



SUBJECT:	Information Technology
PAPER NUMBER:	I
DATE:	25 th April 2023
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 gaming company is in the process of developing a new gaming software. The management of the company decided to follow the Waterfall model during the development phases of such software.

- Explain what is the Waterfall model. (2)
- Mention **all** stages sequentially of the Waterfall model. (3)
- Describe any **THREE** of the stages mentioned in part (b). (3)
- Justify the management's decision to use the Waterfall model, by stating **THREE** advantages of such model. (3)
- Mention **THREE** drawbacks the company might face when using the Waterfall model. (3)
- Describe **TWO** other methodologies which the gaming company might have used instead of the Waterfall model. (2)
- For **each** methodology listed in part (f), mention **ONE** advantage and **ONE** disadvantage. (4)

(Total: 20 marks)

Please turn the page.

Answer TWO questions from Questions A2, A3 and A4.

Question A2

'Tom's supermarket' is a new supermarket which has just opened in Qormi. Employees of the supermarket capture data on a day-to-day basis.

- a) Explain the term 'data capture' referred to in the above-mentioned scenario. (1)
- b) i. Mention **FOUR** methods, commonly associated with data capture, which are important for 'Tom's supermarket'. (2)
ii. Highlight the use of **THREE** of the methods specified in part (b)(i). (3)
iii. For **each** method explained in part (b)(i), list **ONE** advantage and **ONE** disadvantage. (6)

The management of 'Tom's supermarket' has drafted a corporate ICT strategy. Moreover, they are organising a computer-based training session for all supermarket employees.

- c) Explain why ICT related training is important in such an organisation. (1)
- d) i. Apart from computer-based training, briefly explain **ONE** other mode of training which could have been used by the management of 'Tom's supermarket'. (1)
ii. Provide **ONE** advantage and **ONE** disadvantage for:
- computer-based training;
- the training mechanism specified in part (d)(i). (4)
- e) Explain **TWO** aspects which the management of 'Tom's supermarket' might include in their corporate training strategy. (2)

(Total: 20 marks)

Question A3

A secondary school IT teacher was explaining the different types of existent computer systems. Most of the students were only aware of desktop computers.

- a) Draw the outline of a general computer system which the teacher might use to introduce the topic. Your answers should include a minimum of four major components, one of which should be elaborated further. (6)
- b) i. Apart from desktop computers, list **FOUR** other computer categories. (2)
ii. Define **each** computer category listed in part (b)(i). (4)
iii. Provide **ONE** example where **each** computer category listed in part (b)(i) might be ideal. (4)
- c) The teacher explained that the main types of memory present in a computer system are RAM and ROM.
i. Differentiate between both types of memory. (2)
ii. Define **TWO** main types of RAM. (2)

(Total: 20 marks)

Question A4

This question is about number representation.

- a) Convert the following decimal numbers into binary numbers. Show your working.
- i. 25_{10} (2)
 - ii. 43_{10} (2)
- b) Convert the following hexadecimal numbers into decimal numbers. Show your working.
- i. AAA_{16} (2)
 - ii. $FFFF_{16}$ (2)
- c) Convert the following hexadecimal numbers into binary numbers. Show your working.
- i. $9AF_{16}$ (2)
 - ii. $2C4_{16}$ (2)
- d) Perform the following simple binary addition. Show your working.
- i. $0001_2 + 1110_2$ (2)
 - ii. $1110_2 + 1111_2$ (2)
- e) Find the two's complement of the following binary numbers. Show your working.
- i. 10101110_2 (2)
 - ii. 10001.001_2 (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.

The director of a gaming company which has been operating for the past six years insists with all of his employees that all communication taking place between employees and customers should be carried in a written manner.

- a) Highlight **TWO** advantages and **TWO** disadvantages of written communication. (4)
- b) List **FOUR** examples of written communication which might be used by the gaming company. (2)
- c) i. List **TWO** technologies related to written communication which might be used in the above-mentioned scenario. (1)
- ii. List **ONE** feature for **each** technology specified in part (c)(i). (2)
- iii. Mention **ONE** advantage and **ONE** disadvantage of **each** technology specified in part (c)(i). (4)
- d) Mention **TWO** other forms of communication mechanisms which the gaming company might have used instead of written communication. (2)

(Total: 15 marks)

Please turn the page.

