

I.

basic education

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

PINETOWN DISTRICT

GRADE 12

INFORMATION TECHNOLOGY P2 | THEORY

MID-YEAR EXAMINATIONS 2023

MARKING GUIDELINE

MARK ALLOCATION: 150 marks

TIME ALLOCATION: 3 hours

This Marking Guideline consists of 31 pages.

SECTION A: SHORT QUESTIONS

1.1 Multiple Choice

•	
1.1.1	С
1.1.2	D
1.1.3	В
1.1.4	D
1.1.5	В
1.1.6	С
1.1.7	В
1.1.8	В
1.1.9	В
1.1.10	А

(10 marks)

1.2 One-word answers

1.2.3 Dist 1.2.4 Soc	ormalisation istributed computing				
1.2.4 Soc	istributed computing				
1.2.5 Hot	ocial Engineering				
	ot Swapping				
1.2.6 Auc	Audit Trail				
1.2.7 Gre	reen Computing				
1.2.8 Bar	andwidth				
1.2.9 HT ⁻	HTTP				
1.2.10 Top	Topology				

(10 marks)

SECTION A TOTAL | 20 MARKS

SCENARIO

Your parents are deciding whether to buy a new computer or upgrade their current system and require some advice.

- 2.1 Instead of buying a new computer, you suggest that upgrading would be a better and more feasible option.
 - 2.1.1 Name TWO necessary factors that need to be considered when upgrades are to be employed.

Any TWO of:

- \rightarrow Cost factor
- → Compatibility of hardware / devices
- \rightarrow Software requirements

(2 x 1 mark each)

(2)

(1)

2.1.2 What is the term is used to describe the design of computers that allow for upgrading and replacing of hardware components instead of buying a new computer?

Modular Design

(1 x 1 mark)

- 2.2 Your family has heard of SSD technology.
 - 2.2.1 Explain TWO differences between SSD and HDD.

HDD	SSD
Slower access/latency time	Fast, direct access
Mechanical storage device	Electronic storage device
Moving parts can cause heating	No moving parts
Cheaper to purchase	More expensive than HDD
Noisy due to moving parts	Very little noise
Larger capacity than SSD	Smaller capacity than HDD

(2 x 1 mark per comparison)

- 2.2.2 Explain how you would configure the PC if you have both an SSD and HDD drive.
 - \rightarrow SSD for storing the operating system and applications.
 - \rightarrow HDD for high volume data and file storage.

(2 x 1 mark each)

(2)

(2)

- 2.3 Your father decides that to save cost he will only purchase application software like Microsoft Office 2019. He does not wish to buy any system software, as he is only going to use application software.
 - 2.3.1 What is the general function of system software? (2)

System software is software that is intended to...

- \rightarrow control,
- \rightarrow support or
- \rightarrow operate the computer.

(2 x 1 mark)

(2)

(2)

2.3.2 Explain to your father why he will be using system software even though he thinks he may not have bought any system software.

He will be using system software, as his computer cannot function without an operating system.

It is required to load and run applications.

