



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**NOVEMBER 2023**

**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 17 pages.**



## INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX sections:

SECTION A:	Short Questions	(20)
SECTION B:	Systems Technologies	(25)
SECTION C:	Communication and Network Technologies	(30)
SECTION D:	Data and Information Management	(20)
SECTION E:	Solution Development	(22)
SECTION F:	Integrated Scenario	(33)

2. Read ALL the questions carefully.

3. Answer ALL the questions.

4. The mark allocation generally gives an indication of the number of facts/reasons required.

5. Number the answers correctly according to the numbering system used in this question paper.

6. Write neatly and legibly.



**SECTION A: SHORT QUESTIONS**

**QUESTION 1**

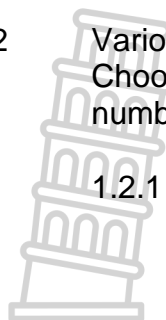
1.1 Choose a term from COLUMN B that matches the description in COLUMN A. Write only the letter (A–P) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 Q.

COLUMN A		COLUMN B	
1.1.1	The efficient and environmentally responsible design and disposal of computer equipment	A	virtual reality
		B	DBMS
1.1.2	The interconnection of computing devices embedded in everyday objects, enabling them to send and receive data via the internet	C	ergonomics
		D	wiki
		E	domain name
1.1.3	A term used to describe memory that loses its data when the power is switched off	F	ROM
		G	URL
1.1.4	The study and design of computer equipment to enhance the comfort and safety of the user	H	green computing
		I	IoT
1.1.5	A collaborative website where users can publish and organise a body of content for free	J	volatile
		K	virtualisation
1.1.6	The real-time integration of text, graphics, audio and other virtual enhancements with real-world objects	L	augmented reality
		M	jpeg
1.1.7	The process of extracting specific information from a database based on a set of criteria or conditions	N	mp4
		O	BitTorrent
1.1.8	The file extension of an image file	P	query
1.1.9	Refers to the unique address of a web page		
1.1.10	A peer-to-peer protocol used for the sharing and transfer of large files across a network		

(10 x 1)

(10)

1.2 Various options are provided as possible answers to the following questions. Choose the answer and write down only the letter (A–D) next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 D.



1.2.1 ... refers to a group of compromised computers or mobile devices connected to a network used to attack other networks.

- A Botnet
- B Zombie cookie
- C Skynet
- D RAID

(1)

1.2.2 ... is a temporary storage area.

- A ROM
- B SSD
- C HDD
- D Cache memory

(1)

1.2.3 Linux is an example of ... software, which means its code is provided free for use, modification and redistribution.

- A Proprietary
- B Shrink-wrapped
- C Open-source
- D Virtual

(1)

1.2.4 Most of today's internet connections are ... connections that are capable of transmitting large amounts of data across the network.

- A dial-up
- B ADSL
- C broadband
- D coaxial

(1)

1.2.5 The answer to the expression given below:

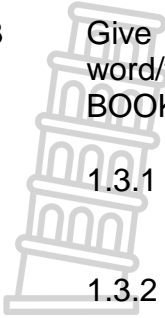
$$24 \text{ MOD } 7 * 5 \text{ DIV } 2$$

- A 3
- B 6
- C 7
- D 7.5

(1)



1.3 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK, e.g. 1.3.1 Computer.



1.3.1 A third-party program that extends the built-in functionality of an application or browser (1)

1.3.2 A data structure that consists of a collection of tables that are joined through linked fields (1)

1.3.3 A type of malware that prevents a user from accessing his or her data on a device until a fee is paid (1)

1.3.4 A creator's exclusive legal right to reproduce, publish or sell intellectual property (1)

1.3.5 The ability of a system to increase or decrease its resources depending on the number of users (1)

**TOTAL SECTION A: 20**



**SECTION B: SYSTEMS TECHNOLOGIES****QUESTION 2**

A university called 'LearnMore' is currently receiving student applications for the new year.

2.1 It has been suggested that the desktop computers in the administration building should be replaced.

2.1.1 State TWO characteristics of a motherboard that should be considered when purchasing new desktop computers. (2)

2.1.2 Except for the CPU, name ONE other component that will process data in a computer system. (1)

2.1.3 The secondary storage capacity is an important consideration when purchasing devices.

Give TWO examples of flash storage devices that could be used in the administration building. (2)

2.2 The IT department at the university suggested that cloud-based servers could be used for the administration department.

2.2.1 Briefly explain what a *cloud-based virtual server* is. (2)

2.2.2 Justify the use of cloud-based virtual servers. (2)

2.2.3 Software as a Service (SaaS) is currently used on the computers in the administration building.

Except for the benefit of renting instead of buying software, state TWO other benefits of using SaaS. (2)

2.2.4 Some of the software being used requires licences.

Motivate why acquiring a site licence is better than acquiring a single-user licence for each of the users. (2)

2.3 Critical to the success of the institution is ensuring no downtime and that regular backups of important data at the university are made.



2.3.1 Explain what a *backup strategy* is and how it can help prevent downtime at the university. (3)

2.3.2 A cloud storage service could be used to backup data off-site.

State TWO disadvantages of using cloud storage to backup data off-site. (2)

2.4 An Engineering Graphics and Design course, using AutoCAD as a drawing tool, is offered at the university.

Give ONE term for the type of computer user associated with the course above by choosing a term from the list below. Write only the term next to the question number (2.4) in the ANSWER BOOK.

home office user; power user; mobile user; small office user

2.5 Data security is essential to safeguard computer systems at the university against malware threats. One such threat is a computer worm.

2.5.1 State TWO characteristics of a computer worm. (2)

2.5.2 Explain why an antivirus product, rather than a firewall, will protect a system from being infected by a computer worm. (2)

2.6 The new computers will be equipped with solid-state drives which do not need to be defragmented to optimise performance.

