L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

ADVANCED MATRICULATION LEVEL
2025 SECOND SESSION

SUBJECT:	**Information Technology**
PAPER NUMBER:	I
DATE:	29th August 2025
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.

MediSure Health Services is a healthcare organisation that handles sensitive patient records. The company has faced issues with unauthorised access, weak password policies, and insufficient protection against data loss. MediSure aims to improve its security practices to safeguard patient information effectively.

a) Define 'cybercrime'. (1)

b) Mention **TWO** effects cybercrime could have on MediSure Health Services. (2)

c) Distinguish **FOUR** types of malpractices that could compromise cybersecurity. (6)

d) Define the term 'data integrity' and justify its importance for MediSure Health Services. (2)

e) One of the strategies MediSure Health Services plans to adopt to enhance its security practices is the implementation of stronger access control mechanisms. Distinguish between 'authentication' and 'authorisation'. (2)

f) Give **THREE** examples of authentication technologies that could enhance the security of patient records. (3)

g) Define 'n-factor authentication'. Provide **ONE** example of how it could be applied at MediSure Health Services. (2)

h) Provide **TWO** examples of authorisation techniques that could be utilised by MediSure Health Services. (2)

(Total: 20 marks)

Please turn the page.

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Answer TWO questions from Questions A2, A3 and A4.

Question A2

InnoTech Enterprises is a growing software company facing challenges in training its workforce to keep up with rapidly evolving technologies. The company is considering implementing a corporate training strategy to address skill gaps and enhance workforce productivity.

a) Define a corporate training strategy. (1)

b) Outline **THREE** key reasons why InnoTech Enterprises should adopt a corporate training strategy. (3)

c) Outline **FOUR** main components of a corporate training strategy that InnoTech Enterprises could implement. (6)

d) Discuss **TWO** reasons why ICT-related training is important for modern organizations like InnoTech Enterprises. (2)

e) Compare and contrast the training requirements for managerial and technical staff, highlighting **TWO** similarities and **TWO** differences. (4)

f) Some managers at InnoTech Enterprises prefer computer-based training, while others favor instructor-led training. Distinguish between these **TWO** types of training. (2)

g) Suggest **ONE** scenario where computer-based training would be more beneficial than instructor-led training for InnoTech Enterprises. (1)

h) Suggest **ONE** scenario where instructor-led training would be more beneficial than computer-based training for InnoTech Enterprises. (1)

(Total: 20 marks)

Question A3

This question focuses on the different types of storage devices and their applications.

a) Differentiate between primary and secondary storage. (2)

b) Provide **ONE** example of **each** type of storage mentioned in part (a). (2)

c) Define the following types of memory:
   i. RAM (1)
   ii. ROM (1)

d) Differentiate between magnetic and optical storage technologies (mention at least **THREE** differences). (3)

e) List **TWO** advantages and **TWO** disadvantages of magnetic storage technologies. (4)

f) Outline the top-level concepts of the following storage devices:
   i. DVD-ROM;
   ii. Hard Drive. (4)

g) Define solid state storage technology. (1)

h) Provide **TWO** examples of devices that use solid state storage technology. (2)

(Total: 20 marks)

Question A4

A school is implementing a new student management system to record and manage student data such as names, grades, and attendance. The school administrator emphasizes the importance of ensuring that the data entered is accurate and valid to avoid errors and inconsistencies in reports.

a) Outline the importance of ensuring accuracy and validity of data in the school's student management system. (2)

b) Define the terms 'data validation' and 'data verification'. (2)

c) Explain how **each** helps in reducing errors in the system. (1)

d) Describe **FOUR** types of validation checks that could be used in the student management system. (6)

e) Describe **FOUR** types of verification checks that could be used in the student management system. (6)

f) Describe **TWO** common data errors that may occur in the student management system. (3)

(Total: 20 marks)

SECTION B: ICT in Organisations

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

Question B1

This question is compulsory. Answer all parts.

