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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

INFORMATION TECHNOLOGY P2

MAY/JUNE 2026

MARKS: 150

TIME: 3 hours

This question paper consists of 17 pages.

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INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX sections:

SECTION A:	Short Questions	(20)
SECTION B:	Systems Technologies	(26)
SECTION C:	Communication and Network Technologies	(25)
SECTION D:	Data and Information Management	(25)
SECTION E:	Solution Development	(26)
SECTION F:	Integrated Scenario	(28)

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.

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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 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 Which ONE of the following is NOT a transmission medium?

A NFC
B UTP
C Fibre optic
D Infrared (1)

1.1.2 The main goal of SEO is to …

A increase the number of results of a search.
B create and design a website for faster loading times.
C improve a website's visibility on a search engine.
D protect a website from cyber threats. (1)

1.1.3 … is a popular communication standard that is primarily used for video and audio output to television sets and monitors.

A VGA
B PCI
C USB 2.0
D HDMI (1)

1.1.4 A language that is used to enhance the formatting and layout of a website:

A AJAX
B PHP
C CSS
D JavaScript (1)

1.1.5 Which ONE of the following is NOT an example of a web browser?

A Google
B Microsoft Edge
C Chrome
D Safari (1)

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1.1.6 Consider the following e-mail that was sent:

To	jane@hypermail.com
CC	michael@acme.com
BCC	siya@securemail.com; peter@securemail.com
Subject	Party next weekend!
Body	Hi everyone! Party at my place next week at 20:00. See you there! Regards, Rob

Which ONE of the following statements is TRUE?

A Jane will know that Michael and Siya were invited.
B Siya will know that Michael and Jane were invited.
C Michael will know that Siya was invited.
D Siya will know that Peter was invited. (1)

1.1.7 Which ONE of the following is a networking device that is used to connect multiple wireless devices to a single wired network?

A Access Point
B ADSL
C Switch
D Hub (1)

1.1.8 The unit of measurement used for the speed of data transferred to and from an HDD is ...

A gigahertz (GHz).
B megabits per second (Mbps).
C gigabits per second (Gbps).
D megabytes per second (MBps). (1)

1.1.9 Which keyword is used in an SQL statement to filter records of a database table using a condition?

A FORMAT
B UPDATE
C WHERE
D LENGTH (1)

1.1.10 Determine the integer value of the variable **iCalculation** when the following Delphi statement is executed:

```
iCalculation := 15 MOD 3 + 5 DIV 2 – Ceil(11/4)
```

A 3
B -1
C 5
D 0 (1)

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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, e.g. 1.2.6 Computer.

1.2.1 Very large data sets that are analysed using computers to reveal trends and associations (1)

1.2.2 An electronic document that serves to authenticate the security and identity of a website (1)

1.2.3 A legal contract between the owner and the user of the software (1)

1.2.4 The set of characters that appear after the dot in a filename and indicates a file's format or the type of file (1)

1.2.5 A processing technique where the CPU switches rapidly between tasks, creating the illusion of running the tasks simultaneously (1)

1.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write 'true' or 'false' next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK. Correct the statement if it is FALSE by changing the underlined word/phrase.

NOTE:

- Do not simply use the word 'NOT' to change the statement.
- NO marks will be awarded if only FALSE is provided as the answer.

1.3.1 Copyleft is a license agreement under which a user may copy, modify and distribute an author's work, as long as the same rights are preserved in the modified work. (1)

1.3.2 An OTP (one-time pin) is sent to a user's smartphone via SMS or e-mail for the purpose of authenticating the user. (1)

1.3.3 Broadband is the maximum amount of data that can be transmitted, in a specific time period, from one point to another in a network. (1)

1.3.4 LAN refers to the physical arrangement of the hardware in a network. (1)

1.3.5 The hexadecimal value E_{16} is equal to the decimal value 13. (1)

TOTAL SECTION A: 20

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SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

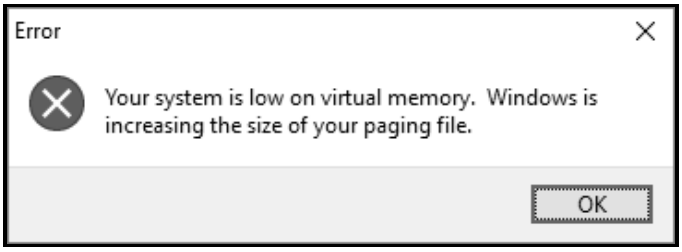
SCENARIO

CompuMart, a leading computer shop, is implementing improvement strategies to provide better services to both in-store and online customers.

