L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

ADVANCED MATRICULATION LEVEL
2026 SECOND SESSION

SUBJECT:	**Information Technology**
PAPER NUMBER:	I
DATE:	31st August 2026
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.

DataWise Ltd is a medium-sized financial services company that manages client accounts, transactions and reports. The company is planning to implement different types of Management Information Systems (MIS), including a Decision Support System (DSS).

a) Outline the main functionality of Information System (IS) for DataWise Ltd. (2)

b) Define the term MIS and explain why it is important for DataWise Ltd. (2)

c) List **FOUR** characteristics of a MIS. (4)

d) Outline **FOUR** factors that may affect the success or failure of adopting a MIS at DataWise Ltd. (4)

e) Define EIS. (2)

f) What is a DSS? (1)

g) Describe another type of MIS apart from DSS and EIS which can be used by DataWise Ltd. (2)

h) Define **THREE** methods for data capture. (3)

(Total: 20 marks)

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Answer TWO questions from Questions A2, A3 and A4.

Question A2

Alex and Maria work in a computer technology centre that specialises in a wide range of input and storage devices. Their role is to advise customers on the most suitable devices for different tasks and professional needs.

a) Suggest **TWO** suitable input devices for **each** of the following customer activities:
   i. A customer needs an input device for playing video games on a computer. (1)
   ii. A customer is a graphic designer who works with image editing and design software. (1)
   iii. A customer has limited hand mobility and needs an input device that is easy to control. (1)
   iv. A customer works remotely and regularly attends online meetings. (1)

b) For **each** activity in part (a), compare and contrast the two input devices suggested, by stating **ONE** similarity and **ONE** difference. (8)

c) Another customer wants to store large multimedia files such as videos, images, and backups for long-term use. Suggest **ONE** magnetic storage device and **ONE** optical storage device that would be suitable for this activity giving reasons for your answer. (2)

d) Compare and contrast the **TWO** storage devices stated in part (c) in terms of:
   i. performance;
   ii. cost;
   iii. durability. (6)

(Total: 20 marks)

Question A3

TechProcess Ltd uses computer systems to manage different types of operations, including customer services, data processing, and automated tasks. Management wants to ensure that the most appropriate processing modes are selected to support each operation efficiently.

a) Outline **FOUR** criteria that should be considered when choosing an appropriate processing mode to support real-world processes apart from speed, user interaction and volume. (4)

b) One of the operations carried out by TechProcess Ltd is allowing customers to place orders through an online system. Identify the most suitable processing mode for this operation and give **TWO** reasons for your selection. (3)

c) Define **TWO** other processing modes used in computer systems, apart from the one mentioned in part (b). (3)

d) Give **TWO** examples of a real-world application for **each** of the processing modes described in part (c) that TechProcess Ltd could use. (4)

e) Compare and contrast the **TWO** processing modes listed in part (c) in terms of:
   i. speed of response; (2)
   ii. level of user interaction; (2)
   iii. volume of data. (2)

(Total: 20 marks)

Question A4

SoftLink Systems is a software development company that creates applications for a wide range of users, including office workers, gamers, and users with accessibility needs. The development team aims to design user interfaces that are intuitive and efficient.

a) Outline **TWO** basic psychological factors that must be considered when designing good software interfaces, with reference to:
   i. Short-Term Memory (STM). (2)
   ii. Long-Term Memory (LTM). (2)

b) Define **THREE** types of user interfaces that could be used by SoftLink Systems. (3)

c) Compare and contrast **TWO** of the interfaces defined in part (b) in relation to **each** of the psychological factors outlined in part (a). (4)

SoftLink Systems is considering the use of haptic interaction in one of its applications to enhance user feedback.

d) Define haptic interaction. (1)

e) List **TWO** advantages and **TWO** disadvantages of using haptic interaction technology. (4)

SoftLink Systems is also exploring the use of gesture recognition as an input method.

f) Define gesture recognition. (1)

g) Give **TWO** examples where this technology might be used by SoftLink Ltd. (2)

h) Mention **ONE** other interface technology, apart from those already mentioned in this question which might be used by SoftLink Systems. (1)

(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.