A hospital is exploring the use of Artificial Intelligence (AI) and Big Data to improve its operations.

a) Define the term 'Artifical Intelligence (AI)'. (1)

b) Provide **FOUR** examples of the use of AI in the healthcare industry. (4)

c) Outline **TWO** advantages and **TWO** disadvantages of using AI in healthcare. (4)

d) Define the term 'Big Data'. (1)

e) The three Vs are key characteristics that define Big Data. One of these is 'Volume'. Explain the other **TWO** Vs. (3)

f) Outline **TWO** advantages and **TWO** disadvantages of using Big Data in healthcare. (4)

g) Provide **ONE** example of how Big Data can be used in the following areas of healthcare:
   i. patient records;
   ii. staffing optimization;
   iii. predicting healthcare trends. (3)

(Total: 20 marks)

Please turn the page.

Answer any TWO questions from B2, B3 and B4.

Question B2

A company is exploring e-Learning tools to train employees effectively across different locations. The training manager wants to ensure the tools chosen are flexible, scalable, and suitable for various learning needs.

a) Define 'e-learning'. (1)

b) Mention **THREE** key advantages of using e-Learning in an organizational setting. (3)

c) Compare and contrast synchronous and asynchronous e-Learning, providing **ONE** similarity and **ONE** difference. (2)

d) Provide **ONE** example of each type of e-Learning mentioned in part (c). (2)

e) Explain what a 'Learning Management Systems (LMS)' is and how it can be utilized by this company. (2)

(Total: 10 marks)

Question B3

BrightRetail, a startup retail company, is facing challenges in managing its customer relationships effectively and is exploring ways to enhance its Customer Relationship Management (CRM) practices.

a) Define the term 'Customer Relationship Management (CRM)'. (1)

b) Discuss **THREE** benefits of implementing a CRM for companies like BrightRetail. (3)

c) Define the **THREE** types of CRMs that BrightRetail could consider implementing. (3)

d) Outline **THREE** applications of CRM that could be implemented within BrightRetail. (3)

(Total: 10 marks)

Question B4

MarketEdge is a marketing agency evaluating various internet communication tools to enhance collaboration within its team and streamline interactions with clients. The agency is considering both synchronous and asynchronous communication methods.

a) Distinguish between synchronous and asynchronous communication media. (2)

b) Describe **FOUR** Internet communication tools that MarketEdge could use. (4)

c) For **each** tool mentioned in part (b), provide **ONE** example of how MarketEdge could use it in a business context. (4)

(Total: 10 marks)

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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

ADVANCED MATRICULATION LEVEL
2025 SECOND SESSION

SUBJECT:	**Information Technology**
PAPER NUMBER:	II
DATE:	1st September 2025
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.

The Library Management System (LMS) manages books, borrowers, and loans. The library initially used a flat-file database but upgraded to a relational database and deployed a distributed system for remote branches. Staff use SQL queries to retrieve and update data, while the Database Administrator (DBA) ensures security and performance. The database is normalized to the 3rd Normal Form (3NF) for consistency, with structured queries accessing book availability, borrower records, and loan histories.

a) Define a database and explain its role in the library system. (1)

b) List **THREE** advantages of a normalized database compared to a flat-file database. (3)

c) Analyze the given tables and create an ERD diagram using Crow's Foot notation. Ensure the diagram includes tables, fields, primary keys, foreign keys, relationships, and cardinalities. (4)

Table 1: Books Table

BookID	Title	Author	Category	Availability
1	Database Systems	Jack Sparrow	Technology	Yes
2	Python Programming	Ace Ventura	Programming	No
3	Data Science 101	Jimmy Beast	Data Science	Yes
4	Machine Learning	Harrison Ford	AI	Yes
5	Networking Basics	Tom Cruise	Networking	No

Question continues on the next page.

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Table 2: Borrowers Table

BorrowerID	Name	Email	PhoneNumber
101	Alice	alice@example.com	123456789
102	Bob	bob@example.com	987654321
103	Charlie	charlie@example.com	555666777
104	Diana	diana@example.com	444555666
105	Eve	eve@example.com	333222111

