



SUBJECT:	Information Technology
PAPER NUMBER:	I
DATE:	22 nd June 2021
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 THREE questions from this section.

Question A1

Setting up a new network for an organisation can be a difficult task, since important decisions need to be taken. If the wrong decision is taken, it can be expensive to correct later on. An international company which has recently relocated its offices to Malta needs to set up a network for their operations.

- a) Define the meaning of this term: physical topology of a network. (1)
- b) Provide a sketch of **TWO** physical network topologies that can be used. (2)
- c) This international company has relocated 350 employees to Malta; which all will be housed in the same building. Should the network be based on a peer-to-peer system or on a client-server methodology? Give **TWO** valid reasons for your answer. (1, 2)
- d) Outline **THREE** communications media that can be used in order to connect a local network. The outline should include the typical bandwidth, distance supported before degradation occurs as well as any anti-interference methods used. (4,4,4)
- e) There is a possibility that this company acquires a building 50 meters away from the main offices. Explain **ONE** method that the company can use to connect these two buildings to the same LAN. Your explanation should include **ONE** benefit and **ONE** drawback for the method identified. (2)

(Total: 20 marks)

Please turn the page

Question A2

A new developer has joined a software development house and is placing a lot of emphasis and thought on HCI.

- a) Explain the term HCI. (2)
- b) Identify and describe **TWO** psychological factors that are needed to design good software. (4)
- c) Name **TWO** types of memory associated with HCI and explain the relevance of **ONE** of them on software design. (3)
- d) Outline **TWO** emerging technologies which can be used to enhance HCI. (4)
- e) The software development house has been contracted to develop the interface of a digital music player. The interface is being designed to support elderly users. It is being suggested that the interface is developed to be text-based. Give **TWO** advantages and **TWO** disadvantages for this selection. Mention **ONE** other possible option for the design of this interface. (5)
- f) List **TWO** advantages of using a CLI in an operating system. (2)

(Total: 20 marks)

Question A3

A local startup have been in the ICT business for 5 years. The number of employees has grown year after year and the company has decided to undergo an exercise to improve its training and ethics culture.

- a) Describe **TWO** factors that need to be considered in ethical decision making. (4)
- b) At this local startup, the guidelines to arrive at taking ethical decisions are somewhat informal. Outline **TWO** risks of using informal guidelines for such decisions. What exercise should the company undertake in order to reduce such risks? (5)
- c) What results should the company expect when training its senior management, middle management and staff? Discuss in terms of:
 - i. efficiency; (2)
 - ii. workplace environment; and (2)
 - iii. staff retention. (2)
- d) Outline **ONE** method of training that can be used by this company. (1)
- e) Part of the training will be related to project management, since the projects embarked upon are becoming ever more complex. Explain **TWO** aims for carrying out project reviews. (4)

(Total: 20 marks)

Question A4

An interior design company is looking to purchase a computer in order to prepare 3D designs of interiors for their customers. They need a computer to generate the 3D design and also to be able to explore the 3D designs with their clients.

- a) Which category of computer is ideal for this company? (1)
- b) Which secondary storage device is ideal in order to maximise the retrieval speed? Mention **ONE** disadvantage for the identified device. (2)
- c) Explain **ONE** type of backup strategy that can be used by this company. (2)
- d) The company would like a system whereby the files created on one drive are automatically copied to an onsite secondary drive. What is this type of system called? What are the hardware requirements for such a system? (3)
- e) Outline **FOUR** concepts that should be part of the company's disaster planning. (4)
- f) The security of the data on the company's computers is of utmost importance. Explain **FOUR** strategies that can be used in order to enhance the authorisation aspect. (8)

(Total: 20 marks)

SECTION B: Human Communication and Business Organisations

Answer THREE questions from this section.

Question B1

- a) Explain the notion of Information Security. (2)
- b) Explain computer-based crime. (2)
- c) Mention **ONE** practice which has been introduced to combat computer-based crimes. (1)
- d) Mention and explain **TWO** illegal practices in relation to computer systems. (4)
- e) Define the term plagiarism. (2)
- f) What is the role of a corporate information security policy within an organisation? (1)
- g) Mention **THREE** factors which might be included in an information security policy. (3)

(Total: 15 marks)

Question B2

- a) What is e-business? (1)
- b) Mention **TWO** advantages and **TWO** disadvantages of e-business with respect to the customers. (4)
- c) Explain the difference between pure and partial e-business. (2)
- d) What is e-learning? (1)
- e) What are Learning Management Systems? (2)
- f) Provide **ONE** example of Learning Management Systems. (1)
- g) Mention **TWO** advantages and **TWO** disadvantages of e-learning. (4)

(Total: 15 marks)

Please turn the page

Question B3

A technological company has decided to launch a new product. The top management has decided to advertise this new product through the use of visual communication mechanisms.