2.1 The CompuMart team evaluates the latest memory and storage options of the computers at the store.

2.1.1 Differentiate between a *USB flash drive* and a *hard disk drive (HDD)* in terms of the technology used for data storage. (2)

2.1.2 While working on one of the computers in the testing lab, the following error message appeared:



(a) Briefly explain why an operating system would report a low virtual memory problem in terms of memory management. (2)

(b) Name ONE immediate consequence of low virtual memory if the warning is ignored and the problem is NOT fixed by increasing the paging file. (1)

2.2 The technicians at CompuMart are required to advise their customers on upgrading monitors.

2.2.1 Customers often confuse the size of a monitor with the resolution and the refresh rate of the monitor.

Distinguish between the THREE monitor-related concepts (size, resolution and refresh rate) by briefly explaining what EACH term refers to:

(a) Size (1)

(b) Resolution (1)

(c) Refresh rate (1)

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2.2.2 Gaming is a popular activity among the CompuMart customers.

(a) Motivate why a monitor with a high refresh rate and low response time would be recommended for gaming purposes.

Specifically state the advantage of EACH of the TWO features (high refresh rate and low response time) for gaming purposes as part of your answer. (2)

(b) The graphics processing unit (GPU) of a computer system is either integrated on the CPU (iGPU) or it can reside on a video card which slots into a PCIe slot on the motherboard.

Motivate why a GPU on a video card is the better option for graphic intensive software usage, such as gaming. (2)

2.3 CompuMart staff offer customers the option to update the BIOS settings on their computers and to upgrade or replace the CMOS battery.

2.3.1 Explain the relationship between BIOS and CMOS. (2)

2.3.2 Give TWO reasons why customers are advised to update the BIOS settings of a computer system. (2)

2.3.3 State ONE potential risk of updating the BIOS of a computer system. (1)

2.4 CompuMart has introduced cloud services to offer customers secure remote storage, backup solutions and other cloud services, such as Software as a Service (SaaS).

2.4.1 State TWO advantages that SaaS provides over traditional software licencing models. (2)

2.4.2 State TWO disadvantages of using cloud services for storage purposes. (2)

2.5 The service desk at the company provides advice and information to customers on hardware, software and power management solutions.

2.5.1 Briefly explain what the purpose of a device driver is. (1)

2.5.2 Give TWO examples of power management settings, in an operating system, that can contribute to energy savings. (2)

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2.5.3 Write down TWO types of system software from the list below.

- Word processor
- Device drivers
- Backup software
- Spreadsheets
- Operating system
- Presentation software (2)

TOTAL SECTION B: 26

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SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

SCENARIO

CompuMart employs professional consultants who are highly qualified in network technologies to better serve their customers.

3.1 Answer the following frequently asked questions to assist customers in understanding networking concepts:

3.1.1 Why would a computer network better serve CompuMart, rather than traditional stand-alone PCs? (2)

3.1.2 Briefly explain why a network operating system (NOS) is NOT required for a peer-to-peer network. (1)

3.1.3 Which communication component is required for a computer to connect to a home area network (HAN)? (1)

3.1.4 Which protocol allows for telephone calls to be made over the internet? (1)

3.1.5 Name the protocol most commonly used to upload/download files to/from the internet. (1)

3.2 The store provides a public Wi-Fi hotspot as part of the service that they provide to their customers.

3.2.1 Explain what a *Wi-Fi hotspot* is. (2)

3.2.2 State TWO risks associated with the use of a public Wi-Fi hotspot. (2)

3.3 The store decided to introduce remote desktop support to assist customers with software issues.

3.3.1 Give TWO reasons to motivate why the store introduced remote desktop support rather than on-site support. (2)

3.3.2 The technician providing remote desktop support will need the IP address of the customer's desktop to establish a connection.

(a) Explain what an *IP address* is. (2)

(b) State ONE possible disadvantage of using a remote desktop connection. (1)

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3.4 Different network communication standards can be used to set up networks, which affect the quality and speed of communication.

Arrange the following network standards in the correct order from the slowest to the fastest based on their typical speed:

3G; 5G; Edge; LTE (2)

3.5 A few customers who required software to be installed on their computers have chosen not to purchase proprietary software. They claim that the proprietary software that they require is downloadable free of charge from BitTorrent.

Critically discuss the legality of the customers' claim. (2)

3.6 CompuMart emphasises data security as a critical matter for customers to attend to.

3.6.1 Explain the role of a public key and a private key in SSL encryption. (2)

3.6.2 Discuss TWO functions of a firewall in network security. (2)

3.6.3 Motivate why a VPN is considered secure for browsing purposes. (2)

TOTAL SECTION C: 25

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SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1 The CompuMart team is conducting research on the most suitable database management system (DBMS) for the company, which has branches all over the country.

4.1.1 What is the purpose of a DBMS? (2)

4.1.2 Motivate the implementation of a database management system (DBMS) by stating ONE benefit of having a DBMS. (1)

4.1.3 The table below shows a comparison between a distributed database system and the server (centralised) database system in terms of data storage and system reliability.

Copy statements (a) to (d) in the table below into the ANSWER BOOK and complete each statement correctly.