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(2 x 1 mark)
```

- 2.3.2 You recommend to your father to go the SaaS route instead of him purchasing Microsoft Office 2019.
 - 2.3.2.1 Name the SaaS version of Microsoft Office. (1)

Office 365

(1 x 1 mark)

2.3.2.2 Give 2 advantages of using the SaaS version of Microsoft Office.

Any two of:

- \rightarrow Renting is cheaper than purchasing the software.
- \rightarrow You have access to the latest version of the software.
- → You have access to cloud storage to make it easier to access files from multiple devices.

(2 x 1 mark)

- 2.4 Your mother saw an advert for Windows 10 and Windows 11 Server. She thought that Windows 11 Server would be a better choice, as it is newer. Comment critically on her choice by outlining the broad difference between these types of operating systems.
 - → Server versions or network operating systems are designed with additional functionality to control and manage shared resources (e.g. files, printers) and users on a network.
 - → Windows 10 is an operating system designed for general desktop usage, so this would be the better choice in this specific situation.

(2 x 1 mark)

(2)

(1)

(1)

(1)

- 2.5 You realise that with the upgraded PC and operating system, you will require updated drivers for the old printer.
 - 2.5.1 Explain to your father what a device driver is.

Device drivers are system software that allows an operating system to communicate with and control a hardware device.

(1 x 1 mark)

2.5.2 Where would you try and locate drivers for the old printer?You can download the driver from the manufacturer's website over the Internet.

(1 x 1 mark)

2.6 Connecting additional hardware like new printers to your PC has been made much easier, as most hardware connects to USB ports. In addition, USB technology supports plug-and-play technology.

Explain what is meant by the term, plug-and-play.

Plug-and-Play refers to the technology whereby devices that are added or connected to a PC are automatically 'detected' and the PC is configured for use.

(1 x 1 mark)

2.7 You advise your parents to archive photo albums before the upgrade. (2)

Explain to them difference between backups and archives.

- → Backups are performed so that you have a copy or 'duplicate' of files in case something goes wrong.
- → Archiving refers to storing files that are static (not going to be changed), usually onto a secondary system to save storage space.

(2 x 1 mark each)

(2)

(2)

2.8 You suggest the purchase of a GPU with the upgrade.

- 2.8.1 Explain to your parents what a GPU is and what it is used for.
 - \rightarrow It is a graphics processor unit (GPU) on the video card.
 - \rightarrow Used to work with the images it has rendered or created.

(2 x 1 mark each)

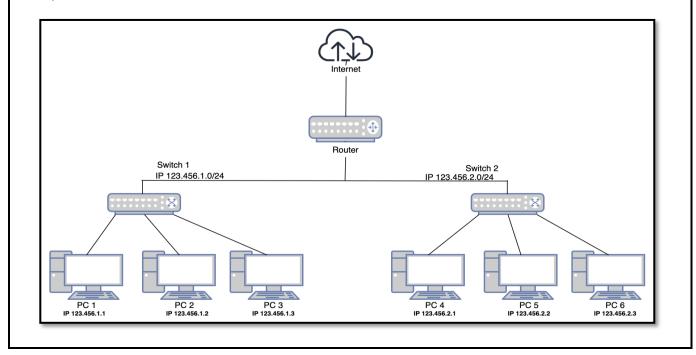
- 2.8.2 Give TWO benefits which a separate video card provides, besides producing better quality images (output) that are displayed on your monitor.
 - → Without a separate processor on the video card, the CPU has to do the job of the video card as well as carrying out the instructions of the program you are running.
 - → Without a dedicated video card, graphics software (such as video editing, photo editing, CAD, 3D and games) can be very slow and unresponsive.
 - \rightarrow Any other reasonable answer

(2 x 1 mark each)

SECTION B TOTAL | 25 MARKS

SCENARIO

Marvel Enterprises is a small business. The diagram below indicates the network they have incorporated into their business.



- 3.1 The computers in the cabled network are used by all staff members and a WLAN has been made available for use by clients.
 - 3.1.1 Give ONE reason why a wireless network is more suitable for the clients.

Any one of:

- → Portability and mobility/a user can connect via a laptop or other device/Access to network from a wider range.
- \rightarrow A device can be added to the network easily.
- \rightarrow Cost effective by saving on data costs.

(1 x 1 mark)

(1)

3.1.2 Give ONE reason why all devices must have a unique IP address. (1)

Any one of:

- \rightarrow Provides a unique address for communication.
- \rightarrow To prevent conflicts in addresses during communication.

(1 x 1 mark)

(2)

(2)

3.1.3 Give TWO possible reasons why clients using the WLAN could experience slow connection speed at times.

Any two of:

- \rightarrow Too far away from the router.
- → Too many users are accessing at the same time/Lack of sufficient bandwidth.
- \rightarrow Interferences like EMI.
- \rightarrow Interference by structures like trees/buildings (attenuation).

(2 x 1 mark)

- 3.2 The LAN in the administration office uses a client-server model and provides internet access.
 - 3.2.1 Name TWO services that can be provided by an ISP besides the connection to the internet.

