

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA
MATRICULATION EXAMINATION
INTERMEDIATE LEVEL
MAY 2014

SUBJECT:	COMPUTING
DATE:	21st May 2014
TIME:	4.00 p.m. to 7.00 p.m.

Directions to Candidates

- Answer **ALL** questions in Section A and **ONE** question from Section B.
- Good **English** and orderly **presentation** are important.
- All answers are to be written on the **booklet** provided.
- The use of **flowchart templates** is permitted but **calculators** may **NOT** be used.

Section A

(Answer **ALL** questions in this section)

- A1 a. According to **De Morgan's laws**, what is equivalent to:
- i. $\overline{(X + Y)}$ and
 - ii. $\overline{(X.Y)}$? [2]
- b. Justify your answers to part (a) above by drawing **truth tables** for each expression. [4]
- A2 a. Briefly describe the purpose of the **half adder**. [1]
- b. Draw the **truth table** for the half adder. [2]
- c. Draw the **logic circuit** for the half adder. [2]
- d. What is the difference between a **half adder** and a **full adder**? [1]
- A3 **Batch, online, real time** and **network** are four types of operating systems used in different situations.
- a. Briefly explain the **difference** between the FOUR operating systems. [4]
 - b. For each operating system mention a **suitable application**. [2]
- A4 a. Use an example to name and explain THREE **addressing modes** used in Assembly Language. [3]
- b. Explain the following THREE terms which are associated with the assembly process: **Source code, Linking** and **Object code**. [3]
- A5 a. What is a **flat file** system? [2]
- b. Mention FOUR **advantages** of databases over traditional file systems. [4]
- A6 a. What is a **LAN**? [1]
- b. Suggest TWO advantages of a **full-duplex** over a **half-duplex** Ethernet connection. [2]
- c. Describe the use of a **hub** on a LAN. [2]
- d. Why is a **MAN** often ideal for use on a large University Campus? [1]

- A7 a. What are the units of measurement of:
- i. **bandwidth** and [2]
 - ii. **baud rate?** [2]
- b. Differentiate between an **analogue** and a **digital** signal. [2]
- c. Suggest ONE reason why, where possible, LANs preferably use a **physical connection** rather than WiFi. [1]
- d. Give ONE advantage of **optical fibre cable** over **twisted pair cable**. [1]
- A8 a. Convert 78_{10} to 8-bit binary. [1]
- b. Represent 2.5_{10} in binary. [1]
- c. What type of **error** occurs if the binary equivalent of 300_{10} is stored in an 8-bit register? [1]
- d. Why is the **hexadecimal number system** necessary in computing? [1]
- e. Represent 01011100_2 in **hexadecimal**. [1]
- f. Represent -17 in 8-bit **Sign and Magnitude**. [1]
- A9 a. Mention TWO principles of the **Data Protection Act**. [1]
- b. Explain the **implications** of ONE of the principles that you mentioned in part (a) above. (Clearly point out the principle you are discussing.) [1]
- c. Suggest a possible **limitation** of e-mail communication. [1]
- d. What is **remote access?** [1]
- e. Give ONE **advantage** and ONE **disadvantage** of remote access. [2]
- A10 a. A **Java method** called *getHighest()* implements a **for loop** that finds and returns the highest score of ten athlete's records stored in an array. The array has been declared as given below.
- int[]score = new int[10];*
- Write the **method** *getHighest()*. [4]
- b. Commercial software is normally subjected to **alpha** and **beta** testing, during its development. Briefly explain what these TWO types of testing are. [2]

Section B

(Answer **ONE** question from this section)

- B1 *This question is about Object Oriented Programming (OOP) in Java.*
- a. Java is an OOP language. What is an **object**? [1]
 - b. Distinguish between **static** and **non-static** methods in the context of OOP. [2]
 - c. Compare and contrast the following **THREE data types** as used in Java: byte, int and double. [3]
 - d. Briefly explain and sketch flowcharts to differentiate between the **while** and the **do while** looping constructs. [4]
 - e. Create a simple Java **class** called *Student* that has the following properties: idNo, name, surname, mark.
Include in this class a **method** called *readDetails()* that allows the user to input student details.
Include also a **method** called *showDetails()*, that outputs the details of a student and also a comment saying 'Pass' if the mark is greater than 49, and otherwise 'Fail'. [5]
 - f. Create a second **class** called *MarksApp* that will include the main method for this application. This method creates an **array of ten objects** of type *Student* and calls the method *readDetails()* for each student record. [5]
- B2 *This question is about Databases.*
- a.
 - i. Define **data dictionary**.
 - ii. Mention **FOUR items** found in a data dictionary. [3]
 - b. Briefly explain the difference between **Data Definition Language (DDL)** and **Data Manipulation Language (DML)**. [2]
 - c. For each database statement below give the **correct term/s**.
 - i. A **database key** that consists of two or more columns.
 - ii. A **row of data** in a database table consisting of a single value from each column of data in the table.
 - iii. The **software** used to control access to the data.
 - iv. A named **unit** of information.
 - v. A **field** in a relational table that matches the primary key column of another table.
 - vi. The **process** of organising the fields and tables of a relational database to minimise redundancy and dependency.
 - vii. A **property** or characteristic of an entity.
 - viii. A **field** that uniquely identifies each record in the table. [4]
 - d. A domestic appliances retail outlet is to computerise all operations normally associated with stock control. It was decided to implement three files (tables): **Stock file** (to store details of appliances), **Customer file** (to store particulars of customers) and a **Transaction file** (to store details of each transaction).
 - i. Draw the **specifications of each file** in tabular form. The specifications for each file should include at least **THREE** important field names and their data types.
 - ii. Which fields from those you listed in part (i.) above, are used to create the **relationships** between the Transaction file and the Stock file and between the Transaction file and the Customer file. [11]