L-Università ta' Malta

SUBJECT:	**Information Technology**
PAPER NUMBER:	I
DATE:	24th May 2022
TIME:	9:00 a.m. to 12:05 p.m.

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 and any other TWO questions in this section.

Question A1

This question is compulsory. Answer all parts.

A travel agency would like to make administrative work and data analysis more effective and efficient so as to improve its business performance. It is thus considering setting up a Management Information System (MIS).

a) Explain how a MIS can help the travel agency to improve its business performance. (1)

b) Outline **THREE** characteristics of a good MIS. (6)

c) Outline **THREE** reasons why the travel agency should use drill-down techniques. (6)

d) Define the life cycle of a Waterfall model. (1)

Many Business Intelligence (BI) systems use Online Analytical Processing (OLAP) to analyse information from multiple database systems at the same time.

e) Outline the **THREE** types of OLAP and their main differences. (6)

(Total: 20 marks)

Please turn the page.

Answer TWO questions from Questions A2, A3 and A4.

Question A2

Different types of computers are suited for different uses.

a) For **each** scenario below, identify what computing device is most adequate and explain why.

    i.   a sales-person within a clothing store, who needs to check item availability and price lists while walking around the shop; (1½)

    ii. a student who would like to have the flexibility of working on academic assignments anytime anywhere; (1½)

    iii. a teen who plays computer games and requires a powerful graphics card; (1½)

    iv. a company that would like to share data and resources and distribute work. (1½)

b) Mention **ONE** limitation of **each** device in your answer to part (a). (4)

c) Use a block diagram to provide an outline of a computer system and its various components. (2)

d) Discuss **ONE** difference between the Arithmetic Logic Unit (ALU) and the Control Unit (CU). (2)

e) Use a block diagram to provide an outline of a microprocessor and its various components. (2)

f) The main interface styles are Command Line Interface (CLI) and Graphical User Interface (GUI). Explain and differentiate the terms CLI and GUI. (4)

(Total: 20 marks)

Question A3

A financial company would like to organise a training session for its employees about ethical guidelines on the application of a new IT system.

a) Identify **FOUR** aspects that the company should follow when developing its corporate training strategy. (4)

b) List **THREE** main factors that the company should consider for ethical decision-making. (3)

c) Outline the difference between formal and informal guidelines for ethical decision-making. (2)

d) List the **FIVE** codes of conduct that the company's employees should follow. (5)

e) Outline how the financial company can back-up copies of the software it has purchased, without infringing on copyright. (1)

This financial company is also discussing its strategy for data loss and recovery methods.

f) Outline **TWO** possible causes of data loss for the company. (2)

g) Outline **THREE** main stages that the company should go through when devising its disaster recovery plan. (3)

(Total: 20 marks)

Question A4

This question is about computers and number representation.

a) Convert the following decimal numbers into binary numbers. Show your working.
  i. 29_{10} (1)
  ii. 0.118_{10} (1)

b) Convert the following binary numbers into hexadecimal numbers. Show your working.
  i. 101010101001_2 (2)
  ii. 001100101.110111_2 (2)

c) Explain why the hexadecimal number representation is used. (1)

d) Use Two's Complement Arithmetic to work the following subtraction: $+29_{10}$ -7_{10}. Show your working. (4)

e) Convert the following decimal numbers into floating point:
  i. 11.5_{10} (2)
  ii. 0.023_{10} (2)

f) How many binary numbers can be represented by 8 bits? Show your working. (1)

g) Explain what happens when adding the binary numbers 11111111_2 and 00000001_2 using a storage of 8-bits. (1)

h) Define the term underflow in the context of number representation. (1)

i) Differentiate between signed and unsigned fixed point integer representation. (2)

(Total: 20 marks)

SECTION B: Human Communication and Business Organisation

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

Question B1

This question is compulsory. Answer all parts.

An insurance company prefers written communication over other means of communication.

a) Briefly explain what is written communication. (1)

b) Mention **TWO** other types of communication mechanisms. (2)

c) Describe **TWO** advantages of written communication when compared with those mentioned in part (b). (2)

d) Mention **TWO** possible written communication technologies which might be used by this insurance company. (2)

e) Explain **TWO** features of the written communication technologies specified in part (d). (2)

Please turn the page

f) Mention **THREE** technologies which the insurance company can use for its written communication. (3)

g) Highlight the main features of the **THREE** technologies mentioned in part (f). (3)

(Total: 15 marks)

Answer any TWO questions from B2, B3 and B4.