WebTrade Solutions is an online business that uses e-marketing tools and web-based platforms to promote its products and communicate with customers. Employees at WebTrade Solutions spend long hours working on computers to manage online markets, web portals, and digital content.

a) What term is used to define online markets? (1)

b) Differentiate between the term mentioned in part (a) and e-marketing. (2)

c) Give **TWO** examples of online markets that WebTrade Solutions could use to sell its products. (2)

d) Define web portal and explain its relevance to WebTrade Solutions. (2)

e) Give **TWO** examples of web portals that could be used by WebTrade Solutions. (2)

f) Explain **TWO** ways in which web portals or online platforms support communication between WebTrade Solutions and its customers. (2)

Questions continue on the next page.

g) With reference to the working environment at WebTrade Solutions, give **SIX** examples of health and safety issues that may arise if the ICT environment is not set up correctly. (6)

h) Describe **THREE** health-related conditions or illnesses that employees at WebTrade Solutions may experience as a result of poor ICT health and safety practices. (3)

(Total: 20 marks)

Answer any TWO questions from B2, B3 and B4.

Question B2

PixelWorks Ltd, a graphic design company, is considering different methods of improving communication with employees and clients. Management is considering visual communication methods as well as alternative communication approaches.

a) What is meant by visual communication, and why is it particularly suitable for PixelWorks Ltd? (2)

b) State **ONE** advantage and **ONE** disadvantage of visual communication. (2)

c) Outline **THREE** visual communication methods that PixelWorks Ltd could use. (3)

d) Describe **THREE** other Internet communication types that the company could use instead of visual communication. (3)

(Total: 10 marks)

Question B3

HomeEase Technologies develops smart home ICT solutions such as automated lighting, heating, and security systems. The company is reviewing how sustainability and automation can improve efficiency and reduce energy use in both production and home systems.

a) Define sustainability in ICT in the context of HomeEase Technologies. (2)

b) Explain **TWO** ways for **each** of the following in which automation can be used to support sustainability at HomeEase Technologies:
   i. in the manufacturing of HomeEase products; (2)
   ii. in the domestic smart home systems developed by HomeEase. (2)

c) List **TWO** advantages and **TWO** disadvantages of using automation systems. (4)

(Total: 10 marks)

Question B4

NetConnect Ltd is a growing company that relies on Internet-based communication tools to communicate with employees, customers, and business partners.

a) Give examples of **SIX** Internet communication tools that can be used by NetConnect Ltd. (6)

b) Choose **TWO** of the communication tools mentioned in part (a) and, for **each** tool, give **ONE** example of how it can be used for:
   i. internal communication with employees; (2)
   ii. external communication with customers and/or business partners. (2)

(Total: 10 marks)

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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

ADVANCED MATRICULATION LEVEL
2026 SECOND SESSION

SUBJECT:	**Information Technology**
PAPER NUMBER:	II
DATE:	1st September 2026
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.

