



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE/
NATIONAL SENIOR CERTIFICATE**

GRADE 12

INFORMATION TECHNOLOGY P2

NOVEMBER 2020

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	(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 A person who studies an organisation's current computer systems and procedures and then designs information system solutions to help the organisation to operate more efficiently is a ...

A systems analyst.
B database analyst.
C system administrator.
D programmer. (1)

1.1.2 A device that can be used to connect many different peripheral devices with a single connector is known as a USB ...

A adapter.
B flash drive.
C hub.
D port. (1)

1.1.3 The process of discovering new patterns in data using sophisticated software is known as ...

A data warehousing.
B information processing.
C big data.
D data mining. (1)

1.1.4 The following variable name is NOT valid in Delphi:

A `_dSalary`
B `dSalary`
C `1dSalary`
D `salary1` (1)

1.1.5 Determine the value of y declared as an integer if the following Delphi statement is executed:

`y := ceil(25.0/6) + 30 mod 6 - round(15.0/4);`

A 3
B 2
C 6
D 1 (1)

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

COLUMN A		COLUMN B	
1.2.1	A technique where two or more disks are grouped together by a special controller to minimise the possible loss of data	A	digital divide
		B	ergonomic security
		C	foreign key
1.2.2	A field in a database table that can be used to identify records, but not used in the table as a primary key	D	piggybacking
		E	RAID
1.2.3	Security based on the identification of unique physical characteristics of a person	F	digital age
		G	disk clean-up
1.2.4	An encryption protocol which encodes data that is sent over the internet	H	utility software
		I	composite key
1.2.5	The gap between people that have access to computers and technology and people who do not	J	rollback
		K	HTTP
1.2.6	The reorganisation of files on a hard disk drive that speeds up access to the files	L	SSL
		M	FTP
1.2.7	Software that enables the operating system to communicate with hardware devices	N	interpreter
		O	disk defragmentation
1.2.8	The protocol used to transfer large files between remote computers that have an internet connection	P	biometrics
		Q	drivers
1.2.9	An operation that reverses a database transaction and restores the data to its previous state	R	alternate key
1.2.10	Programs that are part of system software and are used for maintenance and administrative tasks		

(10 x 1) (10)

TOTAL SECTION A: 15

SECTION B: SYSTEM TECHNOLOGIES

QUESTION 2

SCENARIO

The owner of a start-up importing/exporting business asked your advice on a number of IT-related issues.

- 2.1 The computer technician who will assemble the computers to be used in the office suggested that each computer should have a solid-state drive and a hard drive.
- 2.1.1 State ONE advantage that a solid-state drive has over a conventional hard drive. (1)
- 2.1.2 State ONE disadvantage of a solid-state drive compared to a conventional hard drive. (1)
- 2.2 Each of the office computers will be equipped with 8 GB of RAM and Windows 10 as the operating system.
- 2.2.1 RAM is considered to be volatile memory. What does *volatile* mean in this context? (1)
- 2.2.2 The owner has heard that some computers can only use 4 GB of RAM. He is concerned that he will be paying for hardware that will not be utilised.
- Explain why these office computers will be able to utilise all 8 GB of RAM. (1)
- 2.2.3 The computer technician needs to start installing the operating system for the office computers.
- (a) Indicate whether the hard disk drive or the solid-state drive would be the best option on which to install the operating system. (1)
- (b) Give TWO reasons why you recommend the drive in your answer to QUESTION 2.2.3(a). (2)

2.3 The business' computers will run on Microsoft Windows 10, but there are applications that the owner wants to use that can only run on MacOS.



2.3.1 Suggest a possible technology that can be used to run both operating systems without partitioning the hard drive. (1)

2.3.2 Someone recommended that the latest service pack should be installed for the Windows operating system.

Briefly explain what a *service pack* is. (2)

2.4 VB.NET is a high-level programming language.

2.4.1 Define a *high-level programming language*. (1)

2.4.2 Interpreters and compilers are used to 'translate' a high-level programming language into machine code.

(a) Explain the difference between *interpreters* and *compilers* by stating the difference in the approach they follow when 'translating' code. (2)

(b) Explain the difference between *interpreters* and *compilers* by stating the way each provides feedback and presents the result. (2)

(c) Does Delphi use an interpreter or a compiler? (1)

2.4.3 An API is used when coding in a high-level programming language. What is the function of an API? (2)

2.5 Because of modular design, the latest desktop computers have many slots and connectors to allow for computer components to be added.

