



SUBJECT:	Information Technology
PAPER NUMBER:	I
DATE:	29 th August 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.

Fly-Bye is an online flight booking company that uses an Information System (IS) in its daily operations. The management of Fly-Bye has identified the need for developing new software to improve the operations of the company.

- a) Define the term IS. (1)
- b) Outline **THREE** possible reasons why Fly-Bye uses an IS. (3)
- c) Outline **THREE** issues that could have led to the need of a new system. (3)
- d) The software company that shall be developing the new software for Fly-Bye shall be using the systems life cycle model to ensure that it develops a high-quality software for Fly-Bye. List and describe the **SEVEN** main stages that are involved in the system life cycle. (7)
- e) Discuss **TWO** potential issues that might arise after implementation of the new IS within Fly-Bye. (2)
- f) Discuss **TWO** aspects for a successful IS implementation. (2)
- g) Discuss **TWO** potential ways how Fly-Bye might use data mining to attract more customers. (2)

(Total: 20 marks)

Please turn the page.

Answer TWO questions from Questions A2, A3 and A4.

Question A2

This question is about number representation.

- a) Explain why the following number representations are used:
- (i) binary; (1)
 - (ii) decimal; (1)
 - (iii) hexadecimal. (1)
- b) Convert 256_{10} into binary. Show your working. (1)
- c) Explain what happens if an 8-bit system is used to store your answer to part (b). (1)
- d) Explain **ONE** mitigation to avoid the occurrence given in your answer to part (c). (1)
- e) Convert 10011001_2 into decimal. Show your working. (1)
- f) Convert 10011001_2 into hexadecimal. Show your working. (2)
- g) Convert AB_{16} into decimal. Show your working. (2)
- h) Convert the decimal fraction 0.5_{10} into binary. Show your working. (2)
- i) Add the binary number 1111_2 to the binary number 101_2 . Show your working. (1)
- j) Provide the 8-bit two's complement for the decimal number 35_{10} . Show your working. (3)
- k) Differentiate between fixed point representation and floating point representation. (2)
- l) Define normalisation within the context of number representation. (1)

(Total: 20 marks)

Question A3

The-Movie-Recommender is a website that recommends movies to its users based on each user's ratings of watched movies. The-Movie-Recommender makes use of a database to store relevant information.

- a) Explain what can happen if The-Movie-Recommender does **not** carry out appropriate data validation and verification. (2)
- b) Discuss **TWO** categories of common errors that might affect The-Movie-Recommender if it does not carry out the appropriate data validation and verification. (2)
- c) Differentiate between data validation and verification. (2)

- d) The Movie_Title attribute stores the titles of movies within the database. Outline why data validation is difficult for the Movie_Title attribute. (2)
- e) Outline **THREE** types of validation checks that The-Movie-Recommender should carry out. (3)
- f) The user interface of The-Movie-Recommender includes mainly graphics, rather than text. Outline **TWO** advantages and **TWO** disadvantages of this style of interface. (4)
- g) The-Movie-Recommender gives a lot of importance to the user experience when designing its software. Define user experience. (1)
- h) Outline **ONE** potential reason why The-Movie-Recommender gives a lot of importance to user experience. (1)
- i) State **ONE** way in which The-Movie-Recommender can improve the user experience. (1)
- j) Outline **ONE** emerging technology that might be used by The-Movie-Recommender to enhance its user experience. (2)

(Total: 20 marks)

Question A4

A training centre will be setting up a new training room with a network of 12 computers. Each computer will be equipped with a 1TB hard-drive and 16GB of random-access memory (RAM).

- a) Outline why a hard-drive is required on the computers. (2)
- b) Outline **ONE** benefit and **ONE** drawback for the training centre if it chooses to use solid-state-drives (SSD) instead of the traditional hard-disk-drives (HDD). (2)
- c) Outline why random-access memory is required on the computers. (2)

The training centre shall allow instructors and trainees to use their own laptops in the training room by adding wireless networking.

- d) Outline **ONE** advantage to the training centre of implementing wireless networking. (1)
- e) Outline **ONE** disadvantage to the training centre of implementing wireless networking. (1)
- f) Outline **TWO** factors that affect the speed of data transmission on the wireless network in the training room. (2)

It is very important for the training centre to be protected against malicious attacks.

