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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**ADVANCED MATRICULATION LEVEL
2023 SECOND SESSION**

SUBJECT:	**Information Technology**
PAPER NUMBER:	I
DATE:	30th August 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.

'Euro Bank' has recently set up its roots in Malta. Since sensitive financial information is being stored, the management of this new bank are aware that data integrity and security are two important pillars. Authentication and authorisation methods together with other security mechanisms have already been installed.

a) Define data integrity and explain its importance with respect to the above-mentioned scenario. (2)

b) Differentiate between authentication and authorization. (2)

c) Mention and describe **FOUR** technologies which might be used by 'Euro Bank' for authentication purposes. (4)

d) Mention and describe **FOUR** technologies which might be used by 'Euro Bank' associated with authorisation. (4)

e) List **THREE** mechanisms which 'Euro Bank' might have implemented to physically secure malicious attacks and **THREE** other electronic ones. (3)

f) The management of 'Euro Bank' have drafted a disaster recovery plan. What is disaster planning and why is it important? (2)

g) Although 'Euro Bank' are aware that security is of utmost importance, they also want to ensure that their system remains usable.
   i.   Differentiate between security and usability. (2)
   ii. Mention **ONE** example how a security feature can be both secure and usable. (1)

(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) Convert the following binary numbers into decimal numbers. Show your working.
    i. 111001_2 (2)
    ii. 10010101110_2 (2)

b) Convert the following decimal numbers into hexadecimal numbers. Show your working.
    i. 9124_{10} (2)
    ii. 7562_{10} (2)

c) Convert the following binary numbers into hexadecimal numbers. Show your working.
    i. 1110100011010110_2 (2)
    ii. 1101010_2 (2)

d) Perform the following simple binary addition. Show your working.
    i. $1011001_2 + 111010_2$ (2)
    ii. $11011_2 + 1001010_2$ (2)

e) Find the two's complement of the following binary numbers. Show your working.
    i. 10010_2 (2)
    ii. 110100_2 (2)
    (Total: 20 marks)

Question A3

'AB Insurance' is an insurance company which has been in business for multiple decades. New input, output and storage devices are being bought to keep up to date with the current computer technologies.

a) List **TWO** input devices which should definitely be bought for the day-to-day operations of 'AB Insurance'. (1)

b) For **each** input device listed in part (a), state **ONE** advantage and **ONE** disadvantage. (4)

c) List **TWO** output devices which are essential in insurance companies. (1)

d) Mention **ONE** advantage and **ONE** disadvantage of **each** device specified in part 3(c). (4)

e) The management of 'AB Insurance' is aware of the importance of storage devices. Storage devices are categorised under two main categories, one of which is secondary storage.
    i.   Mention the other category and differentiate between both categories (3)
    ii.   List **TWO** examples of storage devices for **each** category listed in part (e)(i) (2)

f) The main types of secondary storage devices brought by 'AB Insurance' were optical-based.
    i.   What are optical-based storage devices? (1)
    ii.   List **TWO** advantages and **TWO** disadvantages of optical-based storage devices. (4)
    (Total: 20 marks)

Question A4

The Maltese National Statistics Office is currently conducting a survey to determine the quality of life of the Maltese population. For this reason, several individuals were employed on a part-time basis to conduct such surveys via telephone communication. These individuals are also responsible for the inputting of all responses on a computer-based system.

a) Why is it important to ensure that data is accurate in the above-mentioned scenario?   (1)

b) Mention and explain **FOUR** categories of common errors which should be kept in mind in the above scenarios.   (6)

c) List **FOUR** checks which might be conducted by the management of the statistics office on the data for validation purposes. Briefly explain **each** of the checks listed.   (6)

d) For safe-keeping purposes all responses inputted are backed up.
    i.   Mention and explain **TWO** types of backup strategies which the statistics office might utilise.   (3)
    ii. List **ONE** advantage and **ONE** disadvantage for each backup strategy mentioned in part (d)(i).   (4)
                                                                                        (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 new clothing company which has opened recently communicates with the employees in a verbal manner. Although some of the employees prefer this mode of communication, other employees are against such communication mechanism.

a) Highlight **THREE** advantages and **THREE** disadvantages of verbal communication.   (6)

b) List **TWO** technologies which are normally associated with verbal communication.   (1)

c) For **each** technology specified in part (b), list and explain **TWO** of its features.   (4)

d) Mention **TWO** advantages of **each** technology specified in part (b).   (4)
                                                                                        (Total: 15 marks)

Please turn the page.

