



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

INFORMATION TECHNOLOGY P2

NOVEMBER 2021

MARKS: 150

TIME: 3 hours



This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX sections:

SECTION A: Short Questions	(15)
SECTION B: System Technologies	(25)
SECTION C: Communications and Network Technologies	(30)
SECTION D: Data and Information Management	(20)
SECTION E: Solution Development	(20)
SECTION F: Integrated Scenario	(40)
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 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.5) in the ANSWER BOOK, e.g. 1.1.6 D.

1.1.1 Software that translates programming instructions written in a high-level language into an executable file is called a ...
A compiler.
B assembler.
C driver.
D interpreter. (1)

1.1.2 Which data type for variable x in the following expression is CORRECT?
 $x := 13 \bmod 3 = 0;$
A Integer
B Real
C Boolean
D Char (1)

1.1.3 An update to correct a specific bug in software is called a ...
A purge.
B patch.
C backup.
D rollback. (1)

1.1.4 ... refers to the simulation of human thinking in machines that are programmed to think like humans and mimic their actions.
A A simulator
B A learning algorithm
C Artificial intelligence
D Human-computer interaction (1)

1.1.5 What value will be displayed?

```
iCount ← 9
While iCount < 10 do
    iCount ← iCount + 1
End While
Display iCount
```


A 9
B 10
C 11
D Nothing will be displayed (1)

- 1.2 Choose a term from COLUMN B that matches the description in COLUMN A. Write only the letter (A–T) next to the question numbers (1.2.1 to 1.2.10) in the ANSWER BOOK, e.g. 1.2.11 U.

COLUMN A		COLUMN B	
1.2.1	Used to help detect errors in manually entered data, such as bank account numbers	A	social engineering
		B	CMOS
1.2.2	A peer-to-peer protocol used to share large files over the internet	C	edit box
		D	information overload
1.2.3	Storage space used by the operating system when there is insufficient RAM	E	IRQ
		F	check digit
1.2.4	A component that is best suited to display the content of a two-dimensional array with multiple rows and columns	G	virtual memory
		H	virtual reality
1.2.5	An error that causes a break or termination in the running of a program	I	BitTorrent
		J	string-grid
1.2.6	Data capturing technique that stores more data and is more interactive than conventional barcode systems	K	identity theft
		L	ROM
1.2.7	When a record in a database is open, either for editing or for inserting, the record is flagged as 'in use'	M	runtime error
		N	RFID
1.2.8	People are manipulated to divulge confidential information	O	logical error
		P	record locking
1.2.9	Part of the memory that stores user preferences for the boot-up sequence	Q	spin edit
		R	research
1.2.10	Providing large amounts of data that may leave the user confused and unable to make decisions	S	rollback
		T	SEO

(10 x 1) (10)

TOTAL SECTION A: 15

SECTION B: SYSTEM TECHNOLOGIES

QUESTION 2

- 2.1 Journalists are issued with laptops when they start working at a magazine publishing company. The company only uses free open-source software (FOSS).
- 2.1.1 Explain the concept *open source* in the context of FOSS. (2)
- 2.1.2 Give ONE example of a free operating system the company could install on a laptop. (1)
- 2.1.3 State TWO disadvantages of using free open-source software. (2)
- 2.2 The laptops are equipped with either an HDD or an SSD.
- 2.2.1 Users of laptops equipped with HDDs are advised to defragment the HDD regularly.
Briefly explain what *defragmentation* is. (2)
- 2.2.2 Write out the abbreviation SSD in full. (1)
- 2.2.3 Explain why an SSD accesses the data faster than an HDD. (2)
- 2.3 The journalists can access their data remotely using virtualisation or Software as a Service (SaaS).
- 2.3.1 Define the term *virtualisation*. (1)
- 2.3.2 Office365 is an example of SaaS.
- (a) Except for remote data access, state TWO benefits of using SaaS. (2)
- (b) Describe how the license model of SaaS works. (2)
- 2.4 The company takes precautionary measures to protect the magazine's data.
- 2.4.1 An incremental backup strategy has been implemented to safeguard data. Explain how an *incremental backup strategy* works. (2)
- 2.4.2 The company considers installing biometric readers on all the laptops. How would a biometric reader help safeguard the data on a laptop? (1)

2.5 Power outages and power surges are often experienced in rural areas where journalists work.



2.5.1 What device can be used to ensure that journalists are not affected by unexpected power outages? (1)

2.5.2 If the USB ports of a laptop are damaged due to a power surge, how could a user get his/her peripheral devices to connect to the laptop? (1)

2.6 The journalists use their laptops for word processing, research and to upload articles to the company's electronic database only.