FEATURE	DISTRIBUTED DATABASE SYSTEM	SERVER DATABASE SYSTEM
Storage of data	(a) Data is stored …	(b) Data is stored …
System reliability	(c) More reliable because …	(d) Less reliable because …

(4)

4.2 It is important for a business to apply transaction tracking in a database.

The information in the table below is an example of transaction log entries of actions that took place in a database.

TransID	UserID	StartTime	EndTime	Action	Status
T101	U12	10:15:02	10:15:07	Add new customer	Completed
T102	U15	10:15:10	10:15:14	Update stock	Rollback
T103	U12	10:15:15	10:15:16	Process payment	Completed
T104	U20	10:15:20	10:15:29	Delete order	Rollback

4.2.1 What would be the result of rolling back transaction T102? (1)

4.2.2 Give ONE possible reason why a rollback needs to be done on a transaction in a database. (1)

4.2.3 Use the information in the table above to explain TWO benefits of keeping transaction log entries available as part of database management. (2)

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4.3 Validation and verification are two techniques that are used to ensure that data being captured is reliable.

Briefly explain the difference between *validation* and *verification* by explaining what EACH of these techniques does. (2)

4.4 The CompuMart company is considering the possibility of expanding their operations. A decision support system (DSS) could be useful in their venture to grow and expand their business.

Briefly explain what a *decision support system* is. (1)

4.5 A relational database can be used to store a large amount of interrelated data.

4.5.1 State TWO advantages of using a relational database. (2)

4.5.2 The database used in the CompuMart store includes the following tables and fields:

tblCustomers
CustomerID
CustomerName
E-mail
CellNumber
Address

tblPurchases
PurchaseID
PurchaseDate
CustomerID
ProductID
Quantity

tblProducts
ProductID
ProductName
Description
Price
StockQuantity

(a) Define the term *field*. (1)

(b) What is the role of the foreign key field **CustomerID** in the **tblPurchases** table? (2)

(c) Name TWO possible alternate keys in the **tblCustomers** table. (2)

(d) Design a simple ERD (entity-relationship diagram) illustrating the structure and relationship between the **tblProducts** and **tblPurchases** tables. (4)

TOTAL SECTION D: 25

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SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1 Evaluate the statements in the segment of code below and answer the questions that follow.

Statements
`for iCnt := 1 to 15 do;`
`  if iCnt MOD 5 = 0 then`
`    redOutput.Lines.Add(IntToStr(iCnt));`
`ShowMessage(IntToStr(iCnt));`

5.1.1 Explain why the expected output, which is to display the multiples of 5 from 1 to 15, will NOT be displayed. (2)

5.1.2 What value will be displayed in the ShowMessage dialogue box? (1)

5.2 Searching for an element in an array can be done using the binary search technique. The declaration of two arrays, **arrNum1** and **arrNum2**, have been provided below.

```
arrNum1 : array[1..7] of Integer = (12,15,17,34,78,83,92);
arrNum2 : array[1..7] of Integer = (92,17,78,15,12,83,34);
```

5.2.1 Which ONE of the arrays provided above will be more suitable to use to implement the binary search technique? (1)

5.2.2 Give a reason for your answer to QUESTION 5.2.1. (1)

5.2.3 One of the steps in the algorithm of the binary search technique is to locate the element at the middle index/position in an array.

Write a Delphi statement that will determine the middle index of an array called **arrNumbers** with an unknown number of elements. Assign the middle index value to a variable called **iMid**. (2)

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5.3 The Delphi code provided below must be evaluated and traced using a trace table.

Line No.	Delphi code
	`var`
	`  sOut : String;`
	`  iCnt, iLoop : Integer;`
	`begin`
1	`  sOut := '#';`
2	`  for iLoop := 1 to 3 do`
	`    begin`
3	`      iCnt := 1;`
4	`      while iLoop <> iCnt do`
	`        begin`
5	`          sOut := sOut + '*';`
6	`          Inc(iCnt);`
	`        end;`
7	`      redOutput.Lines.Add(sOut);`
	`    end;`
	`end;`

Redraw the trace table structure below into the ANSWER BOOK and complete the trace table using the Delphi code provided above.

NOTE: You are allowed to add more rows to the trace table.

Line No.	sOut	iLoop	iCnt	iLoop <> iCnt ?	Output

(6)

5.4 A text file called '**Names.txt**', which contains names, is provided in an existing Delphi project folder.

Study the segment of Delphi code provided below.

```
Assignfile(tFile,'Names.txt');

Try
     (x);
Except
     (y);
End;
```

5.4.1 Write down the Delphi statement that must replace **(x)** in the code above to prepare the existing text file **Names.txt** to add a name to the file. (1)

5.4.2 When will the statement(s) represented by **(y)** be executed? (1)

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5.5 The following UML class diagram which describes an **Item** object has been provided:

