

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

MAY 2015 SESSION

SUBJECT: **Computing**
 PAPER NUMBER: I
 DATE: 28th April 2015
 TIME: 9:00 a.m. to 11:00 a.m.

Directions to Candidates

Write your index number where indicated at the top of the page.

*Answer **ALL** questions in the spaces provided. You are not allowed to use extra sheets other than those provided in this booklet.*

Good English and orderly presentation are important.

*The use of flowchart templates is permitted. The use of calculators is **NOT** permitted.*

This paper carries 85 marks of the examination.

Question Number	1	2	3	4	5	6	7	8	9	10	11	FOR MARKERS' USE
For Markers' use only	Total number of Marks or Grade obtained by candidate											
MARKS												

1. Consider the truth table below.
(a) Fill in the missing gates and values.

			X	Y	
A	B	C	NOT ?	A ? B	X OR Y
0	0	0	1	0	
0	0	1	0	0	
0	1	0	1	0	
0	1	1	0	0	
1	0	0	1	0	
1	0	1	0	0	
1	1	0	1	1	
1	1	1	0	1	

X = _____
Y = _____

[4 marks]

- (b) Draw the logic circuit according to the truth table above.

[3 marks]

- (c) What is the range of non- negative decimal numbers which can be represented using a 6-bit register?

[2 marks]

(d) Consider the binary number 10010010.

i. What is the effect of a right shift on this number? Justify your answer using the number given.

[3 marks]

ii. What type of error is generated when a left shift is performed on the number given above? Give reasons for your answer.

[3 marks]

2. Underline the correct answer from the ones specified.

(a) A person who uses his expertise to gain access to other people's computers to get information illegally or cause damage is a:

- i. Programmer
- ii. Analyst
- iii. Spammer
- iv. Hacker

(b) The process of transferring files from the internet to your computer is called:

- i. Uploading
- ii. Forwarding
- iii. FTP
- iv. Downloading

(c) What are the four items needed to connect to the internet:

- i. Monitor, keyboard, mouse, modem
- ii. Telephone line, PDA, modem, computer
- iii. Telephone line, modem, computer, ISP
- iv. Modem, computer, PDA, ISP

- (d) A modem is used to:
 - i. Convert analogue to digital
 - ii. Convert digital to analogue
 - iii. Both of the above
 - iv. None of the above

- (e) Devices interconnected by a LAN can include:
 - i. Computers and terminals
 - ii. Mass storage devices, printers and plotters
 - iii. All of the above
 - iv. None of the above

[5 marks]

3. Consider the following Java class

```
class Numbers{  
    public static void main (String args[]){  
        int cnt = 0;  
        do {  
            System.out.println(cnt + " x 4 = " + (cnt*4));  
            cnt++;  
        } while (cnt < 5);  
    }  
}
```

- (a) From the code above identify:
 - i. A variable : _____
 - ii. An assignment statement : _____
 - iii. A loop : _____
 - iv. A condition : _____
 - v. Name of class : _____

[5 marks]

(b) What is the output of the program?

[2 marks]

(c) Rewrite the program using another loop.

[3 marks]

4. From the list of statements below, underline the ones which are **true**.

- (a) A file is a collection of related pieces of information stored together for easy reference.
- (b) Files can be generated (created) from an application.
- (c) Files are permanently stored in RAM.
- (d) Files should be organised as folders.
- (e) It is possible to add security to a file by making them password protected.

[5 marks]

5. Give one word or a term for the following:

- (a) A sequential device _____
- (b) A random access device _____
- (c) Another term used for *sequential* access _____
- (d) Another term used for *random* access _____
- (e) A magnetic storage medium _____
- (f) An optical storage medium _____
- (g) A device which manipulate graphics which are composed of pixels of various colours, which together form an image _____
- (h) Devices that manipulate graphics which are composed of paths, or lines, that are either straight or curved _____
- (i) Software which can be bought ready-made and has a low degree of customisation _____
- (j) Software written specifically to suit one's needs _____

[10 marks]

6. Consider a relational database of an online retail company (online shop), consisting of three tables – Customers, Accounts and Transactions. The database is such that a customer may have only one account under his/her name and a number of transactions may be performed on the account each day.

(a) What is the relationship between:

- i. Customer and Accounts _____
- ii. Accounts and Transactions _____?

[2 marks]

(b) Select a suitable primary key for each table.

[3 marks]

(c) Identify THREE other attributes which you would expect to find in the Customers table.

[3 marks]

7. With reference to software,

(a) Identify the TWO main software categories.