Answer any TWO questions from B2, B3 and B4.

Question B2

A lecturer is explaining to a group of university students, the increase in the number of computer-based crimes in this day and age. He mentioned some common illegal practices and referred to the terms 'plagiarism' and 'piracy' which are normally associated with such a topic.

a) Explain why the current society is becoming more susceptible to threats. (1)

b) Define computer-based crime. (1)

c) Mention and explain **FOUR** categories of illegal practices which the lecturer might have mentioned. (6)

d) Provide **ONE** scenario for each of the illegal practices mentioned in part (c) which the lecturer might have used as an example. (4)

e) Mention **ONE** mechanism which has been introduced in the modern age to combat such cybercrimes. (1)

f) Define plagiarism and explain how this term differs from piracy. (2)
(Total: 15 marks)

Question B3

A new technology company, 'LMN Inc.', has developed a revolutionary product that is set to disrupt the market. The product is a smart home device that can be controlled through a mobile application and can perform various tasks such as adjusting the temperature, controlling lighting, and even ordering groceries. The company is preparing to launch the product in the coming months and wants to communicate effectively with its stakeholders about the product's features and benefits.

a) Mention **THREE** reasons why a company should spread information to the outside world. (3)

b) Mention and explain **FOUR** methods which can be used by 'LMN Inc.' to spread information to the outside world. (6)

c) Following, the successful launch of the product, 'LMN Inc.' is aware that firm user support systems should be in place.

    Identify and explain **FOUR** techniques which the company might utilise to provide technical support to its end users. (6)
(Total: 15 marks)

Question B4

The owner of a stationery, 'Pens and More' has decided to move some of its business to an Internet Commerce based system.

a) Define Internet Commerce. (1)

b) Identify **THREE** advantages and **THREE** disadvantages of Internet Commerce with respect to the 'Pens and More' business. (6)

c) Identify **THREE** advantages and **THREE** disadvantages of Internet Commerce in relation to the customers of 'Pens and More'. (6)

d) The owner of 'Pens and More' has also started using an 'e-Marketing' model. Define e-Marketing and explain its importance to the stationery. (2)
(Total: 15 marks)

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**ADVANCED MATRICULATION LEVEL
2023 SECOND SESSION**

SUBJECT:	**Information Technology**
PAPER NUMBER:	II
DATE:	31st August 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.

Matsec have released a challenge to the students studying the IT syllabus. This task is to produce a simple website covering a navigation menu and a sample of hyperlinks. The requirements are that the student must make use of both HTML and CSS. You have accepted this challenge and have produced this code. However, Matsec will be asking you some questions to verify that you have actually done this work.

The following code is for the file **past_papers.html**

```
1.   <!DOCTYPE html>
2.   <html lang="en">
3.   <head>
4.       <link rel="stylesheet" href="styles.css">
5.       <title>Matsec Webpage</title>
6.   </head>
7.
8.   <body>
9.       <img src="images/Matsec.jpg" alt="Matsec Logo">
10.      <h1>Welcome to the Matsec Webpage</h1><br>
11.      <h2>Past Papers</h2><br>
12.
13.      <p>Navigation Menu</p>
14.
15.      <ul>
16.        <li><a href="home.html">Home</a></li>
17.        <li><a href="past_papers.html">Past Papers</a></li>
18.        <li><a href="about_us.html">About Us</a></li>
19.        <li><a href="contact_us.html">Contact Us</a></li>
20.      </ul><br>
21.
22.      <p>Pastpaper downloads for module AM19</p>
```

Question continues on next page.

```
23.      <ul  style="background-color: Red;">
24.        <li><a href="MAY_2021.pdf">May 2021</a></li>
25.        <li><a href="SEP_2021.pdf">September 2021</a></li>
26.        <li><a href="MAY_2022.pdf">May 2022</a></li>
27.        <li><a href="SEP_2022.pdf">September 2022</a></li>
28.      </ul><br>
29. </body>
30. </html>
```