- a) Mention **FIVE** visual communication mechanisms which can be used. (5)
- b) Specify **TWO** related technologies which can be utilised for visual communication. For **each** technology specified: (2)
 - i. specify **ONE** main feature; (2)
 - ii. mention **ONE** advantage. (2)
- c) Mention **FOUR** photo editing techniques which can be used on visual images to enhance its effectiveness. (4)

(Total: 15 marks)

Question B4

A group of three graduates have decided to develop a new betting company. They realised that there are multiple functional areas which should be in place for the proper functioning of such a company.

- a) Mention **THREE** functional areas which should exist in such a company. Subsequently, explain the work carried out by **each** function. (9)
- b) For **each** functional area mentioned in part (a), specify **ONE** personnel related to that area and explain the main duties of this role. (6)

(Total: 15 marks)



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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 THREE questions from this section.

Question A1

A database within a private education provider has the following schema:

STUDENT (**StudID**, Name, Surname, Course, Mark, ExamDate)

- Write an SQL statement to show the name and surname of the students following the Computing course and who obtained more than 75% in the examination. Sort the output by Mark in descending order. (3)
- List the correct data types for **each** of the fields in the STUDENT relation. (3)
- What is the purpose of normalisation? (1)
- The relation above assumes that a student will only follow one course. Provide an updated set of relations in third normal form, which would allow one student to undertake more than one course. (4)
- Distributed database systems can be defined as the process of distributing a database over several computers. Explain **TWO** different methods of data management in distributed database systems. (4)

(Total: 15 marks)

Question A2

In recent years customers have started to expect that any work started on their desktop computers can be easily continued to be worked upon on their other devices, even if such devices are from different manufacturers, run different operating systems and do **not** have the same instruction set.

- a) How can an application be developed in a way that is portable between different devices? (2)
- b) Explain **TWO** items that are required in order to offer customers the possibility of data portability. (2)
- c) Microsoft have developed OLE in order to make it easier for developers to create applications that can export and import data from third party applications. What are **TWO** drawbacks associated with linking to an object? Under which circumstances would embedding be preferred? (4)
- d) It is generally accepted that compiled languages execute faster than interpreted languages. Explain why this is generally true. Also, provide an example where it would be preferable to develop an application using an interpreted language. (4)
- e) Data privacy and security have been of great concern in the past years. Explain the role of the operating system in providing security to its users. (3)

(Total: 15 marks)

Question A3

a) As of June 2020 there are 1511 active TLDs. What is the purpose of having such a large active number of TLDs? (2)

```

1. <html>
2. <head>
3.   <title>Welcome to my page</title>
4.   <link rel="stylesheet" type="text/css" href="styles.css" />
5. </head>
6.
7. <body>
8.
9.   <ul class="navbar">
10.    <li><a href="index.html">Home page</a></li>
11.    <li><a href="products.html">Products</a></li>
12.    <li><a href="about.html">Abouts Us</a></li>
13.    <li><a href="links.html">Links</a></li>
14.  </ul>
15.
16.  <!-- Main content -->
17.  <h1>Welcome to my shop.</h1>
18.
19.  <p>This page will be updated with information about the shop</p>
20.
21.  <p>I will also add more images of products being sold</p>
22.
23.  <p>Even more coming soon</p>
24.
25.  <p>Last updated 5 April 2021</p>
26.
27. </body>
28. </html>

```

Figure 1

- b) Based on the code shown in Figure 1, write a line of code that provides:
A link to the page contacts.html, with the text "Contact Us" (3)
- c) After which line should the code in part (b) be inserted? (1)
- d) Provide HTML code to insert an image called logo.jpg on line 18. (2)
- e) What is the purpose of the code in line 4? (2)

Questions continue on next page

- f) Provide HTML code for an external link. (1)
- g) Outline the visible changes that would occur if the code on lines 9 to 14 is changed as per Figure 2. (2)

```

9.     <ol class="navbar">
10.    <li><a href="index.html">Home page</a></li>
11.    <li><a href="products.html">Products</a></li>
12.    <li><a href="about.html">Abouts Us</a></li>
13.    <li><a href="links.html">Links</a></li>
14.    </ol>

