Surname		Centre Number	Candidate Number
Other Names			0

GCSE

wjec cbac

C500U10-1

S19-C500U10-1

eduqas
Part of WJEC

COMPUTER SCIENCE – Component 1
Understanding Computer Science

MONDAY, 13 MAY 2019 – MORNING

1 hour 45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	5	
2.	6	
3.	6	
4.	5	
5.	14	
6.	6	
7.	9	
8.	4	
9.	8	
10.	8	
11	3	
12	6	
13	7	
14	3	
15	10	
Total	100	

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The use of calculators is not permitted in this examination.

The total number of marks is 100.

Questions 1, 2, 3 and 6 will require you to draw on knowledge from multiple areas of your course of study.

1. Complete the tables below, showing the relationships between the data storage units. [5]

No	Unit		No	Unit
	bits	=	1	nybble
8		=	1	byte
1024	bytes	=	1	
1024		=	1	megabyte
1024	megabytes	=	1	

2. Describe the functional characteristics of the following types of memory:

(a) Random Access Memory (RAM) [2]

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(b) Read Only Memory (ROM) [2]

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(c) RAM cache memory [2]

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3. *(a)* Complete the following truth table. [4]

A	B	A.B	$\overline{A}$	$(A.B)+\overline{A}$	$B.((A.B)+\overline{A})$
1	1				
1	0				
0	1				
0	0				

(b) Logical operations can be used in control systems.

Name the logical operation that would be used in the following control systems:

(i) A control system closes the windows on a greenhouse when both of the following conditions are true:

- the wind speed rises above 12 km per hour
- it is raining. [1]

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(ii) A control system turns on a sprinkler system in a field when either of the following conditions are exclusively true:

- the temperature rises above 25° Celsius
- it has not rained in the last five days. [1]

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(C500U10-1) **Turn over.**

4. A large organisation needs to copy a 5 TB database from one computer system to another.

In terms of durability, portability and speed compare the functional characteristics of **two** secondary storage devices that could be used to allow the organisation to complete this task.

Secondary Storage Device 1: .... [1]

Secondary Storage Device 2: .... [1]

Comparison: [3]

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5. A new company is setting up a computer network for its employees to share data, software and peripherals.

(a) State what is meant by a network and describe the characteristics of LAN and WAN types. [3]

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5

(b) Draw diagrams to show a bus and a mesh topology, giving **one** advantage and **one** disadvantage of each.

    (i)   Bus topology   [3]

Advantage: ....

....

....

Disadvantage: ....

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....

    (ii)   Mesh topology   [3]

Advantage: ....

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Disadvantage: ....

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(C500U10-1) **Turn over.**

(c) The company is creating a new policy for staff that will be using its network.

Explain the purpose and typical contents of an acceptable use policy. [5]

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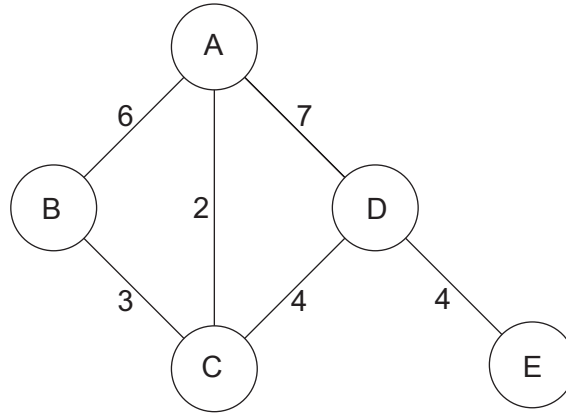
6. *(a)* The following diagram shows the routing cost between each node for data transmitted on a certain network.

Complete the following table, indicating the lowest cost routes from node **A** to each destination. [4]

Destination	Lowest Cost	Route
B		
C		
D		
E		

(b) Give **one** advantage and **one** disadvantage of circuit switching over packet switching. [2]

Advantage: ....

....

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Disadvantage: ....

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Turn over.

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7. *(a)* (i) Convert the denary number 112_{10} to an 8 bit binary number. [1]

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(ii) Convert the binary number 01011011_2 to a denary number. [1]

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(b) (i) Convert the denary number 87_{10} to hexadecimal, showing your workings. [2]

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(ii) Explain why hexadecimal notation is used. [2]

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(c) Two 8 bit binary numbers, 11010010_2 and 11111100_2, are added and the answer is stored in an 8 bit register. Show how this will produce an error and give the name of this type of error. [3]

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8. *(a)* State the purpose of standardised character sets and how they work. [2]

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(b) Name **two** standardised character sets. [2]

Standardised Character Set 1: ....

....

Standardised Character Set 2: ....

....