The following code is for the file **styles.css**

```
1. ul {
2.    list-style-type: none;
3.    margin: 0;
4.    padding: 0;
5.    overflow: hidden;
6.    background-color: dimgray;
7. }
8.
9.  li {
10.    float: left;
11. }
12.
13. li a {
14.    display: block;
15.    color: white;
16.    text-align: center;
17.    padding: 16px;
18.    text-decoration: none;
19. }
20.
21. li a:hover {
22.    background-color: black;
23. }
```

a) Define CSS.   (1)

b) Outline **ONE** difference between between the tag <h1> and the tag <p>.   (1)

c) Show the output of lines 13-20 from the *past_papers.html*. Any colors used must be clearly
    marked.   (4)

d) Outline **ONE** difference between the unordered list in line 15 and the unordered list in line 23
    from the *past_papers.html*.   (1)

e) Describe the purpose of line 21-23 in the *styles.css*   (2)

f) Modify the code to include an additional downloadable past paper of May 2023. Clearly mark
    at which lines you are inserting your code.   (2)

g) Modify the code so that before line 29 of the past_papers.html you add a *Contact Us*
    hyperlink, which will link to the email *matsec@um.edu.mt*   (2)

h) Outline **TWO** differences between HTML and CSS.   (2)

(Total: 15 marks)

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

Question A2

The Internet is a worldwide system of computer networks. The WWW is the most widely used system across the Internet, but it is only one of the many services that uses the Internet.

a) List **FOUR** other services that make use of the Internet.   (2)

b) Describe **TWO** of the services mentioned in part (a).   (2)

c) Outline **ONE** disadvantage for **each** of the services mentioned in part (b).   (2)

d) List **TWO** advantages and **ONE** disadvantage when a mobile device is connected to the Internet.   (3)

In the morning, a salesperson is outside the office meeting clients, while in the afternoon he works from the office. As the IT expert, you have been asked to set his email on different devices.

e) While setting up the salesperson's devices you end up with a choice of either setting the incoming emails with POP or IMAP. Outline **TWO** differences between POP and IMAP.   (4)

f) Identify the most suitable between POP or IMAP for this scenario. Give a reason for your answer.   (2)
(Total: 15 marks)

Question A3

A company called MALO decided to upgrade their old computerised system and have issued a call for tenders. Your company have submitted a tender response, and has been chosen for this development. As part of the design stage you have created an Entity Relationship Diagram (ERD). However, the customer would like to understand this diagram better.
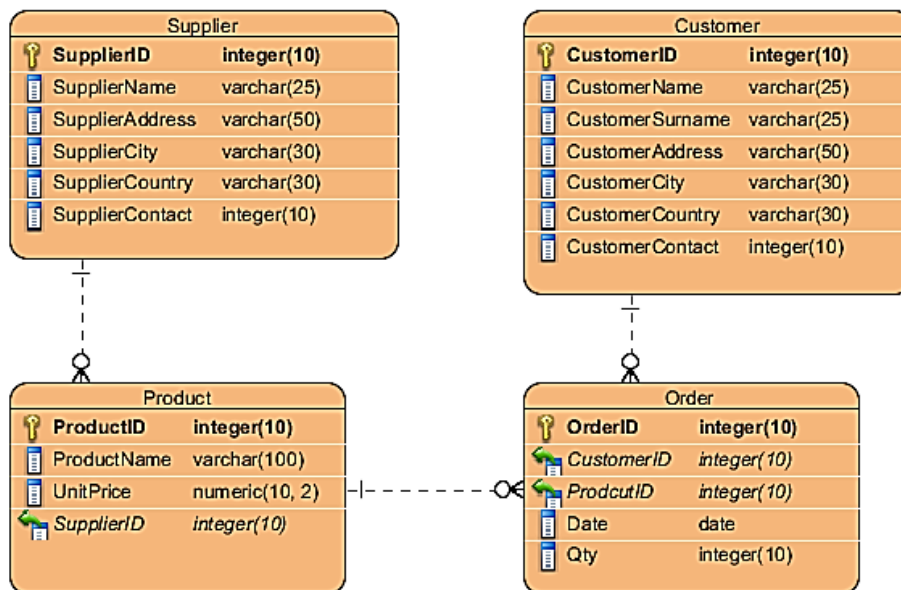

