# St Edward's College Malta

## Mid-Year Examinations February 2020

**Year 11** **Computing Paper 2** **Time: 2 hours**

| **Name and Surname** | |
|---|---|

## Instructions to Students:

1. Do not open this examination paper until instructed to do so.
2. Write your name and surname on this page.
3. Read all instructions and questions carefully.
4. Answer ALL questions in the spaces provided.
5. Diagrams must be drawn in pencil.
6. Leave the last 10 minutes for revision of paper.

**For teacher's use only** **Mr E. Attard Cassar**

| **Question** | **1** | **2** | **3** | **4** | **5** | **Total** |
|---|---|---|---|---|---|---|
| **Obtained** | | | | | | |
| **Allotted** | **20** | **20** | **20** | **20** | **20** | **100** |

1. Question about number representation and logic circuits.

   a. Convert the binary number 1101011011 to **hex**. [1]

   b. Convert the decimal numbers 75 and -24 to **two's complement**. They are to fit in one byte. [2]

   c. Perform 75-24 using the results from (b) above. [2]

   d. With regards to numbers expressed in registers, what do we mean by **overflow** and **underflow**? [2]

   e. If A=37 and B=14 the we know that AxB = 518. Suppose that both A and B are written in binary in one byte and suppose that the bits of A are **left-shifted** by one bit and the bits of B are **right-shifted** by one bit. Now what are the values of:

      i. AxB [1]

      ii. A+B [1]

   f. If X is a binary number made of 5 bits find the **minimum** and **maximum** of X if:

      i. X is **unsigned** [2]

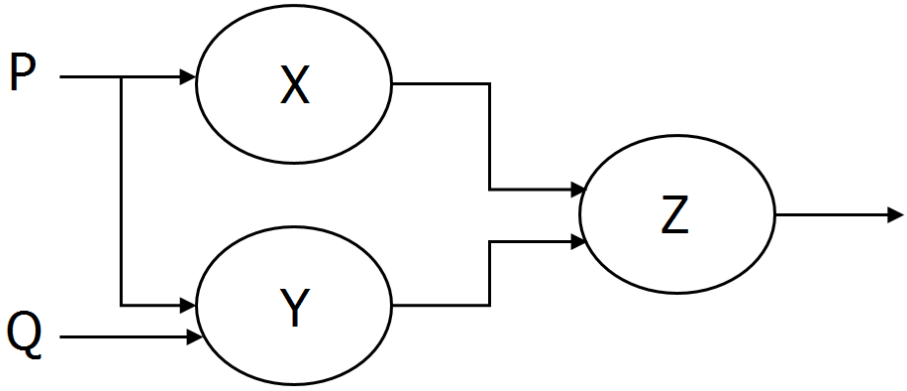
ii. X is in **two's complement**. [2]

g. If F = A.B' + B.C'

i. Draw its **logic circuit**. [2]

ii. Draw the **truth table**. [2]

h. Below is a logic circuit with inputs P and Q. X, Y and Z are logic gates of the type AND, OR and NOT.




i. What is X? [1]

ii. When P=1 and Q=0 then F=1. What are Y and Z? [2]

2.

a. Write notes on the following parts of a **CPU**.

i. Control unit [2]

ii. ALU [2]

iii. Cache [2]

b. Explain the role of the following **registers**:

i. PC [1]

ii. CIR [1]

iii. MAR [1]

iv. MDR [1]

c. The three basic characteristics that differentiate microprocessors are (i) Instruction set, (ii) Bandwidth, and (iii) Clock speed. Explain [3]

d. Consider the following assembly language program:

```
        LDA #0          ; Load zero in the accumulator
Rep:    ADD num         ; Add the number at num to accumulator
        DEC num         ; decrement 1 from num
        JNZ Rep         ; jump to Rep is last result is not zero
```

From the above code snippet, find the following:

i. A **label** [1]

ii. A **branch instruction** [1]

iii. An **opcode** [1]

iv. An **operand** [1]

e. Assume that initially the location **num** contains **4**. What is the assembly code doing? [3]

3.

a. A **relational database** on stamps is made up of three tables.

STAMPS (IdStamp, Description, Date, Value, *IdCountry*, *IdArtist*)

COUNTRIES (IdCountry, Name, Population)

ARTISTS (IdArtist, Name, DOB, *IdCountry*)

i. In databases there are three kinds of **relationships** which are one-to-one, one-to-many and many-to-many. Explain and give examples. [3]

ii. What is the **relationship** between STAMPS and COUNTRIES? [1]

iii. Write down all the **primary keys** in this database. [1]

iv. Write down the **foreign fields** in table STAMPS. [1]

v. If we were to include a table called CAPITALCITIES what would be the **relationship** between this table and COUNTRIES? Give a reason for your answer. [2]

b. In a database what is the role of the **DBMS**? [3]

c. The **system development life cycle** goes through a number of stages.

i. Explain briefly what is involved in the **analysis stage**. [3]

ii. Name and explain two kinds of **tests** made on code to check whether it works or not. [4]

iii. One kind of system maintenance is called **perfective maintenance**. Mention another **two**. [2]

4. Consider the following Java program.

```
1   public class Example
2   {
3      public static void main (String[] args)
4      {
5         double res = average (4.3, 1.5, 3);
6         System.out.println (res);
7      }
8
9      public static double average (double num1, double num2, double
10  num3)
11     {
12        double ave = (num1 + num2 + num3)/3.0;
13        return ave;
14     }
15  }
```

a. Which line shows a **method call**?_____[1]

b. Which lines show a **method definition**?_____[1]

c. From the above program copy a **method signature**. [1]

d. Write a method called **areEqual** that outputs true if its two parameters are equal and false otherwise. [4]

e. Consider the following method and anwer the questions below.

```
public static void t ()
   {
      final int ELMTS = 10;
      double[] nums = new double [ELMTS];
```

```
        double t=0;
        for (int i=0; i<ELMTS; i++)
        {
           System.out.print ("Input a number: ");
           nums[i] = Keyboard.readDouble();
           t=t+nums[i];
        }

        System.out.println (t);
  }
```

i. What is the method t performing? [3]

ii. Draw of **flowchart** of method t. [4]

iii. Write a **while-loop** instead of the for-loop above. [4]

f. Explain the process of **translating** and **executing** a Java program. [2]

5.

a. What do we mean by **data integrity**? [1]

b. What is **file generation** (grandparent, parent and child files)? [2]

c. What is the **Data Protection Act** about? [3]

d. What do we mean by **2.1 GHz**? [1]

e. The operating system manages the resources of the computer. Name **two** such **resources**. [2]

f. The larger the RAM of a computer the fastest is the computer. Explain. [2]

g. Another factor that adds to the speed of the computer is the **cache**. Explain. [2]

h. What do we mean by **resolution** of a screen? [1]

i. Explain the role of the **data bus**, **address bus** and **control bus**. [3]

j. The **width** of an **address bus** in a particular computer is 16 bits. How many addresses does RAM have? [1]

k. What do we mean by **3GL** and **4GL** languages? [2]