



SUBJECT:	<b>Information Technology</b>
PAPER NUMBER:	I
DATE:	14 <sup>th</sup> December 2020
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: INFORMATION SYSTEMS**

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

Question A1

**This question is compulsory. Answer all parts.**

- a) The majority of organisations base their decisions on internal data.
  - i. Give **TWO** examples of internal data sources. (2)
  - ii. Mention **TWO** external sources that can be tapped in order to enhance internal data with data from outside the organisation. (2)
- b) Provide a definition for Management Information System (MIS) and for expert systems. Highlight **TWO** differences between a MIS and an expert system. (4)
- c) Large amounts of data are pushing networks to their limits. A local company is looking into replacing all copper-based wires with fibre optics.
  - i. Mention **TWO** advantages that the company should experience after the switch to fibre optic cabling is complete. (2)
  - ii. A senior manager is recommending that the company switches to a wireless network instead. Mention **TWO** advantages and **ONE** disadvantage of wireless networks when compared to a wired network. (3)
- d) A software development house wants to provide the best environment for its employees.
  - i. Mention **THREE** health and safety issues that can be experienced by the software developers. (3)
  - ii. What **FOUR** measures can the company take to ensure that the occurrence of health and safety issues is reduced? (4)

**(Total: 20 marks)**

***Please turn the page.***

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

## Question A2

A junior network engineer has been tasked to explain to the senior management a highly technical report which was commissioned from an external networking specialist organisation. The report gives the recommendation to switch to asynchronous full-duplex communication.

- a) Asynchronous communication is slower than synchronous communication. Provide **THREE** reasons why this is the case. (3)
- b) How does asynchronous communication compare with synchronous communication with respect to expense and overall complexity? (2)
- c) The report highlighted the adequate use of broadband technology.
  - i. What is broadband technology? (1)
  - ii. For which scenario is narrowband technology recommended? (2)
  - iii. Mention the **THREE** different modes of transmission. (3)
- d) In order to implement cloud computing securely, it is being recommended in the report that protocols such as File Transfer Protocol (FTP) are disabled for guest account and guest networks.
  - i. Mention **THREE** other data transfer protocols that are widely used on the Internet. (3)
  - ii. Give **TWO** reasons why the recommendation to disable FTP was made. (2)
- e) As a small enterprise, the company is currently operating using a peer-to-peer network.
  - i. Give **TWO** advantages for switching over to a server-based system. (2)
  - ii. Explain **TWO** criteria one would consider when investigating whether the company should switch to a server-based system. (2)

**(Total: 20 marks)**

## Question A3

Following a data loss event, GIRD Ltd are looking at ways and means to avoid this from happening again in the future.

- a) Explain the **TWO** types of backup strategies that are available. Your explanation should include the advantages associated with each strategy. (4)
- b) The current plan is for the backup to be stored on a tape system, with the disks stored in the basement of the company.
  - i. How can the company balance data retention and restoration needs with the cost of extra storage media? How can this backup method be implemented? (4)
  - ii. Explain, by giving **ONE** adequate reason, **ONE** method by which the current plan can be improved. (2)
- c) Explain **THREE** security measures that the company can use to protect the physical backups on its premises. (6)
- d) Following an internal investigation, it has been found out that the data loss was due to professional negligence. Describe **TWO** strategies that the company can implement in order to reduce the chances of such malpractice. (4)

**(Total: 20 marks)**

Question A4

PolyFashion is a major importer of clothes. With millions of items being imported and put into stores every year, it is becoming a logistical nightmare for the management to have real-time information of the location of the clothing items.

- a) They have been looking into making use of some form of data capture in order to be able to easily identify and scan the clothing items at each location. Identify and explain **THREE** data capture methods that can be used by PolyFashion. For each method you are to include **ONE** advantage and **ONE** disadvantage. (12)
- b) One of PolyFashion's suppliers has asked for the introduction of Electronic Data Interchange (EDI). Provide PolyFashion with an overview of EDI. (2)
- c) One of the data capture software being tested represents the data internally using hexadecimal. PolyFashion require some conversions in order to make sure that everything is working as expected. All workings must be shown.
  - i. Convert 4A to decimal. (2)
  - ii. Provide the 6-bit two's complement for the decimal number 26. (2)
  - iii. Explain normalisation as defined in number systems. (1)
  - iv. Explain underflow. (1)

**(Total: 20 marks)**

**SECTION B: Human Communication and Business Organisations**

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

Question B1

**This question is compulsory. Answer all parts.**

- a) Mention **TWO** ways by which mechanical engineering has benefitted from the introduction of ICT. (2)
- b) E-Learning has paved the way for millions of people to study remotely.
  - i. How can e-learning courses be managed? (1)
  - ii. Provide the name of such a system. (1)
  - iii. Provide a disadvantage associated with e-learning (1)
- c) Europe's public administrations are increasingly defining e-government services around life events.
  - i. Define life events. (1)
  - ii. Provide **THREE** categories of services can be offered by e-government. (3)
- d) Satellite telephony and voicemail are two forms of communication which have reduced in their popularity. What are the features and advantages of these two forms of communication? (4)
- e) Mention **TWO** criteria that can determine the quality of data being collected. (2)

**(Total: 15 marks)**

***Please turn the page.***

Question B2

The Internet, and specifically its widespread adoption in Malta, provides new ways and forms by which organisations can communicate with their customers. Describe in detail **FIVE** Internet communication utilities that can be utilised.