Name the slot or connector used to add the following modules/components:

2.5.1 RAM (1)

2.5.2 DVD drive (1)

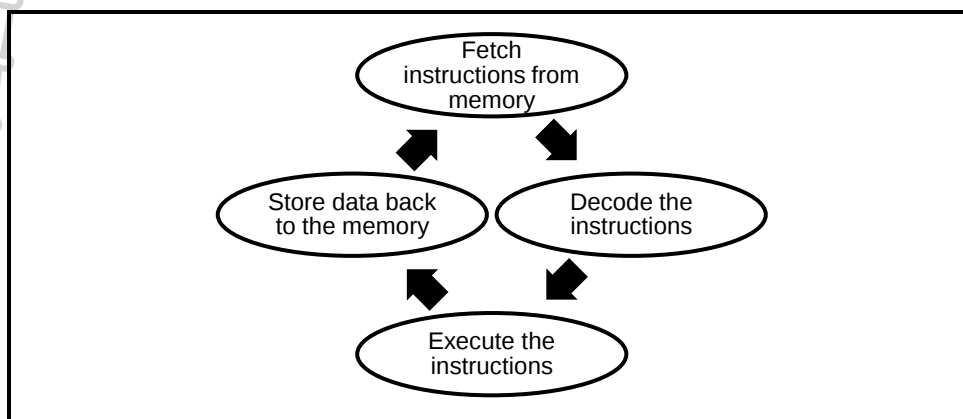
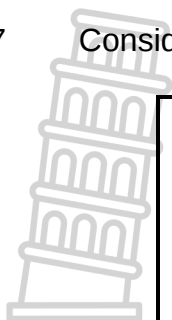
2.5.3 Graphics card (1)



2.6 Motherboards transfer a huge amount of data between various components at any given moment in time.

Explain how the system clock aids in coordinating the transfer of data on a motherboard. (2)

2.7 Consider the diagram below illustrating a process performed by the CPU:



2.7.1 What is the process above called? (1)

2.7.2 The CPU and the RAM communicate with each other via a direct path/connection on the motherboard.

Name this direct path/connection. (1)

TOTAL SECTION B: 25



SECTION C: COMMUNICATIONS AND NETWORK TECHNOLOGIES

QUESTION 3

- 3.1 Wi-Fi, UTP cables and fibre-optic cables are network media that need to be considered when networks are set up. Fibre-optic cables have a greater bandwidth, but can be expensive.

3.1.1 Network bandwidth is measured in Mbps.

(a) Describe *bandwidth* in this context. (1)

(b) Expand the abbreviation *Mbps*. (1)

3.1.2 Apart from having a greater bandwidth and higher speed, name TWO other advantages of fibre-optic cables as opposed to UTP cables. (2)

3.1.3 Give TWO reasons why UTP cables are sometimes preferred in an office environment rather than Wi-Fi. (2)

3.1.4 Define the term *network backbone*. (1)

3.1.5 It has been stated that an NIC is a basic but essential piece of equipment to set up a network.

State the function of an NIC. (1)

3.2 YouTube and Netflix are examples of VOD services.

Explain what a *VOD service* entails. (1)

3.3 AUPs outline the rights and responsibilities of users which is an important requirement in network environments.

3.3.1 Explain why an organisation should include restriction details on the installation of BitTorrent applications in their AUP. (1)

3.3.2 State the condition that should be adhered to, to ensure that the use of BitTorrent is legal. (1)

3.4 Blogs are commonly used as a social media tool.

Give TWO reasons why information published on blogs could be inaccurate. (2)

3.5 The design of web pages can be static or dynamic.

How does a *dynamic web page* differ from a *static web page* from a user's perspective? (2)