Answer any TWO questions from B2, B3 and B4.

Question B2

The local elderly centre wanted to assist the older generation integrate in today's computerised world. Thus, a number of talks were organised free of charge for all elderly in the local community. The first two talks discussed e-services and e-learning systems.

- a) Explain the **THREE** main categories of 'e-services'. (3)
- b) Provide an example for **each** category listed in part (a). (3)
- c) Define e-learning. (1)
- d) Define Learning Management System (LMS) and provide **ONE** example of a LMS. (2)
- e) Highlight **THREE** advantages and **THREE** disadvantages of e-learning. (6)

(Total: 15 marks)

Question B3

Following a recent study conducted with doctors and healthcare professionals, it was noted that the number of health issues which are computer-related have been constantly on the rise. One of the solutions encouraged by doctors to reduce such cases was an ergonomic workplace environment.

- a) Provide an overview of the role of computers and ICT in today's modern society. (4)
- b) Explain why the number of health issues related to computers has increased. (2)
- c) Explain **FOUR** health problems related to computer utilisation. (4)
- d) What does the term ergonomic environment refer to? (2)
- e) List **THREE** mechanisms which can be implemented at the place of work to decrease the number of health risks related to computer systems. (3)

(Total: 15 marks)

Question B4

Three friends are discussing the possibility of opening a new company specialising in the selling of smart equipment. They are aware that the Sales Department must be present within the company. However, they are still unsure as to what other department should be present for the company to be fully operational.

- a) Provide another term for departments. (1)
- b) Provide an overview of the work which should be carried out by the Sales department of this new company. (2)
- c) Mention **FOUR** other functional areas which should be present in the company. (2)
- d) Explain the work carried out by **each** of the functional areas mentioned in part (c). (4)
- e) For **each** functional area mentioned in part (c), name **ONE** employee which is usually associated with that particular functional area/department. (2)
- f) Briefly explain the responsibility of **each** employee specified in part (e). (4)

(Total: 15 marks)



SUBJECT:	Information Technology
PAPER NUMBER:	II
DATE:	26 th April 2023
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: SOFTWARE

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

Question A1

This is a compulsory question. Answer all parts.

A database can be defined as an organised collection of data stored and accessed electronically.

A company called ALTURA is currently using a traditional file-based system to store their data. The management often complains of such a system, and after some research they have decided to implement a relational database system. However, they are uncertain of their choice.

- a) Outline **THREE** advantages that a relational database system have over a traditional file-based system. (3)
- b) Briefly describe the following terminologies:
- i. a tuple; (1)
 - ii. an attribute; (1)
 - iii. a Primary Key; (1)
 - iv. a Secondary Key; (1)
 - v. a Foreign Key. (1)
- c) The management was a bit confused by the concepts of a primary, secondary and foreign key. They are unaware of the relationships that exists between tables. Describe the **THREE** relationship types that can be used between tables. (3)
- d) To ensure that the management have understood the concept of relationships, draft an Entity Relationship Diagram (ERD) of the tables from the short notation below. The diagram should also include the relationship type (using cardinality notation) that is ideal for these tables. (4)
- CLIENT (clientid, name, surname, address, mobile)
- STOCK (stockid, description, price)
- SALES (salesid, *clientid*, *stockid*, qty, date)

(Total: 15 marks)

Please turn the page.

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

Question A2

Linux is a free and open-source operating system (OS) based on the Unix operating system, while the Android operating system is based on a modified version of the Linux kernel and other open-source software, designed primarily for touchscreen mobile devices.

- a) Mention **TWO** other competitors of Linux. (2)
- b) What type of Operating System is Linux? (2)
- c) Apart from the type of operating system (OS) mentioned in part (b), describe **THREE** other types of Operating Systems (OS). (3)

The Android Operating System (OS) is predominantly used via the Graphical User Interface (GUI), however, several tools such as the Android Debug Bridge (ADB) allows the user to communicate with the Operating System using a command line interface (CLI).