2.6.1 Would you classify these journalists as power users or SOHO users? (1)

2.6.2 Explain how multithreading is applied in a word processor. (2)

2.6.3 The processing speed of the computers at head office is very low. Explain why installing more RAM could improve a computer's performance. (2)

TOTAL SECTION B: 25



SECTION C: COMMUNICATIONS AND NETWORK TECHNOLOGIES

QUESTION 3

The magazine publishing company has branches all around the world that operates on a large scale.

- 3.1 Having a large computer network presents potential challenges.
- 3.1.1 Describe what a *computer network* is. (2)
 - 3.1.2 What type of network could be used by an international company such as this? (1)
 - 3.1.3 State TWO disadvantages of using a computer network. (2)
- 3.2 It was decided that a network with a star topology will be installed in their building at head office.
- 3.2.1 Define the term *topology*. (1)
 - 3.2.2 Explain what a *star topology* entails. (2)
- 3.3 It was suggested that VoIP technology be utilised by the company when communicating with clients.
- 3.3.1 Give TWO reasons why a company would benefit from using VoIP technology. (2)
 - 3.3.2 Besides the device you are using, state ONE other requirement needed to make a phone call using VoIP software. (1)
- 3.4 Journalists need to use the internet to do research for their articles.
- 3.4.1 (a) What is the purpose of a web browser? (1)
 - (b) Why can a web browser not be used on its own when searching for information? (1)
 - 3.4.2 Cookies are used to improve the browsing experience of users.
 - (a) What is a *cookie* in this context? (2)
 - (b) Explain how a cookie will enhance the browsing experience of users. (1)
 - 3.4.3 While browsing the internet, a journalist discovered that smaller magazine companies get many more likes on social media than bigger, more popular magazine companies. This could be due to the activities of click farms.
 - Explain what a *click farm* is. (2)

- 3.5 The company needs to renew their contract with their internet service provider (ISP). For this purpose, they need to evaluate the range and bandwidth provided by their current ISP, as well as other practices that their ISP implements that could affect internet access, such as shaping and throttling.
- 3.5.1 Differentiate between the terms *range* and *bandwidth*. (2)
- 3.5.2 Differentiate between *shaping* and *throttling* in this context. (3)
- 3.6 The company requires a digital certificate, issued by a certificate authority (CA), before launching their website.
- 3.6.1 Explain the purpose of a digital certificate when SSL encryption is used. (1)
- 3.6.2 How would you identify a website that is encrypted with a secure connection? (1)
- 3.7 Using the internet presents dangers such as being subjected to hacking and computer worms.
- 3.7.1 Define the term *computer worm*. (1)
- 3.7.2 State ONE activity performed by your electronic device that indicates that the device could be infected with a computer worm. (1)
- 3.7.3 Briefly explain how a firewall can protect a network from being hacked. (2)
- 3.7.4 Give the term used to describe a person that is hired by a company to hack into the company's network to test their level of security. (1)

TOTAL SECTION C: 30

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

SCENARIO

A media company is responsible for managing the publishing of a wide variety of local and international magazines. An MS Access database is used to manage the distribution of magazines published by several publishers.

The database contains two tables which are designed as follows:

Table: tblPublishers

Field name	Data type	Description
PublisherID (PK)	Text	An ID that uniquely identifies the publisher
PublisherName	Text	The name of the publisher
Address	Text	The address of the publisher
PublisherContactNo	Text	The contact number of the publisher

Table: tblMagazines

Field name	Data type	Description
MagazineCode (PK)	Text	A code that uniquely identifies the magazine, e.g. MC001
Title	Text	The title of the magazine
Type	Text	The type of magazine (sport/business/fashion/leisure/other)
NumPrinted	Text	The number of magazines printed
ReleaseDate	Text	The release date of the magazine
Price	Text	The price per magazine
eMagazine	Text	True if the magazine is available in e-format and false if not
PublisherID (FK)	Text	An ID that uniquely identifies the publisher

- 4.1 It is advised that a relational database should be created.
- 4.1.1 What is a *relational database*? (1)
- 4.1.2 Name and explain ONE anomaly that can occur in an operational database if the database is not normalised. (2)
- 4.2 Identify THREE fields in the table **tblMagazines** that require more suitable data types.
- Suggest a more suitable field name and data type for EACH field that you identified. (3)