Discuss why there is no need to defragment a solid-state drive. (2)

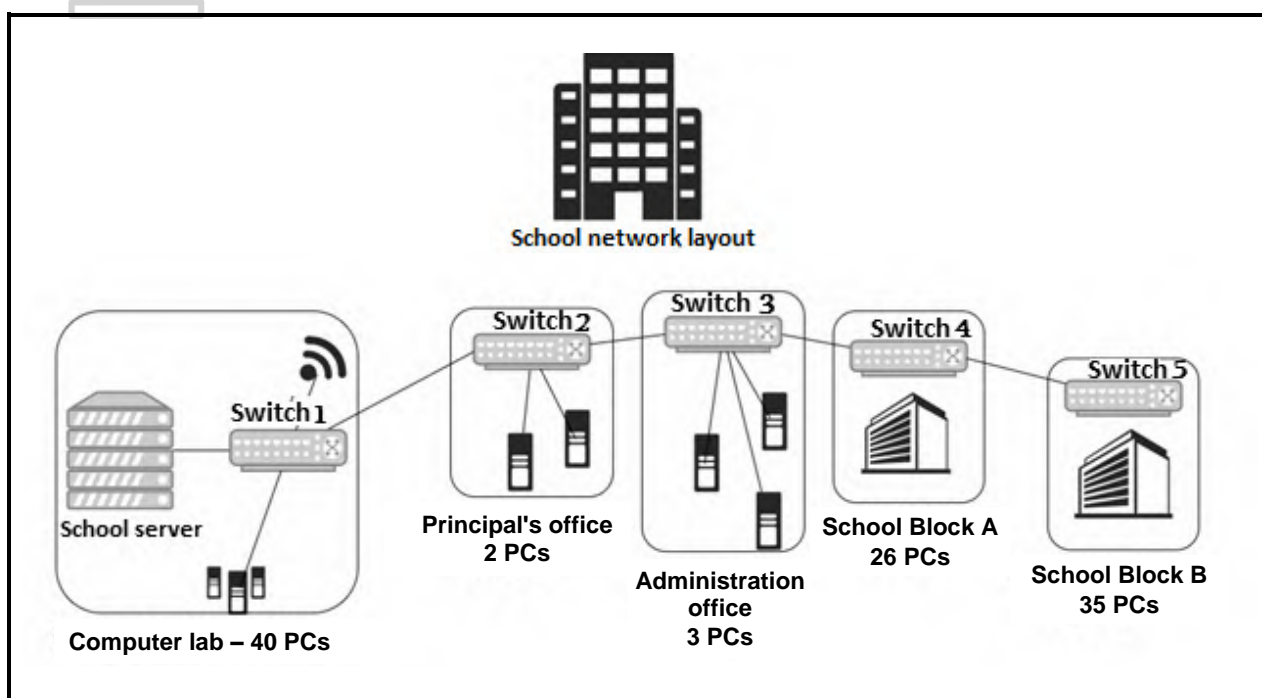
**TOTAL SECTION B: 25**



**SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES**

**QUESTION 3**

A school governing body decided to invest funds in communication and network technologies to upgrade the network of the school. The school network layout is shown in the diagram below.



- 3.1 Study the school network layout and answer the questions below.
- 3.1.1 Define the term *network*. (2)
  - 3.1.2 Why do you think the school will benefit from investing in modern communication and network technologies? (2)
  - 3.1.3 Identify and motivate the need for at least TWO components used in a LAN. (4)
  - 3.1.4 The switches are connected to one another from the computer lab to Block B of the school (from Switch 1 to Switch 5).
    - (a) Describe a potential disadvantage of this layout. (2)
    - (b) Draw a basic diagram to suggest an alternative layout for the network that will prevent the potential problem described in QUESTION 3.1.4(a). (2)



- 3.2 A network can be made up of wired and wireless communication media.
- 3.2.1 Suggest ONE type of wireless technology that can be utilised in an extended network. (1)
- 3.2.2 Explain how the wireless capability of the school's network can be extended to cover the entire school grounds. (2)
- 3.2.3 The school needs to provide network access to their hostel at another location about one kilometre away.
- Suggest a possible solution and indicate how your solution would solve this problem. (2)
- 3.3 The school would like to incorporate VoIP technology in the classrooms.
- 3.3.1 (a) Write out the acronym *VoIP*. (1)
- (b) How does VoIP differ from traditional telephone calls? (2)
- 3.3.2 Assess the possible technical challenges that might be faced when using VoIP at school. Discuss at least TWO challenges. (4)
- 3.4 One of the short-term goals of the school is to set up an intranet.
- Briefly explain what an *intranet* is and give a practical example of how it could be used in a school environment. (2)
- 3.5 Below is an advertisement that the school received to introduce remote teaching and learning.

**Work from anywhere –  
securely, easily and fully  
immersive**

The ultimate remote access and work solution for remote employees, freelancers and hybrid systems

- 3.5.1 Recommend why a remote desktop connection should be used for people working from home. (2)
- 3.5.2 An example of 'remote access' is being able to access the school security while away from the school.
- State ONE advantage and ONE disadvantage of using remote access. (2)

**TOTAL SECTION C: 30**

**SECTION D: DATA AND INFORMATION MANAGEMENT**

**QUESTION 4**

The school stores all the information of the learners in a database with multiple tables. Data was obtained from printed class lists provided by the register class teachers.

The extract below is from a table called **tblLearners**.

