FORM 3          COMPUTING          TIME: 1h 30min

Name: ________________________________                Class: ________________

Directions to Candidates:

Answer ALL questions in Section A and Section B on this paper;
The use of flow chart template is permitted;
Calculators are NOT allowed;
Good English and orderly presentation are important.

For office use only:

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>Paper Total</th>
<th>Course Work</th>
<th>Final Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>85%</td>
<td>15%</td>
<td>100%</td>
</tr>
<tr>
<td>Mark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section A – Answer ALL Questions

1. Give the term for each of the following statements:
   
   a. A very small 2-state hardware item that can either output a 1 or a 0.  
      [1]  
   b. A pointing device found on portable computers (e.g. laptops and notebooks).  
      [1]  
   c. A temporary storage area that acts as a waiting area for data that is being transferred to a slow device.  
      [1]  
   d. A magnetic storage device that is the main form of backing (secondary) store in most computer systems.  
      [1]  
   e. A vector output device useful in producing large graphical images such as maps.  
      [1]  

2. There are seven basic functions of a computer system. One such function is the processing of data.
   
   a. Four other basic functions of computer systems are:
      
      output, retrieve, save, input  

      Label the diagram below with these four functions by writing one function on the appropriate dotted line.
      
      ![Diagram]
      
      [1]  

   b. List the other two basic functions of a computer system (besides the five mentioned above).
      
      i.  
      ii.  
     [2]  

   c. Give one advantage of computerizing a manual stock control system in a shop.
      
      ____________________________________________  
     [1]
3. A local supermarket is automating its bill production system.
   a. Suggest an **input device** for quickly entering the product’s details. [1]

   b. Write down two **advantages for the customer** in using the device you mentioned in part ‘a’ above.
      i.  
      ii. 

   c. Suggest a possible **limitation** of the device mentioned in part ‘a’ above. [1]

   d. The supermarket is issuing loyalty cards to its customers. Interested customers have to complete a form with their details and then return it to the cashier. Mention a document reader that could be used by the supermarket to **directly digitize** the data in these forms. [1]

4. Give one **typical use** for each of the following devices. *The first one has been done as an example.*
   a. Graphics tablet  
      **Inputting architectural plans.** [1]
   b. LCD projector  
   c. Laser printer  
   d. Digital camera  
   e. Braille printer  
   f. Eye sensor reader  

5. This question is about the **quality** of an image on the screen or printer output.
   a. What do you understand by the **resolution** of the screen/printer and what **term/unit** is used to measure it?
      Resolution:  
      Term/Unit:  [1]

   b. An image has a resolution of 160 by 80 and 8-bit colour representation.
      i. How many **pixels** make up this image on a screen?  [1]

      ii. What do you understand by the term ‘**8-bit colour representation**’?  

      iii. How many **bytes** are needed to store this image?  [1]
6. Logic gates have a major role to play inside a computer system.
   a. Mention one use of logic gates in a computer system.

   Study the following logic circuit and then complete its truth table below.

   ![Logic Circuit Diagram]

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Utility software may either come as pre-packed (bundled) with an Operating System or bought separately off-the-shelf.
   a. What is utility software?

   Mention the utility software that is used for:
   i. Detecting, locating and removing viruses.
   ii. Removing all existing information on a disk and preparing it for re-use.
   iii. Improving disk access speed by arranging parts of the same files near each other.

8. Decimal, binary and hexadecimal are three number systems studied during Computing lessons.
   a. What is the base of the hexadecimal number system?

   Which of the three number systems mentioned above, is the one that is actually used by the hardware of a computer system?
c. Complete the following table to show the numbers given in decimal, hexadecimal or binary as indicated. Clearly show your working.

<table>
<thead>
<tr>
<th>Binary</th>
<th>Decimal</th>
<th>Hexadecimal</th>
<th>Binary</th>
</tr>
</thead>
<tbody>
<tr>
<td>11010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decimal</td>
<td>Hexadecimal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexadecimal</td>
<td>Binary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Answer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. a. The following is a screenshot from a Spreadsheet application.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>![](Family Budget Yearly Summary.png)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Income</td>
<td>Expenditure</td>
<td>Money Saved</td>
<td>Percentage Saved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>January</td>
<td>€ 1,280.50</td>
<td>€ 932.40</td>
<td>€ 348.10</td>
<td>27.18%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>February</td>
<td>€ 1,080.50</td>
<td>€ 954.40</td>
<td>€ 126.10</td>
<td>11.67%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>March</td>
<td>€ 980.50</td>
<td>€ 939.70</td>
<td>€ 50.80</td>
<td>5.13%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>April</td>
<td>€ 950.50</td>
<td>€ 932.40</td>
<td>€ 18.10</td>
<td>1.90%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>May</td>
<td>€ 1,180.50</td>
<td>€ 875.30</td>
<td>€ 305.20</td>
<td>25.65%</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>June</td>
<td>€ 980.50</td>
<td>€ 784.30</td>
<td>€ 196.20</td>
<td>20.01%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>July</td>
<td>€ 1,250.50</td>
<td>€ 1,235.50</td>
<td>€ 15.00</td>
<td>1.20%</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>August</td>
<td>€ 1,000.50</td>
<td>€ 932.40</td>
<td>€ 68.10</td>
<td>6.81%</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>September</td>
<td>€ 999.50</td>
<td>€ 886.90</td>
<td>€ 132.60</td>
<td>13.27%</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>October</td>
<td>€ 1,340.50</td>
<td>€ 932.40</td>
<td>€ 408.10</td>
<td>30.44%</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>November</td>
<td>€ 1,980.50</td>
<td>€ 894.30</td>
<td>€ 1,086.20</td>
<td>54.84%</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>December</td>
<td>€ 1,780.50</td>
<td>€ 999.20</td>
<td>€ 781.30</td>
<td>43.88%</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Total</td>
<td>€ 14,815.00</td>
<td>€ 11,279.20</td>
<td>€ 3,535.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Average</td>
<td>€ 1,234.58</td>
<td>€ 939.93</td>
<td>€ 294.65</td>
<td>20.18%</td>
<td></td>
</tr>
</tbody>
</table>

