



GCE AS/A LEVEL

2500U10-1

TUESDAY, 21 MAY 2019 – MORNING

COMPUTER SCIENCE – AS unit 1

Fundamentals of Computer Science

2 hours plus your additional time allowance

Surname _____

Other Names _____

Centre Number _____

Candidate Number 2 _____

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

ADDITIONAL MATERIALS

A calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen or your usual method.

Answer ALL questions.

Write your name, centre number and candidate number in the spaces on the front cover.

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(a) Define the term INTERNET. [1]

1(b) Describe the use of the following networking protocols:

(i) Universal Datagram Protocol (UDP). [1]

1(b) (ii) Dynamic Host Configuration Protocol (DHCP). [1]

1(b) (iii) Simple Mail Transfer Protocol (SMTP). [1]

2. An algorithm which should have four outputs, a, b, c and d is opposite. The algorithm does not work as intended.

(a) State the outputs that this algorithm will give. [2]

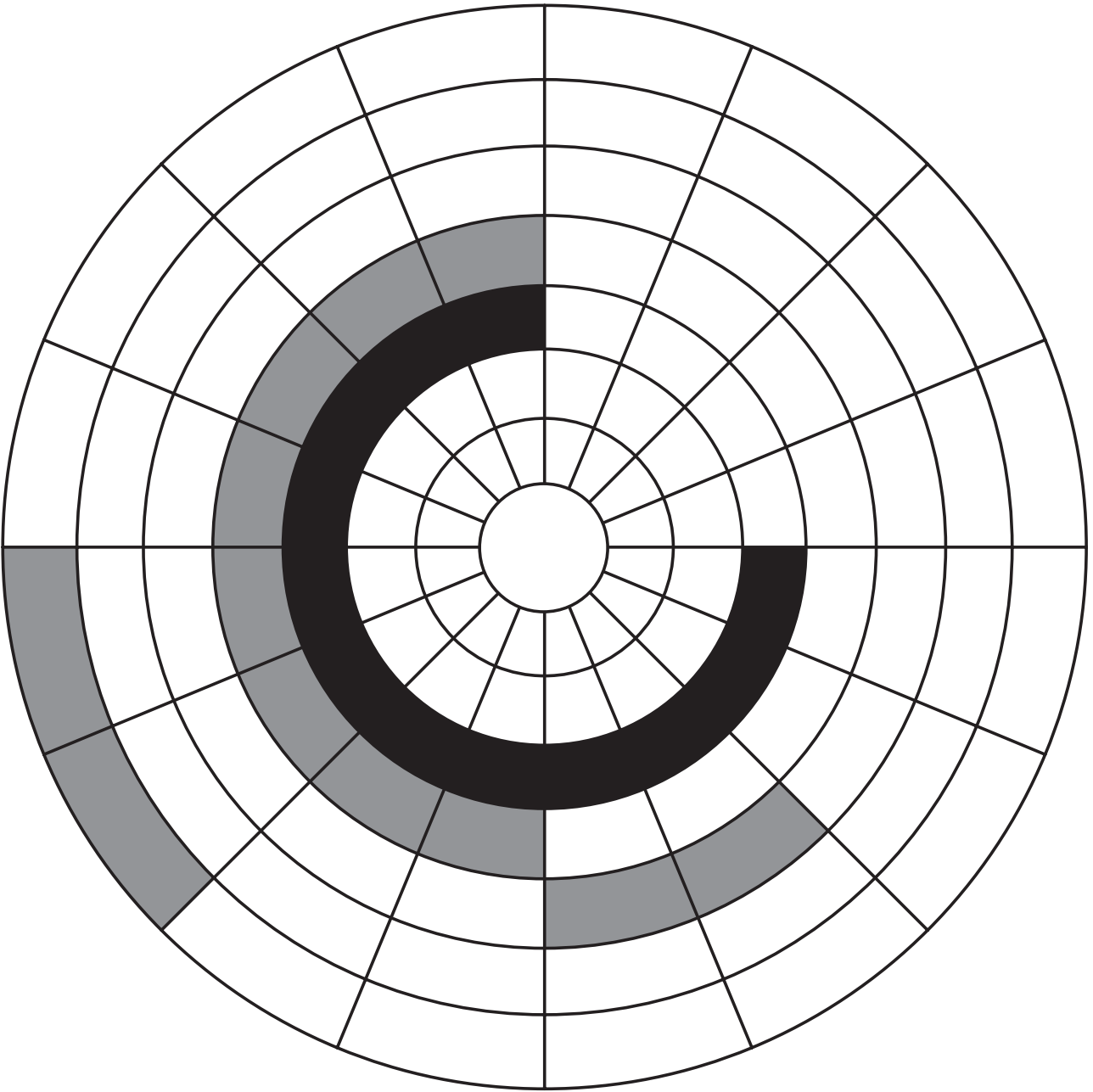
```
1  define myFunction
2  declare c as integer
3  declare d as integer
4      set c = 3
5      set d = 4
6  end myFunction
7
8  Start MainProg
9  declare a as integer
10 declare b as integer
11
12 set a = 0
13
14 if a = 0 then
15     set b = 1
16 end if
17
18 call myFunction
19
20 output a
21 output b
22 output c
23 output d
24
25 End MainProg
```

