basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

INFORMATION TECHNOLOGY P2

2021

MARKS: 150

TIME: 3 hours

This question paper consists of 18 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   (24)
        SECTION D: Data and Information Management   (27)
        SECTION E: Solution Development   (25)
        SECTION F: Integrated scenario   (34)

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–R) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 S.

| COLUMN A		COLUMN B	
1.1.1	Someone who uses a variety of tools to plan, structure, create and maintain website content	A	internet hoax
1.1.2	An update that can be downloaded to fix a specific bug in software	B	intranet
		C	Bluetooth
1.1.3	The use of social media to spread false information that seems truthful	D	spam
		E	adware
1.1.4	A certain amount of high-speed memory built into every hard drive to speed up access to data on a disk	F	service pack
		G	web author
1.1.5	Software that downloads and bombards your computer with advertisements that pop up while connected to the internet	H	RFID
		I	patch
		J	rootkit
1.1.6	A standard language used for querying and manipulating data in a database	K	extranet
		L	SQL
1.1.7	Data capture technology designed to store more data and to work more effectively than barcode systems	M	decryption
		N	disc cache
1.1.8	An organisation's network which is accessible to users outside the organisation	O	HTML
		P	WiMAX
1.1.9	A collection of programs designed to obtain administrator rights to control a computer for malicious purposes	Q	system analyst
		R	VPN
1.1.10	Wireless technology that allows devices to communicate with each other over a short distance		

(10 x 1)   (10)

1.2   Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK.

1.2.1   A high-capacity storage device that uses flash memory chips instead of magnetic metal hard disks   (1)

1.2.2   Software that enables an operating system to communicate with a specific hardware device   (1)

1.2.3   The concept of 'renting' software instead of buying a license to use it forever   (1)

1.2.4   A trend whereby separate technologies and functions from multiple devices are combined into a single multi-purpose device   (1)

1.2.5   A text file (max. 4 Kb) used to store customised settings for a website on your local computer   (1)

TOTAL SECTION A: 15

SECTION B: SYSTEM TECHNOLOGIES

QUESTION 2

2.1   Explain why point-to-point connections are used between components that exchange large amounts of data.   (2)

2.2   A CPU is regarded as the 'heart' of a computer.
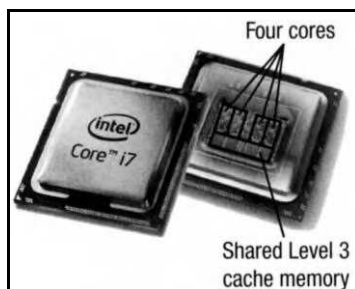
2.2.1   What is a CPU with four cores called?   (1)

2.2.2   Explain why a CPU with more than one core can process a task faster than a single-core processor.   (2)

2.2.3   Give TWO reasons why the cache memory on the CPU speeds up processing.   (2)

2.3   What are the electronic paths that transfer data between components on the motherboard called?   (1)

2.4   Discuss TWO characteristics of RAM.   (4)

2.5   State why developers can benefit from using virtualisation.   (2)

2.6   Firmware is software found in different devices.

2.6.1   State the purpose of firmware.   (1)

2.6.2   Where is firmware located in a device?   (1)

2.7   Explain the relationship between the CMOS and the BIOS by referring to the purpose of EACH.   (2)

2.8   You need to be prepared for a situation where your primary hard disk fails and nothing on your hard disk can be recovered.

List THREE essential things that you should do to ensure that you will be prepared to rebuild your system after installing a new primary hard disk.   (3)