- 4.3 Draw an ERD of **tblPublishers** and **tblMagazines** showing the following:
- The relationship type between the entities
 - A suitable action verb describing the relationship
- (3)
- 4.4 Many database management systems (DBMSs) have built-in integrity controls that help to maintain the data integrity in the database.
- 4.4.1 Explain what *data integrity* entails.
- (2)
- 4.4.2 Apart from normalisation, state ONE other way to ensure data integrity in a database.
- (1)
- 4.5 State TWO ways in which the company can benefit from the use of a database management system.
- (2)
- 4.6 Human error results in many issues when entering information into a database.
- Suggest ONE way to minimise user input.
- (1)
- 4.7 Explain why using a server-based database instead of a desktop database management system would be the better option for a company.
- (2)
- 4.8 Data warehousing plays an important role in data maintenance.
- How does data warehousing affect the size and speed of a database?
- (2)
- 4.9 The company's database is used for data mining.
- State the role of a human in the data mining process.
- (1)

TOTAL SECTION D: 20



SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

Applicants for a software engineering position at the magazine company need to answer some questions on software development.

5.1 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question numbers (5.1.1 to 5.1.3) in the ANSWER BOOK.

5.1.1 An array can only store elements of the same data type. (1)

5.1.2 The index value for the first element in a Delphi array is always one. (1)

5.1.3 The value 23 will be displayed in the rich edit component when the following code is executed:

```
var
    arrNumbers : array[1..5] of Integer = (4,2,3,1,8);
    iValue : Integer;
begin
    iValue := arrNumbers[2]+ arrNumbers[3];
    redOutput.Lines.Add(intToStr(iValue));
end;
```

(1)

5.2 The following algorithm written in pseudocode has been provided to enter integer values into variable A and B, swap the contents of the two variables and display the values:

```
Input A
Input B
A ← B
B ← A
Display A
Display B
```

5.2.1 What will be displayed if the value of 5 is entered into variable A and the value of 6 is entered into variable B? (2)

5.2.2 Rewrite the algorithm so that the content of the variables will be swapped correctly. (3)

5.3 A group of friends gathers once a week to have dinner at a local restaurant. They throw a six-sided dice three times to decide what type of meal they will have.

The following rules apply:

- If the number of the first throw is larger than the number of the second throw, they will eat chicken, or else
- If the number of the third throw is less than the number of the first throw, they will eat fish, or else
- They will eat burgers.

The following incomplete Delphi solution is provided for the scenario above:

```
var
    iFirst, iSecond, iThird : Integer;
    sMeal : string;

begin
    iFirst := Inputbox('Enter value of first throw', '', '');
    iSecond := Inputbox('Enter value of second throw', '', '');
    iThird := Inputbox('Enter value of third throw', '', '');

    // Complete the program (Question 5.3.2)

    showMessage(sMeal);
end.
```

5.3.1 Explain why a syntax error will be displayed when the provided part of the program is executed. (1)

5.3.2 Complete the missing part for the program provided, to assign the correct type of meal to the sMeal variable according to the rules in the scenario above.

Assume that the syntax error referred to in QUESTION 5.3.1 has been corrected. (5)



5.3.3

Which sequence of throws (A, B, C or D) will result in the group of friends having burgers as a meal?

	Throw 1	Throw 2	Throw 3
A			
B			
C			
D			

(2)

5.4 The following UML (unified modelling language) class diagram represents a magazine object.

Magazine
- fMagazineID:Integer - fTitle:string - fPublisher:string - fDatePublished:TDate - fNumCopies:Integer
+ calculateCost() + setNumCopies()

5.4.1 Give TWO reasons why an UML diagram is an important OOP modelling tool. (2)

5.4.2 What is the purpose of an accessor method? (1)

5.4.3 Give an example of a mutator method in the given class diagram. (1)

TOTAL SECTION E: 20

SECTION F: INTEGRATED SCENARIO

QUESTION 6

A magazine company needs to stay up to date with the latest trends in technology in order to deliver a relevant service to their customers.

6.1 The company has an online version of their magazine hosted on a website. Users can interact with videos and dynamic content which can be customised for each user. Local and server-side scripting, CSS and SQL are used on the website.