[2 marks]

(b) Under which software category does the operating system fall?

[1 mark]

(c) What does GUI stand for? Name one OS which uses a GUI.

[2 marks]

(d) Which feature of the OS is used to exchange text and graphics between applications in a particular spreadsheet, word processor and database?

[1 mark]

(e) Name one other function of the OS.

[1 mark]

8. (a) To which type of software do each of the following features belong?

- i. Wordwrap, margin, justification : _____
- ii. Saving, printing, replying and forwarding of messages : _____
- iii. Cells, labels, values, formulas : _____
- iv. Navigating among sites and searching using a popular search engine : _____

[4 marks]

(b) What does HTML stand for and what is it used for?

[2 marks]

9. Describe the term e-learning. Include any advantages and/or disadvantages in your description.

[3 marks]

10. Explain the difference between:

(a) Source and executable code;

(b) Compiler and interpreter;

(c) Assembler and assembly language.

[6 marks]

11. What do the following acronyms stand for and what is their use?

(a) POS :

(b) CAD :

(c) WWW :

(d) CAL :

(e) EFT :

[10 marks]

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SECONDARY EDUCATION CERTIFICATE LEVEL

MAY 2015 SESSION

SUBJECT:	Computing
PAPER NUMBER:	IIA
DATE:	29 th April 2015
TIME:	9:00 a.m. to 11:00 a.m.

Directions to Candidates

Write your index number where indicated at the top of the page.

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MARKS						

1. Computer systems are considered to be information processing devices. In the light of this statement answer the questions that follow.

(a) Give examples of hardware devices that are used to:

- i. Input data - _____
- ii. Process data - _____
- iii. Output data - _____
- iv. Store data - _____

[2 marks]

(b) Give examples of software packages that may be used to process data in the forms described below:

- i. Document - _____
- ii. Spreadsheet - _____
- iii. Database - _____
- iv. Clipart - _____

[2 marks]

(c) One benefit of using computer systems is that data can be shared between software packages. This is achieved by copying the data on a temporary storage space called the _____.

[1 mark]

(d) Different situations need different types of hardware and software that retrieve and store data using different access methods. Give ONE example of a device that accesses data:

- i. In series - _____
- ii. Randomly - _____

[1 mark]

(e) Processed data may need to be transferred from one computer system to another. Give ONE example of how data can be transferred within:

i. Two systems within the same building.

ii. Two systems in two different countries.

[2 marks]

(f) To facilitate the transfer of data across different systems standard character codes were devised.

i. Give an example of standard character coding system.

_____ [1 mark]

ii. Assuming an 8-bit system, work out the total number of characters that may be represented using this system.

_____ [2 marks]

iii. Assuming the code to represent the character 'a' is 01100001, show how the text string 'cab' would be shown using a 3-byte word.

_____ [2 marks]

iv. Calculate the number of bits needed to store a paragraph consisting of 375 characters using this character coding system.

_____ [2 marks]

v. Should these character codes account for spaces? Why?

_____ [2 marks]

2. Today, Java is a very commonly used programming language.

(a) Give FOUR examples of Primitive Data Types supported in the Java Programming Language.

i. _____
ii. _____
iii. _____
iv. _____

[2 marks]

(b) Assuming operator precedence what would be the answer of $x+y*z$ given that the user enters 5 as the value of x, 6 as the value of y and 8 as the value of z.

_____ [2 marks]

(c) What will the following section of code output if 16 is inputted as the value of num?

```
if(num >=10) {  
    System.out.println("Value is larger");  
} else {  
    System.out.println("Value is smaller");  
}
```

[1 mark]

(d) Study the following code.

```
class Test {  
  
    public static void main(String args[]){  
        int x = 5;  
        while( x < 10 ) {  
            System.out.print("value of x : " + x );  
            x++;  
            System.out.print("\n");  
        }  
    }  
}
```

i. Write down the output obtained by running this code.

[1 mark]

- ii. Complete the following java class that uses a switch statement to test for the contents of an integer named *store* and confirms the contents of the variable by outputting “Stored number is 10”.

```
class Test {  
    public static void main(String[] args){  
        int store = 10;  
        switch(store) {
```

```
            case 15:  
                System.out.println("Stored number is 15");  
                break;  
  
            default:  
                System.out.println("Stored number is neither 10 nor 15");  
        }  
    }  
}
```

[3 marks]

- iii. Draw the flowchart that was given to the programmer corresponding to the code listed in question (d).