- g) Outline **TWO** possible authentication methods that can be used by the training centre. (2)

Please turn the page.

- h) Outline **TWO** types of software that the training centre can use to protect against malicious attacks that can take place over the Internet. (2)
- i) Outline how the training centre can protect highly confidential files in transit. (2)
- j) Outline **TWO** physical systems that the training centre can use to protect against malicious attacks such as robberies. (2)

Some instructors choose to store their training material on cloud storage.

- k) Give **ONE** advantage and **ONE** disadvantage to the instructors who use cloud storage. (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 managers of a healthy food company prefer to issue instructions to their employees in a verbal manner. However, they recently encountered a problem. One of the employees is claiming that his manager verbally instructed him to delete some files from the system. On the other hand, the manager is claiming that she never gave such an instruction.

- a) Define the term verbal communication. (1)
- b) Mention **TWO** disadvantages of verbal communication in relation to the scenario provided in this question. (2)
- c) Mention **TWO** possible reasons why the managers of the healthy food company prefer verbal communication. (2)
- d) Mention **TWO** technologies which might be used by the healthy food company for communication purposes. (1)
- e) Provide **ONE** advantage for **each** technology mentioned in part (d). (2)

One of the company's employees suggested the utilisation of visual communication mechanisms, instead of verbal ones.

- f) Mention **FOUR** examples of visual communication mechanisms which might be used by the company. (2)
- g) Describe **TWO** technologies related to visual communication which might be beneficial for the company. (2)
- h) Provide **ONE** advantage for **each** technology mentioned in part (g). (2)
- i) Mention **ONE** other type of communication mechanisms which the company might opt for, apart from verbal and visual communication. (1)

(Total: 15 marks)**Answer any TWO questions from B2, B3 and B4.**

Question B2

Two childhood friends recently graduated and decided to open a new printing company. They are aware that they need Sales and Marketing departments. However, they are still unsure as to what other functional areas are required in their company.

- a) Explain why the Sales and Marketing departments are essential by providing a brief description of the work expected from **each** department. (2)
- b) Mention **FOUR** other functional areas which might form part of this new printing company. (2)
- c) Explain the work carried out by **each** functional area mentioned in part (b). (4)
- d) Mention **ONE** type of personnel usually associated with **each** functional area mentioned in part (b). (2)
- e) Describe the main duties and responsibilities of **each** personnel mentioned in part (d). (4)
- f) One of the friends suggested the development of an organisational chart. Define the term organisational chart and explain why it is important. (1)

(Total: 15 marks)

Question B3

A gaming company has been operational for the past two years. Recently, the employees of the company noticed that some of their data leaked to their competitors. Although they were aware of possible computer-based crimes, they had never experienced their effects until recently.

- a) Define the term computer-based crime. (1)
- b) Apart from data leakages, explain **FOUR** possible categories of illegal practices which the gaming company might experience. (4)
- c) Why did computer-related crimes increase with the introduction of the Internet? (2)
- d) Explain why it would be beneficial for this gaming company to have a corporate information security policy. Include at least **FOUR** valid reasons in your answer. (4)
- e) Describe **FOUR** sections which the gaming company might include in their corporate information security policy. (4)

(Total: 15 marks)

Question B4

A marketing company encourages continuous learning. It frequently offers e-learning opportunities to its employees to further enhance their knowledge in their area of work. The company usually uses synchronous e-learning techniques.

- a) Define the term e-learning. (1)
- b) Define the term synchronous e-learning techniques. (1)

Please turn the page.

- c) Provide **TWO** examples of synchronous e-learning techniques which the marketing company might use. (2)
- d) Explain **ONE** other type of e-learning technique which the marketing company might opt for, apart from synchronous communication. (1)
- e) Provide **TWO** examples of communication that the marketing company might use if it adopts the technique mentioned in part (d). (2)
- f) Provide **THREE** possible reasons why the marketing company uses e-learning instead of traditional learning techniques. (3)
- g) Provide **THREE** disadvantages of e-learning that the marketing company might encounter. (3)
- h) Define the term Learning Management System. (1)
- i) Provide **ONE** example of a Learning Management System which might be used by this marketing company. (1)

(Total: 15 marks)



SUBJECT:	Information Technology
PAPER NUMBER:	II
DATE:	30 th August 2022
TIME:	9:00 a.m. to 12:05 a.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 take-away shop uses a specific, tailor-made application software for billing and accounting purposes. The owner of the shop prefers using this application as opposed to other applications presently available on the market.