TItem
- fItemID: String; - fDescription: String; - fPrice: Real; - fNumInStock: Integer;
+ constructor Create(sItemID, sDescription: String, rPrice: Real, iNumInStock: Integer); + procedure updateNumInStock(iNumSold: Integer); + **(p)**... *Mutator method for fPrice* + **(q)**... *Accessor method for fPrice* + function toString: String; - function determineProfit: Real;

5.5.1 Complete the UML class diagram with statements as described below.

(a) Write a statement to replace **(p)** with the heading of a mutator method for the **fPrice** attribute. The method receives a value to be assigned to **fPrice** as a parameter. (3)

(b) Write a statement to replace **(q)** with the heading of an accessor method for the **fPrice** attribute. (3)

5.5.2 A global object, **objItem**, has been declared in a form class that is linked to the **TItem** object class.

(a) The following statement is an attempt to instantiate the object **objItem** using the constructor create method as described in the given UML class diagram:

```
TItem := objItem.create(sDescription, rPrice,
iNumInStock);
```

State TWO errors in the statement above. (2)

(b) Assume that the object **objItem** has been instantiated correctly. Why will the following statement in the form class return an error?

```
rProfit := objItem.determineProfit;
```

(1)

5.5.3 Assume that the provided parameterised constructor in the UML diagram was replaced by the following default constructor method:

```
Constructor Create();
```

State the changes that will need to be effected to the UML class diagram to ensure that all attributes of the **TItem** object can still be assigned with values. (2)

TOTAL SECTION E: 26

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SECTION F: INTEGRATED SCENARIO

QUESTION 6

SCENARIO

The CompuMart store is investing in state-of-the-art hardware components, updating its system software and enhancing network connectivity. The management is focused on ensuring that these upgrades are secure, efficient and scalable to meet the evolving demands of a competitive retail market.

6.1 At CompuMart's repair and service desk, regular maintenance is carried out to keep systems running smoothly.

6.1.1 Name the utility software that is available as part of Microsoft Windows, that is used for removing temporary internet files and downloads. (1)

6.1.2 State TWO potential benefits of a *custom software installation* versus a *full software installation*. (2)

6.1.3 State ONE benefit of performing regular system backups. (1)

6.2 CompuMart's management is investigating various techniques to increase the sales at the store.

6.2.1 The company wants to improve the experience of customers by reducing the time that customers spend at the store while waiting to be served by staff.

Name AND motivate the implementation of TWO devices that can be used to allow customers to purchase items without staff assistance. (4)

6.2.2 Describe TWO ways in which social media websites may be used to influence sales at the store. (2)

6.3 Customers often call the store to inform them that their computer system has been hacked or infected by malware.

6.3.1 A rootkit is one of the common types of malware that customers should be aware of.

Explain what a *rootkit* is. (2)

6.3.2 CompuMart is running a program known as CAPTCHA, which requires potential clients to identify distorted text when creating an account online.

Motivate why the company is implementing this software. (2)

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6.4 An innovation corner was set up by CompuMart where customers can experience the benefits of virtual reality and augmented reality.

6.4.1 Describe TWO advantages of using augmented reality in business operations. (2)

6.4.2 A few customers at CompuMart have requested for a virtual reality (VR) setup for training applications.

Discuss THREE key hardware requirements for running VR applications effectively and explain why these components are necessary. (3)

6.5 The store manager complains about the poor performance of the DBMS.

6.5.1 Give TWO reasons why data redundancy will have a negative impact on the efficiency of a DBMS. (2)

6.5.2 Suggest TWO ways to improve the efficiency of processing/filtering database queries. (2)

6.6 One of the consultants advised a customer to implement virtualisation on his current computer in order to develop code for iPhones.

6.6.1 Describe ONE way in which virtualisation can be used to reduce hardware costs for the customer. (2)

6.6.2 Explain TWO virtualisation features that enhance the process of recovering from disasters. (2)

6.6.3 Identify ONE challenge associated with implementing virtualisation. (1)

TOTAL SECTION F: 28
GRAND TOTAL: 150

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SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

INFORMATION TECHNOLOGY P2

MAY/JUNE 2026

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 18 pages.

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SECTION A: SHORT QUESTIONS

QUESTION 1

1.1	1.1.1	A – NFC ✓	(1)
	1.1.2	C – improve a website's visibility on a search engine.✓	(1)
	1.1.3	D – HDMI ✓	(1)
	1.1.4	C – CSS ✓	(1)
	1.1.5	A – Google ✓	(1)
	1.1.6	B – Siya will know that Michael and Jane were invited. ✓	(1)
	1.1.7	A – Access Point ✓	(1)
	1.1.8	D – Megabytes per second ✓	(1)
	1.1.9	C – WHERE ✓	(1)
	1.1.10	B – (-1) ✓	(1)
1.2	1.2.1	Big data ✓	(1)
	1.2.2	Digital certificate / SSL certificate / TLS certificate ✓	(1)
	1.2.3	End User License Agreement(EULA) / Software license agreement ✓	(1)
	1.2.4	File extension ✓	(1)
	1.2.5	Multi-tasking ✓	(1)
1.3	1.3.1	TRUE ✓	(1)
	1.3.2	TRUE ✓	(1)
	1.3.3	FALSE, Bandwidth ✓	(1)
	1.3.4	FALSE, Topology ✓ (Also accept Star topology)	(1)
	1.3.5	FALSE, D_{16} ✓	(1)