Figure 1 – Database ERD

Question continues on next page.

a) Describe to the customer what is the meaning of the lines between the entities. (3)

b) The *SupplierID*, *ProductID*, *CustomerID* and *OrderID* are considered as a primary key.
   i.   Define primary key. (1)
   ii.   List **THREE** foreign keys and clearly mark in which entity they are found. (2)
   iii. Describe the relationship between a primary key and a foreign key. (1)
   iv. Describe **ONE** difference between a primary key and a foreign key. (1)

c) Write SQL statements to extract the following data from the database:
   i.   show the CustomerID, CustomerName and CustomerContact from Customer who are based in the Country MALTA; (2)
   ii.   show **all** product details sorted by ProductName in Ascending Order; (2)
   iii. show **all** order details from Order from the year 2023 onwards and grouped by CustomerID. (3)

(Total: 15 marks)

Question A4

The website statcounter.com provides global statistics on a multitude of areas, one of them being Operating System usage. According to their website the worldwide market share for December 2022 was Android in first place at 44.6%, followed by Windows at 28.4%, iOS at 17.3%, OS X at 5.5%, Linux at 1.1%, and the remaining as unknown.

a) Give **ONE** reason why the Windows OS has lost its top position in the marketshare. (1)

b) Each OS listed above allows for a Graphical User Interface (GUI). Mention another type of interface which could be used to communicate with the OS. (1)

c) Outline **TWO** advantages that the interface mentioned in part (b) would have over GUI. (2)

d) Each OS listed above has multitasking capabilities. Define multitasking. (2)

e) List **THREE** other types of Operating Systems. (3)

f) An OS is considered as being part of the System Software. State the other software category that end users might use. (1)

g) Apart from the OS, there are other types of software that make up the System Software. These are usually included as part of the OS. Describe **ONE** use for the following System Software types:
   i.   antivirus; (1)
   ii.   assembler; (1)
   iii. archivers for compression purposes; (1)
   iv. compiler; (1)
   v.   defragmenter. (1)

(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) The code snippet below in the Java programming language displays all the elements in both arrays.

```
1. class Numbers {
2.     public static void main (String args[]){
3.         int ar[][]={{8,9,10,11},{12,13,14,15}};
4.         int counter, counter2, rows=2, columns=3;
5.
6.         System.out.println ("Displaying Array");
7.         for(counter=0; counter<rows; counter++){
8.             for (counter2=0; counter2<=columns; counter2++){
9.                 System.out.print(ar[counter][counter2]+"\t");
10.            }//end of for
11.            System.out.println();
12.        }//end of for
13.
14.    }//end of main method
15. }//end of class
```

   i.   What is the output of the code?   (5)
   ii. Identify the variable *ar[][]* in line 3.   (1)
   iii. The code in line 3 has been modified as follows. Modify the remaining code to function correctly with this change, where necessary, and by clearly mark the line that was modified.   (2)

```
3.          int ar[][]={{1,2,3,4,5},{6,7,8,9,10}};
```

   iv. What is the purpose of variables *counter* and *counter2*?   (2)

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

```
SELECT product_name, price, quantity
FROM products
WHERE category = 'Electronics'
ORDER BY price DESC;
```

   i.   What is the purpose of the "WHERE" statement in this SQL code?   (1)
   ii. What would be the result if the "ORDER BY" clause was removed from the given SQL code.   (1)
   iii. Modify the above code to select only products with a price greater than €100.   (2)
   iv. If the 'products' table had an additional column called 'discount', how could you modify the SQL code to include the 'discount' column in the result set   (1)

c) HTML (HyperText Markup Language) is a standard markup language used for creating and structuring content on the web.
   i.   How can you create a hyperlink in HTML? Provide an example code snippet.   (1)
   ii. Explain the basic formatting properties in CSS, including **color**, **text-align**, **font-family**, and **text-decoration**. Provide code snippet examples for each.   (4)

(Total: 20 marks)

Please turn the page.