- a) Apart from the specific application software being utilised by the take-away shop, mention **TWO** other types of application software. (1)
- b) Describe **each** type of software mentioned in part (a). (2)
- c) Mention **TWO** advantages of specific application software, which might have influenced the owner's decision to opt for this type of software. (2)
- d) Mention **TWO** disadvantages of specific application software. (2)
- e) Mention **TWO** other scenarios, apart from the take-away shop, where specific application software might be required. (2)

The owner of the take-away shop evaluates the correct functioning of his software via a set of evaluation criteria.

- f) Mention **FOUR** examples of evaluation criteria which the take-away shop owner might use. (2)
- g) Describe each of the **FOUR** evaluation criteria mentioned in part (f). (4)

(Total: 15 marks)

Please turn the page.

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

Question A2

A new management team took over the running of a private healthcare centre. The old management used a combination of manual filing systems and traditional file-based approaches to store data. However, the new management scrapped this idea and encouraged the use of a relational database system.

- a) Define the term traditional file-based approach and provide **ONE** example of a traditional file-based approach which might have been used by the old management. (2)
- b) Differentiate between a traditional-file based approach and a manual filing system. (2)
- c) Mention **TWO** limitations of the traditional file-based approach used by the old management. (2)
- d) Support the decision taken by the new management, by listing **THREE** advantages of relational database systems over traditional filing systems. (3)
- e) Mention **FOUR** issues that the new management should consider when adopting a relational database. (2)
- f) Describe **each** issue mentioned in part (e). (4)

(Total: 15 marks)

Question A3

A local library is keeping track of all its book loans. The table below is one of the tables being kept by the library and is presented in 1st Normal form. A new librarian interested in computers and IT suggested the normalisation of such table.

Table 1: Library

CustomerID	Designation	Full Name	Address	Name Of Book Rented
1	Mr	Joe Borg	22, Main Street Mosta	Ulysses
2	Ms	Rita Pace	77, St Joseph Street Sliema	The Great Gatsby
3	Ms	Mary Abela	65, St Mary Street Mellieha	Don Quixote

- a) Define the term normalisation. (1)
- b) Normalise the table presented above into 2nd and 3rd normal form. (6)
- c) Mention **TWO** different data types used in Table 1: Library. For **each** data type, list **all** the fields that have that data type. (2)
- d) Write an appropriate SQL statement which might be used by the librarians to extract all the names of customers who have loaned a book from the library (Use *Table 1: Library* as your main source). (2)

- e) Write an appropriate SQL statement which the librarians should use to list in ascending order the names of all books which have been loaned (Use *Table 1: Library* as your main source). (2)
- f) The library's database is stored as a centralised database system. Explain the term 'centralised database' and differentiate this from 'distributed database systems'. (2)

(Total: 15 marks)

Question A4

An engineering company encourages its employees to use the Internet in their day-to-day operations. Most employees have the misconception that the Internet refers solely to the World Wide Web (WWW).

- a) Mention **TWO** other Internet utilities apart from the WWW which the company might use. (1)
- b) For **each** utility mentioned in part (a):
- i. describe its purpose in relation to the given scenario; (2)
 - ii. highlight **TWO** of its features; (4)
 - iii. list **TWO** advantages; (4)
 - iv. list **TWO** disadvantages. (4)

(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) This question part contains Java related questions. The following is a code snippet in the Java programming language.

```

1. public class P2_Sept22{
2.
3.     public static void main(String []args){
4.
5.         int number1 = 5;
6.         int number2 = 3;
7.
8.         int sum = number1 + number2;
9.         int average = sum/2;
10.
11.        System.out.println("Sum is " + sum);
12.        System.out.println("Average is " + average);
13.
14.    }
15. }
```

- i. What is the output of the above code? (1)

Please turn the page.