6.1.1 Give ONE example of a local or server-side scripting language. (1)

6.1.2 Explain the main purpose of running a CSS on a website. (2)

6.1.3 What is the purpose of using SQL statements on a website? (2)

6.1.4 As magazine readers are from different countries, they can access the website conveniently from any location.

(a) Name the type of computing which refers to software that is based on a user's location. (1)

(b) What satellite technology will enable an application to automatically update information displayed on a device based on the location of the user? (1)

6.2 The company regularly upgrades some of its devices and disposes of devices that are no longer in use.

6.2.1 Name TWO hardware components on the motherboard of a computer that can be upgraded. (2)

6.2.2 Some offices are equipped with desktop computers instead of laptops.

State TWO benefits of using desktop computers over laptops. (2)

6.2.3 After defragmenting their hard disks, some staff members complained that their computers are still functioning at a low speed.

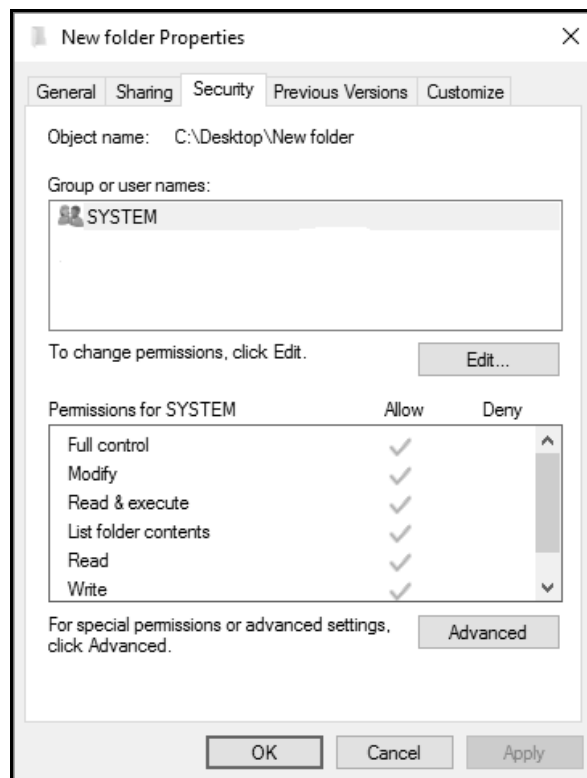
Suggest a way, other than defragmenting the hard disks, to improve the speed of the computers without adding additional hardware components. (1)

6.2.4 Some of the devices replaced by the company need to be disposed of responsibly.

Suggest TWO ways in which the computers can be disposed of in an eco-friendly manner. (2)

- 6.3 Office automation has not been very popular amongst many workers in the magazine industry.
- 6.3.1 What is *office automation*? (1)
- 6.3.2 State TWO advantages of office automation to workers. (2)
- 6.4 The company is setting up a computer network at a new branch.
- 6.4.1 How would the employees be able to connect to the company's Wi-Fi network? (1)
- 6.4.2 Attenuation can be a problem in a cabled network.
- (a) Why is attenuation a problem in networking? (1)
- (b) What type of communication medium can be used to limit attenuation? (1)
- 6.4.3 Give TWO reasons why WiMAX technology is considered to be more suitable than Wi-Fi technology. (2)
- 6.5 The development of mobile technologies and devices promoted the use of social media and microblogging sites.
- 6.5.1 Describe the concept *microblogging*. (2)
- 6.5.2 The excessive use of social media can impact negatively on the health of users.
- State TWO potential health problems caused by the extensive use of social media. (2)
- 6.6 IoT is one of the technologies that is investigated by the company to be used more effectively in future
- 6.6.1 Expand the abbreviation *IoT*. (1)
- 6.6.2 State TWO ways in which IoT devices connect to the internet. (2)
- 6.7 Distributed computing is being investigated by the company for possible implementation.
- 6.7.1 What is *distributed computing*? (2)
- 6.7.2 Give ONE example where distributed computing could be used. (1)

- 6.8 The company decided to do research on the blockchain technology.
 Define the concept *blockchain technology*. (2)
- 6.9 A multi-factor authentication system is used to log onto a website to make payments for services rendered.
 Explain how a *multi-factor authentication system* works. (2)
- 6.10 Why does electronic media use DRM? (1)
- 6.11 The following shared folder with permissions has been created:



- 6.11.1 State TWO tasks that can be performed with files in the folder with Read permissions. (2)
- 6.11.2 Who would usually be allocated the 'Full control' permission? (1)

TOTAL SECTION F: 40
GRAND TOTAL: 150



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MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 15 pages.



