MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

MATRICULATION EXAMINATION
ADVANCED LEVEL
SEPTEMBER 2013

SUBJECT:	INFORMATION TECHNOLOGY
PAPER NUMBER:	I
DATE:	3rd September 2013
TIME:	9.00 a.m. to 12.00 noon

DIRECTIONS TO CANDIDATES

A total of six questions must be attempted; three from Section A and another three from Section B.

SECTION A: INFORMATION SYSTEMS

Answer *the first question in this section* and any other *two* questions.

QUESTION A1
This question is compulsory. Answer all parts.

a)   This part is on *Networks in Organisations.*
    i.   Explain *three* common LAN topologies using diagrams where appropriate.
    ii.   What is the difference between *Narrowband* and *Broadband?*
    iii.   What is a gateway?

[6 marks]

b)   This part is on *Devices.*
    i.   Explain **two** optical-based storage devices.
    ii.   Illustrate using practical examples **two** of the advantages using the devices mentioned in (i).
    iii.   Mention a character set, normally used in computers. Why are such character sets needed?

[6 marks]

c)   This part is on *Number Base Systems and Number Representation.*
    i.   Convert 15_{10} to binary.
    ii.   Convert 25_{10} to hexadecimal.
    iii.   Work out $46_{10}-23_{10}$ using 2's complement representation.
    iv.   Represent 1/16 in binary.

[4 marks]

d)   This part is on *Information policies* and *Management Information Systems.*
    i.   What does *OLAP* stand for?
    ii.   Suppose you have a medium sized firm operating as an ISP. Explain the advantages involved if the management implemented *decentralisation* of information.

[4 marks]

Answer ANY TWO questions A2, A3 and A4.

QUESTION A2
This question is about *Information Systems in Organisations.*

a)   Training can be a valuable asset to a company. Discuss the potential advantages in relation to productivity, working environment and efficiency when training is done for senior management, middle management and staff.

[8 marks]

b)   In reference to *Codes of Practice* briefly describe *two* factors that need to be considered in *ethical decision making*.

[4 marks]

c)   *Negligence* can have severe repercussions on a business. Discuss how the effects of *negligence* can lead to data loss and provide an overview of a *security plan* to protect the organisation's data in such case.

[8 marks]

QUESTION A3
This question is about *Networks* and *Security.*

a)   What is the difference between *serial* and *parallel* transmission?

[4 marks]

b)   Define the term *Internet.*

[3 marks]

c)   Explain how a network can help to improve security in a medium sized shop.

[3 marks]

d)   i.   Differentiate between *permissions* and *restrictions.*
      ii.   Who is responsible for setting *permissions* and *restrictions* in an organisation?
      iii. What is the criterion used to determine such *permissions* and *restrictions?*

[4 marks]

e)   State how you would protect data when it is transferred through a network. Give *one* practical example of this.

[3 marks]

f)   Define the term *biometrics.* Give *one* practical example of this.

[3 marks]

QUESTION A4
This question is about *User Interface* and *Computer Systems.*

a)   Why are different types of **UI (user interfaces)** used?

[6 marks]

b)   Illustrate giving *three* examples how new emerging technologies for *human-computer interaction* can help students in their education.

[6 marks]

c)   A school and a land surveying engineering company are planning to upgrade their current computers. Suggest with reasons which *type of computers* they should opt for.

[4 marks]

d)   Outline the differences in uses of a mainframe and a supercomputer. Give *one* example of each.

[4 marks]

SECTION B: HUMAN COMMUNICATIONS & BUSINESS ORGANISATION
Answer *the first question in this section* and any other *two* questions.

QUESTION B1
This question is compulsory. Answer all parts.

a)   Explain the work carried out by the *Administration Department*.

[4 marks]

b)   Define the following terms:
   i.   B2B;
   ii.   B2C;
   iii. e-Marketing;
   iv.   e-Markets.

[4 marks]

c)   Discuss the effects *RSI* and *ELF* can have on users working on computers every day.

[4 marks]

d)   Briefly distinguish between *Open* and *Closed Systems in organisations.*

[3 marks]

Answer ANY TWO questions B2, B3 and B4.

QUESTION B2

Describe the advantages and disadvantages for both the employer and the employee when using teleworking and video-conferencing as the sole means of communication in an organisation.

[15 marks]

QUESTION B3

Explain how *visual communication* should be portrayed to cater for the different types of organisations like sole traders, partnerships, private and public companies, co-operatives, and/or public sector entities.

[15 marks]

QUESTION B4

Describe (using diagrams where appropriate) the following organisational structures:
i.   Hierarchical;
ii.   Horizontal;
iii. Matrix.

[15 marks]

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MATRICULATION EXAMINATION
ADVANCED LEVEL
SEPTEMBER 2013

SUBJECT:	INFORMATION TECHNOLOGY
PAPER NUMBER:	II
DATE:	4th September 2013
TIME:	9.00 a.m. to 12.00 noon

DIRECTIONS TO CANDIDATES

A total of six questions must be attempted; three from Section A and another three from Section B.

SECTION A: SOFTWARE
Answer *the first question in this section* and any other *two* questions.