2.9   Study the following screenshot:
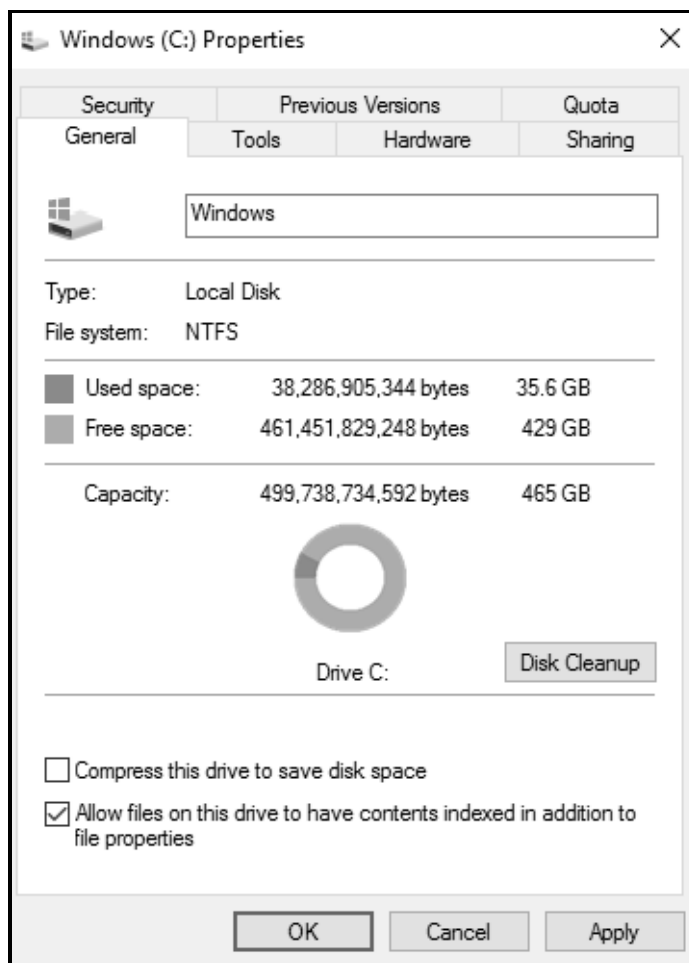
2.9.1   The capacity of the disk is shown in terms of gigabytes. The smallest
          storage unit is a bit. How many bits are in ONE byte?   (1)

2.9.2   Explain why it is a good idea to make sure that the contents of a
          drive is indexed.   (2)

2.9.3   Give ONE reason why you will run a disk clean-up utility.   (1)

TOTAL SECTION B: 25

SECTION C: COMMUNICATIONS AND NETWORK TECHNOLOGIES

QUESTION 3

3.1   A network is formed when connecting two or more devices to make communication between the devices possible.

     3.1.1   Which LAN standard is commonly used in a cabled network?   (1)

     3.1.2   Give TWO reasons why a star topology is popular in networks.   (2)

     3.1.3   Explain why the use of a switch will be an advantage in a network.   (2)

3.2   Networks make it possible to transfer data, information and software.

     3.2.1   Who is a seeder when downloading files from the internet when using BitTorrent?   (1)

     3.2.2   State the difference between the *internet* and an *intranet*.   (2)

3.3   A company decides that their employees must rather work from home for health reasons.

     3.3.1   Employees will need to have access to their documents stored on the server at the office.

            Name the type of network with which they can access these documents through the internet.   (1)

     3.3.2   What is a *back door* when referring to network security?   (2)

     3.3.3   One team member said that while working from home, files would synchronise automatically when saved in online storage.

            Explain what is meant by files being synchronised when saved in this context.   (2)

3.4   Search engines, such as Google, are used by many users each day.

     3.4.1   Explain the difference between a *customised search* and a *context-aware search*.   (2)

     3.4.2   Why does a sponsored link affect the results obtained from a search engine?   (2)

3.5 To enable a web page to be interactive, the web page needs to include specific programming instructions.

    3.5.1 Name TWO different scripting languages. (2)

    3.5.2 Briefly explain how server-side scripting is implemented to establish an interactive web page. (2)

3.6 Management of many retail companies has to make informed decisions every day. State TWO advantages of using a DSS. (2)

3.7 Give ONE reason why the quality of information presented by wikis, such as Wikipedia, are NOT always reliable. (1)

TOTAL SECTION C: 24

**SECTION D: DATA AND INFORMATION MANAGEMENT**

QUESTION 4

A database is used at a mall to store details of stores, staff, clients and other information. A staff member can work at only one store. One of the tables is called **tblStores** and has the following table design:

Table: **tblStores**

Field name	Data type	Description
StoreName	Short Text (30)	The name of the store at the mall
NumOfSquareMetres	Number (Double)	The total number of square metres the store occupies
RentalAmount	Number (Double)	The monthly rent for the store
DateOpened	Date/Time	The date on which the store opened for the first time
NumYearsOpen	Number (Integer)	The number of completed years the store has been doing business at the mall

4.1 The **DateOpened** field has been selected as a primary key field.

    4.1.1 Explain the purpose of a primary key. (1)

    4.1.2 Give a reason why using the **DateOpened** field as a primary key may be inappropriate. (1)

    4.1.3 Recommend a more suitable primary key for the table **tblStores**, that could have been included in the **tblStores** table. (1)