```

Figure 2

- h) Outline **TWO** ways how JavaScript can enhance the user experience on a website. (2)

(Total: 15 marks)

Question A4

- a) What is the main aim of a software translator? List **THREE** different types of translators. (4)
- b) When should reliability tests be used? (1)
- c) Explain the terms compression and defragmentation in the context of an operating system. (4)
- d) When customers are asked about which features they appreciate the most in the software they utilise, ease of use is always the most appreciated criteria. Explain **THREE** other criteria that can be used to evaluate software. (6)

(Total: 15 marks)**SECTION B: PROGRAMMING TECHNIQUES AND SYSTEM DEVELOPMENT****Answer the first question in this section and any other TWO questions.**

Question B1

- a) The following is a code snippet in the Java programming language.

```

1  public class JavaEx {
2
3      public static void Met() {
4          double[] arr = {
5              19, 6, 12.89, 16.5, 8, 200, 9, 13.7
6          };
7          double total = 0;
8
9          for (int i = 0; i < arr.length; i) {
10             total = total + arr[i];
11         }
12
13         double answer = total / arr.length;
14
15         System.out.println("_____ ", answer);
16     }

```



```

17
18     public static void main(String[] args)
19     { ..... }
20 }

```

- i. Insert appropriate text in line 15 (within the inverted comments) to explain what the algorithm is doing? (1)
- ii. Specify the line number where the declaration of a method occurs in the above code. (1)
- iii. Specify the line number where the declaration of a class occurs in the above code. (1)
- iv. The code snippet above contains **ONE** mistake. Identify the mistake and write down the correct version. (2)
- v. Fill in the missing part of line 19 such that a new object of type *JavaEx* is created and the method *Met* is called. (2)
- vi. Create a new method called *MetString()* which stores the following four strings

Information, technology, computer, advanced

into an array and subsequently loops through the array to print them out on screen. (3)

b) The following is an SQL code snippet.

```
SELECT * FROM Station;
```

- i. Explain what the query displayed in the above code snippet does. (1)
 - ii. Add the required code to the query displayed in the above code snippet, so that only the stations whose 'stationID' is greater than 5 are returned. (1)
 - iii. Which SQL construct should be utilised if the result of the query is to be displayed in ascending order according to a particular column. (1)
 - iv. Select the *stationNumber* and *stationMaster* from the *Station* table and order the results ascendingly according to the *stationMaster* column (2)
- c) i. Write down the tag utilised in the following HTML code: `<h1>Hello</h1>` (1)
- ii. Mention and explain **TWO** other tags available in HTML. (4)

(Total: 20 marks)

Questions continue on next page

Question B2

- a) Explain the difference between a class and an object in object-oriented programming (OOP)? (2)
- b) When is the 'this' keyword utilised in OOP programming? (1)
- c) When is 'overloading of methods' required in OOP programming? (1)
- d) Provide a definition of the following terms in OOP and by making use of pseudocode or the Java programming language provide **ONE** example for each?
- i. Abstraction; (4)
 - ii. Encapsulation; (4)
 - iii. Inheritance; (4)
 - iv. Polymorphism. (4)

(Total: 20 marks)

Question B3

System testing is an important part of the system life cycle, particularly because it ensures that all components of a system are working as expected. A testing strategy should be developed both for individual components as well as for the system as a whole.

- a) Define the term dry run when utilised in the context of system testing. (1)
- b) What is the term utilised to describe tests done on:
- i. individual components of a system; (1)
 - ii. the system as a whole. (1)
- c) When testing the overall system, white box testing or black box testing can be utilised.
- i. Distinguish between both terms. (2)
 - ii. Mention **TWO** scenarios whereby white box testing would be more suitable and **ONE** scenario where it would be best to utilise black box testing. (3)
- d) i. Mention and explain **THREE** types of system testing. (6)
- ii. For **each** type of system testing mentioned in part (di), mention **ONE** advantage and **ONE** disadvantage. (6)

(Total: 20 marks)

Question B4

Following the implementation and testing stages in a system life cycle, maintenance and system evaluation should take place.

- a) Define the term system maintenance. (1)
- b) Why is technical documentation useful in system maintenance? (2)
- c) Mention and explain **THREE** features, which if available in a system, makes it easier to maintain. (6)
- d) Mention **FOUR** issues which might occur during system's maintenance, if the system is badly designed and documented. (4)
- e) Define the term system evaluation. (1)
- f) Mention and explain **THREE** criteria against which a system can be evaluated. (6)

(Total: 20 marks)