Question B2

A local ice-cream shop has been in business for over a decade. It has now made an agreement with a syrup company to jointly manage and operate the business.

a) What is the type of organisation formulated in the above scenario? (1)

b) List **ONE** advantage and **ONE** disadvantage of the type of organisation utilised in the above-mentioned scenario. (2)

c) Outline **TWO** other types of organisations apart from the one mentioned in part (a). (2)

d) List **ONE** advantage and **ONE** disadvantage for **each** type of organisation mentioned in part (c). (4)

e) Is the type of organisation mentioned in the given scenario formal or informal? Explain. (2)

f) List **TWO** essential components required for the organisation described in the given scenario to function properly. (2)

g) Does the manager of this ice-cream shop employ an open or closed system approach? Explain. (2)

(Total: 15 marks)

Question B3

An insurance company utilises online systems for its day-to-day transactions. The management of the company is aware that the company stores highly sensitive information related to its clients. Such information includes personal and financial information. Thus, protecting client's information is very important.

a) Explain why the concern of protecting individual privacy is greater in online systems when compared to offline/traditional ones, particularly in relation to the scenario presented in this question. (1)

b) What is the data protection act? (1)

c) Mention **TWO** main principles of the data protection act, which the management of this insurance company needs to know. (2)

d) One of the employees of the insurance company mentioned the term 'DOI websites'. Define the term and explain their importance. (2)

e) Mention **ONE** situation that the insurance company might encounter and which might necessitate the exemption of the data protection act. (1)

The insurance company has recently drafted a corporate information security policy. Moreover, the company is becoming acquainted with the duties of a Data Protection Commissioner.

f) Identify **TWO** duties of a Data Protection Commissioner. (2)

g) Why is it important for this insurance company to have a corporate information security policy? Your answer should include **FOUR** valid reasons. (4)

h) Describe the content of a corporate information security policy. (2)

(Total: 15 marks)

Question B4

Nowadays technological systems are being utilised in all aspects of our lives, even in science and engineering.

a) Mention **FIVE** systems whereby technology is used in the fields of science and engineering. (5)

b) Select **FOUR** of the systems mentioned in part (a), and provide an outline for **each** system. (4)

c) Briefly explain why the utilisation of computer systems is bringing about new health issues. (1)

d) Mention **THREE** health-related problems brought about by the utilisation of computer systems. (3)

e) Suggest **TWO** health and safety considerations which might help in reducing the health-related problems mentioned in part (d). (2)

(Total: 15 marks)

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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**ADVANCED MATRICULATION LEVEL
2022 FIRST SESSION**

SUBJECT:	**Information Technology**
PAPER NUMBER:	II
DATE:	25th May 2022
TIME:	4:00 p.m. to 7:05 p.m.

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 and any other TWO questions in this section.

Question A1

This is a compulsory question. Answer all parts.

The operating system is vital in all computer systems.

a) What is the function of the operating system? (2)

b) Mention and describe **FOUR** components of the operating system. (6)

Different types of operating systems are available on the market, serving different purposes. The OS of an old company only allows the user to perform one task at a time.

c) What is the type of operating system being described in the above scenario referred to? (1)

d) Describe **THREE** other types of operating systems. (3)

e) Mention **THREE** examples of operating systems. (3)

(Total: 15 marks)

Answer any TWO questions from Questions A2, A3 and A4.