**(Total: 15 marks)**

Question B3

As companies grow, they usually feel the need to represent their structure in an organisational chart.

- a) Identify the types of the **TWO** organisational charts in Figure 1 and Figure 2. (2)
- b) Describe **TWO** benefits that push companies to adopt the organisational structure in Figure 1. (2)
- c) Describe **TWO** challenges faced by companies adopting the structure in Figure 2. (2)
- d) Describe **FOUR** advantages that the structure in Figure 2 provides to a company adopting it. (4)

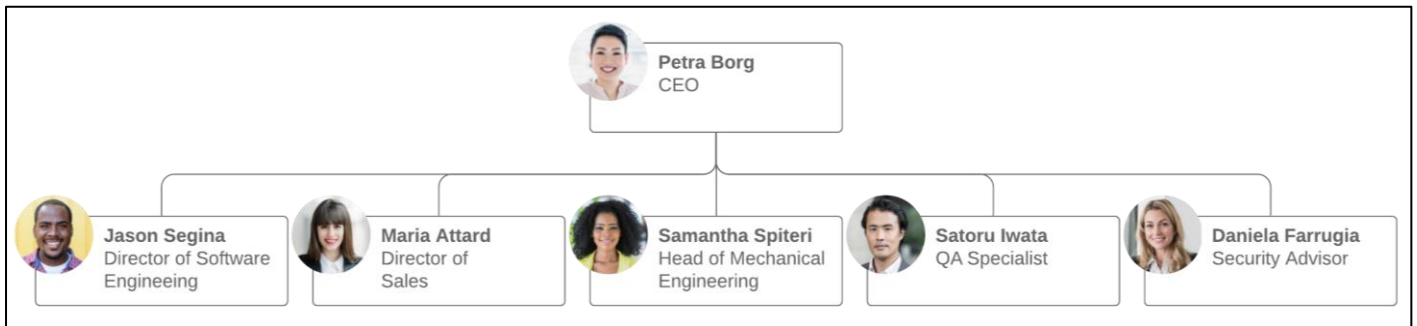


Figure 1 - Organisational Chart 1

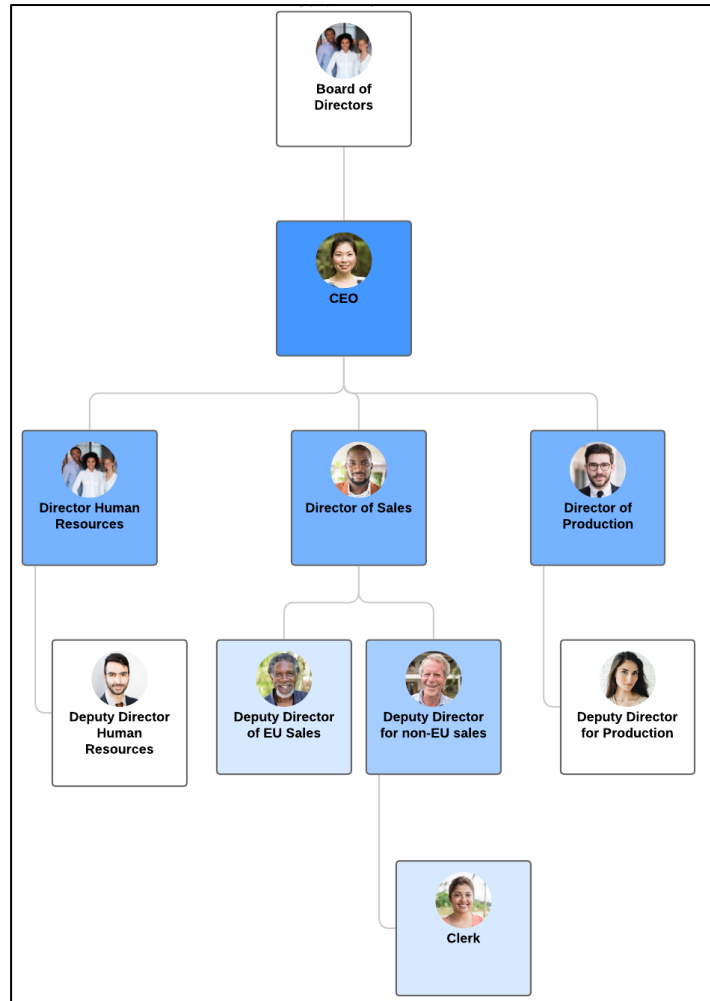


Figure 2 - Organisational Chart 2

- e) What are the aims and functions of the production department? (5)  
**(Total: 15 marks)**

Question B4

In 2018, Eric Lundgren was sentenced to 15 months in prison for copying and distributing software which could be downloaded for free from the computer manufacturer website. This case has brought to the forefront the current issues with software licences.

