
SUBJECT:	Information Technology
PAPER NUMBER:	I
DATE:	14 th May 2018
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 in this section and any other TWO questions.

Question A1

This question is compulsory. Answer all parts.

- a) Data security is crucial for any company storing sensitive customer data such as personal and financial details.
- Explain the difference between authentication and authorisation. (2)
 - List **THREE** authentication technologies. (3)
 - List **THREE** authorisation methods. (3)
 - How can the management of a company keep the data secure whilst sensitive data is transmitted over a network? (1)
 - In order to improve security, the management is considering the introduction of a very strict password strength policy. What would be **ONE** disadvantage of implementing such a policy? (1)
- b) Select the most appropriate processing mode for the following scenarios. Substantiate your answer by providing **ONE** valid reason.
- A local startup is looking into making the flying of drones easier and more automated. Their aim is that the drone would be able to fly to its pre-programmed destination with little to no human intervention. (2)
 - An established clothes retailer is opening shops in various localities across the island. A system is required whereby the entire stock can be checked from any shop. (2)
- c) A local theatre production company has accumulated a good number of costumes over the years. They are now looking into enumerating all their costumes so that they can rent them online. They are considering using either bar codes or RFID.
- Give **ONE** advantage and **ONE** disadvantage of using bar codes for this scenario. (2)
 - Give **ONE** advantage and **ONE** disadvantage of using RFID for this scenario. (2)
 - Which system would you recommend? Give **ONE** reason for your answer. (2)

(Total: 20 marks)

Answer any TWO questions A2, A3 and A4.

Question A2

This question is about networks in organisations.

- a) List **TWO** possible types of communication media you would use for setting up a computer network in a small office. Give **ONE** advantage and **ONE** disadvantage for each media. (6)
- b) List and explain **TWO** basic network topologies that are likely to be used in department offices. Give **ONE** advantage and **ONE** disadvantage of each. (6)
- c) A computer network can receive unwanted signals that disturb the proper communication taking place. What is this problem called? How does it affect the transmission of data over the network? (4)
- d) A financial organisation requires a secure protocol for transferring Internet related data. Which Internet protocol would you suggest to use? (1)
- e) List **ONE** disadvantage of using the protocol presented in part d). (1)
- f) What is bi-directionally computer transmission called? (1)
- g) List **ONE** advantage that cloud computing can offer to a multinational organisation. (1)

(Total: 20 marks)

Question A3

This question is about IS in organisations.

- a) A business organisation requires to acquire a software application for automating the risk management process. Describe a suitable type of application for this scenario. (2)
- b) Give **TWO** disadvantages of the application mentioned in part (a) above. (2)
- c) Where should large volumes of historic data be placed for analytical processing? (1)
- d) What operation has to be done to large data to focus on specific detailed information? (1)
- e) Briefly explain any **FOUR** issues that can cause data loss in a typical organisation. (4)
- f) List and explain any **FOUR** criteria that can be used to select a contingency plan. (4)
- g) Discuss **TWO** conditions where instructor based training is preferred to computer based training (CBT). (2)
- h) Good project management depends on many factors to be successful. Describe any **FOUR** important factors for successful project management. (4)

(Total: 20 marks)

Question A4

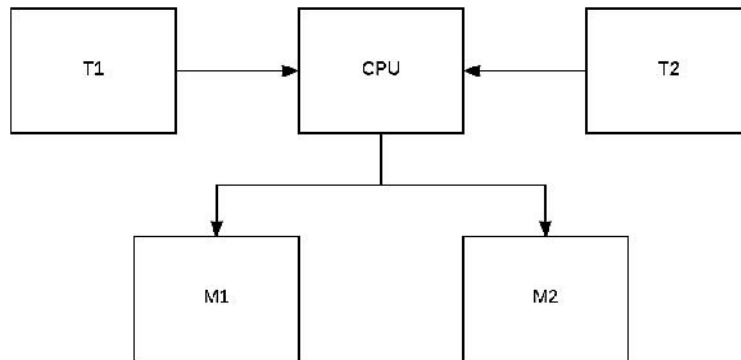
This question is about the basic components of a computer system.

"Registers are quite separate from the locations in main storage, although they can be similar in structure."

Adapted from Computer Science 5th ed. Author: C.S. French

- a) Define the term i) register and ii) data bus. (2)
- b) Briefly explain **ONE** advantage and **ONE** disadvantage of the use of registers in a computer system. (2)

- c) Describe the function of the following internal CPU registers:
- i. Memory Address Register (MAR); (2)
 - ii. Memory Data Register (MDR); (2)
 - iii. Current Instruction Register (CIR). (2)
- d) The following diagram represents the hardware overview of a new drone being developed. T1 and T2 are sensors that relay the altitude to the CPU. M1 and M2 are motors which the CPU subsequently uses to make sure that the drone does not crash.