TOTAL SECTION A: 20

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SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

2.1.1 *Differentiate between a USB flash drive and Hard Disk Drive (HDD) in terms of the technology used for data storage.*

USB flash drive:
Stores data electronically / using non-moving flash memory ✓

Hard Disk Drive (HDD):
Stores data magnetically / mechanically ✓ (2)

2.1.2 *While working on one of the computers in their testing lab, the following error message appeared:*

Error: Your system is low on virtual memory. Windows is increasing the size of your paging file

(a) *Briefly explain why an operating system would report a low virtual memory problem in terms of memory management.*

Any TWO of: ✓✓

- Allocated storage space (paging file) on HDD/SSD is running low
- Insufficient RAM
- Demand for more memory is high (2)

(b) *Name ONE immediate consequence of low virtual memory if the warning is ignored and NOT fixed by increasing the paging file.*

Any ONE of: ✓

- The computer / active program may become slow / unresponsive
- Programs may fail to open
- Programs may crash (1)

2.2 2.2.1 *Distinguish between the THREE monitor related concepts (size, resolution and refresh rate) by explaining what EACH term refers to.*

(a) Physical measurement of the monitor. ✓ (1)

(b) Number of pixels displayed on the screen ✓ (e.g. 1920 × 1080) Width × Height. (1)

(c) Number of times the screen updates itself ✓ per second. (1)

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2.2.2 (a) *Motivate why a monitor with a high refresh rate and low response time would be recommended for gaming purposes.*

Specifically state the advantage of EACH of these TWO features for gaming purposes as part of your answer.

- High refresh rate:
  Smooth motion / sharper fast-moving gameplay ✓
- Lower response time:
  Reduces motion blur / ghosting / input lag ✓ (2)

(b) *Motivate why a GPU on a video card is the better option for graphic intensive software usage such as gaming.*

Any ONE of: ✓✓

- Processes graphics independently (1) so that the CPU and system RAM are free for other tasks (1)
- A GPU on a video card has its own processing power (1) dedicated to graphics (1)
- A card houses its own dedicated video RAM (VRAM) (1), which allows the GPU to handle graphics-intensive tasks much faster (1)
- A dedicated video card can easily be upgraded (1) without replacing the entire motherboard (1)
- Video cards are separate components with its own cooling fans /heatsinks (1) to handle intensive graphics much better (1) (2)

2.3 2.3.1 *Explain the relationship between BIOS and CMOS.*

The BIOS settings / configurations ✓ are stored in CMOS ✓ memory. (2)

2.3.2 *Give TWO reasons why customers are advised to update the BIOS settings of a computer system.*

Any TWO of: ✓✓

- Fix firmware bugs
- Provide support for new hardware
- Improves security / fixes vulnerabilities
- Makes additional features available (2)

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2.3.3 *State ONE potential risk of updating the BIOS settings on a computer system.*

Any ONE of: ✓

- Interrupted updates (e.g. power failure) may render the system unusable
- New security vulnerabilities or bugs
- Loss of support for older hardware/compatibility challenges
- May render the warranty void
- May revert all settings (e.g. overclocking) back to default / Loss of current features or functionality (1)

2.4 2.4.1 *State TWO advantages that SaaS provides over traditional software licensing models.*

Any TWO of: ✓✓

- Automatic updates – always the latest secure version
- Reduction of upfront costs
- Ubiquity (Work from anywhere / any device)
- Scalability
- Minimal setup (2)

2.4.2 *State TWO disadvantages of using cloud services for storage purposes.*

Any TWO of: ✓✓

- Cloud storage depends on internet connectivity, so downtime can disrupt business operations
- Potential data breach / malware attacks
- Server maintenance can lead to downtime
- Speed delays - uploading/downloading of files could be slow
- Limited free space / subscription cost for extra storage
- Migrating / moving data from one provider to another impacts on cost / complexity
- Uploading / downloading files frequently can deplete data cap
- Limited control / management of stored data (2)

2.5 2.5.1 *Briefly explain what the purpose of a device driver is.*

Enables communication between hardware and the operating system ✓ (1)

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2.5.2 *Give TWO examples of power management settings, in an operating system, that can contribute to energy savings.*

Any TWO of: ✓✓

- Automated sleep mode/hibernation mode
- Automatically turn off the monitor when not in use
- Lowering the brightness of the monitor
- Timed start/shutdown schedule
- Energy saver/balanced mode/low power mode
- Dark mode
- Turn off Wi-Fi / Bluetooth / GPS (2)