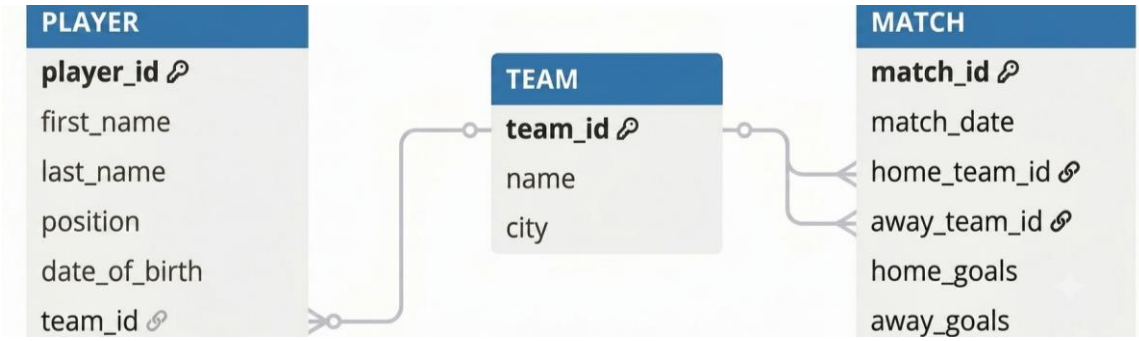
SECTION A: SOFTWARE

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

Question A1

This is a compulsory question. Answer all parts.

A national football association wants to store data about league matches in a database. Each team has a unique identifier, a name, and a home city. Each player belongs to one team and has a unique player ID, a first name, a surname, a playing position (e.g. goalkeeper, defender, midfielder, forward), and a date of birth. The association also stores details about each match played in the league: every match has a unique match ID, a date on which it is played, and two teams taking part – one designated as the home team and the other as the away team – together with the number of goals scored by each team. The system is only concerned with league matches (no cups or friendlies). Analyze the following ERD and answer the questions below.



a) Identify the **THREE** entities in the national football association database and state the primary key for **each**. (3)
b) Suggest **TWO** validation rules that could be applied to the PLAYER table. (2)
c) Name **TWO** foreign keys in the national football association database. State which table and field they link to. (2)
d) Justify whether any table in this ERD requires a composite key. (1)
e) Suggest an appropriate data type for the following fields:
   i. *name* field in the TEAM table; (1)
   ii. *date_of_birth* field in the PLAYER table; (1)
   iii. *home_goals* field in the MATCH table. (1)
f) What is the cardinality of the relationship between TEAM and PLAYER? (1)
g) Explain why the national football association database meets the requirements of 3rd Normal Form (3NF). (3)

(Total: 15 marks)

Please turn the page.

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

Question A2

CloudMall Retail Group operates multiple retail outlets and a rapidly expanding online store. The company manages several websites, an internal intranet for employees, and a partner extranet used by suppliers. CloudMall recently registered new domains as it expands into Europe, and the junior technician must understand how domain names, IP addresses, URLs and web technologies operate so they can support both the public website and internal network services.

a) Explain why CloudMall uses domain names instead of exposing raw IP addresses to customers. (1)
b) CloudMall's hosting provider has assigned IP addresses to both websites. Explain why it still needs these IP addresses even though it already has domain names. (1)
c) When registering its new European domain, CloudMall interacted with an accredited registrar. State the role of global Internet registries in this process. (1)
d) CloudMall relies heavily on fast and reliable connectivity for online orders. Explain why it must contract an Internet Service Provider (ISP). (1)
e) Staff at CloudMall access payslips, schedules, and internal manuals through an intranet. State **TWO** reasons why CloudMall would choose an intranet for these resources. (2)
f) CloudMall's suppliers access product catalogues and delivery documents via a dedicated extranet. Explain how an extranet differs from CloudMall's intranet in this context. (1)
g) CloudMall's older systems still use IPv4, but its new European servers run IPv6. Define **TWO** reasons why hosting providers increasingly use IPv6. (2)
h) Customers access CloudMall's site using browsers such as Chrome and Edge. State **ONE** reason a web browser is essential for CloudMall's customers. (1)
i) CloudMall's IT team manages a dedicated web server for hosting their online store. Outline **TWO** functions this server must perform. (2)
j) CloudMall plans to migrate some services to a new hosting provider. During testing, the IT team notices that customers can access the site when typing https://cloudmall.com , but not when typing http://cloudmall.com .
   i. Define why CloudMall may have chosen to enforce HTTPS only. (1)
   ii. State **ONE** benefit HTTPS provides to customers using the online checkout. (1)
   iii. Explain why forcing HTTPS might require server-side configuration changes. (1)