Any two of:

- \rightarrow Email
- \rightarrow Secure web hosting
- \rightarrow Spam filtering

(2 x 1 mark)

3.2.2 State TWO benefits of using an ADSL connection.

Any two of:

- \rightarrow High speed/permanent connection.
- \rightarrow Allows for internet access and telephone use at the same time.
- \rightarrow Relatively cheap when using a lot of data.
- \rightarrow Scalability.

(2 x 1 mark)

(2)

(2)

(1)

3.2.3 Explain the function of the switch as part of the LAN.

- \rightarrow Connects devices to one another.
- \rightarrow Directs traffic between devices.

(2 x 1 mark)

3.3 Rolling blackouts (load shedding) take place across the country; as a result loss of data is becoming increasingly problematic and impacts on the business negatively.

The use of a UPS had been recommended. How would the UPS assist the business?

Any one of:

- \rightarrow Provides power for a short while if there is a power failure.
- \rightarrow Provides power to have sufficient time to shut down the server properly.

(1 x 1 mark)

- 3.4 A client-server network is used in the main office.
 - 3.4.1 Motivate the choice for having a client-server network rather than a peer-to-peer network. (1)

Any one of:

- \rightarrow Sophisticated security
- \rightarrow More suitable for large number of computers
- \rightarrow Improved management

(1 x 1 mark)

(2)

3.4.2 The desktop computers in the network are all fat clients.

State TWO differences between a fat client and a thin client.

Any two of:

- → Thin client relies on the server for data storage and processing (network resources).
- \rightarrow Thin client does not contain a hard disk.
- \rightarrow Thin client is cheaper.

(2 x 1 mark)

- 3.5 The manager must decide whether to use cloud services or a VPN to access information for the business.
 - 3.5.1 State TWO disadvantages of using cloud storage. (2)

Any two of:

- \rightarrow A public service has lower security.
- \rightarrow Uses bandwidth/data cap.
- \rightarrow Need an internet connection to be accessible.

(2 x 1 mark)

- 3.5.2 Suggest ONE cloud service that can be used to share files.
 - → Google Drive / Drop box /One drive (Any online file sharing service)

(1 x 1 mark)

- 3.5.3 Explain the benefit of using a VPN to share information. (2)
 - → The user is provided with the same security as a LAN to the business network,
 - \rightarrow using a public network such as the Internet.

(2 x 1 mark)

- 3.6 An Acceptable Use Policy (AUP) is in place for the business to outline the rights and responsibilities of the staff in the network environment.
 - 3.6.1 BitTorrent application installations may be viewed as inappropriate in a work environment. What is BitTorrent? (1)
 BitTorrent is a peer-to-peer protocol used for sharing large files over a network such as the Internet.

(1 x 1 mark)

3.6.2 Explain why an organization such as this business should include restriction details on the installation of BitTorrent applications in their AUP.

Any one of:

- → Decrease the likelihood of illicit/harmful downloads on the network through BitTorrent clients.
- → So that the network's bandwidth is not dominated by traffic from BitTorrent downloads.

(1 x 1 mark)

3.6.3 State the condition that should be adhered to, to ensure that the use of BitTorrent is legal.

No downloading of copyrighted material.

(1)

(1)

(2)

- 3.7 Networks may be vulnerable to many forms of malware.
 - 3.7.1 State TWO ways in which the business could protect itself from being infected with malware.

Any two of:

- \rightarrow Keeping the anti-virus up to date.
- \rightarrow Be careful when installing software from the Internet.
- \rightarrow Do not click on pop-up ads.
- \rightarrow Do not open unknown email attachments or programs.
- → Keep informed of media reports and warnings related to new malware or safety concerns.
- \rightarrow Scan removable media such as flash drives before use.

(2 x 1 mark)

3.7.2 How would a firewall protect the network from malware attacks? (1)
 Prevents unauthorised access to the network.

(1 x 1 mark)

SECTION C TOTAL | 25 MARKS

SCENARIO

A local shop is doing their part to protect our planet by going 'Green'. Their shop only sells environmentally friendly / energy-efficient / eco-friendly products. They have found several reliable Suppliers that provide them with a wide variety of these products.

4.1 A database table has been set up containing information about all the suppliers and the products the shop offers. The table design for **tbllnformation** is as follows:

Field Name	Data Type
SupplierID	Short Text
SupplierName	Short Text
Address	Short Text
SupplierContactNo	4.1.1.1
ProductCode	Short Text
ProductName	Short Text
Price	4.1.1.3
QuantityOnHand	Number

4.1.1 No data type and has been indicated for certain fields.

