GCE AS/A LEVEL

wjec cbac

2500U10-1

TUESDAY, 17 MAY 2022 – AFTERNOON

COMPUTER SCIENCE – AS unit 1
Fundamentals of Computer Science

2 hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	8	
3.	8	
4.	19	
5.	6	
6.	7	
7.	8	
8.	4	
9.	5	
10.	8	
11.	8	
12.	4	
13.	11	
Total	100	

ADDITIONAL MATERIALS

A calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Answer **all** questions.

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

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.

The total number of marks available is 100.

Assessment will take into account the quality of written communication used in your answers.

Answer **all** questions.

1. Describe the fetch-decode-execute cycle showing how data can be read from RAM into registers. Your answer should make reference to the MAR, MDR, PC and CIR.   [4]

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2. Describe the use of the following contemporary methods for input and their associated devices. Your answer should include their benefits and drawbacks.

(a) Voice input [4]

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(b) Touch input [4]

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3. (a) Explain the role of multiplexing on a network. [2]

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(b) Describe the contents of a typical TCP/IP data packet. [6]

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4. (a) State the meaning of the term "word". [1]

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(b) Convert the hexadecimal numbers AE_{16} and $1B_{16}$ into binary and, using binary addition, calculate the number that would result from adding them.
Convert your answer into denary.

You must show **all** of your working. [5]

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(c) Show how -39_{10} would be represented using sign/magnitude and how it would be represented using two's complement representation in an 8 bit register. [2]

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(d)   In a certain computer system, real numbers are stored in normalised floating point form using two's complementation, an 8 bit mantissa and a 3 bit exponent.

   (i)   The following is a floating point representation of a real number:

   0.1110100   010

   Calculate the denary value of the mantissa and exponent, and convert this floating point number into a denary number.   [3]

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   (ii)   Showing your workings, calculate the largest positive denary number that this computer system can store.   [3]

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(e) Using the number 111.10110_2, describe truncation and rounding **to two binary places**, and their effect upon accuracy in terms of their absolute errors. State which method is more accurate. [5]

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5. Explain the difference between fixed and variable length records. [6]

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6. (a) Describe the benefits of user groups having different views of database data. Describe how these views may be varied for each user group. [6]

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(b) Describe the need for archiving files. [1]

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7. The following user login details are stored in a two-dimensional string array called `loginDetails`.

	Username [0]	Password [1]	Full name [2]
[0]	MurahanA	152599	Alice Murahan
[1]	JonesT	p@ssword12134	Tim Jones
[2]	MurrayB	Fred1985	Benjamin Murray
[3]	AliZ	1234	Zaheer Ali
[4]	DaviesD	#12356!	Denzil Davies

Write an algorithm, using pseudo-code, which will allow a user to enter a username and password to login.

If the user has logged in successfully, then a suitable welcome message should be displayed followed by their full name.

Your algorithm should output a suitable error message if the password entered is incorrect or if the username is not found.

Your algorithm should be written using self-documenting identifiers. [8]

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8. Describe a suitable mode of operation for producing payslips in a payroll application. [4]

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9. Clearly showing each step, simplify the following Boolean expression:

$$(A+B).(A+C)+\overline{B}.B$$

[5]

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10. The following algorithm calculates the area of a circle for a radius input by the user.

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1    StarProc areaOfCircle
2    A is real
3    B is real
4    C is real
5
6    set C = 3.14
7
8    output "Please enter the radius"
9
10   input A
11
12   B = C * (A * A)
13
14   output "The Area is ", B
15
16   End Proc
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(a) Identify and define the following terms in the algorithm above.

(i) Constant. [2]

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(ii) Variable. [2]

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(b) Describe why the use of self-documenting identifiers is important in programs and suggest suitable changes that you would make to the algorithm above to achieve this.[4]

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11. Describe the distinguishing features of the following different types of programming paradigms.

(a) Procedural. [4]

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(b) Mark-up. [4]

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12. Describe the difference between malicious and accidental damage to data and identify **one**
situation where each could occur. [4]

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13. Explain the purpose of expert systems and describe the possible effects of these systems on the nature of employment in wider society.

Discuss their general benefits and drawbacks. [11]

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For continuation only.

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