4.2 Normalisation is a term that is commonly used in the context of relational databases.

    4.2.1 Explain the term *normalisation*. (2)

    4.2.2 Why does the inclusion of the **NumYearsOpen** field violate normalisation rules? (2)

4.3 Data needs to be validated to ensure that we have quality data.

    Name TWO validation tests that can be performed on the **DateOpened** field when data is entered into the field. (2)

4.4 A table, **tblStaff**, was created to save the information of the staff members of each store. Use the ERD diagram below to answer QUESTION 4.4.1 and QUESTION 4.4.2.
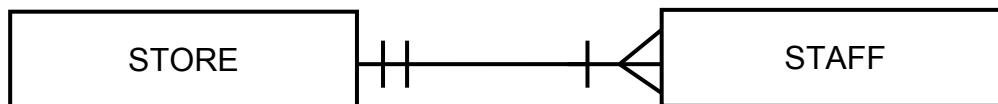
4.4.1 Describe the relationship between the tables using a suitable action verb. (1)

4.4.2 What is the type of relationship between the STORE entity and the STAFF entity? Choose the answer and write only the letter (A–C) next to the question number, e.g. 4.4.2 D.

    A.   Many-to-one relationship

    B.   One-to-many relationship

    C.   Many-to-many relationship (1)

4.5 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question numbers (4.5.1 to 4.5.5) in the ANSWER BOOK.

4.5.1 A primary key and a foreign key used to establish a relationship between two tables must have the exact same field name in both tables. (1)

4.5.2 Data saved in a foreign key field in a table can contain duplicates. (1)

4.5.3 Referential integrity can be applied in a single table. (1)

4.5.4 Database redundancy can lead to database anomalies. (1)

4.5.5 An advantage of data independence is that multiple applications can interface to the same data, as the physical structure of the database is independent of the application. (1)

4.6 Most chain stores at malls use data warehousing, which provide storage for large amounts of data. Records that are outdated in the current database need to be moved to the data warehouse.

Give TWO reasons why the outdated records need to be transformed before it is combined with the data in the data warehouse. (2)

4.7 Transactions in a database management system include deleting records. When a record is deleted, it is only flagged as deleted.

Why are these records flagged as deleted and not removed from the database? (1)

4.8 State TWO potential problems in using a single centralised database serving a large number of connected users and requests. (2)

4.9 The mall needs to take measures to ensure that the information stored in the database will not be compromised.

State TWO ways of preventing an SQL injection attack on the database by hackers. (2)

4.10 Online data collection takes place at the pay point in a supermarket.

4.10.1 Define the term *online data collection*. (2)

4.10.2 Give ONE example of online data collection at the pay point in a supermarket AND explain how the data can be used to the benefit of the supermarket. (2)

TOTAL SECTION D: 27

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1   An algorithm is a step by step breakdown to solving a problem.

      5.1.1   Name ONE technique/tool/diagram that can be used to represent an algorithm.   (1)

      5.1.2   Give ONE reason why algorithms should NOT be language specific.   (1)

5.2   Study the following Delphi code and answer the questions that follow:

```
5  Procedure TForm1.btnCalculateClick(Sender: TObject);
6  Var
7  iSum:integer;
8  begin
9  iSum := 5+7;
10 displayAnswer;
11 end;
12
13 Procedure TForm1.displayAnswer;
14 Var
15 iSum:integer;
16 begin
17 ShowMessage('The sum is: '+ intToStr(iSum));
18 end;
```

      5.2.1   What can be done to make the code in the example above more readable?   (1)

      5.2.2   When the program is executed, the output displayed in line 17 will be 0.

            (a)   What type of error is this?   (1)

            (b)   Give TWO reasons why the sum is displayed as 0, even though the sum is calculated correctly in line 9.   (2)

5.3 The following incomplete Delphi solution is provided for a problem that should display 15 randomly generated odd numbers in the range 10 to 40 (inclusive):

```
1    iCountOdd := 0;
2    While iCountOdd < 15 do
3    Begin
4
5        iRandom :=  …………
6        if (………) then
7        Begin
8
9                showMessage(IntToStr(iRandom));
10       End;
11   End;
12
```

5.3.1 Line 5 needs to be completed. Write Delphi code to generate a random number in the range 10 to 40. (1)

5.3.2 Select the correct option for EACH of the following questions and write down only the CORRECT answer/option in the ANSWER BOOK:

(a) The IF statement to determine if the randomly generated number is an odd number will be …

    (i)   `if (iRandom DIV 2 = 1) then`

    (ii) `if (iRandom MOD 2 = 0) then`

    (iii) `if (iRandom MOD 2 <> 0) then` (1)

(b) The statement `inc(iCountOdd)` should be added to the code above.