4.1.1.1 Give a suitable data type and field size for **SupplierContactNo**.

Data Type: Text / Short Text Field Size: 10

(2 x 1 mark)

(2)

altered in multiple record

Any one of:

- → Cannot make it Number because the '0' in front won't show.
- \rightarrow ContactNo it too large to store as a number.
- → Not doing mathematical manipulation using ContactNo.
- → Easy to validate the length of contact number when it is text.

(1 x 1 mark)

(1)

(4)

(1 x 1 mark)

4.1.2 It is clear that the above table is not normalised.

Currency

Name and explain TWO anomalies that can occur in the above example.

Suggest a suitable data type for **Price**.

Any TWO of:

4.1.1.3

- → Insert anomaly: The design of a database prevents a user from capturing data when they want or need to without adding another piece of unrelated/ unavailable data also.
- → Delete anomaly: Deleting one piece of data results in the simultaneous removal of other, required data.
- \rightarrow Update anomaly: When an item of data changes, it has to be altered in multiple records in the table.

(1 x 2 marks)

(1)

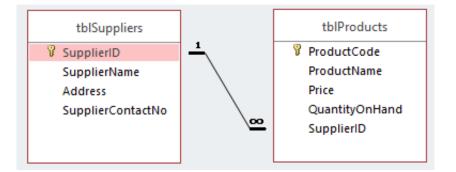
4.1.3 Distinguish between 1NF and 2NF

First Normal Form (1NF): all data fields contain atomic values/ each column/field should not have multiple values.

Second Normal Form (2NF): 1NF plus all non-key attributes are fully dependent on the primary key / should not have partial dependency

(2 x 1 mark each)

- 4.1.4 Re-organise the data above in such a way that anomalies will not occur. Use a basic ERD to illustrate the following:
 - Split the table into two tables.
 - Give the tables suitable names.
 - All original fields must be used.
 - Clearly indicate the primary key for each table.
 - Indicate a foreign key in one table.
 - Clearly indicate the relationship between the tables.



- \rightarrow Two tables with suitable names.
- \rightarrow Correct fields in each table (split correctly).
- \rightarrow Primary Keys / PKs indicated in both tables.
- \rightarrow Correct Foreign key chosen.
- \rightarrow Correct relationship shown.

Use

(5 x 1 mark each)

(5)

4.2 Access control is an essential part of protecting data; we should ensure that no unauthorised people have access to our data.

List TWO methods of access control.

Any two of:

- \rightarrow Use good password policies.
- → Make sure that user rights and privileges are implemented and managed.
- → Make sure that devices are physically secure (e.g. users need passwords to access the device itself).
- → Make sure that locations are physically secured (e.g. key control, access registers, biometric access control, etc.).

(2 x 1 mark each)

(2)

(2)

(2)

4.3 'Parallel data set' is a term associated with databases.

- 4.3.1 Explain what a parallel data set is and what it is used for.
 - → This technique involves keeping multiple copies of data (sometimes referred to as mirroring).
 - → Doing this means that, even if one set of data fails, the parallel set can be used immediately, resulting in no downtime.

(2 x 1 mark each)

4.3.2 Explain the main disadvantage of implementing parallel data sets.

- → It means that you need, at a minimum, to double the storage requirements for your system.
- → f you have more than one mirror, then you need to multiply this by as many copies as there are of the data.

(2 x 1 mark each)

4.4 Data independence is another term commonly associated with database management systems. Explain the term, data independence.

Data independence refers to the separation between:

- → Software: that uses the database applications (including the user interface)
- \rightarrow The actual data structure: managed by the DBMS server.

(2 x 1 mark each)

4.5 What is a distributed database? Would this be appropriate to implement in this scenario?

(2)

- → A distributed database is a database that runs and stores data across multiple computers, as opposed to doing everything on a single machine. (1)
- \rightarrow No the organisation is very small and would not be running a large database. (1)

SECTION D TOTAL | 25 MARKS

5.1 The application below is used to capture personal information of Students who are registering for the year 2024.

🥴 Form1			• ×
Registration	2024		
·····			: : : :
	· · · · · · · · · · · · · · · · · · ·		
Enter Name:	Select	Gender	
	O Mal	e	
Enter Surname edtSurname			
· · · · · · · · · · · · · · · · · · ·	::::: O Fem	nale	
Enter ID Number: edtIDNumber	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
Select Grade: cmbGrade		· · · · · · · · · · · · · · · · · · ·	
· · · · · · · · · · · · · · · · · · ·			
Select Application Date: 2023/06/06 ~			
•••••••••••••••••••••••••••••••••••••••			
Submit		· · · · · · · · · · · · · · · · · · ·	
Subilit	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	