SECTION A: SHORT QUESTIONS

QUESTION 1

1.1	1.1.1	A✓		(1)
	1.1.2	C✓		(1)
	1.1.3	B✓		(1)
	1.1.4	C✓		(1)
	1.1.5	B✓		(1)
1.2	1.2.1	F✓	Check digit	(1)
	1.2.2	I✓	BitTorrent	(1)
	1.2.3	G✓	Virtual memory	(1)
	1.2.4	J✓	String-grid	(1)
	1.2.5	M✓	Run time error	(1)
	1.2.6	N✓	RFID	(1)
	1.2.7	P✓	Record locking	(1)
	1.2.8	A✓	Social engineering	(1)
	1.2.9	B✓	CMOS	(1)
	1.2.10	D✓	Information overload	(1)

TOTAL SECTION A: 15

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

- 2.1 2.1.1 The source code of the software is available / accessible ✓ to view and is editable. ✓
Two marks for editable (implies accessible)
One mark accessible / view / available (2)
- 2.1.2 Any ONE (Free operating system): ✓
• Linux
 ○ Red hat
 ○ Ubuntu
• Chrome OS (1)
- 2.1.3 Any TWO (Disadvantages of FOSS): ✓✓
• Lack of formal support
• No one to hold accountable for errors
• Possible bugs/Unstable versions / malware
• Different versions
• Not regularly updated (2)
- 2.2 2.2.1 Defragmentation rearranges files ✓ that are fragmented / scattered ✓ on the HDD disc (2)
- 2.2.2 Solid State Drive ✓ (1)
- 2.2.3 Any TWO (Why is SSD faster than HDD?): ✓✓
• A SSD is electronic
• No moving / mechanical parts
• No increase latency due to read write heads having to find the correct sectors/tracks (2)
- 2.3 2.3.1 Any ONE (Virtualisation): ✓
• Virtualisation refers to creating an entity (referred to as a virtual machine) that only exists in software.
• It is a machine that runs on the host machine and running a different operating system as a guest operating system using the hardware of the host. (1)



2.3.2 (a) *Any TWO (Benefits of SaaS):* ✓✓

- Minimal setup required / not necessary to install the software on your machine / (minimal effort involved)
- Use less space/resources on your machine
- Pay license fee instead of buying the software/minimal initial cost (saving cost)
- Software is updated automatically on the cloud computers
- New features are regularly added
- Ubiquity – use it on any device at any time / can be used from any computer with an Internet connection
- Easy to collaborate or share information with other users
- Scalability – E.g. payment per month can vary, etc. (2)

(b) You pay a subscription fee ✓ and gain access software / use of the service ✓ (2)

2.4 2.4.1 A full backup is made initially ✓ and on set intervals all the changes that have been made to the data gets backed up. ✓ (2)

2.4.2 Prevents unauthorised access ✓
OR an acceptable explanation (1)

2.5 2.5.1 *Any ONE (Device used for a power outage):* ✓

- Uninterrupted Power Supply (UPS) / power bank
- Inverter with battery/generator / solar power
- Use a mobile device (laptop / tablet) / device with built-in battery (1)

2.5.2 *Any ONE (Connect device to laptop):* ✓

- WiFi/ connect wirelessly/Bluetooth
- LAN / network cable / wired connection

Also accept HDMI / examples of cables (1)

2.6 2.6.1 SOHO ✓ (1)

2.6.2 Concepts:

- Suitable example from using a wordprocessor
- More than one process running at the same time

Example:

The word processor will be able to type, spell check, auto save, etc. ✓ at the same time. ✓ (2)

2.6.3

- More RAM can store more applications / data ✓
- Faster access from RAM ✓

OR

- Leads to less use of virtual memory
- RAM is faster than virtual memory (2)

TOTAL SECTION B: 25

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

- 3.1 3.1.1 *Any TWO (Computer network): ✓✓*
Concepts:
- Multiple devices
 - Connected with communication medium
 - Ability to communicate / transfer / share software, hardware, data and information.
- A collection of computers or other computing devices connected via some sort of communication medium to allow users to share software, hardware, data and information. (2)
- 3.1.2 WAN / Internet ✓
Also accept: GAN (1)
- 3.1.3 *Any TWO (Disadvantages of network): ✓✓*
- Administrator required/ high expertise
 - Sophisticated security required
 - Malware can spread
 - Cost implications
- Also accept:*
- Device /server /network malfunction can disrupt the network
 - Loss of data due to device / server / network crashing (2)
- 3.2 3.2.1 The layout / arrangement of devices ✓ in a network. (1)
- 3.2.2 Star topology requires each of the nodes/devices to be connected ✓ to a central hub/switch ✓ (independently / individually / its own cable) (2)
- 3.3 3.3.1 *Any TWO (Benefits of VOIP): ✓✓*
- Lower call cost
 - Software is generally free
 - Allows video conferencing / calls
 - Allows you to display / transfer documents, images, and videos all while simultaneously engaging in a conversation (2)
- 3.3.2 *Any ONE (Requirement of using VOIP): ✓*
- Internet connection
 - Same software installed on both devices
 - Purchase credits to make phone call to certain numbers
 - Have speakers, webcam, and mic / headset (1)