    Choose the line number for the correct position of the statement:

    (i)   4

    (ii) 8

    (iii) 12 (1)

(c) Which ONE of the following will provide the correct solution if the While statement in the given code on the previous page must be replaced by a Repeat..Until statement:

    (i)
```
Repeat
    …
Until iCountOdd > 15;
```

    (ii)
```
Repeat
    …
Until iCountOdd >= 14;
```

    (iii)
```
Repeat
    …
Until iCountOdd = 15;
```
(1)

5.4 Write down the most suitable data types for variables X and Y in the following statements where the data type of the Number variable is not known:

5.4.1 `X := Floor(80/12*2);` (1)

5.4.2 `Y := Sqr(Sqrt(Number));` (1)

5.5 Consider the following UML-diagram and answer the questions that follow:

TStaff
- StaffID - StaffName - StaffSurname + ContactNumber + DateAppointed
+ create; + getStaffID:String; + setContactNumber(sContactNumber:String); + isValidDate(iDay, iMonth, iYear:integer): boolean; + calcYearsOfExp:integer;
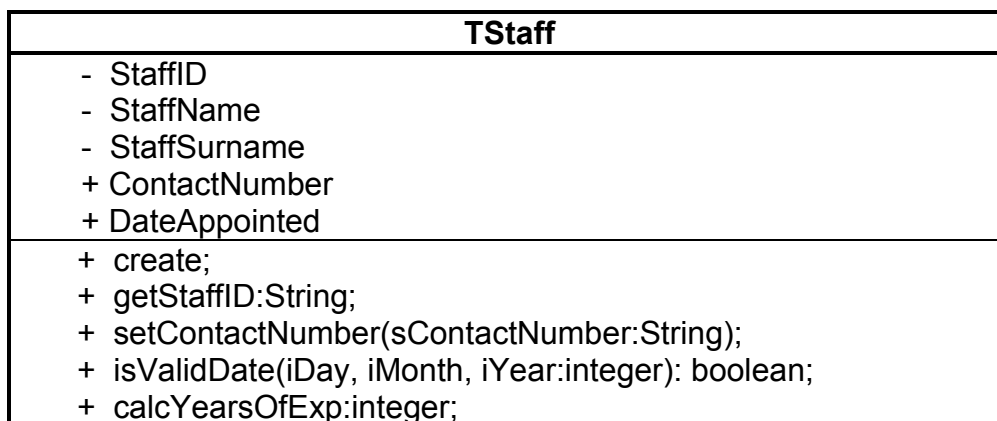
5.5.1 Differentiate between an *accessor method* and a *mutator method*. (2)

5.5.2 (a) What does the positive sign (+) and the negative sign (-) refer to in the UML diagram? (1)

    (b) Refer to the answer to QUESTION 5.5.2(a) and motivate why instance fields/attributes should rather be declared with the negative sign (-) rather than with the positive sign (+). (1)

5.5.3 Identify ONE procedure in the UML diagram above. (1)

5.6   The Fibonacci sequence is a series of numbers: 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

The next number in the series is calculated by adding up the two preceding numbers.

The following incomplete algorithm has been provided:

The number of terms/numbers in the sequence must be entered and the series displayed.

```
input iNumTerms      //number of terms in sequence
iTerm1 ← 1;
iTerm2 ← 1;
if iNumTerms = 1 then
     sLine ← iTerm1
     display sLine

else if iNumTerms = 2 then
      sLine ← iTerm1 + ' ' + iTerm2
      display sLine
else
    ...
    ...
    ...
    ...
    ...
    ...
```

Complete the algorithm above to display the required output.   (8)

TOTAL SECTION E: 25

SECTION F: INTEGRATED SCENARIO

QUESTION 6

A new shopping mall has been built in your area. The availability of computer services and Wi-Fi to businesses and visitors are one of the most important issues to consider.

