

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA
MATRICULATION EXAMINATION
INTERMEDIATE LEVEL
MAY 2013

SUBJECT: COMPUTING
DATE: 29th May 2013
TIME: 9.00 a.m. to 12.00 noon

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. Briefly explain the purpose of the **fetch-execute cycle**. [1]
 b. The fetch-execute cycle is divided in the **fetch phase** and the **execute phase**. Explain the major steps of the fetch phase and the major steps of the execute phase. [5]
- A2 A **3-input logic circuit** is built in a way that it outputs a 1 (true) when the binary value of the input is less than 3, otherwise the circuit outputs a 0 (false).
 a. Draw the **truth table** for this logic circuit. [2]
 b. Design the **logic circuit** for this situation. [4]
- A3 For each of the following situations, mention the **type of operating system (OS)** which is most suitable. *An OS type may be used more than once.*
 a. Processing of data without buffering delays. [1]
 b. Large amounts of data are to be processed. [1]
 c. The flight control system in a military aircraft. [1]
 d. Running the server on the Web. [1]
 e. Running on a server and enabling the management of: data, users, groups, security, applications, etc. [1]
 f. The task is required to run to completion without human intervention such as in billing. [1]
- A4 a. In what **database model** do we use data normalization? [1]
 b. What process is done in **data normalization**? [2]
 c. Define the **THREE forms** of normalization. [3]

- A5 a. Name the **person** responsible for the performance, integrity and security of a database. [1]
 b. i. Mention the TWO essential **features** of a DBMS. [4]
 ii. Mention TWO of the three **levels** (schema) in a DBMS. [1]
 c. What type of **database model** allows object identification and communication? [1]
- A6 a. What is meant by the term **network topology**? [1]
 b. Suggest ONE advantage of a **mesh** topology. [1]
 c. Give TWO reasons why a **ring** topology is suitable for home use. [2]
 d. Suggest ONE use for **message-switching**. [1]
 e. Give ONE reason why **packet-switching** is better suited in a situation where there are multiple locations and large amounts of data to transmit. [1]
- A7 a. Name and briefly outline TWO examples of **e-Commerce**. [2]
 b. For ONE of the examples of part (a) above, explain how e-Commerce may **impact** the average household. [2]
 c. Briefly explain ONE way how **e-Learning** may help gifted students. [1]
 d. Mention how disadvantaged students may be left behind due to **e-Learning**. [1]
- A8 a. Distinguish between **flowcharts** and **pseudocode**. [1]
 b. Name and outline with the help of flowcharts the THREE basic algorithm **constructs**. [3]
 c. For ONE of the constructs mentioned in part (b) above, explain its **relevance** in process control. [2]
- A9 a. **Subtract** 23 from 35 using two's complementation in 8 bits. [2]
 b. What is the **range** of numbers that can be represented in 8-bit two's complement? (*Give your answer in decimal*) [1]
 c. What is the **range** of numbers that can be represented in 8-bit sign and magnitude? (*Give your answer in decimal*) [1]
 d. Mention TWO **advantages** of two's complement representation over sign and magnitude. [2]
- A10 a. Give an example of ONE **language** for each of the following:
 i. an imperative language;
 ii. an object oriented language;
 iii. a formal language. [3]
 b. A Java class in a banking application is called *Account*. It includes a method called *findInterest*. Write a **section of code** to:
 i. Create and instantiate an object of *Account* called *account1*.
 ii. Assuming this method does not expect any parameters, call the method *findInterest* for *account1*. [2]
 c. How is an **instance** method distinct from a **static** method? [1]

Section B

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

- B1 *This question is about social implications of computing.*
- a. Explain each of the following **activities**, and in each case suggest ONE possible **problematic** issue.
 - i. EFT (Electronic Funds Transfer);
 - ii. E-mail. [4]
 - b.
 - i. Describe TWO **features** a software developer may implement to protect his software against piracy.
 - ii. How does copyright **legislation** protect software developers?
 - iii. Mention TWO types of computer-related **crime** other than piracy. [5]
 - c.
 - i. Differentiate between **open-source** and **commercial** software.
 - ii. Name ONE way in which the development of open-source software is **financed**. [3]
 - d.
 - i. Briefly explain why the **Data Protection Act** was necessary.
 - ii. Name and briefly explain TWO **principles** of the Data Protection Act. [4]
 - e. What is **plagiarism**? [2]
 - f. Mention TWO **characteristics** you would consider when designing a Web 2.0 site. [2]
- B2 *This question is about computer architecture and assembly language.*
- a. What do the acronyms **ROM**, **EPROM**, **PROM** and **EEPROM** stand for? [2]
 - b. For each of the statements below name the most appropriate **ROM** from those listed in part (a) above.
 - i. This can be programmed and re-programmed several times in-circuit.
 - ii. This is mainly used to distribute firmware.
 - iii. Must be removed from the device for programming.
 - iv. This is used to store programs permanently. [4]
 - c. In assembly language one can use different modes for addressing data.
 - i. Name THREE **addressing modes**.
 - ii. For each mode give an **example** in assembly language.
 - iii. From one of the examples given in part (ii) above, identify an **opcode** and an **operand**. [8]
 - d. Registers are at the heart of each processing task.
 - i. Mention TWO different types of **data** that may be found in a data register.
 - ii. Briefly explain what a **stack** is, mentioning also the operations that may be performed with it.
 - iii. Explain the **zero flag** in the status register and provide an example of how it may be used by the processor. [6]
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