2.5.3 *Write down TWO types of system software from the given list.*

Any TWO of: ✓✓

- Device Drivers
- Backup Software
- Operating system (2)

TOTAL SECTION B: 26

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SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

3.1 3.1.1 *Why would a computer network better serve CompuMart, rather than traditional stand-alone PC's?*

Any TWO of: ✓✓

- Supports sharing of software resources
- Supports sharing of hardware resources
- Centralisation of data
- Enhanced security when many devices need to be used
- Improves communication / productivity / collaboration (2)

3.1.2 *Briefly explain why a network operating system (NOS) is NOT required for a peer-to-peer network.*

Any ONE of: ✓

- Each device's operating system manages and controls its system resources
- Peer-to-peer networks do not require a dedicated server (1)

3.1.3 *Which communication component is required for a computer to connect to a home area network (HAN)?*

Any ONE of: ✓

- Bluetooth / Wireless adapter / USB dongle
- Network interface controller/card (NIC)
- Router
- Switch
- Access point (1)

3.1.4 *Which protocol allows for telephone calls to be made over the internet?*

Voice over IP (VoIP) ✓ (1)

3.1.5 *Name the protocol most commonly used to upload/download files on the Internet.*

HTTPS / HTTP / FTP / BitTorrent ✓ (1)

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3.2 3.2.1 *Explain what a Wi-Fi hotspot is.*

Physical location / access point / device ✓
providing Internet access / connecting to a network ✓ (2)

3.2.2 *State TWO risks associated with the use of a public Wi-Fi hotspot.*

Any TWO of: ✓✓

- Data can be intercepted (communication not secure)
- Users can become victims of identity theft / hacking / spoofing
- Shared files and folders can be compromised
- Malware infection
- Users prone to shoulder surfing (2)

3.3 3.3.1 *State TWO reasons to motivate why the store introduced remote desktop support rather than on-site support.*

Any TWO of: ✓✓

- Time saving / increases productivity
- Reduces travel cost
- Covers a wider geographical area
- Convenient / safety for client and / or technician
- Enables remote installation / file transfer / troubleshoot software
- Enables flexible after-hour support (2)

3.3.2 (a) *Explain what an IP address is.*

Unique address ✓used to identify a device on a network. ✓ (2)

(b) *State ONE possible disadvantage of using remote desktop connection.*

Any ONE of: ✓

- High bandwidth usage
- Unauthorised remote control and administration
- Requires use of the internet/network connection
- Compatibility between host and client software (1)

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3.4 *Arrange the following network technologies in order from slowest to fastest based on their typical data speed:*

Edge; 3G; LTE; 5G

Outer: Edge; 5G ✓
Inner: 3G; LTE ✓ (2)

3.5 *A few customers who required software to be installed on their computers have chosen not to purchase proprietary software. They claim that the proprietary software that they require is downloadable free of charge from BitTorrent.*

Critically discuss the legality of the customers' claim.

- BitTorrent is legal ✓

Any ONE of: ✓

- Proprietary software is protected by copyright law and requires a paid license to be used legally
- BitTorrent makes you a distributor while downloading, which compounds the legal liability (2)

3.6 3.6.1 *Explain the role of a public key and a private key in SSL encryption.*

The public key is used to encrypt data ✓ sent to a server.
The private key is used to decrypt the data ✓ received. (2)

3.6.2 *Discuss TWO functions of a firewall in network security*.

Any TWO of: ✓✓

- Prevents unauthorised access (to the network)
- Monitors incoming and outgoing traffic
- Filters only certain applications / ports / IPs for Internet communication (2)

3.6.3 *Motivate why a VPN is considered secure for browsing purposes.*

- Hides the location/IP address ✓
- Encrypts all data sent and received ✓ (2)

TOTAL SECTION C: 25

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SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1 4.1.1 *What is the purpose of a DBMS?*

Software designed to effectively manage / organise data ✓ and control access ✓ to data stored in a database. (2)

4.1.2 *Motivate the implementation of a Database Management System (DBMS) by stating ONE benefit of having a DBMS.*

Any ONE of: ✓

- Support data sharing
- Better data security / access control
- Efficient data backup and recovery
- Enhanced decision-making through accurate reporting
- Scalability to handle growing amounts of data
- Has predefined features to support data integrity (1)

4.1.3 *Complete the table below by comparing the two types of database systems based on the given features*

FEATURE	DISTRIBUTED DATABASE SYSTEM		SERVER (CENTRALISED) DATABASE SYSTEM	
Storage of data	(a)	Data is stored across multiple locations / servers✓	(b)	Data is stored on a single server ✓
System reliability	(c)	More reliable because if one site fails, others may still work ✓	(d)	Less reliable because server failure will affect the whole system ✓

(4)

4.2 4.2.1 *What would be the result of rolling back transaction T102?*

The transaction will be reversed/restored to its original status. ✓ (1)