- i. During initial testing, it was noted that the drone was reacting with a 10 second delay to changes in altitude. The sensors were reported to be working optimally and the CPU was operating at 100% usage. What could be the reason for this delay and how would you advise to solve this issue? (2)
- ii. In other tests, it was noted that the data received from the sensors T1 and T2 was being delayed. CPU was noted to be operating at 40% usage and the sensors were operating optimally. What could be the reason for this delay and how would you advise to solve this issue? (2)
- iii. Having solved the issues above, the company is now looking at storing the data being received by the CPU. They are looking for a storage device that is lightweight and stores data even when no power is being applied.
 - 1) Would you consider this to be a primary or a secondary storage? Give **ONE** reason for your answer. (2)
 - 2) Which storage device would you recommend? Give a reason for this. (2)
 - 3) Give **TWO** reasons why PROM not be suitable for the above scenario. (2)

(Total: 20 marks)

SECTION B: Human Communication and Business Organisations

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

Question B1

This question is compulsory. Answer all parts.

- a) For the scenarios described below, suggest which would be the best type of communication technology to use. Give **ONE** valid reason for each suggestion.
- i. A modern company requires to communicate to all its employees about the setting up of new work policies. (2)
 - ii. Managers at different locations are to meet up and discuss an agenda informally. (2)

Questions continue on next page

- b) A new IT system is being developed for a start-up company and this requires the company to have a particular organisation setup.
- (i) Suggest **TWO** possible organisational setups that could be useful for the company. (2)
 - (ii) Give **ONE** valid reason for each suggested setup mentioned in part (i). (2)
- c) Computer fraud at company level is an increasingly worrying problem. List any **TWO** policies that a company could introduce to reduce this type of fraud. (2)
- d) E-Government requires the provision of services to users. List any **TWO** categories of these possible services. (2)
- e) A local institute of computing has realised that there is a market for special type of courses developed for learners who cannot attend classes. What type of learning model could solve this? (1)
- f) Scientific experiments require the processing and analysis of statistical data. List a specific tool or product (excluding Microsoft Excel) that can be useful for this. (1)
- g) List and explain **ONE** way how eyestrain due to computer used can be reduced. (1)
- (Total: 15 marks)**

Answer any TWO questions from B2, B3 and B4

Question B2

Government Internet based services are useful for providing many services to home based users.

- a) Explain and discuss this statement. (4)
 - b) Give **THREE** practical examples of these services. (6)
 - c) Explain why the use of E-id is important for using and co-ordinating these services. (5)
- (Total: 15 marks)**

Question B3

You have been approached by the CEO of a medium sized organisation. The marketing department would like to embark on an external communication campaign; however, the CEO is not convinced that the benefits outweigh the costs.

- a) If you were approached by the CEO explain why his company should embark on this external communication campaign. (9)
 - b) Provide the CEO with a description of **SIX** different methods that can be used to spread information. (6)
- (Total: 15 marks)**

Question B4

Data and information contribute to the functioning of modern organisations but there are various problems that are derived from data.

- a) Discuss this statement. (5)
 - b) Too much information can contribute to serious problems in the organisation.
 - i) What is this problem called?
 - ii) What measures can an organisation take to solve this issue? (10)
- (Total: 15 marks)**

SUBJECT:	Information Technology
PAPER NUMBER:	II
DATE:	15 th May 2018
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 in this section and any other TWO questions.

Question A1

This question is compulsory. Answer all parts.

- Mention and define the **TWO** main software categories. (4)
- Traditional file-based systems are being replaced by relational databases systems. Explain **TWO** limitations of the flat-file approach as well as **TWO** issues associated with relational databases systems. (4)
- What are the roles of HTML, CSS and JavaScript when developing a website? (3)
- A user has just opened Google Chrome in order to visit the Times of Malta website. What protocol was used in this scenario? (1)
- List **ONE** scripting language that you would expect to be used by the website mentioned in part d). (1)
- Explain **ONE** issue associated with the POP protocol. Mention an alternative protocol that can be used instead of POP in order to solve this issue. (2)

(Total: 15 marks)

Answer any TWO questions A2, A3 and A4.

Question A2

This question is about the Software.