Table 3: Loans Table

LoanID	BookID	BorrowerID	LoanDate	ReturnDate
1	2	101	2025-08-01	2025-08-10
2	5	105	2025-08-05	2025-08-15
3	1	103	2025-08-10	2025-08-20
4	4	102	2025-08-15	2025-08-25
5	3	104	2025-08-20	2025-08-30
6	1	105	2025-09-01	2025-09-10
7	2	101	2025-09-05	2025-09-15
8	5	103	2025-09-10	2025-09-20
9	4	102	2025-09-15	2025-09-25
10	3	104	2025-09-20	2025-09-30

d) Based on the above tables, what will be the output of the following SQL query? (2)

```
SELECT *
FROM Loans
WHERE BorrowerID = 103
AND LoanDate BETWEEN '2025-09-01' AND '2025-09-30';
```

e) Write an SQL query to retrieve all loans made by *BorrowerID* **101**, sorted by *LoanDate* in ascending order. (2)

f) Interpret the outcome of the following DML statements based on the given tables:

i. Insert Statement: (1)

```
INSERT INTO Loans (LoanID, BookID, BorrowerID, LoanDate, ReturnDate)
VALUES (11, 2, 104, '2025-09-25', '2025-10-05');
```

ii. Update Statement: (1)

```
UPDATE Books
SET Availability = 'No'
WHERE BookID = 2;
```

iii. Delete Statement: (1)

```
DELETE FROM Loans
WHERE LoanID = 3;
```

(Total: 15 marks)

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

Question A2

LearnNow is an online learning platform that provides video courses, file-sharing options, and email communication for students and instructors. It uses web servers to host its website and leverages various internet protocols to facilitate smooth communication and data transfer. Students access the platform via web browsers and navigate the courses through links provided in emails.

a) Outline the use of a web server in the LearnNow platform. (1)

b) Outline **THREE** features of a web browser that students use on LearnNow. (3)

c) LearnNow uses email for communication between students and instructors. List **THREE** differences between the POP and IMAP protocols used for accessing email on the platform. (3)

d) Explain what would happen if LearnNow's web server goes offline. (1)

e) LearnNow integrates various internet protocols to ensure smooth communication and data transfer. Define the following protocols used by the platform:
   i. HTTPS; (1)
   ii. FTP; (1)
   iii. SMTP. (1)

f) Identify the parts of the following URL:
   https://www.um.edu.mt/matsec/LearnNow/index.html (4)

(Total: 15 marks)

Question A3

TechCare Solutions is an IT company that manages a network of computers for its operations. The company relies on system software like operating systems, antivirus software, and resource monitors to maintain system performance and security. For their business tasks, they use a mix of specific software, general-purpose tools, and online applications.

a) Outline **TWO** differences between Application and System software. (2)

b) Define **TWO** situations where antivirus software is essential for TechCare. (2)

c) Provide **ONE** example for each type of application software in the context of TechCare. The first one is done for you.
   Specific - Payroll software for employee salary management;
   i. General Purpose; (1)
   ii. Application Generators; (1)
   iii. Software Suites. (1)

d) Give **ONE** example of how a defragmenter and an archiver can work together at TechCare. (1)

e) Describe how an operating system enables the use of application software at TechCare. (1)

f) Define **THREE** types of translators that can be used in TechCare's custom software development, highlighting **ONE** unique characteristic for **each** type. (3)

g) List **THREE** advantages of using an online application environment like *Google Workspace* at TechCare. (3)

(Total: 15 marks)

Please turn the page.

Question A4

E-Shop, an online retail platform, is creating a user-friendly website to showcase products and facilitate online sales. The development team uses HTML for structuring the website, CSS for styling, and incorporates form validation for the checkout page. The goal is to create a visually appealing and functional website that ensures a seamless user experience.

a) Define HTML and explain its role in the development of E-Shop's website. (1)

b) E-Shop wants to display a product catalog. Outline how <*ul*> and <*ol*> tags can be used for this purpose. (2)

c) Correct errors in the following HTML snippet for an E-Shop product table. (2)

```
<table>
<tr><td>Product Name<td></tr>
<tr><td>Price</tr></td>
</table>
```

d) Write an HTML snippet for displaying an image of a product on E-Shop's website. (2)

e) List **TWO** differences between CSS class and ID selectors. (2)

f) E-Shop uses an online form for customer registrations and purchases. Justify the use of the following types of validation to ensure data accuracy and user experience on the form.
   i. Range; (1)
   ii. Presence; (1)
   iii. Format; (1)
   iv. Data Type. (1)

g) List **TWO** reasons why it is beneficial to use external CSS files instead of embedding CSS within the HTML for a website like E-Shop. (2)

(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 following are code snippets from the Python programming language.