- ii. Specify the line number where a class is declared in the above code. (1)
- iii. Specify the line number where a method is declared in the above code. (1)
- iv. Add code to the above program so that it also outputs the product (multiplication) of `number1` and `number2`. (2)
- v. Modify the above code so that the program outputs the sum and average of **THREE** numbers. (3)
- vi. Modify the above code so that `number1` is inputted by the user from a keyboard while the program is running. (2)

b) This question part is about databases. Consider the SQL statement below.

```
SELECT itemCode, itemName, itemPrice
FROM items WHERE itemPrice BETWEEN 0 and 100;
```

- i. Explain the above SQL statement. (2)
- ii. Modify the above code to sort the output by `itemPrice` in ascending order. (1)
- iii. What is the use of a primary key in databases? (1)
- iv. What is the primary key in the above statement? (1)

c) This question part is about HTML. Consider the HTML code below.

```
1. <html>
2.     <head>
3.         <title>Address</title>
4.     </head>
5.     <body>
6.         <address>
7.             <p><a href="mailto:holmes@agents.org">Send mail</a></p>
8.             <p>221B Baker Street, London.</p>
9.         </address>
10.    </body>
11. </html>
```

- i. Define the term HTML. (1)
- ii. Explain what the code in line 7 does. (1)
- iii. Explain any **THREE** tags in the code above. (3)

(Total: 20 marks)

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

Question B2

This question is about generations of programming languages, and programming paradigms.

- a) Outline **THREE** differences between natural and formal languages. (3)
- b) Explain what is the purpose of language translators. (1)
- c) Mention and outline **THREE** types of language translators. (3)
- d) Provide **ONE** advantage and **ONE** disadvantage for **each** of the language translators given in your answer to part (c). (3)
- e) Outline **THREE** advantages of high-level languages when compared to assembly language. (3)
- f) Explain the following programming paradigms:
 - i. Imperative programming; (1)
 - ii. Functional programming; (1)
 - iii. Declarative programming; (1)
 - iv. Object-oriented programming. (1)
- g) Provide **TWO** suitable use cases for object-oriented programming. (2)
- h) Mention **ONE** example of an object-oriented programming language. (1)

(Total: 20 marks)

Question B3

A student is trying to write a program that implements the bubble sort algorithm in ascending order. The program is executing properly, however it is not producing the correct result.

- a) Show how the bubble sort algorithm should sort the following array in ascending order. Show **all** the steps. (6)

5	1	4	2	8
---	---	---	---	---

- b) Draw a flowchart that shows how the bubble sort algorithm works for any array length. (6)

Debugging is an important part of determining why the student's program is not working as it should.

- c) Discuss whether the student's error is a syntax error, giving at least **ONE** reason for your answer. (2)

Please turn the page.

- d) Discuss whether the student's error is a run-time error, giving at least **ONE** reason for your answer. (2)
- e) Discuss whether the student's error is a logical error, giving at least **ONE** reason for your answer. (2)
- f) Explain **ONE** facility that the student can use for debugging. (2)

(Total: 20 marks)

Question B4

A car rental company has approached a software development company to develop new system software to use in its daily operations of car rental. Before the software is designed, it is important that the software development company understands the problem very well.

- a) Outline **TWO** ways how the system analyst can acquire information about the problem. (2)

The software developers shall carry out a technical feasibility study.

- b) Explain what a technical feasibility study is. (1)
- c) Outline **TWO** other types of feasibility studies that should be carried out. (2)

While identifying the system and information requirements, the software development company made use of Data Flow Diagrams (DFD).

- d) Explain what a DFD is. (1)

Top-down and bottom-up are two types of approaches to the system design.

- e) Outline **THREE** criteria that the software development company should consider while working on the design of the new system. (3)
- f) Differentiate between top-down and bottom-up approaches. (2)
- g) Outline **ONE** advantage and **ONE** disadvantage of **each** of these two approaches. (4)
- h) Explain the following terms related to system testing:
 - i. dry run; (1)
 - ii. black box testing; (1)
 - iii. white box testing. (1)

It is important that the new system can be easily maintained.

- i) Outline **TWO** ways how the software development company can ensure that the system is easy to maintain. (2)

(Total: 20 marks)