5.1.1 There are THREE parts of the program that use selection components to capture data.

Motivate why the application developer would use selection components rather than entry fields to capture students' data.

(1)

Selection component will not allow users to make mistakes when entering data.

(1 x 1 mark)

5.1.2 The data is then stored in a database that is connected to the application.

Why would the data be store in a database rather than a text file or an array?

Any one of:

- \rightarrow A database is more permanent.
- \rightarrow Larger storage facility.
- \rightarrow A database is more structured.

(1 x 1 mark)

(1)

5.1.3 Data validation is very important when it comes to programming. How can we validate whether a gender was selected or not? (1)
We can test the index value if its equal to -1 (1 x 1 mark)
5.1.4 Write pseudocode to validate that the ID number has the correct number of digits. (3)

> sID ← User enter IDNumber if length of sID <> 13 Display ID Number must have 13 digits

> > (3 x 1 mark)

5.2 Below is a snippet of code that is used to determine whether a number entered by the user is either an even number or an odd number:

1	Procedure TForm1.btnDetermineClick(Sender: TObject);
2	var
3	iNum: Integer;
4	begin
5	iNum := edtNum.Text;
6	if iNum div 2 <> 0 then
7	begin
8	ShowMessage('Number is odd');
9	end;
10	else
11	begin
12	ShowMessage('Number is even');
13	end;
14	end;

There are many errors in this snippet of code.

Provide the line number where each of the following errors occurs and the corrected code:

5.2.1	Syntax Error		
	Line 9 :	end (without semi-colon)	
5.2.2	Logic Error		(2)
	Line 6 :	<i>if iNum mod 2 <> 0</i>	
5.2.3	Runtime Error		
	Line 5 :	IntToStr(edtNum.Text);	
	(1 mark fo	r correct line identification; 1 mark for corrected code)	

5.3 Loops allow us to execute the same thing over and over again.

Provide an example for the following:

5.3.1	Conditional Loop	(1)
	While Loop (1)	
5.3.2	Post-Conditional Loop	(1)

Repeat Until Loop (1)

- 5.4 Object Orientated Programming (OOP) allows a programmer to automate repetitive tasks and create reusable code.
 - 5.4.1 Explain the purpose of making an attribute of the object class private and not public.

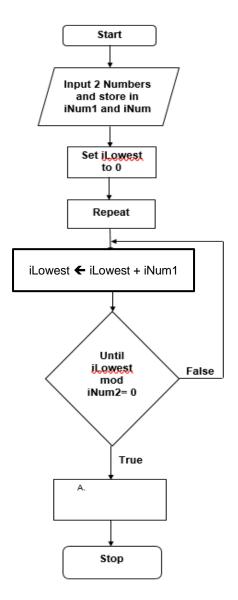
They are made private in order to protect their data integrity. (1)

- 5.4.2 In order to access the attributes, we make use of methods.Name the TWO types of methods used to access the attributes. (2)
 - \rightarrow Setters (Mutator)
 - \rightarrow Getters (Accessor)

(2 x 1 mark each)

(1)

5.5 Study the flow chart below and answer the questions that follow on the next page:



5.5	5.5.1	What is this flowchart trying to determine?	(1)
		Lowest Common Multiple (LCM).	
		(1 x 1 mark)	
	5.5.2	Write down the missing step for Block A.	(1)
		Display iLowest as Lowest Common Multiple.	
		(1 x 1 mark)	
	5.5.3	Why would a Repeat loop be used in this instance as opposed to a For loop?	(1)
		We do not need it to run for a fixed number of times but rather until a condition is met.	
		(1 x 1 mark)	

5.6 Redraw the trace table below and complete all the steps using the input provided. Do not forget to fill in a heading for the last column according to your answer in **5.5.2**.

Line	iNum1	iNum2	iLowest	iLowest mod iNum2 = 0?	Α.
1	5				
2		7			
3			5		
4				False	
5			10		
6				False	
7			15		
8				False	
9			20		
10				False	
11			25		
12				False	
13			30		
14				False	
15			35		
16				True	
17					35
~			✓	✓	✓

One mark per:

- \rightarrow The No. column all the way to 17
- \rightarrow *iLowest all the way to 35*
- \rightarrow *iLowest mod iNum2* = 0? *T/F or True/False(accept Yes/No)*
- \rightarrow Display iLowest
- \rightarrow Display 35

(5 x 1 mark)

SECTION E TOTAL | 25 MARKS

(5)

SCENARIO

The Durban Youth Wellness Centre is home to eight (8) practitioners (including Speech and Occupational Therapists, a Paediatrician and Play Therapists), a Receptionist and an Accounts Manager. Currently, each employee maintains their own stand-alone PC workstation on which they keep their personal data files, including client contact information and confidential reports. All devices on-site are able to access the internet through a shared Wi-Fi router connected to a Fibre line; however, the devices themselves are currently not networked.

It must be noted that patients can see multiple practitioners at the organisation and crossreferrals are frequent; however, each practitioner still maintains the original file and sends a photocopy to his/her colleague. The Accounts Manager must collate the information sent to her by the practitioners at the end of each day so that she can submit claims to the Medical Aid Schemes online.

As a Network Administration consultant, you have been tasked with creating a cohesive ICT system for the organisation.