Imagine you are tasked with creating a simple pattern generator for a digital art project at E-Design. The goal is to use programming to create a grid-like pattern on the screen that can represent product displays, banners, or placeholders. The provided code uses nested loops in Python to generate a series of asterisks (*).

```
1. for row in range(5):
2.     for col in range(10):
3.         print("*", end="")
4.     print()
```

   i. What would be the output of the Python code provided above? (4)
   ii. Modify the code so that it asks the user to input the values for the *row* and *col*. (3)

You are tasked with designing a program for your school that evaluates a student's performance based on their exam score. The provided code determines the student's grade and provides feedback on how well they performed.

```
1.  score = 88
2.
3.  if (score < 0) or (score > 100):
4.      print("Score must be between 0 and 100.")
5.
6.  if (score >= 90):
7.      print("Excellent! You achieved an A grade.")
8.
9.  if (score >= 80):
10.     print("Great job! You achieved a B grade.")
11.
12. if (score >= 70):
13.     print("Good effort! You achieved a C grade.")
14.
15. if (score >= 60):
16.     print("You passed with a D grade. Keep improving!")
17.
18. if (score < 60):
19.     print("You failed. Better luck next time!")
```

iii. What would be the output of the Python code provided above? (3)

iv. The logic of the program is flawed, leading to potentially incorrect or conflicting outputs. Rewrite the program to fix this issue without using logical operators (and, or, not) in your solution. (4)

v. State how you can determine if a piece of code belongs to an *if* condition or not. (1)

b) The following HTML code represents a simple webpage structure for a travel website.

```
1. <!DOCTYPE html>
2. <html>
3. <head>
4.     <title>Travel Paradise</title>
5.     <meta charset="UTF-8">
6. </head>
7. <body>
8.     <header>
9.         <h1>Welcome to Travel Paradise</h1>
10.            <nav>
11.                <a href="home.html">Home</a> |
12.                <a href="about.html">About Us</a> |
13.                <a href="mailto:info@travelparadise.com"
   Contact Us</a>
14.            </nav>
15.         </header>
16.         <main>
17.            <h2>Top Destinations</h2>
18.            <p>Explore our curated list of travel
   destinations to find your perfect getaway.</p>
19.            <img src="beach.jpg alt=Beach View">
20.         </main>
21.         <footer>
22.            <p>&copy; 2025 Travel Paradise. All rights
   reserved.</p>
23.         </footer>
24.     </body>
25.     </html>
```

Question continues on the next page.

i. Identify the **TWO** errors in the above code and explain how to fix each one. (2)
ii. Modify the code to add another menu option called booking that references to a new empty *bookings.html* page. (1)
iii. Explain how the *<meta charset="UTF-8">* tag ensure a better user experience, particularly for an international audience. (2)

c) Structured Query Language (SQL) is a programming language designed for managing and manipulating data in a relational database. The following table students contains the fields *name*, *surname*, *dob*, *marks*, *class*.

```
SELECT name FROM students WHERE marks > 75;
```

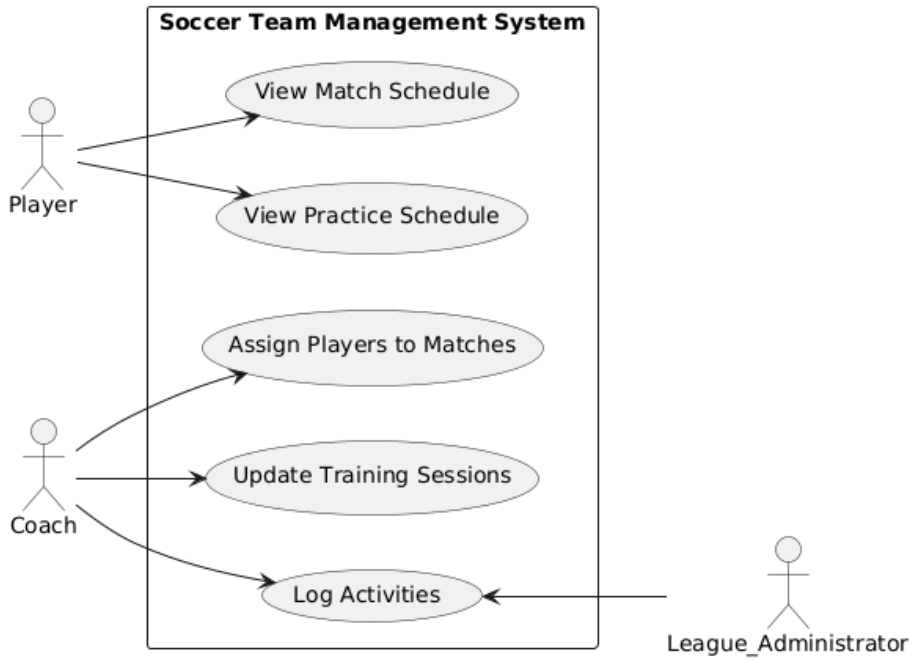
i. Modify the query to include only students in "Class 10" with marks greater or equal to 60. (2)
ii. Write a query to retrieve **all** students from "Class 12", ordered by their marks in descending order. (3)