- a) Most distributed software can be categorised according to its license type. Describe the **TWO** main categories for software licencing. (4)
- b) What is the difference between software copyright and software licencing? (2)
- c) Explain how plagiarism is different from piracy. (2)
- d) A local organisation is used to making copies of the software they purchase for backup purposes. Is this practice legal? (1)

***This question continues on next page.***

e) The Maltese cybercrime unit within the police force was founded in 2003. During 2003 the cybercrime unit received 51 cases. This is in stark contrast with the 1080 cases dealt with during 2018.

i. What does cybercrime mean?

(1)

ii. Write a report detailing the main categories of cybercrime.

(5)

**(Total: 15 marks)**



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SUBJECT:	<b>Information Technology</b>
PAPER NUMBER:	II
DATE:	15 <sup>th</sup> December 2020
TIME:	4:00 p.m. to 7:05 p.m.

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

Question A1

**This question is compulsory. Answer all parts.**

- a) JavaScript provides a way to validate a form's data on the client's computer before sending it to the web server.  
Identify **TWO** functions generally performed by Form validation. (2)
- b) Write down the proper HTML tag for creating a hyperlink. (2)
- c) i. Name the **THREE** types of cardinality ratios. (3)  
ii. Using the proper notation, give an example of each type of constraint. (3)
- d) i. Identify **ONE** difference between integrated and software suites. (1)  
ii. Name **ONE** advantage and **ONE** disadvantage of each of the above mentioned suites. (4)

**(Total: 15 marks)**

***Please turn the page.***

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

Question A2

- a) One main function of an operating system (OS) is to execute and provide services for application software, which are used for specific tasks, such as manipulating text, graphics, and numbers. Name **THREE** such specific application software. (3)
  - b) A network operating system is one type of OS. Describe a typical application where a network operating system might be used. (2)
  - c) Give **ONE** example where a graphical user interface (GUI) is preferred over a command line interface (CLI) and **ONE** example where a CLI is preferred over a GUI. (2)
  - d) The MS-DOS operating system is an example of a CLI. However, today, most users prefer the graphical user interface (GUI). Name **THREE** operating systems which offer a GUI. (3)
  - e) Although not all operating systems have the same structure, they share similar OS components. Name **FIVE** of these components. (5)
- (Total: 15 marks)**

Question A3

- a) The distribution of data and applications has potential advantages over traditional centralised database systems. There are also disadvantages. Mention **TWO** disadvantages of a distributed database system. (2)
- b) Many companies are switching to distributed databases for a variety of reasons. Mention **TWO** reasons why distributed databases are becoming increasingly popular. (2)
- c) Consider a relation REPAYMENT with the following table:

REPAYMENT (borrower\_id, name, address, loanamount, requestdate, repayment\_date, repayment\_amount)

Assume that this table records the repayment of loans by the borrowers. A borrower may have more than one entry if he/she has paid several instalments.

Write SQL queries to achieve the following:

- i. List **all** the records with information on repayments from the borrower with id equal to 20, and where the repayment amount exceeds 1500. (4)
- ii. Find the total number of repayments made by each borrower. (4)



- d) SQL comprises of a DDL (Data Definition/Description Language) and a DML (Data Manipulation Language).

Refer to the following statement:

```
CREATE TABLE employee  
(name VARCHAR, id INTEGER);
```

Which of the above two languages does this statement belong to? Justify your answer. (3)

**(Total: 15 marks)**

#### Question A4

- a) Even though domain names use a set of words, letters, numbers, or a combination of all, what do they actually represent? (1)
- b) Identify the top-level domain (TLD) name in the following URL link. (1)  
<http://www.matsec.com/index.html>
- c) Skype is one type of Internet client applications. Name and describe **TWO** other applications. (4)
- d) i. Name and explain **TWO** types of malware. (4)  
ii. Name **TWO** solutions that help prevent malware from infecting a computer. (2)
- e) Identify the correct protocol for the following:  
i. The communication protocol used by the Internet. (1)  
ii. The protocol used for the World Wide Web. (1)  
iii. The protocol used to upload and download files. (1)