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

Question B2

Programming paradigms are a way to classify programming languages based on their features. While a programming language is what the programmers use for writing computer programs.

a) List **FOUR** types of programming paradigms. (2)

b) Mention **ONE** characteristic for each of the programming paradigm mentioned in part (a). (4)

c) Mention **ONE** advantage and **ONE** disadvantage of **TWO** of the programming paradigms mentioned in part (a). (4)

d) What is the purpose of a language translator? (1)

e) List **THREE** types of language translators. (1)

f) Mention **TWO** differences between any of the two language translators mentioned in part (d).(2)

g) While creating code in a programming language, programmers usually encounter several types of errors, explicitly those of syntax, logical and run-time. Describe and give **ONE** example, in JAVA, for each of these errors. (6)
    (Total: 20 marks)

Question B3

The latter part of the system life cycle process is often overlooked and not given enough importance. However, this cannot be further from the truth. The maintenance stage will remain with the finished product throughout its lifetime, while the evaluation stage will help in the creation of better products in the future.

a) The three main types of maintenance can be classified as preventive, corrective and adaptive maintenance. Mention **ONE** characteristic for each. (3)

b) Define modularity. (1)

c) List **TWO** reasons why modular code is considered as being easier to maintain. (2)

d) Documentation is one of the key factors for assisting in the maintenance of the system. List **TWO** reasons why this statement is correct. (2)

e) Describe **THREE** items found in a technical document. (6)

f) Define System Evaluation in the context of the System Life Cycle. (2)

g) Outline **TWO** advantages that white box testing has over black box testing (2)

h) Outline **TWO** advantages that black box testing has over white box testing. (2)
    (Total: 20 marks)

Question B4

A local company called Morana has decided to enhance their sales tactics and implement an online system. They have came up with the following basic Use Case Diagram.
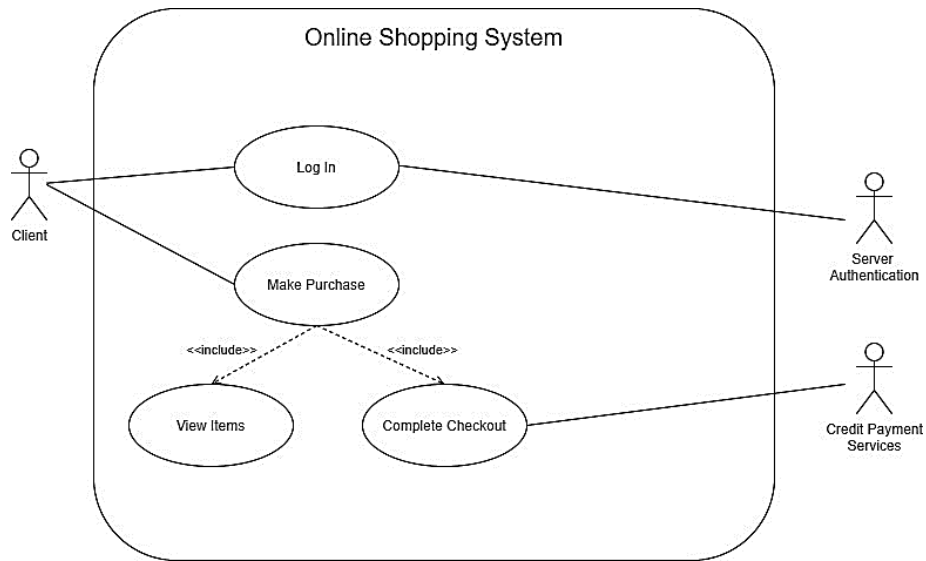

Figure 2 – Use Case Diagram

a) Identify **ONE** primary actor. (1)

b) The client has two lines connecting to the use cases. What do these lines represent? (1)

c) The diagram contains an <<include>> relationship. List **ONE** more relationship type that can be used in Use Case Diagrams. (1)

d) Outline **ONE** difference between the <<include>> relationship and the relationship mentioned in part (c). (2)

e) Modify the Use Case Diagram in order to include **TWO** additional use cases where it will always verify the password, and occasionally display a login error when the password is incorrectly entered. (5)

f) Modify the Use Case Diagram in order to add a Make Payment use case, which has to, first and foremost, check if the client has sufficient funds in his account. The client will also have two choices of payment being by paypal or credit card. Once all of this has been processed, it will be sent to the bank for processing. (10)

(Total: 20 marks)