(Total: 25 marks)

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

Question B2

Analyse the following Use Case Diagram and answer the following questions.



a) Identify the primary and secondary actors in the Soccer Team Management System. (1)

b) Explain the roles of the actors mentioned in question 2a. (3)

c) Describe the specific purpose of the "Log Activities" use-case and explain why multiple actors interact with it. (2)

d) If the "Update Training Sessions" use-case was removed, state how this might impact the system and the *Coach* actor. (2)

e) Suggest a new use-case that could enhance the Soccer Team Management System and explain which actor(s) would interact with it. (2)

f) Identify **ONE** potential issue if the *Player* actor was given access to the "Log Activities" use-case, and explain why it should remain restricted. (1)

g) How can the UCD for the Soccer Team Management System assist in identifying missing requirements during the design phase? (2)

h) In what way does the UCD help clarify the responsibilities of each actor in the Soccer Team Management System? (2)

(Total: 15 marks)

Question B3

A charity organization is developing a Charity Management System (CMS) to handle donor details, manage donations, and track campaign progress. The system must have a modular design, efficient inputs/outputs, and thorough testing to ensure reliability.

a) The CMS development team is debating between a top-down and bottom-up approach. Suggest which approach would be better for designing the donor management feature and explain why. (3)

b) List **TWO** advantages and **TWO** disadvantages of using a modular design specifically for the CMS's campaign tracking feature. (4)

c) Describe **THREE** specific aspects that should be considered when designing the user interface for the CMS, particularly for tracking donations. (3)

d) Outline the importance of a conversion plan for transitioning from a manual system to the CMS, particularly for donor data migration. (1)

e) In the CMS, explain how flowcharts and Data Flow Diagrams (DFDs) would help model the donation process. (2)

f) Explain why structured English might be more suitable than pseudocode for documenting the donation tracking algorithm in the CMS. (1)

g) The charity wants to ensure the CMS testing covers all scenarios. State why it is important to include erroneous test data when testing the system. (1)

(Total: 15 marks)

Please turn the page.

Question B4

SpaceX is managing a rocket launch project to deploy satellites into orbit. The project involves multiple teams handling rocket development, satellite integration, and mission planning. To ensure the launch's success, SpaceX emphasizes strong project management practices, efficient team collaboration, and effective leadership.

a) Define project management and explain how it impacts the quality of SpaceX's rocket launch project. (2)

b) List **TWO** aspects of project management that are crucial for ensuring the success of the rocket launch project. (2)

c) SpaceX's rocket launch project involves multiple stages, including rocket assembly, satellite integration, and mission control. To ensure the project stays on track, the project manager must effectively monitor progress and take corrective actions when necessary.
   i. Outline **ONE** method SpaceX can use to measure the progress of the rocket launch project. (1)
   ii. Suggest **ONE** corrective action the project manager could take if a critical milestone, such as satellite integration, is delayed. (1)

d) List **THREE** characteristics of an efficient project team. (3)

e) List **THREE** characteristics of an effective project manager. (3)

f) State how the project manager can ensure the rocket launch project stays within budget without compromising quality. (2)

g) State how can the project manager ensure clear communication between teams working on rocket development and mission control. (1)

(Total: 15 marks)