ID	FirstName	Surname	Age	Gender	RegisterClass	Teacher
1	John	Smith	16	Male	10A	Boyd
2	Jane	Doe	18	Female	12C	Nkwe
3	James	Brown	15	Male	9A	Peterson
4	Emily	Davis	16	Female	10A	Boyd
5	Michael	Johnson	18	Male	12C	Nkwe

4.1 Study the table above and answer the questions that follow.

4.1.1 State the purpose of a primary key in a table. (1)

4.1.2 State a requirement of a primary key, except not having duplicate values. (1)

4.1.3 The structure of the table above will result in anomalies.

(a) What design error in this table might lead to an anomaly? (2)

(b) Suggest how this design error can be resolved and explain how a solution can be accomplished. (4)

4.2 Data verification and data validation are important database management processes.

Compare the concepts of *verification* and *validation* to clearly indicate why validation does not remove the need for verification. (4)

4.3 The school uses a 'Microsoft Access' database as their DBMS solution.

4.3.1 What programming language is mostly used to extract data from a database? (1)

4.3.2 Identify a typical scenario when a server-based database would be required and explain how a server-based database would serve to cater for the needs of the scenario identified. (3)

4.4 An audit trail is used in the school's database.



4.4.1 How does the creation of an audit trail enhance data security in the school database? (2)

4.4.2 Besides using an audit trail, suggest an alternative method to enhance the security of the school's database and explain how it can be used. (2)

**TOTAL SECTION D: 20**



## SECTION E: SOLUTION DEVELOPMENT

### QUESTION 5

5.1 Efforts are made to identify and improve code segments in the current software system utilised by the administration department.

Study the extract of Delphi code below and answer the questions that follow:

```
1   iCounter := 0;
2   for iRow := 1 to 3 do
3     begin
4       sLine := '';
5       for iCol := 1 to 5 do
6         begin
7           sLine := sLine + '*';
8           inc(iCounter);
9         end;
10    end;
11  redOutput.Lines.Add(sLine);
```

5.1.1 Write down the line number of any line of code from the provided code segment above that implements the following:

(a) Initialisation (1)

(b) Looping (1)

5.1.2 What will be the value of **iCounter** after the above code has been executed?

**NOTE:** Assume that all the variables are declared correctly and there are no errors in the code. (1)

5.1.3 Provide the output of the program after the code above has been executed. (2)

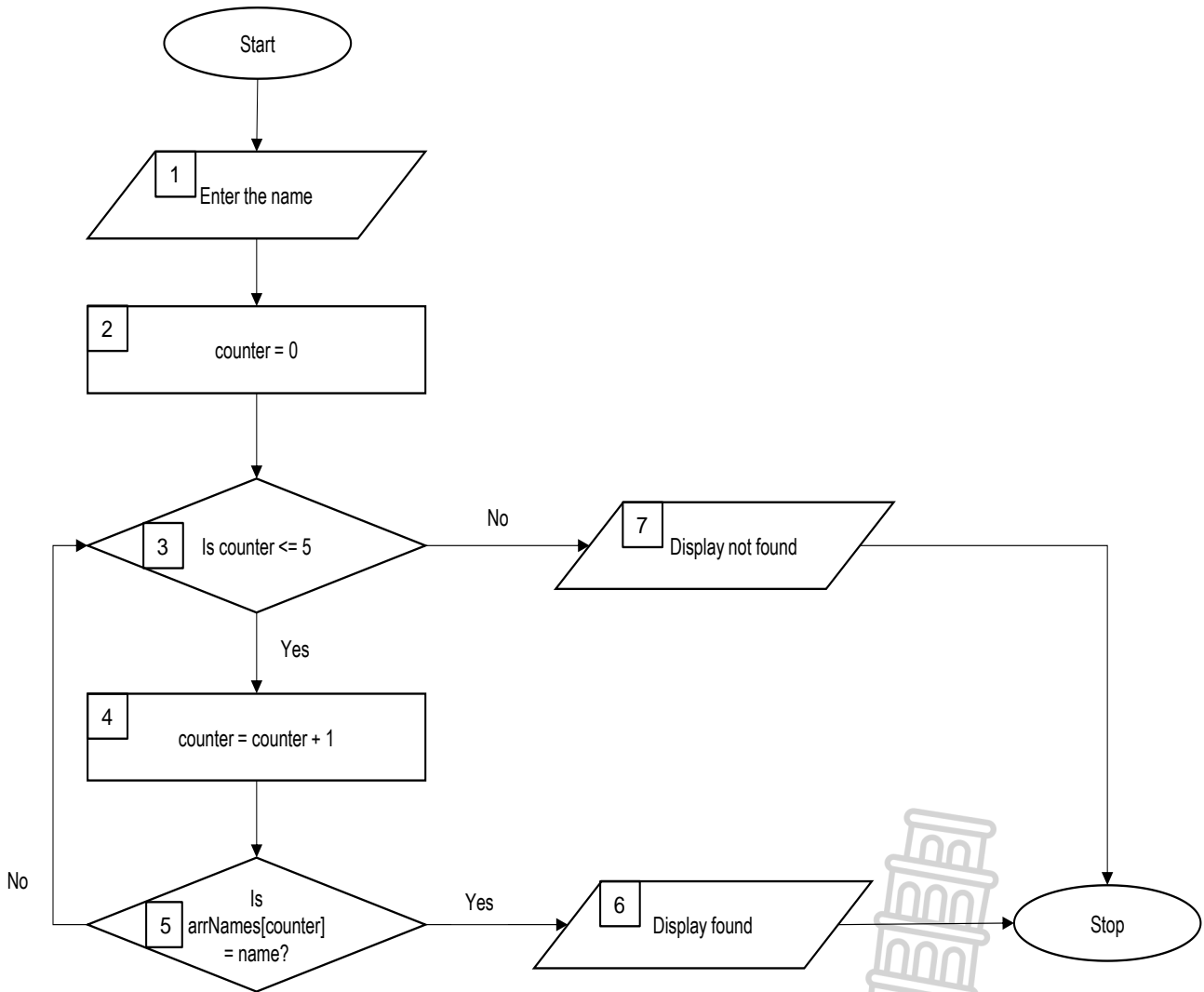
5.1.4 Rewrite the second loop (for iCol := 1 to 5 do) as a conditional loop. (3)

5.2 A prototype application was developed for the human resources (HR) department that will allow them to search for student names.

