Surname	Centre Number	Candidate Number
First name(s)		2

GCE AS

B500U10-1

S24-B500U10-1

TUESDAY, 14 MAY 2024 – AFTERNOON

COMPUTER SCIENCE – AS component 1

Fundamentals of Computer Science

2 hours

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

B500U101
01

ADDITIONAL MATERIALS

A calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

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 additional page(s) 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 need for good English and orderly, clear presentation in your answers.

The total number of marks available is 100.

JUN24B500U10101

Examiner only

Answer **all** questions.

1. Explain parallel processing, giving a suitable example.

Your answer should include any potential limitations. [6]

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2. Clearly showing each step, simplify the following expression using only Boolean identities and rules. [7]

Do not use truth tables in your answer.

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

Examiner only

3. Describe how characters are stored in binary form. [3]

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Examiner only

4. (a) State the meaning of the following terms:

(i) Byte. [1]

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(ii) Word length. [1]

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(b) Convert the numbers $2A_{16}$ and 74_{10} into two binary numbers and, using binary addition, calculate the binary number that would result from adding them.

You must show all your working. [4]

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Examiner only

(c) In a certain computer system, real numbers are stored in floating-point form using two's complementation, with an 8-bit mantissa and a 4-bit exponent.

The following is a floating-point representation of a real number:

```
0.1001101 0110
```

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

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(d) Show the effect of truncation and rounding, to two binary places, on the following number. [2]

```
110101.1011101
```

TRUNCATION

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ROUNDING

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Examiner only

5. Distinguish between the use of serial and sequential file access methods in computer applications. [6]

Examiner only

6. Describe contemporary processes that protect the security and integrity of data. [6]

Examiner only

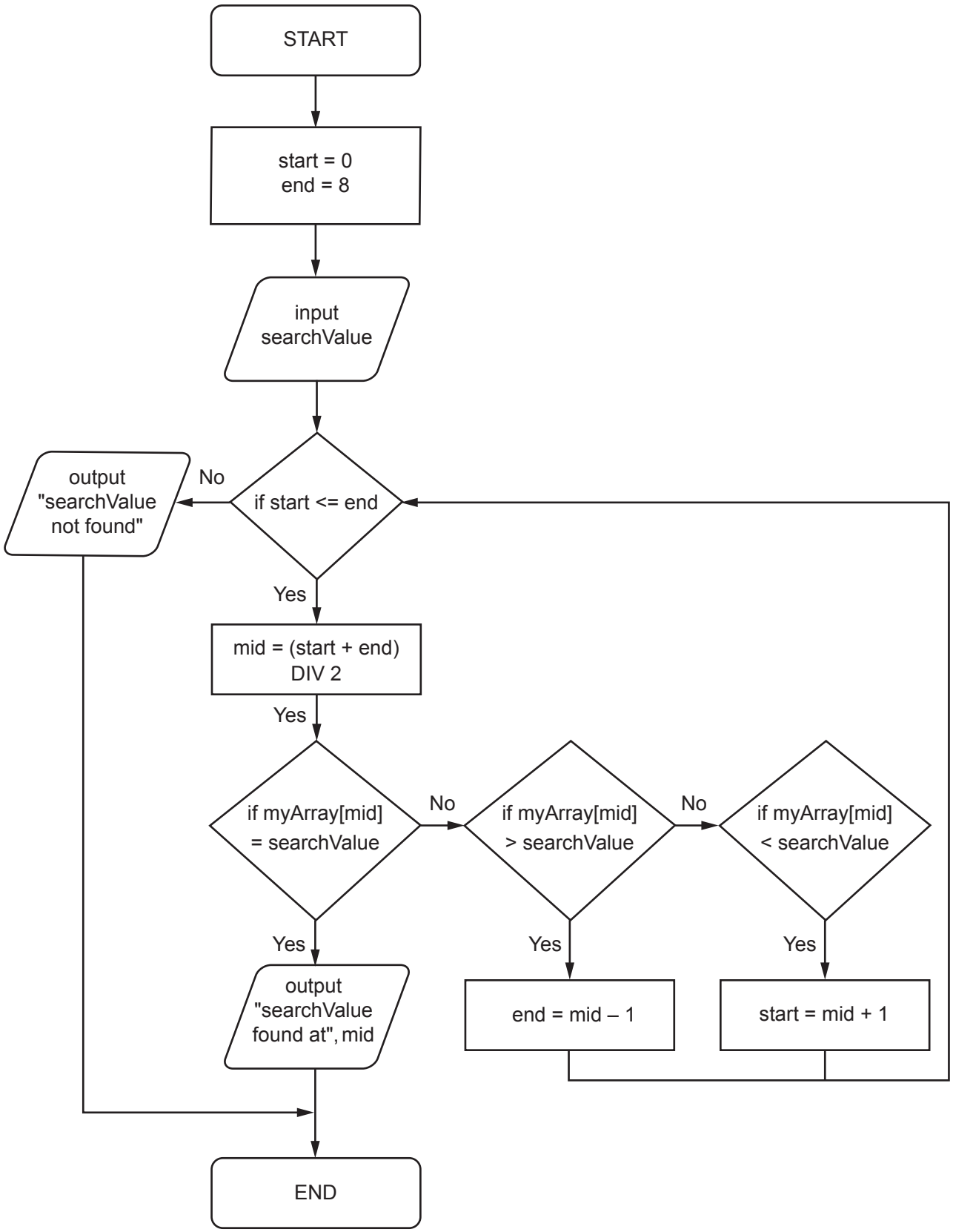
7. Presence checks can be used to ensure that the required input is not empty or null.