QUESTION A1
This question is compulsory. Answer all parts.

a) Explain the following terms:
   i.   GUI;
   ii. One-to-many relationship;
   iii. Software Portability;
   iv. Multitasking. **[7 marks]**

b) This part is on *Databases.*
   i.   Distinguish a *Relational DB* and an *Object Oriented DB.*
   ii. Indicate **three** operations normally carried out in *Data Manipulation*. **[4 marks]**

c) This part is on *Application Software*.
   i.   Explain how a user may opt to output information from a database.
   ii. Illustrate the advantages of using mail merge when drafting academic and behaviour reports of individual students. **[4 marks]**

Answer ANY TWO questions A2, A3 and A4.

QUESTION A2
This question is about *Software Applications.*

a) Name the **two** categories of software and briefly explain each category. **[6 marks]**

b) Discuss the advantages and disadvantages of *Video Conferencing.* **[3 marks]**

c) For a category of software mentioned in (a) identify and explain any *three* functionalities from a user's perspective. **[3 marks]**

d) Explain any three criteria that can be used to evaluate software. **[3 marks]**

QUESTION A3

This question is about *Databases.*

a) A book shop database has the following schema:
   CLIENT (Book_ID, Author, ISBN, Date_Published, Year_Purchased, Genre, Price, QTY)

   Write a simple SQL statement to output the authors publishing works before the year 2005. Sort the output by Date Published in ascending order. **[3 marks]**

b) With reference to question (a) provide correct data types for the fields used in the schema.
   [2 marks]

c) What is the difference between *Primary Key* and *Secondary Key?* **[2 marks]**

d) What is the purpose of *normalisation?* **[2 marks]**

e) Explain the term *ERD.* **[2 marks]**

f) Using the schema in part (a) how can one calculate the commission (QTY * price * 0.13) the book shop received in the year 2010 only? **[4 marks]**

QUESTION A4

This question is about *Software.*

a) In relation to *System Software,* what is a *Translator*? **[1 mark]**

b) Explain the term *Error Handling.* **[2 marks]**

c) Mention and describe ways how software companies can help users understand features of newly developed applications. **[3 marks]**

d) What is *a Benchmark Test?* **[2 marks]**

e) "More than reliability and functionality, users tend to value software on easiness of use". Discuss whether the above statement is correct or not. **[4 marks]**

f) Explain the terms *compression* and *defragmentation* in the context of an operating system.
   [3 marks]

SECTION B: PROGRAMMING TECHNIQUES AND SYSTEM DEVELOPMENT

Answer *the first question in this section* and any other *two* questions.

QUESTION B1
This question is compulsory. Answer all parts.

```
01 public class BinarySearch {
02 public static boolean contains(int[] a, int b) {
03 if (a.length == 0) {
04 return false;
05 }
06 int low = 0;
07 int high = a.length-1;

08 while(low <= high) {
09 int middle = (low+high) /2;
10 if (b> a[middle]){
     a. low = middle +1;
11 } else if (b< a[middle]){
     a. high = middle -1;
12 } else {
     a. return true;
13 }
14 }
15 return false;
16 }
17 }
```

a) Describe the code workings between line 07 and 12.

[10 marks]

b) Find the errors in the SQL Code below and correct them.
    i)   SELECT * FROM STATION, STATS WHERE STATION.ID = = STATS.ID
    ii)   SELECT * FROM STATS WHERE TEMPC < 0 AND MONTH = 1 AND ORDER BY
            RAINC;

[5 marks]

c) Describe the following basic CSS Code snippet:

```
<STYLE type=text/css>
A:link {
 COLOR: red
}
A:visited {
 COLOR: #800080
}
A:hover {
 COLOR: green
}
BODY { COLOR: #800080 {
</STYLE>
```

[5 marks]

Answer ANY TWO questions B2, B3 and B4.

QUESTION B2

a) Discuss the importance of modularity in software design and development. Give examples of how modularity can be achieved in systems design and programming. **[7 marks]**

b) Suppose you are a consultant for a clothing firm, explain the importance of having an online portal capable of handling secure transactions from a user's point of view. Illustrate your answer with examples. **[7 marks]**

c) Explain the UML Class diagram and Use Case diagrams. **[6 marks]**

QUESTION B3

a) What is a *4GL?* Provide your answer with an example. **[3 marks]**

b) Distinguish between *Imperative* and *Functional Programming.* **[4 marks]**

c) Explain the importance of *subroutines* in a JAVA program. **[4 marks]**

d) Using **two** classes, declare and instantiate an object (Robot) of name Bender accepting the following as variables:
   i.   Speed (Low, Medium, High);
   ii.   Make (EU, US, Non-European);
   iii. Cost. **[5 marks]**

e) Explain using an example what is meant by the term *variable scope*. **[4 marks]**

QUESTION B4

a) List and explain any *three* concepts of the object oriented programming paradigm. **[3 marks]**

b) List and explain the use of any *four* string functions as provided in Java. **[4 marks]**

c) What are reserved words used for? Give *two* examples of such words. **[3 marks]**

d) Write the pseudo code for an algorithm to populate a 1 dimensional array of size 10, with numbers. **[8 marks]**

e) Describe *any* two types of validation checks. **[2 marks]**