An array has been declared as follows:

```
arrNames: array [1..5] of String =
    ('Trevor', 'Mpho', 'Lebo', 'Steven', 'Verushka');
```

Study the flow diagram below and answer the questions that follow:



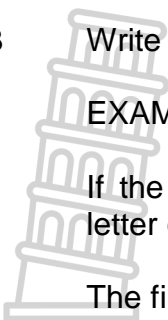
Copy the trace table below in your ANSWER BOOK and complete the table to determine the output of the provided flow diagram if the name 'Lebo' is the input in the component labelled number 1 in the diagram.

name	counter	Is counter <= 5?	Is arrNames [counter] = name?	Display
Lebo				

**NOTE:** You need to add more rows to the trace table to complete tracing through the flow diagram.

(4)

5.3 Write pseudocode to input a word and display the word in reverse letter order.



EXAMPLE:

If the word 'database' was entered as the input word, the word in reverse letter order will be displayed as 'esabatad'.

The first step in the pseudocode algorithm is:

Input sWord

**NOTE:** The pseudocode must work correctly for any word that is entered, not only the word in the example.

(4)

5.4 An object class is required to create a student card object.

The details required on the student card are shown in the table below.

Details on student card:	Example:
Unique student number	013795
Name of the student	'Trevor'
Surname of the student	'Chabale'
Year of study	2

Draw a unified modelling language (UML) class diagram to represent the object class called **TStudentCard**.

The diagram must contain the following:

- All the attributes of the **TStudentCard** object indicating data types and public/private scope
- A constructor method indicating values received for all four attributes via a parameter list
- A mutator method called **setStudyYear** to receive a new year of study as a parameter

(6)



**TOTAL SECTION E: 22**

## SECTION F: INTEGRATED SCENARIO

### QUESTION 6

Open days at schools are used to take learners on tours where they can see the facilities of the institution.

- 6.1 Registration for an open-day event at a school takes place by using QR (quick response) codes to open a link to a form. The information entered on the form is then used to e-mail an application form to the learner.
- 6.1.1 Explain what a *QR code* is and how it can be captured. (2)
- 6.1.2 When completing a form online, it often happens that personal information, such as your e-mail address, is automatically entered into the fields. How does that happen? (1)
- 6.2 A video of a 3D tour of the school campus is placed on the school's website for learners who cannot attend the open day.
- 6.2.1 A computer with the latest operating system and multiprocessing specifications was used to create the video.
- (a) Explain what *multiprocessing* is. (2)
- (b) Discuss how the different processes are managed by the operating system to ensure that all applications will have adequate resources. (2)
- 6.2.2 When a person visits the school's website more than once, it opens much faster because of the web cache.
- Explain the process of web-caching. (2)
- 6.2.3 The online 3D tour can be downloaded or streamed.
- Critically discuss the increased use of streaming material rather than downloading. (4)
- 6.3 The school's website is an example of a Web 1.0 generation website.
- 6.3.1 State TWO characteristics of a Web 1.0 website. (2)
- 6.3.2 Give any TWO reasons that led to websites evolving from Web 1.0 to Web 2.0. (2)

6.4 All the data of the prospective learners are saved in an online database.

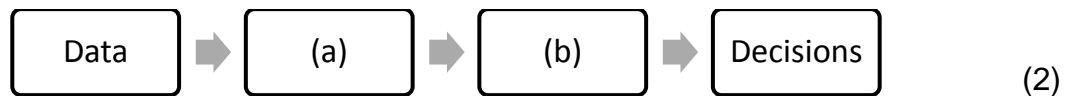


The following variations of data was recorded:

Surname	Grade
Chetty	7
Franklin	seven
Gumede	Gr. 7
Venter	Grade 7

- 6.4.1 Discuss why the data above might compromise the quality of input data. (2)
- 6.4.2 State TWO different techniques on how the form, in which the data is captured, could be optimised to prevent this type of input. (2)
- 6.4.3 Data gathered from a form needs to be used for decision-making. The process of transforming data in the information cycle is depicted in the diagram below.

Provide the missing labels for parts (a) and (b).



6.5 The school is one of many schools in the 'LearnMore School' franchise enrolling new learners.

A distributed database is used to save the data required for use by the school.

- 6.5.1 Why would a distributed database be a more suitable option for this scenario? (1)
- 6.5.2 Private information that is transferred over public networks, such as the internet, should always be encrypted. Briefly explain how *encryption* works. (2)
- 6.5.3 Suggest which distributed database model will be most suitable for this scenario and motivate your answer. (2)





6.6 Technology has made it possible for more people to gain access to information.



6.6.1 Give TWO examples of digital communication platforms that can be used to promote the open-day event of the school. (2)

6.6.2 It has been reported that confidential information about parents and learners have been distributed without their knowledge.

Which policy document can be used as motivation for the need to take disciplinary action against the perpetrator? (1)

6.7 The school decided to host a workshop on artificial intelligence (AI) and invited the primary school learners to attend.

ChatGPT as an AI tool is frequently used to generate information based on user input.