i. Write the formula that was typed in the following two cells. *Full marks are awarded if you use the correct built-in function in your formula.*

Cell C19:  
Cell E18:  

[2]
ii. Suggest an **advantage** of representing the numeric data in the spreadsheet in a graph/chart.

b. Mention and briefly explain the **word processing feature** that allows the user to use spreadsheet data to create a personalized invitation for 200 people.

10. Complete the following **flowchart**. The algorithm of the flowchart is to accept the total rainfall in mm every day for a month and then output the average rainfall for that month. *(Remember that not all months have the same number of days, so you should:)*

   i. use a counter to count the number of days in the month;
   ii. allow the user to exit the entry of rainfall by inputting ‘999’.

```
start

counter = 0
total = 0

```
11. The Internet has various applications in the business world.
   a. Mention one advantage of using e-mail for business communication. [1]
   b. Suggest two other uses (except email) of the Internet in the business world.
      i. [1]
      ii. [1]
   c. How is the World Wide Web (WWW) different from the Internet? [2]

Section B – Answer BOTH Questions

12. The picture on the right shows an assembled mini-golfer using the Lego Mindstorms Kit.

   The mini-golfer moves towards a ball and then uses a motor to swing its golfing arm to hit a red ball. It does not hit the ball if the ball is blue.

   The following picture shows the blocks that make up the program to activate the mini-golfer. Study the picture and then answer the questions set on it.

   a. Identify the following three blocks in the picture above by writing the type of block in the empty boxes given above.
      i. A move block
      ii. A sound block
      iii. A block that waits for a sensor input

      [3]
b. The program on the previous page makes use of two sensors. Write the name of these sensors and briefly mention their function.

<table>
<thead>
<tr>
<th>Name of Sensor</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[2]

[2]

c. The mini-golfer makes use of a motor to swing the golfing arm to kick the ball. To which port was this motor attached?

[1]

d. The program makes use of the three programming constructs.

i. The three constructs are described in the table below. The ‘Sequence’ construct has been given. Identify the two other constructs from their description.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequence</td>
<td>This section of program makes the mini-golfer search for a ball.</td>
</tr>
<tr>
<td></td>
<td>This part of the program detects whether the ball is red or blue.</td>
</tr>
<tr>
<td></td>
<td>This section of program makes the device carry out the instructions again and again.</td>
</tr>
</tbody>
</table>

[1]

[1]

ii. The picture on the previous page has two items labeled ‘X’ and ‘Y’. Write the name of the construct that is being represented by the two items.

Item X: ____________________________  [1]

Item Y: ____________________________  [1]

e. Before the program was set up, a flowchart was drawn to plan the task of the mini golfer.

Fill in the three flowchart symbols on the following page so that the flowchart represents the section of the program that is duplicated below.

*(Take the cut off point for the light intensity to be 50)*
13. A typical computer system has both Main Memory and Backing (Secondary) Storage. RAM and ROM make up the Main Memory.

a. Why is Main Memory an essential part of a computer system?

b. What do the acronyms RAM and ROM stand for?

   **RAM:**

   **ROM:**

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]

   [1]
d. Draw **arrows** to match the following storage media with their typical capacities.

<table>
<thead>
<tr>
<th>Storage media</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD-ROM</td>
<td>5 GB</td>
</tr>
<tr>
<td>Hard Disk</td>
<td>650 MB</td>
</tr>
<tr>
<td>Pen Drive</td>
<td>500 GB</td>
</tr>
<tr>
<td>DVD-ROM</td>
<td>32 GB</td>
</tr>
</tbody>
</table>

Data on a backing storage medium can be accessed either serially or directly.

e. What is **direct access**?

f. Give one **application** where direct access would be ideal.

  [1]

  [2]

g. Give one **application** where serial access would be ideal.

h. Mention one **storage medium** that is only capable of serial access.

i. Suggest one **disadvantage** of serial access.