**(Total: 15 marks)**

***Please turn the page.***

**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.**

The following is an incomplete program snippet.

```

1. public class CheckOddEven
2. {
3.     public static void main(String[] args)
4.     {
5.         int number = 9;
6.         System.out.println("The number is " + number);
7.         if ( ..... ) //check if number is even
8.         {
9.             System.out.println( ..... );// display even
10.        }
11.        else
12.        {
13.            System.out.println( ..... );// display odd
14.        }
15.    }
16. }

```

- a) Insert the proper code in lines 7, 9 and 13. (4)
- b) Modify the code so that the number variable in line 5, is input from the keyboard rather than being a fixed value. (2)
- c) A group of *if* statements can also be written down with an alternative decision structure. Name and give a simple example (in code) of this decision structure. (4)
- d) You are required to create a conceptual data model of the data requirements for an IT Company. The company employs 20 instructors and accepts up to 50 trainees per training session. The Company offers IT courses, each of which is taught by one or more instructors. Each instructor may be assigned to teach a course or may be assigned to do research. Each trainee can only follow one IT course per training session. Draw an Entity Relationship(ER) diagram to represent the data requirements for the company. State any assumptions you make about the data. (5)

e) Consider the following snippet:

```
1.      <!DOCTYPE html>
2.      <html>
3.      <head>
4.      <meta charset="UTF-8">
5.      <title>IT ADV</title>
6.      </head>
7.      <body>
8.      <p> Syllabus</p>
9.      <p> Module 1, Module 2, Module 3 </p>
10.     </body>
11.     </html>
```

- i. Turn text on line 9 as an ordered list. (3)
- ii. Make text on line 8 a header. (2)

**(Total: 20 marks)**

#### Question B2

a) A class called Book is designed to model a book written by one author. It contains:

- Three private instance variables: name (String), author (of the class Author) and price (double);
- public getters/setters getName(), getAuthor(), getPrice(), setPrice().

A class called **Author** is designed to model the above book's author. It contains:

- Three private instance variables: name (String), email (String), and gender (char of either 'm' or 'f');
- public getters/setters: getName(), getEmail(), setEmail(), and getGender();

Draw a Class Diagram for the above two classes. (8)

b) Access modifiers in Java help to restrict the scope of a class, constructor, variable, method or data member.

Public is one type of access modifier. Name and explain, through the use of an example, any other **TWO** access modifiers. (4)

***This question continues on next page.***

c) Consider the following program:

```

1. public class SongB
2. {
3.     public static void sing()
4.     {
5.         System.out.println( "re");
6.     }
7. }
8. public class SongA extends SongB
9. {
10.    public static void sing()
11.    {
12.        System.out.println("do");
13.    }
14.}
15. public class Runner
16. {
17.    public static void main(String[] args)
18.    {
19.        SongA a = new SongA();
20.        SongB b = new SongB();
21.        a.sing();
22.        b.sing();
23.    }
24.}

```

- i. What is the output of this program? (2)
- ii. What concept is being implemented in line 8? (1)

d) File organisation deals with storing files in a certain order.

- i. Explain **TWO** differences between serial and sequential files. (2)
- ii. Name and explain **ONE** other type of file. (2)
- iii. What is the use of serialisation in Java? (1)

**(Total: 20 marks)**

### Question B3

- a) Give **FOUR** reasons why a feasibility study is important when designing a new system. (4)
- b) One approach to systems design is the top-down approach. Explain this approach. (2)
- c) Why is systems analysis required before computerising a business? (2)
- d) Outline **TWO** different ways in which training may be provided to users of a recently installed system. (2)
- e) List down **TWO** sections you would expect to find in the user guide of a new system. (2)

- f) A school is in the process of designing a new library system. List **THREE** important questions one would ask the school librarian in order to understand how the present system works. (3)
- g) A User Interface Design is important because it can make or break a software product. Describe **TWO** considerations that must be taken into account in user-interface design. (2)
- h) Data Flow Diagrams (DFDs) may be included in reports prepared by the system analyst.
- i. Why are DFDs required? (1)
  - ii. Name and draw **TWO** symbols used in DFDs. (2)
- (Total: 20 marks)**

#### Question B4

- a) Identify **THREE** differences between natural and formal languages. (3)
- b) i. What is the purpose of a language translator? (1)
- ii. A translator, in software programming terms, usually refers to a compiler, assembler, or interpreter. Name **ONE** feature for each of these translators. (3)
- c) Programming languages have been classified into several programming language generations. The first generation languages included *machine language*, the second included *assembly language* whilst the third included *high level* languages. However, *fourth generation* languages are the most commonly used today. Explain the words in italics. (4)
- d) Using Java as the programming language, give **ONE** example of:
- a reserved word;
  - a primitive data type;
  - a logical expression. (3)
- e) Name **THREE** programming errors commonly found in high-level languages and for each give an example. (6)
- (Total: 20 marks)**