



**SUBJECT: INFORMATION TECHNOLOGY
PRELIMINARY EXAMINATION : PAPER I**

**GRADE: 12
MARKS: 150
TIME: 3 HOURS**

**DATE: 6 AUGUST 2025
EXAMINERS: IT CLUSTER
MODERATOR: IT CLUSTER**

FULL NAME:

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. This question paper consists of 25 pages, which includes the front cover. Please check that your question paper is complete.
2. Read the questions carefully and make sure that you answer all parts of all the questions.
3. **Answer ALL the questions on the question paper and hand this in at the end of the examination. Remember to write your name in the space provided.**
4. Show all working where applicable.
5. A non-programmable calculator may be used.
6. It is in your own interest to write legibly and to present your work neatly.
7. Three pages of lines (pages 23 to 25) are included at the end of the paper. If you run out of space for a question, use this page. Clearly indicate the number of your answer should you use this extra space.

Question	1	2	3	4	5	6	7	8	Total
Possible Marks	10	10	28	10	28	16	7	41	150
Actual Marks									

SECTION A SHORT QUESTIONS**QUESTION 1****10 MARKS**

Give the most appropriate term for each of the following expressions:

- 1.1 A non-volatile storage device that uses flash memory to store data and non-mechanical parts. (1)

- 1.2 The time delay between initiating a request and receiving a response from the system or device. (1)

- 1.3 The process of manually increasing a hardware component's clock speed beyond its factory-set limits to achieve better performance. (1)

- 1.4 The set of rules that govern data communication between devices on a network. (1)

- 1.5 A hardware component designed specifically for rendering visuals, gaming, video editing, 3D modelling, and other graphics-intensive tasks. (1)

- 1.6 The computer component that supplies stable electrical power to all internal components of a computer. (1)

- 1.7 A component on the motherboard that stores system firmware and performs the initial hardware checks when the computer is powered on. (1)

- 1.8 A network topology that combines two or more different types of topologies to benefit from the strengths of each. (1)

1.9 A compact, high-speed internal expansion card and storage format used in modern PCs, laptops, and consoles. (1)

1.10 A software utility that scans memory and removes harmful or malicious software from a system. (1)

SECTION B SYSTEM TECHNOLOGIES

QUESTION 210 MARKS

For each of the terms in Column A below, you should select the most correct definition in Column C, matching the letter to the question number. You should merely write down the appropriate letter in Column B. An example is shown as Question 2.0, using “W” as the correct answer.

Column A: Terminology	Column B: Definition
2.0 Practical Examination	W. An examination where a student writes SQL and OOP code.
2.1 Modular design	A. Breaking down a complex problem or system into smaller, more manageable parts.
2.2 Control Unit	B. A programming principle that hides internal object details from external access.
2.3 Switch	C. A component of a CPU that manages and coordinates the execution of instructions.
2.4 Encapsulation	D. An engineering and computing approach where a system is divided into independent, interchangeable components that can be developed, upgraded, or replaced separately.
2.5 Green Computing	E. A technology that uses radio signals to identify and track tags attached to objects.
2.6 RFID	F. A device that directs data only to the intended recipient on a network.
2.7 VRAM	G. A portion of the hard drive that is used as an extension of RAM.
2.8 MAC Address	H. A specialised device designed to offload specific tasks from the main processing unit to improve performance and efficiency.
2.9 Dark Web	I. A hidden part of the internet not indexed by search engines and only accessible through special tools.
2.10 Co-processor	J. Memory used by graphics cards to store and rapidly access visual data, such as textures, frame buffers, and 3D models.
	K. The method of identifying a device on a network at the hardware level.
	L. The process of designing, manufacturing, using, and disposing of hardware, software, and networks in a way that minimises environmental impact.

