# HALF-YEARLY EXAMINATION 2016

**FORM 4**  
**COMPUTER STUDIES**  
**TIME: 1h 30min**

<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>14</th>
<th>Global Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Mark</td>
<td>8</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>10</td>
<td>6</td>
<td>15</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>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

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**Instructions:**

- Answer all the questions on this paper.
- Calculators are NOT allowed.
- Good English and orderly presentation are important.

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**Name:** ____________________________  
**Class:** ___________
SECTION A

1. Below is a partly drawn logic circuit and its incomplete truth table.

![Logic Circuit Diagram]

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

a) Examine the logic circuit and the truth table to find out what type of gates are represented by the circles. Write down OR, AND or NOT in each circle.

b) Complete the truth table so that it matches the logic circuit.

c) Write the Boolean expression of the circuit. ________________________________

[8 marks]

2. Produce a Boolean expression and draw the logic circuit for the following truth table.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Boolean expression: ________________________________

[4 marks]
3. a) **Complete** each row of the table to show the same number in **binary, hexadecimal** and **decimal**:

<table>
<thead>
<tr>
<th>Binary</th>
<th>Hexadecimal</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 0 1 0 0 1 0 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 B</td>
<td>50</td>
</tr>
</tbody>
</table>

b) Can the hexadecimal number **A1** be stored in a **four-bit register**? (Hint: convert the number into binary) Yes [ ] No [ ]

4. **CAD** is replacing the drawing board and designs are therefore produced more quickly.

a) What does CAD **stand for**?

b) CAD is normally used in conjunction with CAM. **Define** CAM.

c) How are CAD and CAM **related**?

d) Answer with either **True** or **False**.

*CAL can help the student learn on his own using the computer.* ________

[6, 1 marks] [4 marks]
5. a) A computer uses 8-bit unsigned numbers. In the space below fill in the largest positive binary number that can be represented in this computer.

b) Given two binary numbers \( X = 1000 \) and \( Y = 0111 \), find \( Z \) if \( Z = X + Y \).

c) Show that your answer \( Z \) is correct by changing the number \( X \) and \( Y \) to decimal and performing the addition.

d) A computer has a character set consisting of capital letters A to Z (26 characters) and the digits 0 to 9 (10 characters). What is the minimum number of bits required to represent a character on this computer?

[4 marks]

6. Draw the Circuit and the Truth Table for this Boolean Expression. (A and B) or Not C

[6 marks]
7. This question is about **Computer applications**. Choose 7 of the following phrases.
   Every phrase can be used only ONCE.

<table>
<thead>
<tr>
<th>Simulation</th>
<th>Computer Aided Learning</th>
<th>Air Traffic Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Commerce</td>
<td>Computer Aided Manufacturing</td>
<td>Stock Control</td>
</tr>
<tr>
<td>Point Of Sale</td>
<td>Office Automation</td>
<td>Auto Pilot</td>
</tr>
<tr>
<td></td>
<td>Computer Process Control</td>
<td></td>
</tr>
</tbody>
</table>

   a) ____________________________________ is the idea of doing business electronically over the Internet.

   b) An ________________________________ is a system used to control the route of a vehicle without requiring constant human intervention.

   c) The combination of software and hardware that models real life without actually being real is referred to as ________________.

   d) A ________________________________ is the place where the customer pays for the goods s/he bought.

   e) A ________________________________ system keeps an up-to-date record of all the items held and places orders for fresh deliveries if any item runs low. (ex: in supermarkets).

   f) In ________________________________, secretaries and receptionists use computers for correspondence, newsletters, reports and other tasks.

   g) Using ____________________________ airplanes are safely routed into and out of major airports, along established airways to airport traffic control centres.

   [7 marks]

8. Time in computers can be measured in **Milli seconds**, **Micro seconds** and **Nano seconds**. Explain each one of these.
   a) Nano second - ____________________________________________________________

   b) Milli second - ____________________________________________________________

   c) Micro second - ____________________________________________________________

   [3 marks]
9. This question is about an **8-bit Two's complement register**.
   a) Represent **80** in this register.

   ![Blank space for answer]

   b) Represent **-60** in this register.

   ![Blank space for answer]

   c) Perform **80-60** using 2’s complement subtraction.

   ![Blank space for answer]

   d) What is the **largest positive decimal number** that this **8-bit Two's complement** register can hold?