2(b) Explain why this algorithm does not work as intended. [4]

[illegible]

- 3. Apart from buses, describe the function of THREE main components in a contemporary Von Neumann type CPU architecture. [6]**

[illegible]



FILE A



FILE B

- 4. FILES A and B are stored on an external hard disk drive (HDD).**
- (a) Describe the functional characteristics of a HDD.**

[5]

[illegible]

4(b) (i) Explain why there would be a difference in disk access speeds when loading FILE A and FILE B into main memory. [3]

[illegible]

- 4(b) (ii) An alternative secondary storage medium which does not have the same issue as question (b)(i) is a Solid State Drive (SSD). Explain why this is the case. [2]**

5. Give the simplest Boolean expression for each truth table.

(a)

INPUT		OUTPUT
A	B	C
0	0	0
1	0	1
0	1	0
1	1	0

[1]

5(b)

[1]

INPUT		OUTPUT
P	Q	R
0	0	1
1	0	0
0	1	0
1	1	0

5(c)

[1]

INPUT		OUTPUT
X	Y	Z
0	0	1
1	0	0
0	1	0
1	1	1

6. Parameters can be passed to procedures by reference.

(a) Explain what is meant by the term parameter and how passing parameters by reference works. [2]

[illegible]

6(b) Describe another method for passing parameters to a procedure. [2]

6(c) Give ONE disadvantage of passing parameters by reference. [1]

- 7(a) Draw a clearly labelled diagram that shows how a transaction file and master file are used during an update. [4]**

7(b) Describe the data used and the organisation of transaction files and a master file for an application of your choice. [4]

[illegible]

7(c) Describe the most suitable mode of operation for your chosen application. [3]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

8. Clearly showing each step, simplify the following Boolean expression using Boolean algebra and identities: [6]

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

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

9. Describe methods used in file security to prevent accidental data loss from computer systems. [6]

[illegible]

10. Two different types of search algorithm are binary search and linear search.
- (a) Opposite is a binary search algorithm.

By crossing out or shading the discarded elements in the diagram overleaf, show how the algorithm will reduce the part of the array being searched at each repetition. [3]

```
1  declare myArray[0 to 10]
2  declare start is integer
3  declare end is integer
4  declare found is Boolean
5  declare mid is integer
6
7  set start = 0
8  set end = 10
9  set found = FALSE
10
11 input searchValue
12
13 repeat
14     set mid = (start + end) DIV 2
15     if searchValue = myArray[mid] then
16         set found = TRUE
17         Output "searchValue found at
position", mid
18     end if
19
20     if searchValue > myArray[mid] then
21         set start = mid + 1
22     end if
23
24     if searchValue < myArray[mid] then
25         set end = mid - 1
26     end if
27
28 until (found = TRUE) OR (end < start)
```

searchValue = 22

	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Original Data	12	22	27	31	38	54	63	71	73	87	92
Repetition 1	12	22	27	31	38	54	63	71	73	87	92
Repetition 2	12	22	27	31	38	54	63	71	73	87	92
Repetition 3	12	22	27	31	38	54	63	71	73	87	92

myArray

10(b) Write a linear search algorithm, using pseudo-code, for the following array.

(1)	(2)	(3)	(4)	(5)
45	12	98	54	56

`myArray`

Your algorithm should output the position of the searchValue if it is found or a suitable message if the searchValue is not found.

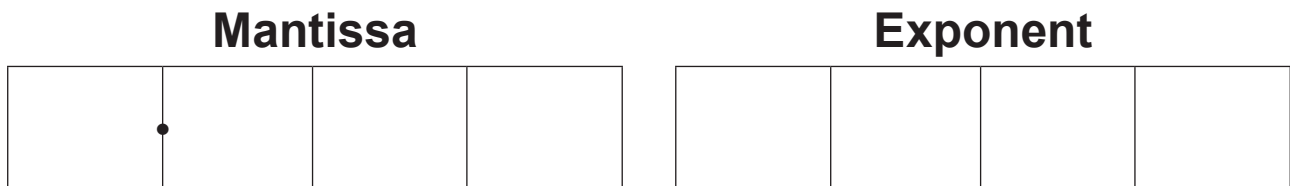
Your algorithm should be written using self-documenting identifiers. [8]

10(c) Describe an appropriate circumstance for the use of each search type. [2]

11(a) Convert $6C_{16}$ and AF_{16} into binary and add them together using binary addition. [3]

[illegible]

- 11(b) In a certain computer system, real numbers are stored in **NORMALISED** floating-point form using a positive 4 bit mantissa and a positive 4 bit exponent.



Calculate the denary range of positive real numbers that can be stored in this normalised floating-point form.

SHOW ALL YOUR WORKINGS. [6]

11(c) Give the advantages of representing numbers in integer form and in floating-point form. [4]

[illegible]

12. Describe the different methods of investigation used by a systems analyst. [6]

[illegible]

13. Discuss the advantages of using database systems and their associated features to store data. [11]

[illegible]

END OF PAPER

FOR CONTINUATION ONLY.

[illegible]

FOR CONTINUATION ONLY.

[illegible]

FOR CONTINUATION ONLY.

[illegible]

FOR CONTINUATION ONLY.

[illegible]