Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A Level

2500U10-1 – **NEW AS**

S16-2500U10-1

COMPUTER SCIENCE – Unit 1
Fundamentals of Computer Science

A.M. MONDAY, 6 June 2016

2 hours

For Examiner's use only		
	Maximum Mark	**Mark Awarded**
Total	**100**	

2500U101
01

ADDITIONAL MATERIALS

The use of a calculator is permitted in this examination.

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 page 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.

Examiner only

Answer **all** *questions.*

1. The following algorithm checks if the numbers entered are even or odd numbers.

```
1  Start Procedure EvenOdd
2  numberstocheck is integer
3  num is integer
4
5  input numberstocheck
6
7  for i = 1 To numberstocheck
8     input num
9
10    if num MOD 2 = 0 Then
11          output num & " is an even number"
12    else
13          output num & " is an odd number"
14    end if
15 next i
16
17 End Procedure
```

(a) Explain the role of MOD in the algorithm above. [3]

.....

.....

.....

(b) Using an example from the algorithm, describe the purpose of selection. [2]

.....

.....

.....

(c) Using an example from the algorithm, describe the purpose of repetition. [2]

.....

.....

.....

Examiner only

2. Complete the following truth table: [4]

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

Examiner only

3. Describe the function of the main components of the Von Neumann CPU architecture. [8]

Examiner only

4. Describe **six** Integrated Development Environment (IDE) tools used in the development and debugging of programs. [6]

Examiner only

5. *(a)* Data can be transmitted using different methods. Describe simplex, half-duplex and full duplex transmission methods. [3]

(b) Describe what is meant by a data collision on a bus network and how such collisions should be dealt with. [2]

Examiner only

6. *(a)* State the meaning of the following terms:

(i) Byte. [1]

.....

.....

.....

(ii) Word. [1]

.....

.....

.....

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

You must show **all** of your working. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

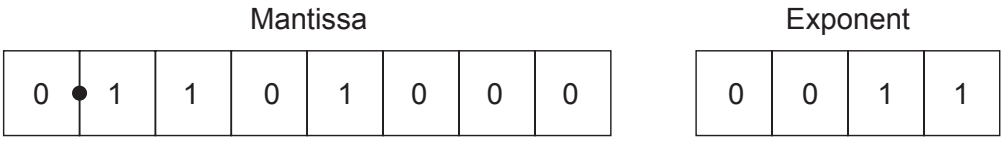
2500U101
07

Examiner only

(c) Using an example, describe two's complementation in an 8 bit register. [2]

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

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



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

Examiner only

(e) Using the number 26.8_{10} as an example, describe truncation and rounding, and their effect upon accuracy. [6]

Examiner only

7. Describe direct (random) access files in terms of hashing algorithms, overflow areas and the need for files to be re-organised on occasions. [6]

Examiner only

8. Write a binary search algorithm, using pseudo-code, for the following array.

myArray

23	34	39	42	47	56	61
(0)	(1)	(2)	(3)	(4)	(5)	(6)

Your algorithm should output the position of the `SearchValue` if it is found or a suitable message if the `SearchValue` is not present in the array.

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

Examiner only

9. Giving an example, describe standard modules and their benefits. [4]

Examiner only

10. Clearly showing each step, simplify the following Boolean expression: [5]

$$A.(A + C) + C.(A + B)$$

Examiner only

11. A university consists of a number of departments. Each department offers several courses. A number of modules make up each course. Students enrol on a particular course and take modules for that course.

Draw an entity relationship diagram to represent this situation. [4]

BLANK PAGE

Examiner only

12. *(a)* Compare **two** methods of changeover that a systems analyst may suggest to an organisation. [10]

Examiner only

(b) A systems analyst produces maintenance documentation.
Describe the typical contents of this documentation. [6]

Examiner only

13. A large organisation wishes to back up the data stored on its network on a daily basis.

Explain a suitable back up procedure that the organisation could use and compare **three** different types of secondary storage devices on which the data can be stored.

You should draw on your knowledge, skills and understanding from a number of areas across your Computer Science course when answering this question. [10]

Examiner only

END OF PAPER

Examiner only

For continuation only.