3.4

3.4.1



- (a) A browser simply displays web pages. ✓

Also accept

- Used to view web pages
- Web browser is used to run the search engine (1)

- (b) You need a search engine to search for content ✓

Also accept

- With a search engine you do not need to know the URLs
- A web browser can only view pages, not search (1)

3.4.2

- (a) A cookie is a small text file ✓ used to store the preferences/settings of a website visited. ✓ (2)

- (b) When visiting the same website again, it 'remembers' your profile and applies your preferences automatically. ✓

Any answer that implies using user preferences being stored and used (1)

3.4.3

Click farms are companies that pay workers / bots / botnets to repeatedly click on website elements / generate 'likes' ✓ to artificially 'increase' / 'boost' the status of a product or web page. ✓

Concepts:

- Clicks being generated
- Artificially create a status/likes/popularity for a web page (2)

3.5

3.5.1

Any ONE (Range) ✓

- Range refers to the measurement of how far data or a signal can be transmitted and received,
- Distance that can be covered

Any ONE (Bandwidth) ✓

- Bandwidth refers to how much data you can send through the network per time unit
- Speed of connection (2)





3.5.2 Shaping occurs when an online activity gets prioritised over other activities ✓ when the network / Internet is busy ✓ – only certain online activities are restricted during peak times.

Throttling reduces bandwidth ✓ to all activities when network is strained or once you have exceeded your monthly limit.

Concepts:

- Both happens when there is congestion / high traffic / excessive data usage
- Shaping – Limit bandwidth to specific prioritised activities
- Throttling – Limit bandwidth on all activities (3)

3.6 3.6.1 A digital certificate is used to verify the validity/authenticity of a person or organisation. ✓ (1)

3.6.2 *Any ONE (Secure connection):* ✓

- There will be an 's' in the URL of the website e.g., <https://www.Google.co.za>
- There will be a lock symbol in the address bar (1)

3.7 3.7.1 *Any ONE (Computer worm):* ✓

- A type of malware that exploits weaknesses in an application or operating system / network in order to spread
- Spreads copies or replicates itself / without interaction
- Spreads itself over a network (1)

3.7.2 *Any ONE (Activity indicating a computer worm):* ✓

- Hard drive space decreases even though no extra files have been loaded on the HDD
- Performance of the computer decreases
- Files are missing but not deleted by the user / new files on HDD that were not added by the user
- Anti-virus software detects a worm and requests a user response to delete the file
- Emails sent out from computers without the user's knowledge (1)

3.7.3 A firewall is a network security device/software that monitors incoming and outgoing network traffic ✓ and decides whether to allow or block specific traffic ✓ based on a defined set of security rules

Concepts:

- Monitoring of traffic
- Blocking of unwanted traffic (2)

3.7.4 A white hat / ethical hacker / security analyst ✓

Also accept:

Penetration tester / PEN tester (1)

TOTAL SECTION C: 30

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

- 4.1 4.1.1 A database containing multiple tables linked together in a relationship. ✓

Also accept:

- A database containing tables that are linked with primary and foreign keys.

(1)

- 4.1.2 Any ONE (Anomaly) ✓ with explanation: ✓

- Insertion anomaly: The database has been created in such a way that the required data cannot be added unless another piece of unavailable/unrelated data is also added.
- Deletion anomaly: The legitimate deletion of a record of data can cause the deletion of some required data.
- Update / Modification anomaly: Incorrect data may have to be changed, which could involve many records having to be changed, leading to the possibility of some changes being made incorrectly.

