

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

SUBJECT: COMPUTING
DATE: 6th September 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.
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Section A

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

- A1 a. With reference to the Von Neumann architecture, briefly explain the role of the following **units**:
- i. Control Unit;
 - ii. ALU;
 - iii. Main Memory. [3]
- b. Distinguish between a **mainframe** computer and a **microcomputer**. [1]
- c. Mention **ONE application** for a mainframe computer and **ONE application** for a minicomputer. [2]
- A2 *This question is about networking.*
- a. What is the **IP model**? [2]
 - b. Why are standard communication **protocols** necessary? [1]
 - c. Briefly explain one method of overcoming **data transmission errors** over a network. [2]
 - d. Explain how **DNS** facilitates the use of the Internet. [1]
- A3 a. In the context of e-Learning, what does **VLE** stand for? [1]
- b. Name **THREE features** you expect to find in a VLE. [3]
- c. Mention **TWO advantages** of face-to-face learning over e-Learning. [2]
- A4 A Java application includes a Quiz with ten questions.
- a. Distinguish between a Java **class** and a Java **object**. [1]
 - b. The application includes a class called *Question*. How would one **create** and **instantiate** an object of *Question* called *question1*? [2]
 - c. The class *Question* contains a void method called *tryQuiz()*. How is the **method** using the *question1* instance called? [1]
 - d. The user is awarded 1 point for each correct answer. What **data type** would you choose for the variable holding quiz points? Justify your answer. [2]

- A5 a. With reference to programming, what is the purpose of organising data in **data structures**? [1]
- b. The *if...else* and *switch...case* are used to construct **conditional statements**. Differentiate between them. [2]
- c. Implement in Java a **section of code** that outputs ‘Qualifies for benefits’ if a variable ‘income’ is less than 10000 and ‘age’ is less than 61. Otherwise outputs ‘Does not qualify for benefits’. [3]
- A6 The system bus consists of the **Address Bus**, **Data Bus** and **Control Bus**.
- a. Briefly **differentiate** between the three buses. [3]
- b. State whether the following statements are **True** or **False**.
- i. Modern computers use both **parallel** and **serial** data buses.
 - ii. The **wordlength** of a computer is a measure of the width of the control bus.
 - iii. A computer with **8 address lines** may access 256 different memory locations.
 - iv. The address bus is a **two-directional bus**.
 - v. The control bus carries signals that report the **status** of various devices.
 - vi. **Interrupt** signals are transferred over the data bus. [3]
- A7 a. Mention **TWO** main reasons to show why **ROMs**, and not other types of ROM (such as PROM), are used in a computer. [2]
- b. Name **TWO** items that are **normally stored** in a ROM of a computer. [2]
- c. Give **TWO advantages** of EEPROMs when compared to ROMs. [2]
- A8 a. Name and briefly explain the use of **FOUR** general purpose **data registers** found inside the CPU. [4]
- b. One special purpose register is the **stack pointer**. Name and explain the **TWO** assembly language operations that change the contents of this register. [2]
- A9 Three main functions of an OS are the **control of processes**, the **management of memory** and the **management of files**.
- a. A **process** may be in any one of three **states**. Name and briefly explain the **THREE** states. [3]
- b. What are **memory store protection** and **memory fragmentation**? [2]
- c. What are **file access rights**? [1]
- A10 a. What is an **interrupt**? [1]
- b. List **THREE** important **events** that take place immediately after the CPU receives an interrupt signal. [3]
- c. What is a **vectored interrupt**? [2]

Section B

(Answer ONE question from this section)

B1 *This question is about networking.*

- a. Distinguish between LAN, MAN and WAN. [3]
- b. Mention ONE **communication medium** suitable for each type of network mentioned in part (a) above. [3]
- c. What is **network topology**? [1]
- d. Name, sketch and describe THREE different **topologies**. [3]
- e. Suggest ONE suitable **application** for each topology mentioned in part (d) above. [3]
- f. What is a **proxy server**? [1]
- g. How does **hypermedia** improve the users' online experience? [1]
- h. Suggest how hypermedia can enhance the **learning experience**. [2]
- i. Briefly explain how **authoring tools** facilitate the creation of multimedia applications. [1]
- j. Distinguish between a **web client** and a **web server**. [2]

B2 *This question is about digital logic.*

- a. Using the **laws of Boolean algebra** simplify the following Boolean expressions to a minimum number of literals (justify your answer by showing your working for each step):
 - i. $A.B.E + \bar{A}.B + A.B.\bar{E}$
 - ii. $\overline{(X + Y)} . (\bar{X} + \bar{Y})$
- b. Study the following truth table and then answer the questions below: [8]

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

- i. Given that A, B and C are inputs while F is the output, express **F** in terms of A, B, and C.
- ii. Use any method to **simplify F**. [6]
- c. Draw the **truth tables** of the following 2-input gates:
 - i. NAND gate;
 - ii. NOR gate;
 - iii. XOR gate. [3]
- d.
 - i. Mention ONE reason to show why **NAND** or **NOR** gates are normally used to implement the basic logic operations (AND, OR and NOT).
 - ii. Draw a logic circuit using only NOR gate/s that implements the **NOT operation**. [3]