Question A2

An accounting firm uses various software that can be divided into two main categories. For instance, an operating system can be classified in the category of system software.

a) Mention **THREE** other types of system software that the accounting firm might use. (3)

Question continues on next page.

b) State the other software category (i.e. apart from system software) that the accounting firm might use. (1)

c) Describe **both** system software and the category mentioned in part (b). (2)

d) Mention **THREE** types of software which fall under the category stated in part (b). (3)

e) List **ONE** advantage and **ONE** disadvantage for **each** software type mentioned in part (d). (6)

(Total: 15 marks)

Question A3

One of the primary data models utilised for the storage and processing of data within a gaming company is the relational data model. The managers of this company prefer this model over traditional filing models.

a) List **THREE** advantages of this model over traditional filing models. (3)

b) The managers frequently use the terms entity and field when discussing their relational data model. Define **both** entity and field. (2)

c) Mention **THREE** types of fields which the company might use. (3)

d) A field might be classified as a primary key field. Define the term primary key field and provide an example where the gaming company might require a primary key field. (2)

e) Define the term relationship in the context of the relational data model used by the gaming company. (1)

f) Mention **THREE** types of relationships which the gaming company might require. (3)

g) What is the term used for an attribute that is required to create a relationship? (1)

(Total: 15 marks)

Question A4

A new company decided to launch a new website. A snippet of the CSS files used by the company is found below.

```
h1{
    color: blue;
    background-color: yellow;
    border: 1 px solid black;
}

p{
    color: red;
}
```

(Source: https://developer.mozilla.org/en-US/docs/Learn/CSS/First_steps/How_CSS_is_structured)

a) Define CSS. (1)

b) Write down the line of code required to reference an external CSS. (1)

c) What are 'h1' and 'p' called? (1)

d) What is the purpose of the tags 'h1' and 'p'? (2)

The management of the new company knows that once the website is hosted on the Internet, it would be exposed to security problems.

e) Mention **THREE** examples of Internet-based fraud. (3)

f) Define the term malware. (1)

g) Mention **THREE** types of malware. (3)

h) Mention **ONE** possible solution for **each** malware listed in part (g). (3)

(Total: 15 marks)

SECTION B: PROGRAMMING TECHNIQUES AND SYSTEM DEVELOPMENT

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

Question B1

This is a compulsory question. Answer all parts.

a) The code snippet below in the Java programming language displays all the elements in an array.

```
1. public class TestArray {
2.    public static void main(String[] args) {
3.            _____ = {1.9, 2.9, 3.4, 3.5};
4.
5.        for _____ {
6.            System.out.println(myList[i] + " ");
7.        }
8.
9.        double total = 0;
10.        for (int i = 0; i <= myList.length; i++) {
11.            total += myList[i];
12.        }
13.
14.        System.out.println("Total is " + total);
15.
16.        double max = myList[0];
17.        for (int i = 0; i < myList.length; i++) {
18.            if (myList[i] > max) max = myList[i];
19.        }
20.
21.        System.out.println("_____ "+ _____);
22.    }
23.}
```

Question continues on next page.

    i. Specify the line number where a declaration of a class occurs in the above code.   (1)

   ii. Specify the line number where an array is passed to a method as a parameter in the above code.   (1)

  iii. Rewrite line 3, filling in the missing part that declares the proper variable.   (1)

  iv. Continue the loop in line 5.   (1)

   v. Complete the code in line 21 within the brackets with the appropriate text/syntax.   (1)

  vi. The code snippet above contains an out of bounds error. Identify the error and write down the correct syntax.   (2)

b) The following code snippet in Java programming language traverses and prints the elements of an array. Give the output result after the code is executed.   (3)

```
1. public static void main(String[] args) {
2.     int LA[] = {1,3,5};
3.     int i = 0, n = 3;
4.
5.     System.out.printf("The original array elements are :\n");
6.
7.     for(i = 0; i<n; i++) {
8.         System.out.printf("LA[%d] = %d \n", i, LA[i]);
9.     }
10. }
```

c) Consider the relation below and provide SQL statements that output the requested data.

      GymMember (<u>MemberID</u>, Name, Surname, Gender, DOB, Email, Membership)

    i.   Show all the data in ascending order by the DOB (date of birth).   (1)

   ii.   Show only the name, surname and email address of gym members who have a membership of 12 months or longer.   (3)

d) What is the use of a foreign key in databases?   (1)

e) Explain the difference between the tags <ul> and <ol>.   (1)

f) Write the HTML and CSS code between the appropriate tags in the code below to create and style a blue box of width 200px and height 200px, centered, using a class to name the box and linked to a contactus.html page.

```
1. <html>
2.    <head>
3.       <title>Blue Box</title>
4.       <style>
5.       </style>
6.    </head>
7.    <body>
8.    </body>
9. </html>
```

    (4)

(Total: 20 marks)

Answer any TWO questions from Questions B2, B3 and B4.