9. Clearly showing each step, simplify the following Boolean expressions using Boolean identities and rules.

(a) $P.Q+P.\overline{Q}$ [3]

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(b) $X+\overline{X}.Y$ [5]

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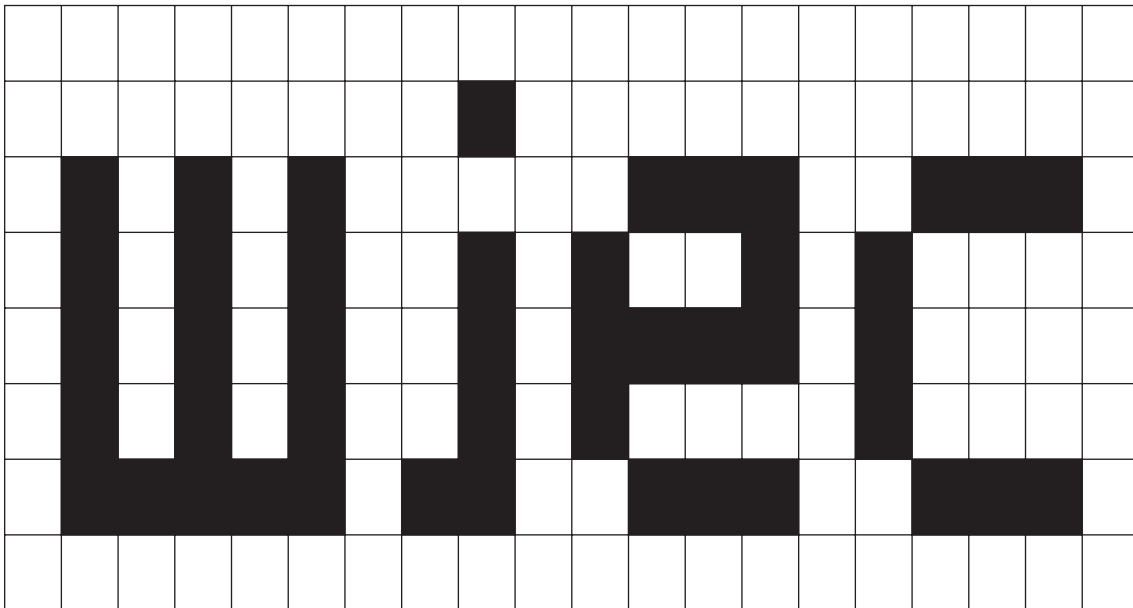...

10. The following black and white graphic is stored using a computer system.

(a) (i) Calculate the size of the file in bytes assuming each pixel in the graphic requires 1 bit of storage. **Show your workings.** [2]

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(ii) If this image had an 8 bit colour depth, calculate the size of the file in bits. [1]

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(iii) Determine the number of different colours available in an 8 bit colour depth graphic. [1]

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Examiner only

(b)   A data compression ratio of 5 : 2 means that a file of 10 KB in size before compression would be 4 KB in size after compression.

(i)   Complete the table below showing the sizes of files A, B and C after compression.

[3]

File	Size Before Compression	Compression Ratio	Size After Compression
A	195 KB	15 : 3	
B	900 KB	30 : 1	
C	180 KB	18 : 2	

(ii)   Calculate the **minimum** number of emails it would take to send all the compressed files if there is an attachment limit of 50 KB per email.   [1]

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11.   A school wishes to record the time taken for several pupils to complete a 100m race. Each competitor will race 6 times.

State and design the most suitable data structure for storing this data.   [3]

Data structure: ....

Design:

12. Complete the Integrated Development Environment (IDE) facilities table below. [6]

Facility	Use
	Allows a programmer to enter, format and edit source code
	A program which allows previously compiled code, from software libraries, to be linked together
	A program which helps locate, identify and rectify errors in a program
	A facility which displays the order in which the lines of a program are executed, and possibly the values of variables as the program is being run
Break point	
Variable watch	

13. A program written using a high-level programming language is intended to add five numbers input by a user. The program contains an error. This program will be **compiled**.

```
1    Start addProc
2    number is integer
3    a is integer
4    total is integer
5
6    if i = 1 to 5
7         output "Please enter next number"
8         input number
9         a = a + number
10   next i
11
12   total = a
13   output "The total = ", total
14
15   End addProc
```

(a) Complete the following sentences about the program, using only the terms given below.

Code optimisation	Recursion analysis	Semantic analysis	Iteration count
Syntax analysis	**Code generation**	**Viaduct construction**	**Lexical analysis**

(i) The program is split into tokens and all whitespace is removed during the

.... stage of compilation. [1]

(ii) The error in this program would be detected during the

.... stage of compilation. [1]

(iii) Memory locations would be allocated to the variables `number`, `a` and `total` during

the .... stage of compilation. [1]

(iv) **Line 12** creates an inefficient use of memory. The

.... stage of compilation would address this.
[1]

(b) Identify the error detected and suggest a suitable change to this code to address the error. [2]

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(c) Suggest a suitable change to address the inefficient use of memory. [1]

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14. Give **three** environmental impacts of digital technology on wider society. [3]

Environmental Impact 1: ....

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Environmental Impact 2: ....

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Environmental Impact 3: ....

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15. Describe the functionality of the operating system in providing a user interface and describe the use of input and output devices with user interfaces. [10]

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END OF PAPER

For continuation only.

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For continuation only.

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