[3 marks]

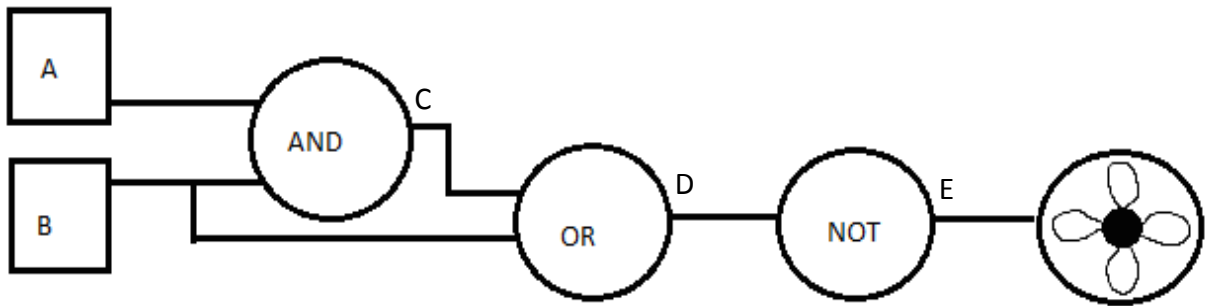
- (e) Write the code that finds the largest of **THREE** values stored as integer variables a, b and c. The final output must show the largest number.

```
class Largest {  
    public static void main (String args[]) {  
        int a = 5, b = 2, c = 4;
```

```
    }  
}
```

[3 marks]

3. An engineer was assigned the task of checking a circuit intended to power on a fan to cool down the temperature inside an engine room. Two sensors are providing the input and the circuit was designed to switch the fan on if any one of the sensors was ‘ON’.



(a) As a first step the engineer worked out the Truth Table. Fill in the results he obtained.

A	B	C	D	E

[4 marks]

(b) By observing the Truth Table the engineer noticed there was a problem with the circuit, which would result with an improper functioning of the fan. What was the problem?

[1 marks]

(c) Using appropriate symbols draw a simple circuit that would correct the problem with the fan.

[2 marks]

- (d) Prove that your circuit gives the desired output by drawing and filling in a Truth Table in the space provided.

[2 marks]

- (e) When assigned another task the engineer was given the following Boolean statement:

$$(A + B) \cdot \overline{(B \cdot C)}$$

- i. Draw the logic circuit that corresponds to the Boolean Statement.

[2 marks]

- ii. Draw the truth table that corresponds to the Boolean statement.

[2 marks]

(f) What is the largest positive number that can be represented using 8-bit Two's Complement Binary representation?

[2 marks]

(g) What is the largest negative number that can be represented using an 8-bit Two's Complement Binary representation?

[2 marks]

(h) Work out $93-86$ using 8-bit Two's Complement Binary Representation.

[2 marks]

Please turn the page.

4. Computer languages are normally classified under Language Generations.

(a) Give one example of a:

3GL;

4GL.

[2 marks]

(b) State ONE advantage of a 4GL over a 3GL.

[2 marks]

(c) State ONE disadvantage of a 4GL over a 3GL.

[2 marks]

(d) Explain the term *Software Portability*.

[1 mark]

(e) Mention TWO types or errors that can occur while programming code.

[2 marks]

(f) If someone copies software and presents it as if it were his/her own, it would be a breach of

[1 mark]

(g) If someone sells someone else's software he would be committing a crime normally referred to as Software _____.

[1 mark]

(h) List THREE examples of how to stop illegal copying and distribution of software.

- i. _____
- ii. _____
- iii. _____

[3 marks]

(i) According to Maltese law, data is protected by the *Data Protection Act*. List any THREE provisions found in this law.

- i. _____
- ii. _____
- iii. _____

[3 marks]

5. Computers may be designed to operate in different contexts. This calls for different types of Operating Systems and varying hardware configurations.

(a) Give examples of THREE types of operating system.

- i. _____
- ii. _____
- iii. _____

[3 marks]

(b) List ONE application for *each* of the examples mentioned in question (a).

- i. _____
- ii. _____
- iii. _____

[3 marks]

(c) Some Operating Systems need to support networking environments. Give TWO uses of computer networks in a school.

- i. _____
- ii. _____

[1 mark]

(d) The school network is connected to the Internet via a MODEM. What does the term MODEM stand for?

_____ [1 mark]

(e) The school’s technician noticed that browsing the Internet is becoming slower and slower. Suggest how he could improve the situation with the help of the Internet Service Provider without changing any installed hardware and software.

_____ [1 mark]

(f) A very important part in every computer in the school is the ROM chip. What does ROM stand for?