State TWO potential risks associated with the use of ChatGPT. (2)

**TOTAL SECTION F: 33**  
**GRAND TOTAL: 150**





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**MARKING GUIDELINES**

**NOVEMBER 2023**

**MARKS: 150**

**Approved:**



**These marking guidelines consist of 19 pages.**

**SECTION A: SHORT QUESTIONS**

**QUESTION 1**

1.1	1.1.1	H ✓	Green computing	(1)
	1.1.2	I ✓	IoT	(1)
	1.1.3	J ✓	Volatile	(1)
	1.1.4	C ✓	Ergonomics	(1)
	1.1.5	D ✓	Wiki	(1)
	1.1.6	L ✓	Augmented reality	(1)
	1.1.7	P ✓	Query	(1)
	1.1.8	M ✓	jpeg	(1)
	1.1.9	G ✓	URL	(1)
	1.1.10	O ✓	BitTorrent	(1)
1.2	1.2.1	A ✓	Botnet	(1)
	1.2.2	D ✓	Cache	(1)
	1.2.3	C ✓	Open-Source Software	(1)
	1.2.4	C ✓	Broadband	(1)
	1.2.5	C ✓	7	(1)
1.3	1.3.1	Plug-in / Extension / Add-on ✓		(1)
	1.3.2	Relational database ✓		(1)
	1.3.3	Ransomware ✓		(1)
	1.3.4	Copyright ✓		(1)
	1.3.5	Scalability ✓		(1)



**TOTAL SECTION A: 20**

## SECTION B: SYSTEMS TECHNOLOGIES

### QUESTION 2

- 2.1 2.1.1 Any TWO characteristics of a motherboard: ✓✓
- Type of ZIF socket
  - Type of CPU supported / Bus speed
  - Type of chipset
  - Types of slots
  - Number of slots
  - Available ports
  - Number of DIMM/RAM slots
  - Extra features: Wi-Fi/Bluetooth built-in
  - Number of SATA ports
  - Form Factor/physical size
  - On board features like NIC (2)
- 2.1.2 GPU / Graphics card / Video card ✓ (1)
- 2.1.3 Any TWO examples of flash storage: ✓✓
- Flash drive
  - SSD / M.2
  - Memory card / SD card (2)
- 2.2 2.2.1 It is a server hosted/based on the internet (online) ✓ that does not exist as a physical entity / only exists in software. ✓ (2)
- 2.2.2 Any TWO justifications of using cloud virtual servers: ✓✓
- Accessibility/ubiquity – The server could be accessed at any location/any time using an internet connection
  - Scalability – The server specifications could be adapted to suit the changing needs of the university
  - The server does not use local resources
  - The service provider takes responsibility for maintenance and software upgrading
  - Outsourcing of skilled processes
  - Improved server reliability/availability
  - Lower total operational cost / Affordability (2)



2.2.3 Any TWO advantages for using SaaS: ✓✓

- Don't need to install software on the computers / easy setup.
- Do not need to update software on the computers.
- No need for high-end computers as you only need to run the applications from the web browser.
- SaaS company responsible for storing data and backups.
- Work from multiple devices/locations.
- Takes up less local resources.
- Collaboration features
- Scalability / Ability to upgrade SaaS model according to their needs

**NOTE:** Do NOT accept renting/cost. (2)

2.2.4 Motivation for using site license:

A site license allows all the employees of the institution to use the same license ✓ which is cheaper than buying individual licenses. ✓

**Any TWO of the following concepts:**

- Replaces the need for individual licenses / All users use the same license
- Leading to cost saving
- Leading to less administration

(2)

2.3 2.3.1 A backup strategy ensures that regular copies of data are made ✓ that will prevent data loss ✓ and ensure quick recovery/restoring of data ✓ to prevent downtime.

**Any THREE of the following concepts:**

- Creating copies of data
- Regular creation of back-ups/copies
- To prevent data loss
- Data can be quickly recovered/restored

(3)

2.3.2 Any TWO disadvantages of using cloud storage: ✓✓

- Internet access required to access storage
- Bandwidth issues – You need a large amount of bandwidth to back up large chunks of data
- Full data recovery could take some time
- Data costs associated with storing data off-site
- Security exposure
- Data may be lost if company/service closes down

(2)

2.4 Power user ✓ (1)

2.5 2.5.1 Any TWO properties associated with a computer worm: ✓✓



- Ability to replicate itself from one computer to another
- Creates back-doors for other threats to gain access to a computer system
- Uses weak areas in an application/operating system to spread
- Transfers over a network to other devices
- Emails itself to all the contacts in an email address book
- Uses a lot of system resources (slows down machine)
- Causes strain on network bandwidth
- Causes loss of data

(2)

2.5.2 Firewalls monitor and manage access to a network from other networks, ✓ while an anti-virus identifies/blocks/removes malware. ✓

**Concepts:**

- Firewall monitors network traffic, but does not always prevent the spread of malware
- Anti-virus identifies/removes malware

(2)

2.6 Any ONE motivation why defragmenting is not needed on an SSD: ✓✓

SSD has no moving parts. (2)

OR

SSD is a type of electronic storage. (2)

OR

Groups/position of stored data doesn't influence access speed. (2)

(2)

**TOTAL SECTION B: 25**



## SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

### QUESTION 3

3.1 3.1.1 *Any ONE explanation of a network: ✓✓*

A network is a group of interconnected devices (1) that can communicate with each other. (1)

**Concepts:**

- Multiple devices that are connected
- Via a communication medium (2)

3.1.2 *Why the school would benefit from investing in communication and network technologies:*

*Providing TWO reasons: ✓✓*

- Improved productivity
- Improved communication speed
- Improved reliability
- Increasing the capacity
- Supports more devices
- Supports modern online services
- Improved collaboration

Also ACCEPT any ONE reason with an explanation. (2)

3.1.3 *Any TWO components of a LAN:  
2 x name of component ✓✓  
2 x motivation ✓✓*

- Network Interface Card (NIC) (1) – This is a hardware component that connects a device to the network. (1)
- Switch (1) – This is a networking device that connects multiple devices together in a local area network. (1)
- Router/Modem (1) – To provide connection to the internet. (1)
- Cabling/Communication medium (1) – To carry signals / connect devices/nodes (1)
- Wireless Access Points (1) – To provide wireless access to a network. (1)