- d) Outline **ONE** advantage that a CLI has over a GUI, and **ONE** advantage that a GUI has over a CLI. (2)
- e) One major component of the Android Operating System (OS) is security. Nonetheless, it is generally accepted that Android devices are more at risk of malware due to its open-source nature (a code that is designed to be publicly accessible).
 - i. Define malware. (2)
 - ii. Mention **TWO** types of locks used by Operating Systems (OS), on mobile devices to prevent unauthorised access. *Example: a pin number.* (2)
 - iii. Describe **TWO** other components of an Operating System (OS). (2)

(Total: 15 marks)

Question A3

A small local company named PORUNN was always skeptical in using web technologies for their business. This was mainly due to concerns on data security and privacy. In the past years, their company has grown considerably and they have employed an IT expert. One of the main duties will be to implement web technologies and assure the management about their safety and usefulness.

- a) This company's first task is to implement an Intranet and Extranet. Briefly describe the difference between Intranet and Extranet. (2)
- b) The management are still concerned about the explanation in part (a). This may be because they are associating the terms used in part (a) with the Internet. Briefly explain how the Internet differs from the Intranet and Extranet. (2)
- c) The next task is to convince the management in implementing an online shop. As such, it has been decided to register a domain name, and subscribe to a dedicated hosting server.
 - i. Define domain name. (1)
 - ii. Explain how the domain name is related to the Domain Name Server (DNS). (1)
 - iii. Mention **THREE** main considerations for choosing a website hosting server. (3)
- d) The management has agreed to register www.porunn.com.mt as their domain name. Mention which part of the domain name is considered as the Top-Level Domain (TLD). (1)

- e) The management is still concerned in implementing an online shop, mainly due to fear of cyber attacks. To put their mind at ease, briefly explain how the following attacks can be prevented or counteracted:
- i. viruses; (1)
 - ii. brute Force Attacks; (1)
 - iii. Denial of Service (DoS) attacks which is a malicious attempt to overwhelm a web property with traffic in order to disrupt its normal operations. (1)
- f) Prior to the process of creating the company's website, it was suggested that the website is built as mobile-friendly. Outline **TWO** advantages for implementing a mobile-friendly website. (2)

(Total: 15 marks)

Question A4

MATSEC have asked a number of students to create a very basic website. The following code snippet represents the website built by one of the students.

```

1.  <!DOCTYPE html>
2.  <html lang="en">
3.  <head>
4.      <title>Matsec Webpage</title>
5.  </head>
6.
7.  <body>
8.      <h2>Welcome to the Matsec Webpage</h2><br>
9.
10.     <p>This webpage will contain information about MATSEC such as:</p>
11.     <ul>
12.         <li>Exam Dates</li>
13.         <li>Past Papers</li>
14.         <li>Contact Information</li>
15.     </ul>
16.
17.     <p>It will also contain images related to MATSEC such as:</p>
18.     <ol start="5">
19.         <li>Logos</li>
20.         <li>Examination Centres</li>
21.         <li>Staff Photos</li>
22.     </ol>
23.
24.     <!-- image from local device -->
25.     
26.     
27.     <br><hr><br>
28.
29.     <a href="page2.html">Page 2</a>
30.
31. </body>
32. </html>

```

Question continues on next page.

- a) Define the tags <h2>,
, and <p>. (3)
- b) Outline the difference between the tags and . (2)
- c) How would the HTML code from line 17 to 22, be displayed on a browser? (2)
- d) Line 25 and Line 26 have the "alt" attribute. Identify the function this has. (1)
- e) Line 25 and Line 26 are showing the same image. What is the difference between these two lines of code? (1)
- f) Explain what is the main function of the "href" attribute on line 29. (1)
- g) The student forgot to create a hyperlink for the "Contact Us" page, called "contactus.html". Provide the HTML code to create this hyperlink. (2)
- h) The provided webpage looks very basic. This is because the student has forgot to link his external CSS called "styles.css". Provide the HTML code to create this link. (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) Analyse the Java code snippet below.

```

1. class Loops{
2.     public static void main(String[] args) {
3.         final int rows = 5;
4.
5.         for (int i = 1; i <= rows; ++i) {
6.             for (int j = 1; j <= i; ++j) {
7.                 System.out.print(j + " ");
8.             }//end of inner loop
9.
10.            System.out.println("");
11.
12.        }//end of outer loop
13.    }
14.}