(Total: 15 marks)

Question A3

CloudMall Retail Group is launching a redesigned version of its online store. The new website must follow modern HTML structure, use CSS for layout and styling, and adopt semantic tags to improve accessibility and SEO. A sample of the homepage draft is shown below:

```
1.  <html>
2.  <head>
3.      <title>CloudMall Online Store</title>
4.      <style>
5.          h1 { color: blue; text-side: center; }
6.          .promo { font-load: bold; font-size: 20px; }
7.      </style>
8.  </head>
9.
10. <body>
11.    <header>
12.        <h1>Welcome to CloudMall</h1>
13.        <nav>
14.            <a href="products.html">Products</a>
```

```
15.            <a href="offers.html">Latest Offers</a>
16.        </nav>
17.    </header>
18.
19. <main>
20.     <p class="promo">Best prices guaranteed!</p>
21.     <img src="banner.jpg" width="300">
22. </main>
23.
24. <footer>
25.     <p>Contact us at info@cloudmall.com </p>
26. </footer>
```

a) Identify **TWO** HTML tags in the snippet that improve the structure and readability of CloudMall's website. (2)

b) Identify and correct the **TWO** CSS errors in the <style> block in the snippet. (2)

c) Give **TWO** reasons why CloudMall should move styling from the <style> tag into an external CSS file as the website grows. (2)

d) The homepage uses the class *.promo* to style a paragraph. Explain why CloudMall uses a class instead of an ID for this element. (1)

e) Identify **TWO** reasons why CloudMall uses client-side validation on its sign-up form. (2)

f) CloudMall applies several types of validation to the form input fields. For **each**, give **ONE** type of validation where it may be used on CloudMall's registration form:

   i. Requiring the customer to enter an email address. (1)

   ii. Ensuring the email follows *name@example.com*. (1)

   iii. Ensuring the password is at least a minimum number of characters. (1)

g) A junior developer incorrectly writes the following HTML:

```
1.  <p>Welcome to CloudMall
2.     <h1>Latest Products</h1>
3.  </p>
```

   i. Identify the mistake. (1)

   ii. Explain why this structure is invalid. (1)

   iii. Rewrite the corrected HTML. (1)

(Total: 15 marks)

Question A4

PrintWorks Solutions is a medium-sized company that provides printing, document management, and delivery services to local businesses. The company uses a mix of specialised software for managing print jobs, generic office tools for administration, and online platforms for customer submissions. Across its operations, PrintWorks also relies on different Operating Systems (OS): real-time OSs in printing machines, mobile OSs for driver tablets, and a network OS that manages its distributed file servers. A new junior technician has joined the IT team and must understand the different types of application software and OSs used within the company.

a) The finance team at PrintWorks uses specialised invoicing software, while the admin team uses general office applications. Explain **TWO** differences between specific application software and general-purpose application software in this context. (2)

b) PrintWorks receives customer print requests through an online portal. State **TWO** advantages of using an online application environment for this service. (2)

c) The IT department uses an application generator to create simple internal forms for tracking print jobs. Explain the purpose of an application generator in this situation. (1)

Questions continue on the next page.

d) The management team uses a software suite for presentations, spreadsheets and reports. Give **ONE** benefit of using a software suite. (1)

e) PrintWorks' printing machines must react instantly to paper sensors and toner levels. Name the type of OS suitable for these machines and state **ONE** reason why. (2)

f) Delivery drivers use tablets to confirm drop-offs and capture signatures. Identify the type of OS used on these devices and give **ONE** reason. (2)

g) PrintWorks' main server manages thousands of documents daily, handles multiple print jobs at once, records system activity, and must keep customer files secure. The junior technician must understand which OS components handle each task. Name the OS component responsible for the following:

   i. Organising the thousands of folders and documents used by staff. (1)

   ii. Managing the large temporary print files that machines read and write during processing. (1)

   iii. Recording every machine fault and print error for later analysis. (1)

   iv. Handling many print jobs at the same time during peak hours. (1)

   v. Protecting customer documents so only authorised staff may access them. (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 following are code snippets from the Python programming language.