6.1   The diagram below is an example of a WLAN. Wi-Fi access points have been placed at various places in the shopping mall.
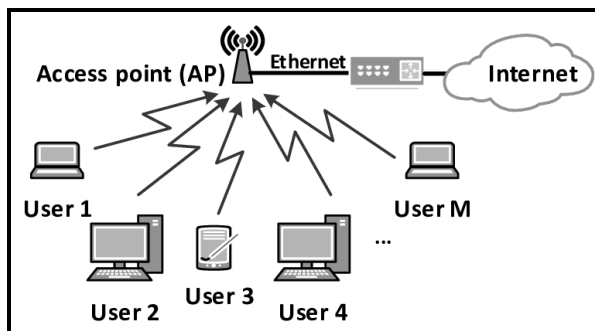
6.1.1   What <u>medium</u> is used to transfer Wi-Fi data?   (1)

6.1.2   Give TWO reasons why there may be a need for many access points in the network environment of the mall.   (2)

6.2   The local shopping mall allows you to download an app to make navigating the mall easy and it can help customers to have a more enjoyable visit to the mall.

6.2.1   Which type of device will most likely be used to run this app?   (1)

6.2.2   What does the term *appification of the Web* refer to?   (2)

6.2.3   You are requested to improve the app by applying defensive programming.

What is *defensive programming*?   (2)

6.2.4   Briefly describe TWO examples of defensive programming techniques.   (2)

6.3   Transactions are mostly done electronically. Any data that is sent over a network passes through different nodes. Encryption is necessary to ensure that all transactions are secure.

6.3.1   Name an encryption protocol commonly used to encrypt private data that is sent over the internet.   (1)

6.3.2   Briefly explain how public key encryption works.   (3)

6.4   GPS and location-based computing are terms that are often used together.

6.4.1   Define *location-based computing*.   (2)

6.4.2   Give an example of the use of location-based computing in a mall environment.   (1)

6.5   Staff in different shops must be made aware of cybercrime, such as hacking and DDoS attacks.

6.5.1   Explain the difference between a *white hat hacker* and a *black hat hacker.*   (2)

6.5.2   Explain the effect of a DDoS attack.   (1)

6.5.3   The effects of cybercrime are largely the same as those of normal crime.

Name TWO negative effects that cybercrime can have on businesses.   (2)

6.6   MyVSpace is a virtual office space in the mall.

Define the term *virtual office*.   (2)

6.7   During the Covid-19 pandemic, employees of a law firm were requested to work from home. The employees need to have a Google Meet session at 09:00 every work day. These meetings must be recorded.

6.7.1   What is the term used to indicate that an employee uses technology to work from home?   (1)

6.7.2   All employees have been provided with a laptop, data and software applications to attend the meetings. What other hardware device would you recommend to be used in a home environment during these meetings, and why?   (2)

6.7.3   Name ONE video conferencing platform, other than Google Meet, that can be used for the meetings.   (1)

6.7.4   Give ONE example of a cloud storage space/service that could be used for saving the records of the meetings.   (1)

6.8 Augmented reality and virtual reality are two of the most promising technologies available to mobile app developers.

      6.8.1 Explain the difference between *virtual reality* and *augmented reality*. (2)

      6.8.2 How can the app improve the shopping experience at the mall by using augmented reality? (1)

      6.8.3 Augmented reality is made possible by fusing data from multiple sensors. Name TWO applicable sensors available on a mobile device. (2)

TOTAL SECTION F: 34
GRAND TOTAL: 150

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INFORMATION TECHNOLOGY P2

2021

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 13 pages.

SECTION A: SHORT QUESTIONS

QUESTION 1

1.1	1.1.1	G✓	(1)
	1.1.2	I✓	(1)
	1.1.3	A✓	(1)
	1.1.4	N✓	(1)
	1.1.5	E✓	(1)
	1.1.6	L✓	(1)
	1.1.7	H✓	(1)
	1.1.8	K✓	(1)
	1.1.9	J✓	(1)
	1.1.10	C✓	(1)
1.2	1.2.1	SSD – solid state drive	(1)
	1.2.2	Driver	(1)
	1.2.3	Software as a service (Saas)	(1)
	1.2.4	Convergence	(1)
	1.2.5	Cookie	(1)

TOTAL SECTION A: 15

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

2.1   Point to point connections between components (not devices) are not shared/ are dedicated ✓
        providing high data transfer speeds ✓   (2)

2.2   2.2.1   Quad-core✓   (1)

        2.2.2   A task is separated into different threads ✓ that can be processed simultaneously✓ spread/executed on/by different cores.   (2)

        2.2.3   *Any TWO of: ✓✓*
- Stores data and instructions that may be needed next / recently used / pre-fetched
- It is high speed memory / closer to (on) the CPU
- Faster access than fetching from RAM
- Prevent slower process from slowing down systems   (2)

2.3   A bus ✓   (1)

2.4   *Discuss TWO characteristic of RAM (2 x ✓✓) of the following:*
- RAM has no moving parts and it is completely electronic (Solid State Memory) - Electronic
- RAM is faster than any mechanical hardware (hard/optical drive) - Fast
- RAM loses its contents if the power supply is interrupted - Volatile
- RAM is more expensive per GB than storage - Comparatively expensive
- It stores data and instructions currently being executed.