3.1.4

(a) Any ONE problem/disadvantage of layout described:

Failure of one device/switch ✓ can make other parts of the network inaccessible. ✓

OR

Multiple switches are connected in series (1) if any one of the switches fail, it can disrupt other parts of the network. (1)

OR

Single cable between network segments (1) can lead to congestion in the cables / loss of network management efficiency. (1)

OR

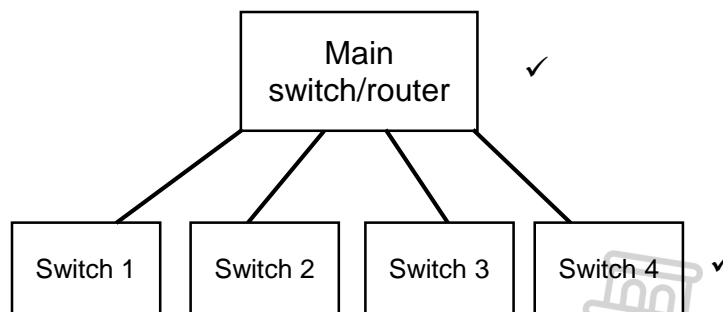
Signal travels through multiple switches (1) it can slow down communication. (1)

**Concepts:**

- Switches are connected in series / Single cable between network segments / Signal travels through multiple switches / A problem in one device influences other parts of the network
- Can lead to congestion / slower communication / network segments failing

(2)

(b)



**Concepts:**

- Centralised switch (1)
- Secondary switches individually connected (1)

(2)

3.2

3.2.1

Any ONE wireless technology: ✓

- WiFi/Access points
- Range extenders
- WiMax
- Satellite
- Mesh technology

(1)





3.2.2 *How to extend the wireless capability of the school's network:*

Using additional access points, ✓ which can be placed strategically / spread across the school grounds. ✓

OR

WiMAX (1) has a larger range. (1)

Also accept other technically correct answers.

(2)

3.2.3 *Any ONE way the network could be extended to the hostel: ✓ Motivation ✓*

- WiMAX/WiFi – Hostel will be in range of WiMax/WiFi technology.
- Fiber cable – Low attenuation makes data transfer over long distances possible.
- UTP with switches – Signal needs to be repeatedly strengthened to cover the distance.
- VPN – Use existing resources to securely connect to the school's network over the internet.

(2)

3.3 3.3.1 (a) Voice over Internet Protocol ✓

(1)

(b) *Any TWO of the following differences of VoIP vs traditional calls: ✓✓*

- No dedicated connection/calls made over the internet
- Lower cost
- Allows for video calls
- Needs preinstalled software applications
- Can make call to any computing device connected to the internet
- Call cost not dependant on distances

(2)

3.3.2 *Any TWO technical challenges to implement VoIP:  
2 x challenges identified ✓✓  
2 x correctly described ✓✓*

- Stable internet connection (1) – To ensure that the call does not disconnect (1)
- Sufficient bandwidth (1) – Low connection speed can influence the quality of the call (1)
- Software (1) – Must be the same version / compatible (1)
- Data cost (1) – High data cost when making video calls (1)

(4)

3.4 An intranet is an organisation's private network / Internet-like environment ✓  
consisting of web pages.  
Course notes, schedules, news, announcements etc. could be posted to the  
intranet providing access to these resources/communication. ✓ (2)

3.5 3.5.1 Any TWO reasons why a RDC be used: ✓✓

- Software is easily configured on host and target computer compared to setting up a VPN
- Allows users same control on the remote device as if sitting in front of the device
- Changes are made to files directly on the remote computer
- Software is included in your operating system

(2)

3.5.2 Any ONE advantage of RDC: ✓

- Provides access to viewing from any location / at any time
- Low maintenance cost
- Convenient/saves time/cost saving

Any ONE disadvantage of RDC: ✓

- Can be hacked
- Setup cost is expensive
- Dependant on internet access/data cost
- Video material can take a long time to transfer

(2)

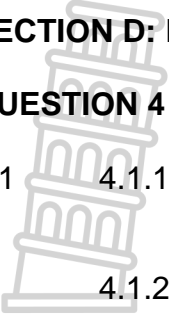
**TOTAL SECTION C: 30**



**SECTION D: DATA AND INFORMATION MANAGEMENT**

**QUESTION 4**

4.1 4.1.1 A primary key is a field in a table that uniquely identifies each record in that table. ✓ (1)



4.1.2 Cannot have a null value. ✓ (1)

4.1.3 (a) Any ONE design error with explanation: ✓✓

Data is duplicated in the Teacher field. (1) If the teacher is replaced the data needs to be corrected everywhere. (1)

OR

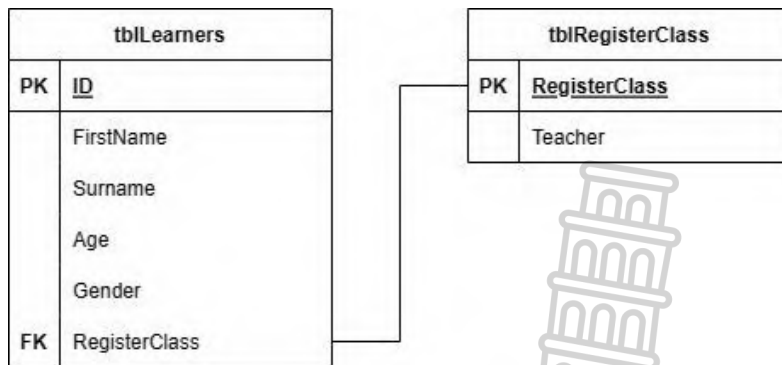
Table is not normalised (1) the table contains redundant data / Teacher field is linked to register class / Teacher field is dependent on another field that is not part of primary key. (1)