- A business owner has just opened a branding and design studio. The computers chosen to equip this studio are the iMac Pro from Apple. The business owner now has a dilemma: either choose to purchase the industry standard Adobe Photoshop software or else the up-and-coming Pixelmator. Provide the business owner with **FIVE** criteria that can be used upon which to evaluate the software mentioned above. (5)
- Following the criteria provided the business owner has decided to purchase Adobe Photoshop. Each time an asset is imported into Adobe Photoshop the users are being asked whether they want the asset to be embedded or else to be linked. Provide an explanation, highlighting the difference between the two options. (2)

Question continues on next page

- c) Just like Microsoft Windows and Linux; macOS is made up of a number of components. Mention and explain **THREE** components of an operating system. (6)
 - d) Historically, operating systems were provided with a command-line interface (CLI). This was subsequently replaced by a more user-friendly GUI.
 - i. Give **ONE** example where it would be more efficient to make use of a CLI rather than a GUI. (1)
 - ii. Give **ONE** disadvantage of the CLI in relation to human interaction. (1)
- (Total: 15 marks)**

Question A3

This question is about the Internet

- a) A DNS server being used by a user is not operational. What is a i) DNS server and ii) what should the user know in order to still be able to browse a website? (2)
- b) Figure 1 - Website File Structure shows the file structure of a website.
 - i. What HTML code should be added to the index.html page so that it is linked to the mystyle.css stylesheet? (2)
 - ii. In which section of the HTML page should the above code in part (i) be inserted? (1)
 - iii. What HTML code should be added to the contact.html page so that the mainpic.jpg is inserted into the page? (2)
 - iv. What HTML code should be inserted into the index.html page so that a link to the contact.html page is added with the text "Click here to contact us" (2)
 - v. In which section of the HTML page should the code in (iv) be inserted? (1)
 - vi. What happens to the website if the images are too large in size? (1)
 - vii. What solution can be used to solve the problem for images that are too large? (1)

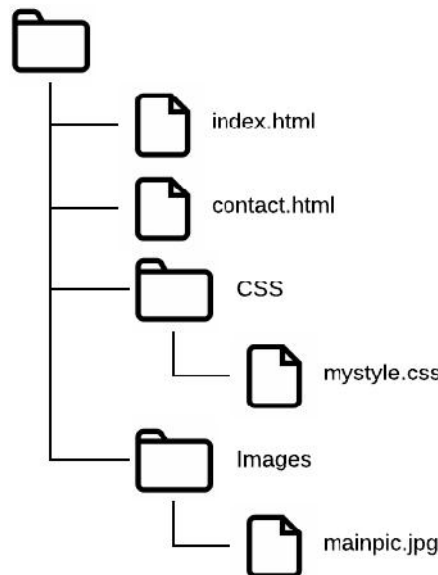


Figure 1 - Website File Structure

- c) How can digital signatures and certificates help create a more secure Internet? List **ONE** other solution that can assist in securing the Internet. (3)
- (Total: 15 marks)**

Question A4

This question is about Database Systems.

- a) List and define the three level schema. (6)
- b) Table 1 shows the table of a database used in a school. Is the database in the 1st, 2nd or 3rd normal form? Give **ONE** reason for your answer. What is the benefit of normalisation? (3)

Table 1: School_Data

StudentID	CourseID	TeacherID	TeacherEmail	CourseName	Location	Grade	HasBook
435678	IT101	T001	T001@school.com	IT	645A	47	Yes
435678	BUS101	T003	T003@school.com	Business	311B	89	No
342125	IT101	T001	T001@school.com	IT	645A	76	Yes
987999	ENG101	T003	T003@school.com	Engineering	567W	43	No
987999	MEC101	T004	T004@school.com	Mechanical	345Q	78	Yes

- c) Write an SQL statement that retrieves the StudentID, CourseID, Location and Grade from the table School_Data shown above, only for those students who have a grade higher than 50. The results should be sorted by Grade in ascending order. (4)
- d) Define and mention **TWO** uses of a data dictionary in a DBMS. (2)

(Total: 15 marks)

Questions continue on next 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 a program snippet:

```

1  public class QuestionB1 {
2
3      public static void main(String[] args) {
4          int[] numbers = {5,4,3,2,1};
5          TransformArray(numbers);
6      }
7
8      public static void TransformArray(int[] x) {
9          for (int i = 0; i < x.length; i++) {
10             for (int j = 1; j < (x.length - i); j++) {
11                 if (x[j - 1] > x[j]) {
12                     int temp = x[j - 1];
13                     x[j - 1] = x[j];
14                     x[j] = temp;
15                 }
16             }
17         }
18         for(int i=0; i<x.length; i++) System.out.print(x[i] + " ");
19     }
20 }