        NOTE: Only one mark if the characteristic is mentioned with no discussion   (4)

2.5   By using one computer ✓developers can test their software on different operating systems / platforms. ✓   (2)

2.6   2.6.1   Firmware is used to control the basic operation of a device. ✓   (1)

        2.6.2   On a ROM ✓chip   (1)

2.7   The CMOS is the type of memory that stores the BIOS settings that can be changed, ✓ while the BIOS contains the essential start-up instructions / does the POST on a computer. ✓   (2)

        Please turn over

2.8   *THREE concepts:* ✓✓✓
- Make sure that you have a good backup policy and know how to restore your data / save all your important files in the cloud / syncing of files across devices.
- Make sure you have records of all your licence keys and serial numbers.
- Keep the software installation files/CD/DVD/flash disk in a place where you can easily find and access them.

Concepts:
- Data backup
- Keeping licence keys/ serial numbers
- Keep installation files/CDs/DVD/flash disk

2.9   2.9.1   8 bits ✓   (1)

2.9.2   *Any TWO of* ✓✓
- Ease of access/speed
- This enables the user to better search for a file using words or phrases that might appear inside the document.
- The operating system has an index that does not only include file names, but also include words and parts of text inside the file.   (2)

2.9.3   *Any ONE of* ✓
- To remove temp files downloaded from the Internet
- To remove deleted files and folders by emptying the recycle bin
- To remove temp files created by operating system
- To remove components of operating system that are not used
- To remove installed programs that you no longer/seldom uses
- To free up/open up additional space on the HDD
- To improve the access speed of the device   (1)

TOTAL SECTION B: 25

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

3.1   3.1.1   Ethernet ✓ (1)

3.1.2   *Any TWO of* ✓✓
- New devices can easily be added/removed/set up on the network.
- Easy to troubleshoot/maintain
- If any connected device breaks, the rest of the network is not affected.
- Network traffic can be managed more effectively (2)

3.1.3   A switch connects many computers ✓ on the same network and has the ability to direct network traffic to the correct port / lessens network traffic. ✓ (2)

3.2   3.2.1   The person/point from which a downloaded file is being shared ✓ (1)

3.2.2   Internet: Any ONE✓
- The Internet shares information accessible to everybody.
- Internet - much larger network than an Intranet / unlimited resources

Intranet: Any ONE✓
- An Intranet shares information / is accessible privately/ limited group.
- Intranet – small network with limited resources (2)

3.3   3.3.1   VPN ✓ (any explanation implying VPN) (1)

3.3.2   It is a loophole that is programmed into software ✓ that is used to bypass the security ✓ controls in the network/computer/program. (2)

3.3.3   All changes/updates of the files will automatically be copied to ✓ all the devices linked to online storage/folders.✓ (2)

3.4   3.4.1   Customised: A search in which the results are customised by search engines (like Google) to match one's profile of interests and activities. ✓

Context aware: A search in which additional information (e.g. one's present physical location) is used as criteria to make search results more relevant. ✓ (2)

3.4.2   Advertisers pay for sponsored links to appear ✓even when not relevant to the search. ✓
OR
The user often sees sponsored links first on the results page and these links do not always take you to a relevant information/website.   (2)

3.5   3.5.1   *Any TWO of* ✓✓
Javascript, Pearl, Ruby, ASP.net, Python, PHP, HTML-5 (not without 5)   (2)

        3.5.2   Retrieves information from a database on the web server using the profile of the user ✓ for whom the web page is dynamically created on the server before downloaded to your browser. ✓

               Concepts:
- Personal information obtained from a database on the webserver
- Web page is created on the server before downloaded.   (2)

3.6   DSS analyses the information gathered and presents it in a summarised or graphical format suitable for making informed decisions.

