GCSE
4341/01
COMPUTER SCIENCE
UNIT 1: Understanding Computer Science

WEDNESDAY, 7 JUNE 2017 – MORNING
1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES
Use black ink or black ball-point pen. Do not use pencil or gel pen. Do not use 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 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.
Quality of written communication (QWC) will be assessed in question 15. The total marks available for this unit is 90.
1. **Tick (✓) the correct boxes below to indicate whether each of the following types of memory is volatile or non-volatile. Give an example of typical data that might be stored in each type of memory. The example data must be different in each case.**

Random Access Memory (RAM)

Tick the correct box  
Volatile [ ]  
Non-volatile [ ]

Typical data

Read Only Memory (ROM)

Tick the correct box  
Volatile [ ]  
Non-volatile [ ]

Typical data

Flash memory

Tick the correct box  
Volatile [ ]  
Non-volatile [ ]

Typical data

Cache or CPU memory

Tick the correct box  
Volatile [ ]  
Non-volatile [ ]

Typical data
2. For the tasks listed below, write down the most suitable type of application software package. [4]

<table>
<thead>
<tr>
<th>Task</th>
<th>Application software package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating a formal letter</td>
<td></td>
</tr>
<tr>
<td>Calculating the monthly expenditure for a small business</td>
<td></td>
</tr>
<tr>
<td>Creating a company logo</td>
<td></td>
</tr>
<tr>
<td>Explaining the rules of a game to a large audience</td>
<td></td>
</tr>
</tbody>
</table>
3. Jane buys a personal computer with two secondary storage devices, a magnetic hard disc and a solid state drive.

Jane has to decide which device she uses to store:

- the operating system
- backups of pictures and videos

Giving a reason in each case, state which device would be the most suitable for storing each of the above.

[4]

Device to store the operating system

Reason

Device to store backups of pictures and videos

Reason
4. (a) Draw a diagram of a star topology and a bus topology network. Clearly label all components of the networks.

Star topology diagram

Bus topology diagram
(b) Give three advantages of a star topology network compared with a bus topology network. [3]

Advantage 1 .................................................................................................................................................................

Advantage 2 .................................................................................................................................................................

Advantage 3 .................................................................................................................................................................

(c) Give one advantage of a bus topology network compared with a star topology network. [1]
5. A company stores data about its customers. Company employees have access to this data.

(a) The Data Protection Act applies to the data, state which principle of the Act would be broken by the company in the following situations: [2]

   - The data being seen by people not working for the company

   - Giving one reason for collecting data, but using it for something else

(b) When an employee logs on to the network they are asked to read and accept the company’s Code of Conduct which lists the rules employees have to follow.

   Give two reasons the company would insist that employees agree to follow these rules. [2]

   - Reason 1
   - Reason 2
6. (a) Files on hard disc drives can become fragmented.

(i) Describe the difference between a file that has become fragmented and a file that has not become fragmented. [2]

(ii) Explain what happens to a fragmented file during the defragmentation process. [2]

(iii) Describe a difference the user might experience when accessing a fragmented file from a disc drive compared with accessing a file that is not fragmented. [1]

(b) Virus checker software detects viruses. Give two other typical functions carried out by virus checker software. [2]

Typical function 1 ..................................................................................................................................................................

Typical function 2 ..................................................................................................................................................................

(c) Give two typical functions carried out by system restore (roll back). [2]

Typical function 1 ..................................................................................................................................................................

Typical function 2 ..................................................................................................................................................................
7. (a) State the function of an Internet Protocol (IP) address. [1]

(b) Describe the role of a Domain Name System (DNS) server. [1]

(c) Explain how DNS servers are used to answer a request made by a web browser to display a web page. [3]

8. (a) State why compilers are required. [1]

(b) Describe the main difference between the way in which a compiler and an interpreter operate. [2]
9. (a) Convert the denary number $156_{10}$ to an 8 bit binary number. 

Show your workings here

Write your answer here

(b) Write down the maximum and minimum denary number that can be represented using 8 bits.

(c) Convert the 8 bit binary number $00101100_2$ to denary.

Show your workings here
10. (a) Complete the following truth table. [4]

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>A AND B</th>
<th>A OR (A AND B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

(b) Below is a conditional statement from an algorithm. [3]

IF (X > 5) AND (Y < 7) THEN
   OUTPUT true
ELSE
   OUTPUT false
ENDIF

Write down the output for the following values of X and Y.

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
11. A MAC address consists of 48 binary digits.

(a) State the role of the MAC address. [1]

(b) State two reasons why network technicians often use hexadecimal (Hex) notation when they write down a MAC address. [2]

Reason 1 ....................................................................................................................................................................................... 

Reason 2 ....................................................................................................................................................................................... 

(c) The following 48 bit binary MAC address has to be converted to Hex. Some of the conversion has been done, complete the conversion. [2]

<table>
<thead>
<tr>
<th>MAC address</th>
<th>0011</th>
<th>1001</th>
<th>1010</th>
<th>1101</th>
<th>0000</th>
<th>1111</th>
<th>1110</th>
<th>0111</th>
<th>1100</th>
<th>0001</th>
<th>0111</th>
<th>0101</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex</td>
<td>3</td>
<td>9</td>
<td>A</td>
<td>D</td>
<td>0</td>
<td>F</td>
<td>7</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. One physical resource managed by the operating system is the hard disc drive.

State **three** other physical resources of a personal computer that the operating system manages and describe **one** role of the operating system when managing each resource. [6]

<table>
<thead>
<tr>
<th>Resource 1</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource 2</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource 3</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. Below is an algorithm.

Algorithm FindTotal

HighNum is integer \{input by user\}
Total is integer
i is integer

startmainprog

input HighNum
set Total = 0
if HighNum < 1 then
    output “Number not valid”
else
    for i = 1 to HighNum
        set Total = Total + i
        output Total
    endfor
endif
endmainprog

Write down all the outputs in the correct order produced by the algorithm for the input below: \[5\]

Input is 0

Input is 4
14. Below is the declaration section from an algorithm that uses variables of different data types.

Algorithm FindMean
- Num is integer \{number input by user\}
- Total is integer \{stores the total of the numbers input\}
- Count is ??? \{stores the count of the numbers input\}
- Mean is ??? \{stores the mean of the numbers input\}

(a) Write down the most suitable data type for the variable Count. [1]

(b) Write down the most suitable data type for the variable Mean. [1]
15. There are many different types of errors that can occur when developing computer programs. Identify three types of error, and for each describe:

- a situation where the error might occur.
- how the error is detected.
- strategies that would reduce the chance of this error. \[12 \text{ QWC}\]

Quality of written communication will be assessed in this question.