   ![Blank space for answer]

   [4 marks]

10. Java is a widely used programming language. Fill in with either **True** or **False**.

<table>
<thead>
<tr>
<th>Statement</th>
<th>True or False</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The <strong>new</strong> keyword creates an object from a class.</td>
<td></td>
</tr>
<tr>
<td>b) The <strong>main</strong> method should be declared in every class by default.</td>
<td></td>
</tr>
<tr>
<td>c) A class name normally starts with a capital letter.</td>
<td></td>
</tr>
<tr>
<td>d) The following is a valid attribute declaration: <strong>string name;</strong></td>
<td></td>
</tr>
<tr>
<td>e) Java is a case sensitive programming language.</td>
<td></td>
</tr>
<tr>
<td>f) The <strong>println</strong> command moves the cursor to the next line.</td>
<td></td>
</tr>
<tr>
<td>g) A comment can start with /*</td>
<td></td>
</tr>
</tbody>
</table>

[7 marks]
11. Application Software can be bought either be Off-the Shelf or Tailor-Made.
   a) Differentiate between Off-the-shelf and Tailor-Made software?
      ________________________________________________________________
      ________________________________________________________________

   b) Give another name for Tailor-Made software. __________________________

   c) Give three advantages of Off-the-shelf software.
      i. ________________________________________________________________
      ii. ________________________________________________________________
      iii. ________________________________________________________________

   d) Give two advantages of Tailor-Made software.
      i. ________________________________________________________________
      ii. ________________________________________________________________

   e) Different software can be customised in different ways. Name a customization
      that is offered by some software.
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________

   [10 marks]

12. When a program is loaded into memory and run, the fetch execute cycle comes into
    play. Explain the steps involved.
    ________________________________________________________________
    ________________________________________________________________
    ________________________________________________________________
    ________________________________________________________________
    ________________________________________________________________
    ________________________________________________________________
    ________________________________________________________________
    ________________________________________________________________

   [6 marks]
SECTION B

   a) What is the word length for this computer? ________________________ [1 mark]
   b) What is the size of the addressable memory for this computer? __________ [1 mark]
   c) How many memory cycles does the CPU need to fetch a four-byte instruction using this computer? _________________ [2 marks]
   d) Why is a 16-bit 60MHz CPU generally faster than an 8-bit 12MHz CPU?
      ____________________________________________________________________
      ____________________________________________________________________ [2 marks]
   e) Four registers normally found in a computer are the Shift Register, Program Counter, Accumulator and the Instruction Register. For each of these registers indicate the Unit in which it is found and its purpose.
      Shift Register          Unit: ________________________________
      Purpose: ____________________________________________________________
      ____________________________________________________________________
      Program Counter        Unit: ________________________________
      Purpose: ____________________________________________________________
      ____________________________________________________________________
      Accumulator            Unit: ________________________________
      Purpose: ____________________________________________________________
      ____________________________________________________________________
      Instruction Register   Unit: ________________________________
      Purpose: ____________________________________________________________
      ____________________________________________________________________ [8 marks]
f) Describe the functions of the three buses when reading from and writing to memory.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

[3 marks]

14. The following is an incomplete Java Class. Read the Class carefully and then answer the questions that follow.

```java
public class Rectangle {
    double length;
    double width;

    public void inputDetails(){
        /** when completed this method will ask the user
         * to enter the length and width of this rectangle.
         */
    }

    public void outputDetails(){
        /** when completed this method will output
         * the length and width of this rectangle.
         */
    }

    public void outputArea(){
        /** when completed this method will work out the area
         * and output the answer on the screen.
         */
    }
}
```

a) Write down:

i. The **Name** of this Class: ____________________________

ii. A **property** used in this Class: ____________________________

iii. A **method** used in this Class: ____________________________

iv. A **data type** used in this Class: ____________________________

v. A Java keyword used in this Class: ____________________________

[5 marks]
b) Each rectangle will have a **new property** called ‘name’ containing the name of the rectangle (ex: ‘Yellow Rectangle’). How would you declare the property ‘name’?  

[1 mark]

c) Complete the method `outputArea()` (as used in the above Class):

*Lines provided do NOT indicate the amount of code to be written*

```java
public void outputArea() {
    ____________________________________________________
    ____________________________________________________
    ____________________________________________________
} [3 marks]
```

d) The application also includes another class called `RectangleApp`. Complete this class by filling in the blanks below.

```java
public class __________________________ {
    public static void main (String args[]) {
        __________________yellowRectangle = _________ Rectangle();
        //calls method inputDetails for yellowRectangle
        ______________________________________________;
        //calls method outputDetails for yellowRectangle
        ______________________________________________;
    }
}
```

[5 marks]

e) When we run this application, from which method will execution start?  

[1 mark]