Question:	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10
Answer:	W										

SCENARIO:

Ms Tseole, a recent university graduate, is establishing Innovation Labs in Pretoria, Bloemfontein and Gqeberha to support the development of new technological ideas. Each lab will feature high-performance laptops connected to high-speed LANs, with all research data stored centrally at the Pretoria campus. As a Grade 12 IT student, you have been asked to help set up and test the laptops, ensuring the systems are ready and fully

Below are the specifications of the laptops chosen for the Innovation Labs:

CPU	AMD Ryzen 7 7840HS 3.8GHz (8 Cores, 16 Threads, 16MB Cache)
Memory	8GB LPDDR5 RAM
Storage	1TB PCIe Gen4 NVMe SSD; 500GB External USB 3.1 Backup Drive
Graphics Card	AMD Radeon 780M Integrated Graphics
LAN	Gigabit Ethernet 10/100/1000 Mbps
Wireless	Wi-Fi 6E + Bluetooth 5.3
USB Ports	2 x USB 3.2 Gen 2 Type A; 1 x USB 4.0 Type-C with DisplayPort
HDMI	1 x HDMI 2.1
Screen	15.6-inch Full HD (1920 x 1080) IPS Anti-Glare Display
Operating System	Ubuntu Linux 22.04 LTS (64-bit)

QUESTION 3

28 MARKS

3.1 What is meant by the specification that the “CPU has 8 Cores and 16 threads”? (1)

3.2 Explain how a 16-thread CPU with a 64-bit data bus improves processing speed. (1)

3.3 Explain the function of the 16MB cache in the CPU and how it benefits performance. (2)

3.4 What is the role of Bluetooth 5.3 in a school setting using these laptops? Give ONE example of how it is used. (1)

3.5 With reference to the Ryzen CPU, how you know this system makes use of hyperthreading? (1)

3.6 How would multithreading benefit the processing speed of the Ryzen CPU, if it has multiple cores? (3)

3.7 Complete the table below to show the differences between Static RAM and Dynamic RAM. (4)

Feature	Static RAM (SRAM)	Dynamic RAM (DRAM)
Storage Mechanism		
Speed		
Cost		
What it is used for:		

3.8 Give TWO reasons why an NVMe SSD is preferable over a traditional HDD for storing applications. (2)

Reason 1:
Reason 2:

3.9 Explain how an Operating System uses paging when RAM is fully used. (3)

3.10 Define a device driver and explain its role. (2)

3.11 Does Plug and Play remove the need for device drivers? Justify your answer. (2)

3.12 A Java application run on both Ubuntu and Windows laptops? Explain why this is possible with reference to the type of compilation it undergoes. (2)

3.13 Explain TWO benefits of using open-source software in an educational lab environment. (2)

3.14 Explain why having both USB Type-A and USB Type-C ports on a laptop is beneficial. (2)

SECTION CINTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 410 MARKS

- 4.1For Questions 4.1.1 to 4.1.10, you need to select the **most correct** answer from the options A–D. An answer grid for your answers is at the bottom of this page. You need only to write down the appropriate letter to indicate your answer.
- 4.1.1Signal attenuation occurs

A. when large packets of data are transmitted.
B. when a signal is not transmitted in binary.
C. when a signal is transmitted over a long distance.
D. when the receiver of the signal doesn't receive the signal correctly
- 4.1.2A network gateway is a device

A. that connects networks with different protocols.
B. that connects LAN network segments.
C. that only amplifies a signal.
D. that is used to reduce network traffic in a LAN.
- 4.1.3This protocol allocates IP addresses to devices as they join a network.

A. ARP
B. TCP/IP
C. DHCP
D. DNS
- 4.1.4A Wireless Access Point

A. will always ensure encrypted data transfer.
B. can only be found in public places.
C. is created to share private data.
D. is used to connect devices to a wired network without the need for cables.
- 4.1.5VOIP...

A. is a method of hacking into Voice-Operated Internet packets.
B. transmits voice data over the Internet.
C. cannot be used by tablets.
D. can be used without an internet connection.

4.1.1	4.1.2	4.1.3	4.1.4	4.1.5

4.1.6 A Trojan

- A. is a type of antivirus software.
- B. can only be transmitted using a USB Flash Drive.
- C. is software that seems useful but is a type of malware.
- D. is a type of ransomware.

4.1.7 Thin clients ...

- A. are only used on cabled networks.
- B. are used to reduce server processing requirements.
- C. are devices with minimal processing ability.
- D. are commonly used in most school networks.

4.1.8 WLAN

- A. uses radio waves to connect devices instead of using cables.
- B. can only be achieved if you have a wired LAN.
- C. is achieved using several routers connected in close proximity.
- D. none of the above.