        Any TWO of the following concepts: ✓✓
- Analyse information
- Presents information in a summarised or graphical format suitable
- Assists in informed decision making/decision support system   (2)

3.7   The quality of information - can be questionable as anybody can create/edit the information. ✓
OR
The bias of editors - any editor can select/edit the information to promote his/her point of view.   (1)

TOTAL SECTION C: **24**

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1   4.1.1   To uniquely identify a record in a table. ✓   (1)

        4.1.2   There can be more than one store in the mall that opened on the
                  same day. ✓   (1)

        4.1.3   StoreID/StoreNumber. ✓   (1)

4.2   4.2.1   **Normalisation** is the process of efficiently designing a database
                  ensuring data integrity✓ and eliminating data redundancy.✓
                  OR
                  Designing a database to prevent anomalies and data redundancy.   (2)

        4.2.2   NumYearsOpened can be calculated✓using the DateOpened field.✓   (2)

4.3   *Any TWO of* ✓✓
        • Test for the format of the date e.g.
            o   format must be yyyy/mm/dd.
        • Test if the date is in the correct range e.g.
            o   the date the shop opened was after the date that the mall opened
            o   check that the date is not in the future.
        • Presence check – a date was entered or selected.

        NOTE: In each case accept an explanation or a suitable example.   (2)

4.4   4.4.1   *Any ONE of:* ✓
                  Has
                  Employs
                  Also accept any other sensible action verb that describes the
                  relationship.   (1)

        4.4.2   B   One to many ✓   (1)

4.5   4.5.1   False✓   (1)

        4.5.2   True ✓   (1)

        4.5.3   True ✓   (1)

        4.5.4   True ✓   (1)

        4.5.5   True ✓   (1)

4.6   *Any TWO of* ✓✓

- To make the data more suitable for data mining.
- Data need to be compressed to limit size.
- Data need to be standardised to the same format as the data in the data warehouse.   (2)

4.7   *Any ONE of* ✓
- To access the history of the record.
- To reinstate the record / provide for recovery if records are deleted accidentally.
- For auditing purposes.   (1)

4.8   *Any TWO of* ✓✓
- Slows down the network traffic because of the large volume of data being communicated/overloading.
- High data charges (cost).
- The risk of the whole business shutting down when the central database is down.   (2)

4.9   *Any TWO* ✓✓
- Validate data fields.
- Provide only certain options for example using a component where input can only be selected.
- Limit size of fields to be entered.
- Use parameterised queries.   (2)

4.10.1   Online data collection is where data is processed immediately✓/in real time after it has been captured or collected. ✓
OR
Data is captured/recorded and saved directly/immediately onto a system   (2)

4.10.2   *Any ONE example* ✓ *with the benefit/use of data* ✓

Possible answers:

- The specific purchases are recorded – business establishes buying patterns of clients.
- The bank that clients use is recorded – business can use it as bargaining tool with bank.
- The time of day that purchase is made – can plan for rush hours.

Also accept other valid answers.   (2)

TOTAL SECTION D: 27

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1   5.1.1   *Any ONE of* ✓
- Flowchart
- IPO
- Pseudo code   (1)

     5.1.2   *Any ONE of* ✓
- A programmer of any programming language must be able to understand / code the algorithm
- Anyone must be able to interpret the algorithm.
- It is just a planned solution, not a program.   (1)

5.2   5.2.1   *Any ONE of* ✓
- Indent the code
- Better line spacing/open lines
- Add comments to code   (1)

     5.2.2   (a)   Logical error✓   (1)

         (b)   Concepts:
             Scope:
- iSum is a local variable in each of the subprograms / not global ✓
             Life time:
- iSum is again declared 'empty' in each displayAnswer procedure call ✓   (2)

5.3   5.3.1   *Any ONE of* ✓
```
iRandom := random(31) + 10;
iRandom := randomrange(10,41);
```
                                                                                   (1)

     5.3.2   (a)   (iii) `if (iRandom MOD 2 <> 0) then` ✓   (1)

         (b)   (ii) 8 ✓   (1)

         (c)   (iii) `Repeat`
```
        …
    Until iCountOdd = 15; ✓
```
                                                                                   (1)

5.4   5.4.1   Integer✓ (1)

        5.4.2   Real/ Double ✓ // the compiler will reject integer because of the sqrt (1)

5.5   5.5.1   Accessor method returns the current value of an attribute of an object✓
                  Mutator method returns no value but changes the current value of an
                  attribute of an object.✓ (2)

        5.5.2   (a) *Any ONE of:* ✓
                       • Accessibility
                       • Private and public declaration (1)