```

- i. What is the output of the code? (5)
- ii. Define the term used for a loop inside another loop. (1)
- iii. Mention **TWO** other loops that are used in the JAVA programming language. (2)
- iv. Specify the line number where the declaration of a constant occurs. (1)
- v. Mention the variable which store the column value/s. (1)
- b) HTML (HyperText Markup Language) is a standard markup language used for creating and structuring content on the web.
- i. Mention **TWO** benefits of using the alt attribute in HTML. (2)
- ii. Create the required code to include an external stylesheet in an HTML document. (1)
- iii. What is the purpose of the <meta> tag in HTML? Give an example of when you might use it. (2)

c) SQL (Structured Query Language) is a programming language designed for managing and manipulating data in a relational database.

```
SELECT first_name, last_name, email
FROM users
WHERE country = 'Malta'
ORDER BY first_name;
```

- i. What is the purpose of the "SELECT" statement in this SQL code? (1)
- ii. Explain the above SQL statement. (2)
- iii. Modify the above code to select ALL fields in the table users while ORDERING them by the last_name field. (2)

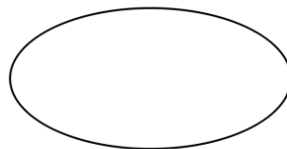
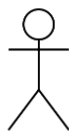
(Total: 20 marks)

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

Question B2

A company that specialises in producing shoes, has been using an outdated system for storing clients data. The Systems Analyst has been offered the task of managing the development of a new system.

- a) Prior to the start of the project, the Systems Analyst has decided to consider several feasibility studies. Describe the **FOUR** TELOS: feasibility studies that should be considered. (4)
- b) Suggest what should be the next step, if the result of the feasibility study report shows that many outcomes are unattainable. (1)
- c) One of the main tasks in the Analysis stage is to collect information about the current system. List **THREE** methods for collecting information. (3)
- d) Outline **ONE** advantage and **ONE** disadvantage for each of the methods listed in part (c). (6)
- e) In the design stage you are still undecided whether to a top-down or bottom-up approach. Differentiate between these **TWO** structured techniques. (2)
- f) The following are diagrammatic representations used in a Use Case Diagram, which is one of the UML models used in the design stage. List the name of the following **TWO** elements. (2)



g) The Use Case Diagram makes use of the <<include>> and <<extend>> relationship. Outline the differences between these relationships. (2)

(Total: 20 marks)

Please turn the page.

Question B3

Object-Oriented Programming (OOP) is a method of structuring a program by bundling related properties and behaviors into individual objects.

- a) List the **FOUR** principles associated with OOP. (4)
- b) For **each** principle listed in part (a), give a real life example where it could be used. (4)
- c) In relation to one of the principles mentioned in part (a), describe the different types of Access Modifiers. (2)
- d) Differentiate between the **FOUR** types of Access Modifiers. (4)
- e) The essential methods getters and setters are utilised regularly in OOP. Provide sample code in JAVA which highlights the use of these methods. It is also expected that you provide the sample code for the MAIN method, in relation to the getters and setters. (6)

(Total: 20 marks)

Question B4

- a) Mention **ONE** programming language used in **each** of the 1st Generation Language, 2nd Generation Language, 3rd Generation Language, and 4th Generation Language. (4)
- b) The 1st Generation Language and 2nd Generation Language are considered as Low Level Languages (LLL), while the 3rd Generation Language and 4th Generation Language are considered as High Level Languages (HLL). Outline **TWO** differences between LLL and HLL. (2)
- c) Define the purpose of a Language Translator. (1)
- d) Outline **TWO** differences and **ONE** similarity between the compiler and the interpreter. (3)
- e) In your cover letter you have specified that you are proficient in using the Object-Oriented programming paradigm. List **THREE** more types of programming paradigms. (3)
- f) Compare and contrast **TWO** of the programming paradigms listed in part (e). (4)
- g) Explain modularity in relation to programming. (1)
- h) Mention **TWO** advantages of modularity in programming. (2)

(Total: 20 marks)