BrewBeats Café is developing a simple Python program to manage their digital menu display and stock levels. The first program generates a simple seating layout using a grid of brackets for each seat.

```
1. for row in range(3):
2.     for seat in range(5):
3.         print("[]", end="")
4.     print()
```

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

ii. A customer complained that the display shows all tables without spaces between them. Modify the original program so that each [] seat is separated by a space. (1)

iii. Explain what will happen if *print()* at line 4 is removed from the original program. Describe the output and why this happens. (2)

iv. Predict the output of the program if *range(3)* is changed to *range(1, 4)* and explain why this happens. (2)

BrewBeats also wants a small program to check which items are in stock and which are out of stock.

```
1.  stock = ["Mugs", "Plates", "Cups"]
2.  quantities = [10, 0, 4]
3.
4.  for i in range(len(stock)):
5.      if quantities[i] == 0:
6.          print(stock[i], "OUT OF STOCK")
7.      else:
8.          print(stock[i], "available:", quantities[i])
```

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

vi. The program works, but it can be improved. Rewrite the program so that it also handles invalid quantities (e.g. negative numbers) by displaying "INVALID QUANTITY" for that item. Do not use logical operators (and, or, not). (2)

vii. After the changes done in part (vi), what would the output be if line 2 changes to `quantities = [0, -2, 10]`. (2)

Questions continue on the next page.

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

```
1. <!DOCTYPE html>
2. <html>
3. <head>
4.     <title>BookHub Online</title>
5.     <meta charset="UTF-8">
6. </head>
7.
8. <body>
9.     <header>
10.        <p>BookHub Online</p>
11.        <nav>
12.           Home | Categories | Contact
13.        </nav>
14.    </header>
15.
16.    <main>
17.        <p>Discover our latest books and bestsellers.</p>
18.    </main>
19.
20.    <footer>
21.        <p>&copy; 2025 BookHub Online</p>
22.    </footer>
23. </body>
24. </html>
```

i. Replace the navigation text on line 12 with an unordered list containing the same three items: Home, Categories, Contact. (2)

ii. Write **ONE** line of HTML that adds an image called bookshelf.jpg directly under the paragraph on line 17. (1)

iii. Write a CSS rule inside a <style> tag (inside <head>) that makes all <p> elements bold. (2)

c) MedTrack Clinics stores patient and appointment information in simple text files. As the clinics expand, the IT team plans to replace the old flat-file system with a relational database and must decide whether to use a centralised or distributed database across their three branches.

i. Some MedTrack files require reading every record from the beginning until the desired data is found. What type of file access method is this? (1)

ii. State **ONE** reason why using a database is important for MedTrack. (1)

iii. Outline the three-level database architecture. (3)

(Total: 25 marks)

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

Question B2

Orion Space Agency is developing software to control satellites, monitor astronauts, analyse sensor data, and manage space missions. Different software systems are written in various programming languages and follow different programming paradigms depending on the task. Mission engineers must also design clear algorithms to validate sensor inputs, search through telemetry data, and sort mission logs efficiently. A trainee programmer has joined the mission control team and must understand programming languages, paradigms, translators, and basic algorithms to contribute effectively.