                  (b) *Any ONE of:* ✓
                       • To control access from other units/programs
                       • Unintentional changes prevented
                       • Direct access and change prevented. (1)

        5.5.3   setContactNumber ✓ (1)

5.6   sLine ← iTerm1 + ' ' + iTerm2 ✓
                  loop ✓ I from 1 to iNumTerms – 2 ✓
                    start loop
                        iTerm3 ← iTerm1 + iTerm2 ✓
                        sLine ← sLine + iTerm3 + ' ' ✓
                        iTerm1 ← iTerm2✓
                        iTerm2 ← iTerm3 ✓
                    end loop
                   Display sLine ✓ (8)

                                                    TOTAL SECTION E: 25

SECTION F: INTEGRATED SCENARIO

QUESTION 6

6.1   6.1.1   Micro waves / Radio waves ✓   (1)

          6.1.2   *Any TWO of* ✓✓
- To increase the range/ mall can cover a large area
- There may be a lot of traffic with many users on a single access point / less sharing of available bandwidth / will provide higher access speed
- Signal interference by structures like walls   (2)

6.2   6.2.1   Mobile device ✓
                    OR accept a suitable example such as Smart phone/tablet/smart watch   (1)

          6.2.2   The trend that mobile devices increasingly use apps ✓ to access web-sites directly rather than via a browser.✓
                    OR
                    The web is the backend and the app is the front end.   (2)

          6.2.3   *Any ONE for two marks*✓✓
                    Designing your program to ensure the continuing function of a piece of software under unforeseen circumstances.
                    OR
                    When a programmer anticipates problems and writes code to deal with them.   (2)

          6.2.4   *Any TWO of* ✓✓
- Check data for consistency and integrity
- Use try/catch
- Range checking
- Format checking
- Using pre-defined lists / combo box
- Check if items are selected or input entered from components   (2)

                                    Please turn over

6.3   6.3.1   HTTPS / SSL✓ (1)

         6.3.2
- Public key sent to the person/computer wishing to communicate, sent over the network ✓
- Public key used to ENCRYPT data/session key that is sent back to institution ✓ (bank),
- Private key that matches the public key which never moves over network) is used to DECRYPT the data/session key ✓

             Concepts: Marks allocated towards the following:

             Encryption using public key
             Decryption using private key
             Public key is sent / private key retained by user (3)

6.4   6.4.1   Computer-processing where the physical location of people and objects are determined ✓and used during processing. ✓ (2)

         6.4.2   *Any ONE of* ✓
- Specific advertisements / notifications when someone walks pass a shop.
- Request to rate a shop as soon as you visit the shop.

             Any other acceptable answer. (1)

6.5   6.5.1   A white hat hacker does not cause damage ✓ they just prove skills/ test security/not committing a crime
             A black hat hacker hacks to cause damage ✓or steal data or commit a crime. (2)

         6.5.2   The servers become overloaded, unresponsive, and effectively unavailable for everyone. ✓ (1)

         6.5.3   *Any TWO of* ✓✓
- Loss of revenue due to cost for security
- Downtime
- Damage of reputations / losing customers
- Loss of data
- Theft of money via web (2)

6.6   A fixed physical address that has a reception desk and meeting room ✓ which is used as a shared space by people who otherwise work from a mobile office. ✓ (2)

6.7	6.7.1	Telecommuting ✓	(1)

6.7.2 List the device ✓ (example filtered microphone / ear phones)
Motivation ✓ (example to block out background - sound / block out
other conversations) (2)

6.7.3 *Any ONE of* ✓
- Skype
- Teams
- FaceTime
- Jitsi
- Zoom
- WhatsApp calls

Any other correct video conferencing platform (1)

6.7.4 *Any ONE of* ✓
- Google Drive
- One Drive/Share point
- Dropbox

Any other correct online storage space (1)

6.8 6.8.1 While Virtual Reality immerses you into a virtual world and blocks out
the real word ✓ / Computer based,
Augmented Reality refers to overlaying computer-generated images
on top of real-time images ✓ / Combines real world images with
computer generated images. (2)

6.8.2 *Any ONE of* ✓
- The app can have an assistant advertising some products
- The app can give you 3D views of some of the items in the shops

Good explanation showing knowledge about using AR (1)

6.8.3 *Any TWO of* ✓✓
- Camera
- Gyroscope / movement sensor
- Accelerometers
- GPS
- Light sensor (2)

TOTAL SECTION F: 34
GRAND TOTAL: 150