- 6.1 One of the practitioner's workstations is obsolete and he would like you to investigate the use of a tablet for his client notes and other information.
 - 6.1.1 What advantages are there for the practitioner using a mobile device?

(2)

Mobile devices have advantages, including:

- \rightarrow can run on battery power, unlike a desktop
- → portability: can be moved to another location if required for therapeutic purposes
- \rightarrow on-demand access to the internet
- \rightarrow any other reasonable advantage

(2 x 1 mark each)

Risks include:

- \rightarrow physical device and data loss (impacts on confidentiality)
- \rightarrow rise of computer crime targeting mobile devices
- \rightarrow can risk personal privacy
- \rightarrow any other reasonable risk

(2 x 1 mark each)

6.1.3 How would you protect against the risks mentioned in 6.1.2? (2)

Protection against risk:

- \rightarrow using secure pins and passwords
- \rightarrow be informed of phishing and other computer crime
- \rightarrow use of cloud back-up services
- \rightarrow any other reasonable protection
- (2 x 1 mark each)
- 6.2 Currently, each practitioner, the Receptionist and the Accounts Manager maintain their own flat-file database of client information, including contact information, billing information and medical history.
 - 6.2.1 Differentiate between flat file and relational databases (2) *Flat file: data is stored in one large table.* (1) *Relational: data is stored in a set of tables linked through relationships provided by primary and foreign keys.* (1)
 6.2.2 State 2 problems that could be encountered in the setup described above. (2)
 - \rightarrow In flat-file databases, we can observe anomalies.
 - → Having multiple databases also creates redundancy which is inefficient.
 - \rightarrow Any other reasonable problem

- 6.2.3 Give 2 reasons for the implementation of a relational database for client contact, medical and account information.
 - → By using a relational database that all practitioners have access to, the integrity of the clients' data will be enhanced.
 - → This would make the work of the Accounts Manager easier as she would be able to draw reports.
 - \rightarrow Any other reasonable benefit.

(2 x 1 mark each)

(2)

- One of your tasks is to create a Maintenance Plan for the practice's ICT system.Compile a plan whereby maintenance tasks are explained, and the frequency of tasks is noted.
 - 6.3.1 Explain the purpose of the following maintenance tasks:

6.3.1.1 Software Updates – fix bugs and add new features.Prevents security issues.

6.3.1.2 Disk clean-up – helps free space on hard disk for improved performance / increase storage space (2)

6.3.1.3Defragmentation - reorganizes scattered files in(2)contiguous locations to increase speed of access.(2)

6.3.2 How frequently would you perform each of the tasks listed above?

6.3.1.1 Software Updates - Daily / weekly/ monthly

- 6.3.1.2 Disk clean-up monthly
- 6.3.1.3 Defragmentation monthly or when the hard disk is more than10% fragmented.

(3)

- 6.4 One of the Speech Therapists has been researching Virtual, Augmented and Mixed reality technologies.
 - 6.4.1 Differentiate between augmented and virtual realityAugmented reality refers to superimposing a digital image on a real environment.

Virtual reality refers to creating a digital environment using software.

6.4.2 Examine the use of Augmented Reality as it applies to healthcare and education, as practiced at The Durban Youth Wellness Centre.

Augmented reality may be implemented in the practice in a number of ways including:

- \rightarrow Educational games that are immersive
- \rightarrow Can be used to promote physical activity in children
- \rightarrow Simulations can be used for training purposes
- \rightarrow Any other appropriate response

(2)

6.5 The privacy of both Employees and Clients are protected by the POPI Act in South Africa.

6.5.1 What does the acronym POPI stand for? Protection of Personal Information (1)
6.5.2 Why is online privacy becoming more difficult to achieve? Interaction on social media – sharing of personal information – failure to change privacy settings. Sharing information online – forms / purchases / websites Online searches (Any suitable responses)

(2 x 1 mark each)(2)

- 6.6 AI (Artificial Intelligence) refers to technology that simulates human intelligence. One example is the use of chatbots online, by companies and institutions.
 - 6.6.1 Discuss the benefits of using a chatbot on the website of the Durban Youth Wellness Centre.

Clients get assistance faster

Fewer employees required for client feedback

Available 24/7

(Any suitable responses)

 $(2 \times 1 mark each)$ (2)

SECTION F TOTAL | 30 MARKS

PAPER TOTAL | 150 MARKS