Question B2

a) Write an algorithm in pseudo code that asks the user to input the width 'a' and length 'b' of a rectangle, and then calculates the area of the rectangle. (2)

b) Illustrate a flowchart for the algorithm provided in part (a) with appropriate symbols. (2)

c) Discuss the following methods of verification:
   i.   Data Type Check; (1)
   ii. Range Check. (1)

d) Define the following terms used in file organisation:
   i.   serial file organisation; (1)
   ii. sequential file organisation; (1)
   iii. indexed sequential file organisation; (1)
   iv. direct file organisation. (1)

e) The below code writes a String to a file. The getBytes() method converts the String into an array of bytes.
   i.   Explain what the logic in line 14 is checking. (1)
   ii. Rewrite and complete the syntax in line 34 to finalise the programme. (1)
   iii. Rewrite and complete the syntax in line 12. (1)

Please turn the page.

```
1.  import java.util.*;
2.  import java.lang.*;
3.  import java.io.*;
4.    public class Main {
5.      public static void main(String[] args) {
6.        FileOutputStream fos = null;
7.        File file;
8.        String mycontent="This is data which needs to be written into the file";
9.
10.     try {
11.         file = new File("C:/myfile.txt");
12.         fos = _____;
13.
14.         if (!file.exists()) {
15.             file.createNewFile();
16.         }
17.
18.         byte[] bytesArray = mycontent.getBytes();
19.         fos.write(bytesArray);
20.         fos.flush();
21.         System.out.println("File Written Successfully");
22.     }
23.     catch (IOException ioe) {
24.         ioe.printStackTrace();
25.     }
26.     finally {
27.         try {
28.             if (fos != null)
29.             {
30.                 fos.close();
31.             }
32.         }
33.         catch (IOException ioe) {
34.             _____.____._____;
35.         }
36.     }
37.   }
38. }
```

f. Define primitive data type and Object data type in Java.   (2)

g. Explain the following branching statements:
   i.   break;   (1)
   ii.   continue;   (1)
   iii. return.   (1)

h. Differentiate the outputs from pseudo code 1 and 2.

   Pseudo code 1

```
   set count to 0
   while count < 6 do
       send 'coding with java' to display
       set count to count + 1
   end while
```

Pseudo code 2

```
set count to 6
while count < 6 do
    send 'coding with java' to display
    set count to count + 1
end while
```

(2)

(Total: 20 marks)

Question B3

A software start-up company is going to use the Software Development Life Cycle (SDLC) method to establish a framework for software development.

a) Explain each of the **SIX** phases of the Waterfall SDLC model that the company shall go through in its software development. (6)

b) Draw a diagram of the Waterfall Model containing the **SIX** phases listed in part (a), in the correct order. (2)

c) In the design phase of the waterfall model, the designer shall design the system at two different levels. List these **TWO** levels and explain what the designer does at **each** of these levels. (3)

A programming language is a computer language that is used by programmers to communicate with computers.

d) Explain what is assembly language, and outline **ONE** advantage and **ONE** disadvantage. (3)

e) Python and Java are two examples of a high level language. Explain what is a high level language, outline **ONE** advantage and **ONE** disadvantage. (3)

f) Explain what is the role of a compiler, an interpreter and an assembler, and differentiate between them. (3)

(Total: 20 marks)

Question B4

A hotel is improving its information system. During the development phase, the management is discussing various implementation methods as well as methods for maintaining the system after the development phase.

a) Explain **THREE** main system implementation methods that the hotel can use. (3)

After development and deployment of a system, it is critical for the hotel to also maintain it.

b) List **THREE** methods that the hotel should use to make the system easy to maintain. (3)

Please turn the page.

The hotel shall evaluate its system based on usability, effectiveness and maintainability.

c) Outline the following terms:
  i.   usability;   (1)
  ii. effectiveness;   (1)
  iii. maintainability.   (1)

d) Explain **TWO** possible software maintenance issues that the hotel can face if the system is badly designed or documented.   (2)

e) Outline **THREE** types of system testing and mention **ONE** advantage and **ONE** disadvantage of each.   (9)

(Total: 20 marks)