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4.2.2 *Give ONE possible reason why a rollback needs to be done on a transaction in a database.*

Any ONE of: ✓

- An error could have occurred during the stocktaking process.
- Allows the system to restore the database to its original state after a failed / cancelled transaction

Accept any other reasonable explanation. (1)

4.2.3 *Use the information in the given table to explain TWO benefits of keeping transaction log entries available as part of database management.*

Any TWO of: ✓✓

- Shows which transactions were completed/rolled back
- Shows the users who were responsible for the transactions to ensure accountability
- Shows the time when the transaction took place to assist in tracing possible problems that occurred
- Audit trail of transactions (2)

4.3 *Briefly explain the difference between validation and verification by explaining what EACH of these techniques does.*

Validation ensures that data is sensible / correct format / correct range. ✓
Verification is ensuring the correctness / accuracy of data. ✓ (2)

4.4 *Briefly explain what a decision support system is.*

Make a decision/ solve a problem based on analysing large amounts of data.✓ (1)

4.5 4.5.1 *State TWO advantages of using a relational database.*

Any TWO of: ✓✓

- Eliminates data redundancy
- Ensures data consistency
- Ensures data integrity
- Ensures data independence
- Allows efficient data retrieval through queries (2)

4.5.2 (a) *Define the term field.*

Smallest unit of data / single attribute in a table. ✓ (1)

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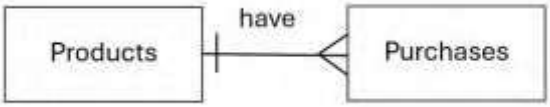
(b) *What is the role of the foreign key field **CustomerID** in the **tblPurchases** table?*

To link / connect ✓ tblPurchases to tblCustomers ✓
OR
To identify which purchases (1) are related to which customer (1) (2)

(c) *Name TWO possible alternate keys in the **tblCustomers** table.*

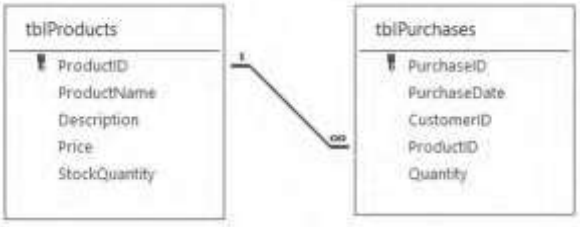
- E-mail ✓
- CellNumber ✓ (2)

(d) *Design a simple ERD illustrating the structure and relationship between the **tblProducts** and **tblPurchases** tables.*



Products ✓
Purchases ✓
Have✓
One-to-many relationship✓

OR



tblProducts (1)
tblPurchases (1)
ProductID relationship (1)
One-to-many relationship (1) (4)

TOTAL SECTION D: 25

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SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1 5.1.1 The semicolon (;) at the end of the for loop statement ✓
causes the IF statement not to execute for each iteration. ✓

Concepts:
Identify the error (1)
Explain the result of the error which causes the incorrect output (1) (2)

5.1.2 16 ✓ (1)

5.2 5.2.1 arrNum1 ✓ (1)

5.2.2 Binary search must be done on an ordered/sorted array. ✓ (1)

5.2.3 `iMid := (Low(arrNumbers) + High(arrNumbers))` ✓ DIV 2 ✓ (2)

5.3

Line No.	sOut	iLoop	iCnt	iLoop <> iCnt ?	Output
1	#				
2		1			
3			1		
4				1 <> 1 False	
7					#
2		2			
3			1		
4				2 <>1 True	
5	#*				
6			2		
4				2 <> 2 False	
7					#*
2		3			
3			1		
4				3 <> 1? True	
5	#**				
6			2		
4				3 <> 2? True	
5	#***				
6			3		
4				3 <> 3? False	
7					#***
2		4			
✓	✓	✓	✓	✓	✓

(6)

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5.4 5.4.1 `Append(tFile)` ✓ (1)

5.4.2 Any ONE of: ✓

- If the file is not found
- If the file is already in use/open (1)

5.5 5.5.1 (a) `Procedure` ✓ `setPrice` ✓ `(rPrice : Real);` ✓ (3)

(b) `Function` ✓`getPrice` ✓`: Real;` ✓ (3)

5.5.2 (a) *State TWO errors in the instantiate statement:*

- The Class name and object name are swapped ✓
- The argument list does not match the number/order of parameters in the constructor ✓ (2)

(b) The method is private in the object class ✓ which means the method cannot be accessed from the form class. (1)

5.5.3 *State the changes that will need to be effected to the UML class diagram to ensure that all attributes of **TItem** object can still be assigned values.*

Mutator method(s) will need to be added ✓ for the fItemID, fDescription and fNumInStock ✓ attributes respectively. (2)

TOTAL SECTION E: 26

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SECTION F: INTEGRATED SCENARIO

QUESTION 6

6.1 6.1.1 *Name the utility software that is available as part of Microsoft Windows that is used for removing temporary internet files and downloads.*

Disk Cleanup ✓ (1)

6.1.2 *State TWO potential benefits of a custom software installation versus a full software installation.*

Any TWO of: ✓✓

- Select only the features required
- Saves disk space
- Personalised per user
- Faster installation (2)

6.1.3 *State ONE benefit of performing regular system backups.*

Any ONE of: ✓

- Ensures important files can be restored if lost.
- Rollback versions of files are available.
- Prevents permanent data loss in case of crashes.
- Minimal downtime. (1)

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6.2 6.2.1 *Name AND motivate the implementation of TWO devices that can be used to allow customers* to purchase items without staff assistance.