4.1.9 An email application, like Microsoft Outlook, belongs to which of the following layers as found in the OSI Model?

- A. Physical Layer
- B. Data-Link Layer
- C. Presentation Layer
- D. Application Layer

4.1.10 Which network device receives, and forwards data packets based on MAC addresses?

- A. Hub
- B. Switch
- C. Router
- D. Modem

4.1.6	4.1.7	4.1.8	4.1.9	4.1.10

QUESTION 5

28 MARKS

- 5.1 The network can be centralised or decentralised.
- 5.1.1 Explain how a **centralized** network would function. (2)
- | |
|--|
| |
| |
| |
- 5.1.2 Give TWO advantages of a centralised network. (2)
- Advantage 1:
- | |
|--|
| |
| |
- Advantage 2:
- | |
|--|
| |
| |
- 5.1.3 Give ONE drawback of a centralised network. (1)
- | |
|--|
| |
| |
- 5.2 Ms Tseole has bought a server for the Pretoria Lab. The Lab will be installed to use Microsoft Office applications so that students can access learning resources. The devices will be smart clients.
- 5.2.1 What is a smart client? (2)
- | |
|--|
| |
| |
| |
| |

5.2.2 Give one advantage and one disadvantage of a smart client. (2)

Advantage:

Disadvantage:

5.3 Ms Tseole would like all three Labs across the country to be able to share data. The technician has told her about peer-to-peer file sharing.

5.3.1 What is meant by Peer-to-Peer sharing? (1)

5.3.2 Explain one drawback of using Peer-to-Peer when sharing data across the three labs. (2)

5.4 Ms Tseole has gathered IT students to create a learning system that uses Web 4.0 concepts.

Explain TWO specific things that the IT students will be able to do when using Web 4.0? (2)

5.5 The specifications mention “Gigabit Ethernet 10/100/1000 Mbps.”

5.5.1 What does “Mbps” mean? (1)

5.5.2 This tells the person the bandwidth of the network.
What is meant by the term bandwidth? (1)

5.5.3 Explain the need for frames to carry both IP and MAC addresses. (2)

5.5.4 Explain how Data is transmitted in the LAN using Ethernet frames. (3)

- 5.6 A student in the Bloemfontein Lab needs to install a programming application but lacks knowledge of how to do a custom install. The technician in Pretoria offered to assist.
- 5.6.1 Which one would the technician to use if he were to connect to the student's laptop from his office? (1)

VPN		Remote access	
-----	--	---------------	--

- 5.6.2 What is the difference between VPN and remote access? (4)

- 5.7 Ms Tseole's hard drive failed, and she lost all her data. Explain two safeguards she could have implemented to prevent data loss. (2)

SECTION D SOCIAL IMPLICATIONS

QUESTION 6

16 MARKS

Ms Tseole wonders how to balance the need for open collaboration between labs in different cities with the responsibility to protect users’ personal information and intellectual property. She is not sure whether to allow unrestricted sharing between labs or enforce stricter access controls, which might limit collaboration.

6.1 AI tools are assumed to provide information that is well-researched and accurate. Give TWO ways one can ensure the accuracy of information obtained from an AI source? (2)

6.2 Describe the impact of AI tools on the digital divide. What is the digital divide? (2)

6.3 In your opinion, how can AI tools exacerbate or worsen the digital divide? (2)

6.4 Explain how using AI Tools may promote intellectual property infringement and plagiarism. (2)

6.4 There has been a significant rise in the number of reported phishing cases in recent years.

6.4.1 Explain the term phishing. (2)

6.4.2 Provide ONE example of how phishing can occur on social media platforms. (2)

6.4.3 Would an anti-virus program prevent a phishing attack? Justify your answer. (2)

6.4.4 Explain how pharming is different to phishing and how it uses the concept of spoofing. (2)

SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 7

7 MARKS

7.1 Explain what data validation is and give ONE reason why it is important in software solutions that rely on user input. (2)

7.2 Explain the difference between a syntax error and a logic error by giving one example of each. (2)

7.3 Data needs to be checked to ensure that a number is input. What is the name of this type of validation? (1)

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7.4 Explain two other types of data validation that can be used to ensure the quality of data input into a system. (2)

QUESTION 8

41 MARKS

8.1 Explain the following programming terms:

8.1.1 Inheritance

(2)

8.1.2 Composition

(2)

8.2 In inheritance terminology, what is the difference between a superclass and a subclass?

(2)

- 8.3 Ms Tseole wants to build a software system for her Innovation Labs to manage different types of users: learners and facilitators. All users have the following common attributes:
- A name (String)
 - An email address (String)

In addition:

- Learners have a field for grade (integer).
- Facilitators have a field for expertise area (string).