```

- a) Answer the following questions with regard to the code shown above.
- What is the purpose of the TransformArray method? (2)
 - Write down the exact output of the program snippet. (2)
 - Rewrite line 18 using a different control structure. (3)
 - List the variables used in this program. (3)
- b) Explain the following SQL statement: (3)

```
SELECT * FROM Product WHERE ProductName='Chocolate';
```

- c) Explain how you can modify the statement in part (b) to retrieve products where the price is higher than 18.00. Assume that the Price attribute exists in the Product table. (2)
- d) Write HTML code to show the following as an ordered list. (5)
- Galaxy 8
 - iPhone X
 - Pixel 2

(Total: 20 marks)

Question B2

This question is about Programming Techniques.

- a) List **FOUR** different programming paradigms and mention **ONE** area of application for each paradigm. (8)
- b) A class called Point requires two attributes: one integer called X and another integer called Y.
 - i) Write a default constructor that sets the X to 10 and Y to 15. (3)
 - ii) Write a custom constructor that sets the X and Y according to the value set in the input parameters. (5)
- c) Write code that creates an object of type Point called MyPoint as per part (b) above using the default constructor. (2)
- d) Explain using an example the concept of inheritance. (2)

(Total: 20 marks)

Question B3

This question is about System Development.

- a) Explain the difference between alpha, beta and acceptance testing. (6)
- b) What would be your recommendation to a client who asks for only acceptance testing to be carried out? (2)
- c) Once a software has been developed; maintenance becomes crucial. Explain **THREE** factors than can make a system easier to maintain. (6)
- d) Explain **THREE** criteria that can be used for system evaluation. (6)

(Total: 20 marks)

Questions continue on next page

Question B4

This question is about software design.

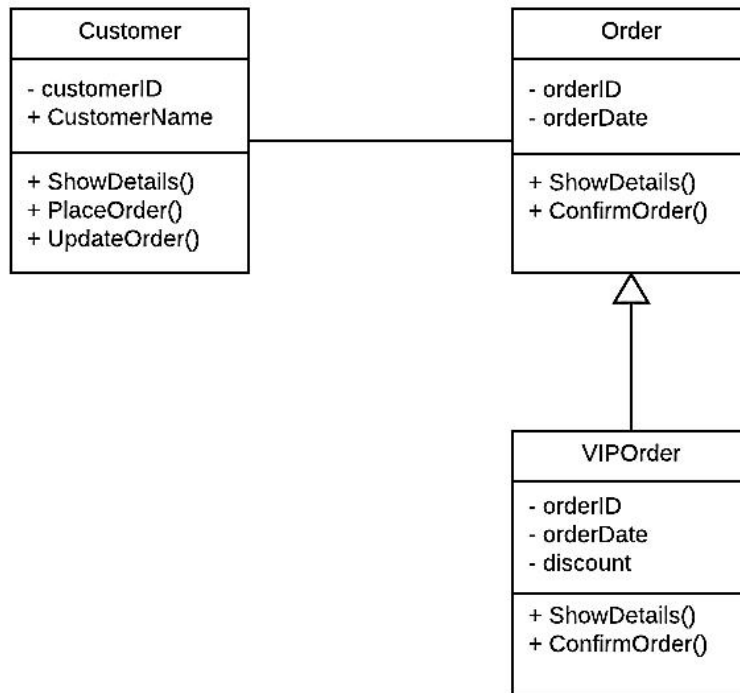


Figure 2: Customer Ordering System Class Diagram

- a) With regards to the class diagram in figure 2 shown above:
 - i. list the name of **TWO** classes; (2)
 - ii. list **ONE** public attribute; (1)
 - iii. list **ONE** private attribute; (1)
 - iv. list **TWO** methods; (2)
 - v. list **ONE** subclass. (1)
- b) What is the purpose of the UML class diagram? (2)
- c) Select the appropriate data types or data structures for the scenarios below:
 - i. store an integer between -15 and 50; (1)
 - ii. store 100 integers; (2)
 - iii. store decimal numbers when precision is not essential. (2)
- d) Explain the difference between the top-down and the bottom-up approach. Include an example of each approach in your explanation. (4)
- e) A tester at a software house is testing an application without access to the source code. What type of testing is this? (1)
- f) What type of implementation is it when a new system is introduced gradually with the old application being still used until the new system takes completely over? (1)

(Total: 20 marks)