Device 1 ✓ and correct aligned motivation ✓
Device 2 ✓ and correct aligned motivation ✓

Devices:	Motivation:
Barcode scanner Touchscreen terminal Vending-style machines / Self-service kiosk	• No queues • Access to real-time stock • Pay directly
RFID / Smart trolleys	• Tracks spending in real time • No queues • Access to real-time stock • Pay directly
Portable card / Customer smartphone	• Pay instantly via QR codes or NFC • Supports digital wallets (Apple Pay, Google Pay) • No queues • Access to real-time stock • Pay directly

(4)

6.2.2 *Describe TWO ways in which social media websites may be used to influence sales at the store.*

Any TWO of: ✓✓

- Social media websites like Facebook, allow businesses to reach a larger audience (increased exposure)
- These platforms collect user data, allowing businesses to run ads targeted at specific groups which increases the chance of making a sale (targeted advertising)
- Positive reviews and comments encourage new customers to buy (customer reviews and recommendations)
- Businesses can partner with social media influencers to promote products, which can lead to a boost in sales due to the influencer's followers (influencer marketing)
- Some platforms allow businesses to sell directly through their pages making it easier for users to buy instantly (direct sales features).

(2)

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6.3 6.3.1 *Explain what a rootkit is.*

A program/ software that hides itself in a computer system. ✓
Gives attacker unauthorised administrative access ✓ to the computer system. (2)

6.3.2 *CompuMart is running a program known as CAPTCHA which requires potential clients to identify distorted text when creating an account online.*

Motivate why the company is implementing this software.

Any TWO of: ✓✓

- Verifies the user is human
- Prevents bots from performing actions
- Reduces spam / fake registrations
- Improves security (2)

6.4 6.4.1 *Describe TWO advantages of using augmented reality in business operations.*

Any TWO of: ✓✓

- Keep customers interested / Improved customer engagement
- Customers are more likely to purchase when they can visualise products (e.g. assembled gaming chair / table)
- Complex products or services can be explained visually and interactively
- AR can simulate real-life scenarios
- Convenience of try-before-you-buy tools (2)

6.4.2 *Discuss THREE key hardware requirements for running VR applications effectively and explain why these components are necessary.*

Any THREE of: ✓✓✓

Component	**Explanation**
Powerful GPU (Graphics card)	High frame rates needed for smooth visuals
Sufficient VRAM (at least 16 GB)	Loads complex 3D environments faster
VR headset / High-resolution display	Ensures a realistic and immersive experience
Sensors/Controllers	Needed for motion tracking
Fast storage (SSD/M2)	Speeds up loading time of VR apps
Powerful CPU	Enhances smooth performance, avoids delays
High-speed ports (e.g. HDMI 2.1 / USB 3.0)	Smooth performance of graphics intensive demands

(3)

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6.5 6.5.1 *Give TWO reasons why data redundancy will have a negative impact on the efficiency of a DBMS.*

Any TWO of: ✓✓

- Wastes storage space / backup size
- Data inconsistency
- Added maintenance
- Complicated data management
- Slower queries/processing / increased anomalies (2)

6.5.2 *Suggest TWO ways to improve the efficiency of processing/filtering database queries.*

Any TWO of: ✓✓

- Normalise the database to reduce redundancy
- Optimised queries
- Archiving outdated data
- Ensure proper database design
- Apply filters to remove unwanted data before further querying
- Create indexes on columns frequently used (2)

6.6 6.6.1 *Describe ONE way that virtualisation can reduce the hardware costs for the customer.*

By running multiple virtual OS ✓on one physical machine. ✓ (2)

6.6.2 *Explain TWO virtualisation features that enhance the process of recovering from disasters.*

Any TWO of: ✓✓

- Snapshots/backups of virtual machines allow quick restoration of systems
- Cloning/replication of virtual machines enables fast recovery on another server
- Easy migration of virtual machines to alternative hardware in case of failure (2)

6.6.3 *Identify ONE challenge associated with implementing virtualisation.*

Any ONE of: ✓

- Virtualisation requires hardware with high specifications
- Causes system resources to be strained
- Limited by the resources of the physical machine
- Impact on licensing cost (e.g. operating system) (1)

TOTAL SECTION F: 28
GRAND TOTAL: 150

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