 1: Number Systems**

18 0478/13/M/J/20/Q1

Pradeep is reading hexadecimal values for a project he is working on.

(a) The first three hexadecimal values he reads are **15**, **102** and **A9**.

Give the **denary** values for the three hexadecimal values.

15 .....

102 .....

A9 .....

[3]

Working space

.....  
.....  
.....  
.....

(b) Pradeep has two 8-bit binary values that he needs to convert to hexadecimal values for his project.

Give the **hexadecimal** values for the two 8-bit binary values.

01010000 .....

00111101 .....

[4]



**Topic 1: Number Systems**

**19 0478/11/O/N/20/Q2(a)**

Ron is attending a music concert. He has bought three tickets.

Each ticket number is displayed as a hexadecimal number.

(a) Complete the table to show the **12-bit binary** values and the **Denary** values for each Hexadecimal ticket number.

Hexadecimal ticket number	12-bit binary value	Denary value
028		
1A9		
20C		

[6]

Working space

.....

.....

.....

.....

.....

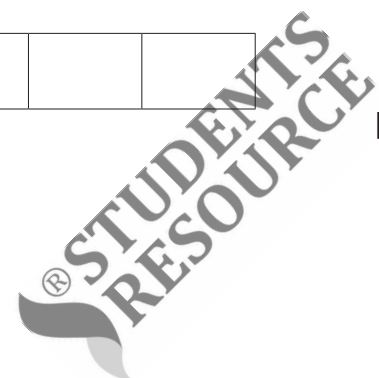
**20 0478/12/O/N/20/Q1(b-ii)**

(b) (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	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
B7	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
F0	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

[6]



21 0478/13/O/N/20/Q3

(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]



Topic 1: Number Systems

22 0478/12/F/M/21/Q1

A hockey club records the number of people that watch each match. An 8-bit binary register is used to store this value.

(a) 46 people watch the first match and 171 people watch the second match.

Show how the registers would store these denary values as 8-bit binary.

Denary value	8-bit binary								
46									
171									

[2]

Working space

.....

.....

.....

.....

(b) Give the largest denary value that can be stored in the 8-bit binary register.

..... [1]

(c) The hockey club wants to increase the number of people that can watch each match to 2000. The 8-bit binary register may no longer be able to store the value.

Give the smallest number of bits that can be used to store the denary value 2000.

..... [1]

Working space

.....

.....

.....

.....