Answer the following questions based on this scenario.

8.3.1 Draw a UML class diagram below with inheritance to represent the above scenario. Include:

- One superclass and two subclasses
- Appropriate data types for the attributes
- Correct use of access modifiers.
- A constructor with the correct parameters
- At least one accessor (getter) and one mutator (setter) method per class
- Any other methods that should be a standard.

Complete Diagrams on the next page.

Show the relation diagram that would show inheritance:

(2)

Superclass name: _____	
Subclass 1 name: _____	Subclass 2 name: _____

CLASS DIAGRAMS:

(16)

Superclass Name:	

Subclass 1 Name:	

Subclass 2 Name:	

- 8.4 Write the java code of a class header for one of the subclasses to show inheritance. (1)

- 8.5 The following object is declared and instantiated for you:

User u ;

Complete the if-statement header so that can check whether **u** refers to a Facilitator object. (1)

If (u 8.5.1 _____ Facilitator)

***{

.....
}***

Answer:

- 8.6 Each Innovation Lab stores data about learners working on different tech projects. A method is used to count how many learners have selected Artificial Intelligence (AI) as their project theme.

An accessor method called `getProject()` will return the value of the attribute for any object that is of type `Learner` and returns the project theme.

The following statements declare and initialise size and an Array of Learners:

`int size = 4;`

`labLearners[0] = new Learner("Sipho", "Robotics");`

`labLearners[1] = new Learner("Lebo", "AI");`

`labLearners[2] = new Learner("Jenna", "Cybersecurity");`

`labLearners[3] = new Learner("Fatima", "AI");`

Given the following method:

```
public static int countAIProjects() {  
  (1)  int count = 0;  
  (2)  for (int i = 0; i < size; i++) {  
  (3)    String project = labLearners[i].getProject();  
  (3)    if (project.equals("AI")) {  
  (4)      count++;  
        }  
    }  
  (5)  return count;  
}
```

8.6.1 Complete the trace table below:

(6)

Line	i	i < size?	labLearners[i].getProject()	project.equals ("AI")?	count	Result
1					0	
2						

8.6.2 What is the final value returned by the method?

(1)

8.6.3 Modify the method so it will return the percentage of learners working on AI projects. Write down the line number and the full statement to accomplish this.

(2)

8.7 The method **allowProject()** decides whether a learner may register for the Advanced-Project Track based on four Boolean inputs supplied by other classes in the system:

Input (Boolean)	Meaning	Shorthand
orientationDone	Learner completed the safety & orientation session.	O
goodAverage	Learner's overall mark $\geq 70\%$.	G
proposalSubmitted	Learner uploaded a project proposal.	P
facilitatorApproved	A facilitator signed off the learner's idea.	F

A learner qualifies if: $(O \text{ AND } G) \text{ AND } (P \text{ OR } F) \text{ AND NOT } (G \text{ AND NOT } F)$

or, in function form: $F(O, G, R, F) = (O \cdot G) (P + F) (G \cdot F)'$

8.7.1 Complete the truth table for this function: (6)

O	G	R	F	F'	O . G	P + F	G.F'	(G.F')'	F(O,G,P,F)	RESULT
0	0	0	0							
0	0	0	1							
0	0	1	0							
0	0	1	1							
0	1	0	0							
0	1	0	1							
0	1	1	0							
0	1	1	1							
1	0	0	0							
1	0	0	1							
1	0	1	0							
1	0	1	1							
1	1	0	0							
1	1	0	1							
1	1	1	0							
1	1	1	1							

GRAND TOTAL: 150 MARKS

ADDITIONAL WRITING SPACE:

[illegible]