Describe, using examples, **three** other validation techniques. [6]

Examiner only

8. Explain how contingency planning can aid in the recovery from disasters that affect computer systems and outline potential threats to those systems. [6]

9. Consider the following algorithm.



Examiner only

(a) State the name given to this type of algorithm. [1]

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(b) Describe how this algorithm operates. [6]

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(c) Describe **two** constructs used in this algorithm. [4]

CONSTRUCT 1

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CONSTRUCT 2

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Examiner only

10. An algorithm is required to translate English words into their Spanish equivalent.

A partial example of the two-dimensional array, called `translations`, is shown below:

	English [0]	**Spanish [1]**
[0]	Each	Cada
[1]	Eagle	Águila
[2]	Early	Temprano
[3]	Earn	Ganar
[4]	Earth	Tierra
[5]	East	Este
[6]	Easy	Fácil
[7]	Eat	Comer
[8]	Eavesdrop	Escuchar a escondidas
[9]	Ebb	Marea baja

Write an algorithm, using pseudo-code, which allows a user to input an English word and output its Spanish equivalent.

Your algorithm should output a suitable error message if the word is not found.

Your algorithm should be written using self-documenting identifiers. [7]

Examiner only

11. Master and transaction files are commonly used in file update operations. One example is a banking system, where both the master file and transaction file can be used to update account balances when cash is withdrawn from an ATM.

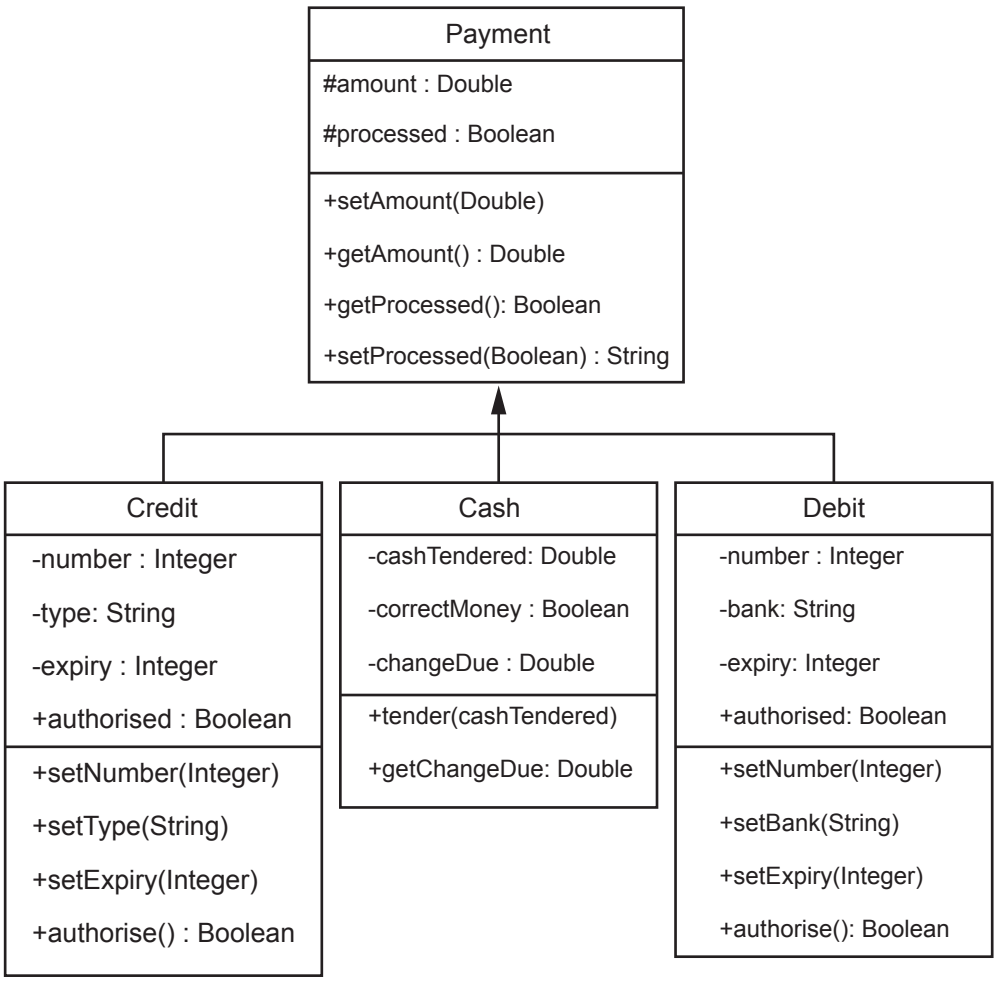
(a) Describe this system and the update process for account balances. [4]

(b) Give **two** advantages of using this approach for updating account balances. [2]

Examiner only

12. Object-oriented programming is a programming approach that structures code into real world objects.

Consider the following class diagram for a payment system:



(a) Describe the relationship between an object and a class. [2]

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(b) Give **one** example for each of the following from the class diagram.

(i) A public method. [1]

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(ii) A method that requires a parameter. [1]

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(iii) A method that does not require a parameter. [1]

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(c) Describe the difference between a private and protected method. [2]

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13. Describe the possible effects of computers on the nature of employment in wider society. [6]

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14. A new computerised system has been developed for an organisation.

They will be provided with user and maintenance documentation for the new system. They will also have to consider either to carry out direct or parallel system changeover.

Discuss the relative merits of direct and parallel system changeover methods, and describe the typical contents of user and maintenance documentation. [12]

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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