OR

Any TWO examples of design errors: (2)

- Data redundancy/repeated data/not normalised
  - A field is dependent on another field that is not the primary key/description of anomaly
- (2)

(b) Create a separate table ✓ and move the RegisterClass and Teacher fields to that table. ✓ Use the RegisterClass field as the foreign key in the tblLearners table ✓ and the primary key in the new table. ✓



**Concepts:**

- Splitting the data into two tables
- RegisterClass/teachers must be placed in a separate table
- Tables must be linked
- Indication of linking on the RegisterClass

**Note:** Concepts can be described or illustrated using a table diagram.

(4)

4.2 *Validation vs verification: ✓✓*

- Validation ensures that data is acceptable/valid. (1)
- Verification is ensuring the correctness of data. (1)

*Why validation does not remove the need for verification: ✓✓*

If data is valid, it only implies that the data is in the correct format/data type/range/presence/check digit, (1) and not necessarily factually correct. (1)

OR

Verification requires that the information be checked against the source (1), that validation does not do. (1)

(4)

4.3 4.3.1 SQL/Structured query language code ✓ (1)

4.3.2 *Identify and explain a scenario where a server-database would be required:*

Where a lot of personnel need to access the same database. ✓  
A server-based database will allow many users to use the database at once, ✓ from many different locations. ✓

**Concepts:**

- Scenario correctly identified with many users/many locations
- Simultaneous use of database / providing access to many users
- Access possible from different locations/over a network

(3)

4.4 4.4.1 *Any TWO of the following about an audit trail: ✓✓*

- Tracks WHAT changes are made
- Tracks WHEN changes were made
- Tracks WHO made changes

(2)

4.4.2 *Any ONE method ✓ with an explanation enhancing the security of the school database: ✓*

- Access control: Setting permissions and access levels for users, passwords, biometric access control, multifactor authentication, physical locking of server room.
- Encryption: By encrypting sensitive data such as learner records, the school can prevent unauthorised access to this information.
- Regular backups: Regular backups are essential for protecting data from loss due to hardware failure, data corruption, or other disasters.
- Firewall: Using a firewall to monitor all incoming and outgoing transmissions/traffic and block unwanted communication/requests.

(2)

**TOTAL SECTION D: 20**

## SECTION E: SOLUTION DEVELOPMENT

### QUESTION 5

5.1 5.1.1 (a) *Any ONE indicating initialising:* ✓  
• Line 1 (iCount := 0)  
• Line 4 (sLine := '') (1)

(b) *Any ONE indicating looping:* ✓  
• Line 2 (for iRow := 1 to 3 do)  
• Line 5 (for iCol := 1 to 5 do) (1)

5.1.2 15 ✓ (1)

5.1.3 \*\*\*\*\* ✓  
Only one line ✓ (2)

5.1.4 iCol := 1; ✓  
while iCol <= 5 do ✓  
begin  
inc(iCol); ✓  
...  
end;

OR

```
iCol := 0; (1)
repeat
  inc(iCol); (1)
  ...
until iCol = 5 (1)
```

OR

Any other correct solution

#### Concepts:

- Initialise counter (1)
- Conditional loop with correct condition (1)
- Increment loop controller (1)

(3)

5.2

name	counter	Is counter <= 5?	Is arrNames [counter] = name?	Display
Lebo	0	True		
	1		False	
	2	True		
			False	
	3	True		
			True	
				Found
	✓	✓	✓	✓

**Concepts:**

- Correct **counter** column (1)
- Correct **Is counter < 5** column (1)
- Correct **Is arrNames [counter] = name** column (1)
- Correct **Display** – Any phrase indicating "Found" (1)

(4)

5.3

Input sWord (Given)  
 Initialise sOutput  
 Loop ✓ K from length of sWord downto 1 ✓  
 sOutput ← sOutput + sWord[K] ✓✓

OR

Input sWord (Given)  
 Initialise sOutput  
 Loop (1) K from 1 to length of sWord (1)  
 sOutput ← sWord[K] + sOutput (2)

OR

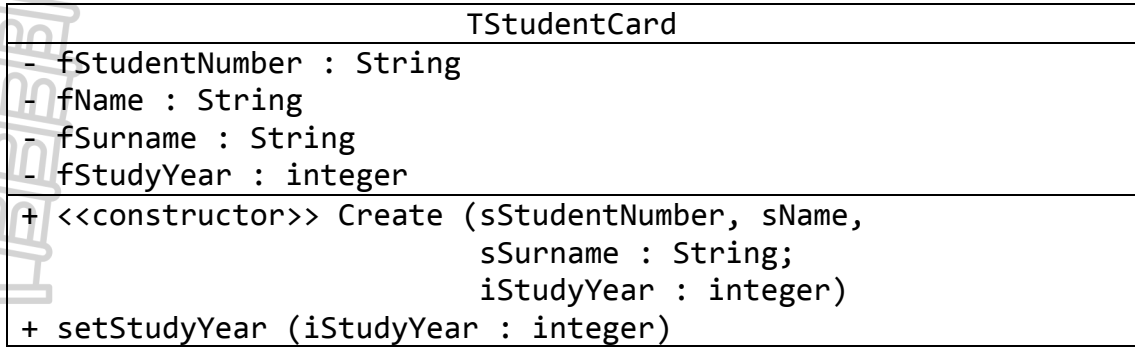
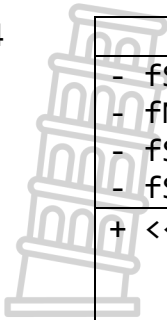
Any other correct solution

**Concepts:**

- Loop (1) for length (1)
- Correct adding of characters using correct indexing (2)