a) Astronauts use natural language to communicate, while computers require programming languages. State **TWO** differences between natural languages and programming languages. (2)

b) Orion uses Assembly code for hardware-level satellite control. List **TWO** reasons for this. (2)

c) The mission dashboard is written in Python. Explain **TWO** reasons why a high-level language is suitable for this part of the system. (2)

d) Before Orion's software can run on the spacecraft, it must be converted into machine code. For each of the following situations, identify the most appropriate language translator to use:
   i. Mission-critical flight software is fully tested and must run as efficiently as possible during the mission. (1)
   ii. Control scripts are being tested line by line during development to quickly identify errors. (1)
   iii. Low-level hardware instructions written in Assembly are used to directly control spacecraft components. (1)

e) Some navigation calculations are written as mathematical functions that do not modify data. Identify the paradigm used and explain **ONE** benefit of this approach. (2)

f) Astronaut age is checked to ensure it falls between 18 and 60 before mission assignment. Identify **ONE** type of validation algorithm that should be used in this situation. (1)

g) Orion requires engineers to enter an access code in the format **OPS-###**. Write pseudocode to validate whether the access code follows the required format. (3)

(Total: 15 marks)

Question B3

Orion Mission Control receives a signal strength reading from a space probe. For safety, the system must ensure the reading is valid (between 0 and 100) and then classify the signal as strong or weak. If the reading is invalid, the engineer must re-enter it. The following Python code was written to address this issue.

```
1.   signal = int(input("Enter signal strength (0-100): "))
2.
3.   while signal < 0 or signal > 100:
4.       print("Invalid signal strength.")
5.       signal = int(input("Enter signal strength (0-100): "))
6.
7.   if signal >= 60:
8.       print("STRONG SIGNAL")
9.   else:
10.      print("WEAK SIGNAL")
```

a) Draw a flowchart for the program above. (6)

b) The signal-checking program follows a clear sequence of steps and decisions. Identify the programming paradigm used. (1)

c) If Orion Mission Control wanted to check a list of past signal readings to find a specific value, identify **ONE** suitable search algorithm. (1)

d) Explain **TWO** advantages of using a flowchart instead of Python code when presenting the signal-checking logic to non-programmer engineers. (2)

e) If the engineer enters a non-numeric value for the signal strength, identify the type of error that would occur. (1)

f) Suggest **TWO** debugging techniques an engineer could use to inspect how the value of signal changes during execution. (2)

g) Explain **TWO** reasons why validation algorithms are especially critical in space-mission software compared to everyday applications. (2)

(Total: 15 marks)

Please turn the page.

Question B4

SkyTrack Airport Services is developing a new computer-based system to manage passenger check-in, baggage handling, flight scheduling, and staff allocation. The current system is outdated and difficult to maintain, so management has approved the development of a new solution. A systems analyst and project manager have been appointed to design, test, implement, and maintain the system. They must carefully choose suitable design approaches, testing strategies, implementation methods, and project management techniques to ensure the system is delivered on time and meets operational requirements.

a) Explain why a top-down approach would be suitable when designing the SkyTrack system. (1)
b) Explain **TWO** advantages of using a bottom-up approach during later stages of SkyTrack's development. (2)
c) Suggest **ONE** module that could be created for the SkyTrack system and explain its purpose. (1)
d) SkyTrack is designed using a modular approach. State **TWO** advantages and **ONE** disadvantage of using modular design for the SkyTrack airport management system. (3)
e) Explain **ONE** important user interface design consideration for airport staff using SkyTrack. (1)
f) SkyTrack Airport Services is testing different parts of its new airport management system before full deployment. For **each** of the following situations, identify the most appropriate type of testing:
    i. The development team tests the baggage handling module on its own to ensure luggage IDs are recorded and updated correctly. (1)
    ii. The check-in module is tested together with the flight scheduling module to ensure passengers are assigned to the correct flight. (1)
    iii. SkyTrack is tested as a complete system to ensure passenger check-in, baggage handling, boarding pass printing, and staff allocation all work together under normal airport conditions. (1)
    iv. Before the system goes live, SkyTrack runs a full simulation of a busy airport day with hundreds of passengers and flights. (1)
g) Identify **TWO** tasks that must be completed before SkyTrack's implementation stage is deemed complete. (2)
h) SkyTrack plans to introduce the system to one terminal first before full rollout. Identify the changeover technique. (1)

(Total: 15 marks)