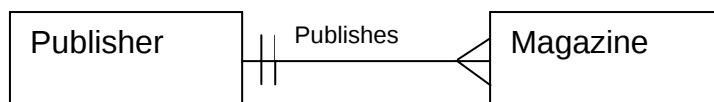
(2)

- 4.2 Any THREE fields with correct data type ✓✓✓

- ReleaseDate: Date/Time / TDate
- Price: Currency / Real / Double
- eMagazine: Boolean / Yes No
- NumPrinted: Number / Integer / ShortInt / LongInt

(3)

4.3



Concepts:

- Correct entities / table names included and displayed on diagram ✓
- Correct relationship type indicated (One-to-Many) ✓
Any acceptable notation indicating the correct relationship
- Correct / acceptable action verb describing the relationship ✓

(3)

- 4.4 4.4.1 Any TWO (Aspects of data integrity): ✓✓

- Completeness of data
- Accuracy / Correctness / Reliability of data
- Consistency of data
- Validity

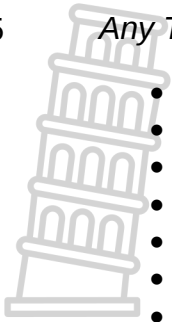
(2)

- 4.4.2 Any ONE (Way to ensure data integrity): ✓

- ensuring referential integrity
- including validation in your database design
- verify that all the data is correct

(1)

4.5 *Any TWO (Uses of DBMS): ✓✓*



- Improves the organisational structure / storage of data
- Reduces redundancy
- Improves data transfer
- Enhances data security
- Improved data integration
- Minimises data inconsistency
- Faster data access
- Better decision making
- Increased end-user productivity
- Many operations like insertion, deletion or creation of file or data are easy to implement
- Prevent anomalies though a correct structure

Accept any other applicable and correct answer (2)

4.6 *Any ONE (Way to minimise user input): ✓*

- Default values
- GUI-controls / components / examples of components
- Importing data from other systems / automated input
- Barcode scanner / reader
- RFID

(1)

4.7 *Any TWO (Benefits of a server based DB instead of a desktop DB): ✓✓*

- Ideal to accommodate large numbers of users
- to work simultaneously on the database
- from many different locations

(2)

4.8 Data warehousing will decrease the size ✓ of a database and increase the speed. ✓

OR

Increasing the size of the data warehouse decreases the speed of the data warehouse

(2)

4.9 *Any ONE (Role of a human in data mining): ✓*

- Selecting and preparing data sets
- Developing data mining software and algorithms
- Interpreting / verifying results delivered by the data mining software



(1)

TOTAL SECTION D: 20

SECTION E: SOLUTION DEVELOPMENT

- 5.1 5.1.1 True ✓ (1)
- 5.1 5.1.2 False ✓ (1)
- 5.1 5.1.3 False ✓ (1)
- 5.2 5.2.1 6 ✓
6 ✓
- Also accept:
Any description that indicates both values to be 6 (2)
- 5.2.2 Input A
Input B
- Temp ← A ✓
A ← B
B ← Temp ✓
- All three statements above in the correct order ✓
- Display A
Display B
- Accept any variable used as a temporary holder (3)
- 5.3 5.3.1 Any ONE (Syntax error that will be displayed): ✓
- A string value is assigned to an integer type variable
 - Add the StrToInt function
 - Type cast from a String to an integer
- (1)
- 5.3.2 `if iFirst > iSecond ✓`
 `then sMeal:= 'chicken' ✓`
 `Else if iThird < iFirst ✓`
 `then sMeal:= 'fish' ✓`
 `Else sMeal:= 'burgers' ✓`
- Concepts:
- If and condition
 - Assign correct value to sMeal
 - Else if and condition
 - Assign correct value to sMeal
 - Else assign correct value to sMeal / initialise sMeal at the start
- (5)
- 5.3.3 B ✓✓
- If a list of options are :
- Only mark the first answer (2 marks)
 - Subtract 1 mark for every incorrect answer added
- (2)

5.4



5.4.1 Any TWO (Reasons why UML diagrams are important): ✓✓

- Specifies the structure or behaviour of an object / Helps to visualise an object
- Provides a template as a guide to constructing an object
- Breaks down a complex object into simple parts
- To list attributes / data types
- To indicate accessibility of attributes / methods
- UML is generic, it can be interpreted by any programmer (2)

5.4.2 Returns the current value of an attribute ✓ of an object (1)

5.4.3 setNumCopies() ✓ (1)

TOTAL SECTION E: 20



SECTION F: INTEGRATED SCENARIO

QUESTION 6

6.1 6.1.1 Any ONE (Example of a local / server side scripting language): ✓

- PHP
- JavaScript
- ASP.NET
- Node.js
- Ruby
- Perl
- Python
- Lua
- HTML 5

(1)

6.1.2 It allows web developers to design the layout and appearance of web pages once ✓ and then automatically updates the design changes done on other web pages ✓

Concepts:

- Design the layout and appearance once
- Automatically updates / implements on all web pages

(2)

6.1.3 SQL is used to interact with the database, ✓ and make the website more interactive. ✓

Concepts:

- Interaction with the database/ store and retrieve / extract data
- Makes the website more interactive