(4)

5.4



**Concepts to be used within a UML diagram:**

- Indicate attributes to be private ✓
- Indicate methods to be public ✓
- All attributes declared correctly with correct data types ✓
- Constructor/Create method declared correctly ✓  
with correct parameters ✓
- Mutator method declared correctly with correct integer parameter ✓

(6)

**TOTAL SECTION E: 22**



## SECTION F: INTEGRATED SCENARIO

### QUESTION 6

6.1 6.1.1 The use of an image/two-dimensional block code to store information/URL. ✓  
It can be captured/scanned using a digital camera/smartphone. ✓ (2)

6.1.2 Any ONE way information is automatically entered: ✓

- Autocomplete/Autofill done by the browser
- Information stored in cookie from previous visits to site
- Device/App feature from registered/stored information

(1)

6.2 6.2.1 (a) A computer's OS utilises more than one processor or processing core ✓ to simultaneously execute multiple tasks/threads/processes. ✓ (2)

(b) The process of ensuring that each process/task/thread gets enough CPU time ✓ and access to memory, storage and other hardware ✓ to be able to work without interference by other processes.

**Concepts:**

- Allocation/sharing of processing time
  - Allocation of resources/memory/storage
- (2)

6.2.2 When a website is visited for the first time, the browser downloads all the necessary content from the server to cache on local storage. ✓  
When the user visits the website again, the browser loads the content from cache. ✓

**Concepts:**

- Web content from previous visits is stored
  - Content obtained from the cache/local storage when visited again
- (2)





6.2.3

*Critical discussion of streaming rather than downloading:*

*A critical discussion of at least TWO aspects comparing its implication on both streaming and downloading:*

2 x 2 marks ✓✓✓✓

	Streaming	Downloading
Storage	Accessible without the need to store locally.	Requires enough storage space for downloaded material.
Speed of access	Instantly available to start watching.	Needs to be downloaded first to watch.
Internet Dependency	Only available with internet connection.	Can be viewed without internet connection after download.
Ownership/ Copyright	Does not provide permanent ownership.	Users keeps a copy of the file locally.
Cost	Often involves subscription models.	May include one-time purchases or rentals.
Environmental Impact	Consumes more energy because it must be downloaded every time it is viewed.	Consumes less energy because it can be repeatedly viewed after being downloaded once.
Quality of Experience	Quality may fluctuate based on internet speed.	Provides a consistent quality experience.
Security	Content is only retained in a buffer.	Content is locally stored and might include malware.

ALSO ACCEPT other relevant and correct answers.

(4)



6.3



6.3.1

Any TWO features of a Web 1.0 website: ✓✓

- Static pages that do not change frequently
- Simple design with limited graphics and multimedia content
- User is a content consumer and not a content creator
- Hyperlinks to other webpages for further information
- Basic HTML and CSS code used for webpage creation
- No interactive or collaborative features, such as user comments or social media integration

(2)

6.3.2

Any TWO reasons why websites have evolved from Web 1.0 to Web 2.0: ✓✓

- To allow users to contribute content
- To provide an interactive experience
- To allow for social networking
- Availability of new web technologies
- Higher bandwidth availability
- Internet availability

(2)

6.4

6.4.1

Any TWO of the following reasons why the data might compromise the quality of input data: ✓✓

- Because of the different formats used to enter the same information/data not standardised.
- It will be difficult to group/compare/analyse/sort records with different formats.
- Difficult to extract core information that can lead to errors

**Concepts:**

- Different formats can lead to (1)
  - Incorrect capturing of data
- OR
- Difficulty in extracting/interpreting the data (1)

(2)

6.4.2

Any TWO of the following different techniques on how the form could be optimised to prevent this type of input: ✓✓

- Selection components
  - List box
  - Combo box / Dropdown box
  - Radio group
  - Spin edit
- Providing examples of required format / default values
- Input mask

(2)

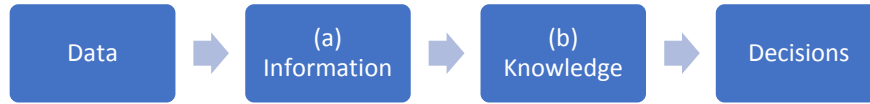


6.4.3

(a) ✓

(b) ✓

Alternative 1:



Alternative 2:



(2)

6.5

6.5.1

Any ONE reason for using a distributed database: ✓

- Increased performance levels/less traffic on network/less traffic on server/less data transfer
- Can accommodate many users
- Needs to be accessed from many locations
- More stable (reduces redundancy)

(1)

6.5.2

The information is scrambled/made inaccessible ✓ using a secret key/algorithm/set of rules. ✓

(2)

6.5.3

Partitioning ✓ each server only stores the part of the data it works with / Less data to be stored or transferred ✓

OR

Duplication (1) every server holds all the data / Data will not be lost if one server crashes (1)

(2)

6.6

6.6.1

Any TWO valid digital platforms: ✓✓

- Email
- Social media
- Blogs
- Online newspapers
- Instant messaging
- Website



Also accept any TWO examples of any of the above.

(2)



6.6.2

*Any ONE example of a policy document: ✓*

- Acceptable Usage Policy (AUP)
- Privacy Policy
- POPIA
- EULA (End User License Agreement)

(1)

6.7

*Any TWO potential risks of using ChatGPT: ✓✓*

- People rely on the information generated without any fact-checking
- Copyright issues/Plagiarism
- Over reliance on the technology
- Replacing human skills/employment opportunities
- Removing motivation to learn skills
- Limited accountability
- May generate potentially inappropriate content for children
- May generate malicious code
- May track and store personal information

Also accept other valid examples.

(2)

**TOTAL SECTION F: 33**  
**GRAND TOTAL: 150**