_____ [1 mark]

(g) Mention ONE characteristic of a ROM chip.

_____ [1 mark]

(h) Why is the ROM chip needed in a computer system?

_____ [1 mark]

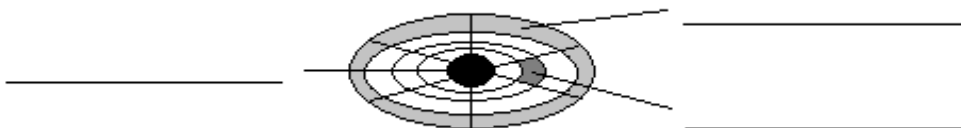
(i) Give TWO examples of secondary storage devices.

_____ [1 mark]

(j) To make good use of storage devices, files are typically stored in a hierarchy. Explain what is meant by the term *hierarchy*.

_____ [1 mark]

(k) The diagram presented below shows a platter from a hard disk drive. Label it using the terms *Spindle*, *Sector* and *Track*.



[3 marks]

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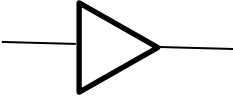
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1. a. Fill in the missing information in the table below.

Logic Gate	Truth Table			Symbol
AND	A	B	OUTPUT	
	A	B	OUTPUT	
	0	0	0	
	0	1	1	
	1	0	1	
	1	1	1	
	A	OUTPUT		

[6 marks]

Underline the correct answer to complete the following statements.

a. 1024 bytes equals

- i. 1KB
- ii. 1MB
- iii. 1GB
- iv. 1TB

b. A _____ is approximately 1 billion bytes.

- i. Bit
- ii. Kilobyte
- iii. Gigabyte
- iv. Megabyte

- c. The basis of a hexadecimal number is:
 - i. 2
 - ii. 8
 - iii. 10
 - iv. 16
- d. Computers use the _____ system to store and process data.
 - i. Relational
 - ii. Megabyte
 - iii. Binary
 - iv. Processing

[4 marks]

e. Complete the following table by filling in the missing values.

Binary	Decimal	Hexadecimal
11011010		
		9F
	34	

[6 marks]

f. Which numerical representation is used as a shorthand for binary?

_____ [1 mark]

2. Consider the following Java program snippet

```
int maths = 70;
int english = 60;
int maltese = 80;
int num = 3;
int average = (maths+english+maltese) / num;

if (average > 50) System.out.println("Passed");
else System.out.println("Fail");
```

a. What is the output of this program?

_____ [3 marks]

b. Identify THREE types of errors that can occur in a program.

_____ [3 marks]

c. Which one of the errors mentioned in part (b) occurs if :

i. The formula is replaced by $average = (maths + english - maltese)/num$

ii. If $num=3$ is replaced by $num=0$

iii. A semicolon is omitted from any of the lines?

[3 marks]

d. Write down (in the correct order) the stages involved in the systems analysis and design process.

_____ [3 marks]

e. Choose the correct term from the list below to complete the given paragraph. Note that some terms must be used more than once.

pseudocode, algorithm, flowchart

The _____ is a way of describing how a program will work. _____ & _____ are two ways for designing the solution of a problem. _____ is a mix of English like statements and the programming language involved whereas _____ gives a graphical representation of the program. [5 marks]

4. This question refers to data storage and processing.

a. Explain the difference between data security and data integrity.

[2 marks]

b. Identify TWO ways of ensuring data privacy.

[2 marks]

c. Two ways of ensuring data recovery in the case of accidental loss of data is by doing *backups* and by using the *grandfather-father-son* method. Explain the terms in italics.

[4 marks]

d. Mention THREE principles which are taken into consideration with the Data Protection Act.

[3 marks]

e. Identify ONE software and ONE hardware procedure used to reduce piracy.

[2 marks]

f. Why is unauthorised copying of software detrimental for software houses?

[1 mark]

g. Computers are machines which as much as they can be useful, can also have negative effects. Discuss.

[3 marks]

5. Outline the difference between:

a. RAM and ROM;

b. Main memory and secondary memory;

c. User and technical documentation.

d. General purpose and dedicated computer;

e. Classes and objects.

[10 marks]

f. Identify the roles related to IT to match the following definitions.

i. A person who uses analysis and design techniques to solve business problems using IT.

ii. A person who writes code for devices such as computers.

iii. A person employed to enter or update data into a computer system database.

iv. A person responsible for creating, managing and organising a website.

v. A person who repairs and maintains computers.

[5 marks]

g. Mention ONE advantage and ONE disadvantage of e-Commerce.

[2 marks]