(2)

6.1.4 (a) Location based ✓ computing

(1)

(b) GPS ✓

(1)

6.2 6.2.1 Any TWO (Components on the motherboard that can be upgraded): ✓✓

- RAM
- CPU
- Graphics card / GPU
- I/O cards

Also accept

- HDD/SSD

(2)



6.2.2 Any TWO (Benefits of desktop computers over laptops): ✓✓

- Larger screens
- Supports modular design / custom design
- Easily expandable / upgradeable
- Easier to repair
- Affordability / lower cost

(2)

6.2.3 Any ONE (Way to improve the speed of computers without adding hardware) ✓

- Disable specific features
- Run system clean-up
- Clock manipulation
- Removing malware
- Updating of software
- Closing some applications

Also accept examples that apply to the above

(1)

6.2.4 Any TWO (Ways to dispose computers in an eco-friendly way) ✓✓

- Recycle the material
- Dispose at an approved e - waste site
- Reuse components
- Donating computers
- Sell working parts of computers / computers

(2)

6.3 6.3.1 Process whereby certain routine office processes are carried out without human intervention✓ / process done by a computer / machine

(1)

6.3.2 Any TWO (Advantages of office automation): ✓✓

- Saves time/ complete repetitive tasks faster
- More accurate
- Manages digital processes effectively
- Decrease the workload of workers

(2)

6.4 6.4.1 Any ONE (Employees connect to company's network): ✓

- Hotspot / Access Point / Wi-Fi modem
- Naming a specific device / setting that can be used to connect to Wi-Fi
- Network Interface Card (NIC) on the users device

(1)

6.4.2 (a) Any ONE (Problem with attenuation): ✓

- Attenuation causes loss of signal strength in networking
- Limits the distance that signals can be transmitted

(1)

(b) Fibre optic cable✓

(1)



6.4.3 Any TWO (WiMax more suitable than Wi-Fi): ✓✓

- Wider range
- More secure
- Faster speed / higher bandwidth

(2)

6.5 6.5.1 Posting of short ✓ text / pictures / audios / videos ✓

(2)

6.5.2 Any TWO (Negative impact of excessive use of social media): ✓✓

- Anxiety
- Depression
- Addiction
- Overweight / obesity
- Eye strain
- Wrist aches / Carpal Tunnel Syndrome (CTS)
- Back aches
- Repetitive Strain Injury (RSI)

Also accept:

Any appropriate / relevant health issue

(2)

6.6 6.6.1 Internet of Things✓

(1)

6.6.2 Any TWO (Ways): ✓✓

- Wi-Fi / Wirelessly
- Bluetooth
- Cellular
- Satellite
- Physical Connection / Wired
- Sensors

(2)

6.7 6.7.1 The processing power of many computers are combined to work together ✓ to solve a single problem.✓

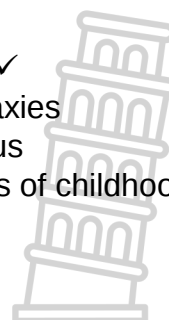
(2)

6.7.2 Any ONE (Example of distributed computing): ✓

- Counting the number of stars in the galaxies
- Finding a solution/cure for the Ebola virus
- Finding a solution/cure for certain strains of childhood cancer
- Finding new prime numbers
- Categorising galaxies
- Searching for alien life
- Fight AIDS
- Weather modelling
- Genetic research

Also accept any other applicable example

(1)



6.8 A growing list of records / entries / transactions ✓ that are linked using cryptography / difficult or impossible to altered/changed/ incorruptible ✓

Concepts:

- A list of records / entries / open ledger / transactions ✓ that are linked
- Difficult or impossible to change / incorruptible

(2)

6.9 More than one level / factor / technique of authentication ✓
An explanation / example to justify the above ✓

Also accept for two marks

Naming TWO different techniques of security checks with appropriate examples

Examples of security techniques can include the following:

A password / OTP / SMS / Email / Biometrics / QR code

(2)

6.10 *ANY ONE (Why does electronic media use DRM): ✓*

- Encryption / technique to control access to the content / protection of rights.
- Encryption / technique to prevent unlawful copying / piracy.

(1)

6.11 6.11.1 *Any TWO (Tasks performed with Read permissions): ✓✓*

- List
- Read / access / open files
- Copy / download files
- Save As
- Execute

(2)

6.11.2 Administrator ✓

Concept:

Any person in charge of the files in the folder

(1)

TOTAL SECTION F: 40
GRAND TOTAL: 150