- 3.6 Digital signatures are common in the world of electronically conducted business.
- What is the purpose of a digital signature? (1)
- 3.7 Web developers use a variety of technologies, such as HTML, CSS and AJAX, to produce visually impressive websites.
- 3.7.1 What type of software on the client's computer is used to execute HTML instructions? (1)
- 3.7.2 Name TWO ways in which CSS files help to maintain uniformity across several web pages. (2)
- 3.7.3 What is the purpose of AJAX in the context of website development? (2)
- 3.8 DDoS attacks are typically performed by botnets.
- 3.8.1 Define the term *botnet*. (2)
- 3.8.2 Describe what happens in a DDoS attack. (3)
- 3.8.3 What is a *zombie* in the context of a botnet? (1)
- 3.9 Cybercrime is a common phenomenon in the modern world.
- 3.9.1 Briefly explain what a *keylogger* is. (1)
- 3.9.2 Suggest TWO safeguards that computer users can employ to avoid becoming the victims of cybercrime. (2)

TOTAL SECTION C: 30



SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

SCENARIO

The import of plants can be dangerous as the plants may be invasive or introduce diseases to native plants and ecosystems. A rigid testing process must first be conducted before any alien plant may be taken across a country's borders.

A database is used to manage requests and keep track of the number of plants brought into the country. An application needs to be made and processed each time an importer wants to import plants.

The database contains two tables which are designed as follows:

Table: tblImporters

Field name	Data type	Description
ImporterID	Short Text (10)	An ID to uniquely identify an importer entity
ImporterName	Short Text (40)	Name of organisation/person of the importer
ImporterCountry	Short Text (40)	Location/Country the importer is from
DateRegistered	Date/Time	Short date which indicates the date that the importer was registered

Table: tblApplications

Field name	Data type	Description
ApplicationID	AutoNumber	An ID to uniquely identify a log record/request to import plants
PlantName	Short Text (80)	The scientific name of the plant requested to be imported
Quantity	Number	The number of plants requested to be imported
Approved	Number	0 indicates that the import request has been denied 1 indicates that the import request has been approved
DateReceived	Date/Time	The date on which the import request was made/the record was created
DateProcessed	Date/Time	The date on which the import request was approved or denied
ProcessedDuration	Number	The number of days it took for the request to be processed

4.1 The database design is incomplete. Primary keys have not been identified yet and a relationship still needs to be created between the two tables, **tblImporters** and **tblApplications**.

4.1.1 State TWO specific requirements relevant to the content of a primary key field. (2)

4.1.2 A foreign key field needs to be identified in order to establish a relationship between the tables.

(a) Identify a suitable foreign key and give the name of the field and the name of the table that contains the field. (2)

(b) Name the type of relationship between tables **tblImporters** and **tblApplications**. (1)

4.1.3 Name the diagram used to illustrate the relationship between the two tables. (1)

4.2 Suggest a more appropriate data type for the **Approved** field in the **tblApplications** table. (1)

4.3 Explain why the **ProcessedDuration** field in the **tblApplications** table is redundant. (1)

4.4 During the beta version testing of the system, the DBA noticed inconsistencies in the capturing of the names of countries in the **ImporterCountry** field. For example, Canada's name was captured in the following different ways:

CA
Canada
Cannada

4.4.1 Explain what is meant by the term *beta version*. (1)

4.4.2 Suggest a way in which the system can be adapted so that the name of a country is captured uniformly in the **ImporterCountry** field. (1)

4.5 Ensuring the quality of the data involves extensive data validation and verification. Use the field **Approved** in the **tblApplications** table to explain the following:

4.5.1 Data validation (2)

4.5.2 Data verification (1)

4.6 Only authorised people should have access to the database server hosting the database.

Suggest any TWO physical ways in which access to the database server can be restricted.

(2)

4.7 Data independence is a characteristic of a well-designed database.

4.7.1 Explain the term *data independence*.

(2)

4.7.2 One level of data independence is physical independence.

Name another level of data independence.

(1)

4.7.3 Give TWO important reasons for enforcing data independence.

(2)

TOTAL SECTION D: 20



SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1 There are many types of errors that can occur in software development.

5.1.1 Differentiate between a *syntax error* and a *runtime error*. (2)

5.1.2 Give TWO guidelines on how a programmer can construct useful error messages. (2)

5.2 Several search algorithms are available to be used, e.g. binary and linear search algorithms.

What is the prerequisite for an array to be searched when using the binary search algorithm? (1)

5.3 A novice programmer was testing a concept and wrote the following segment of Delphi code:

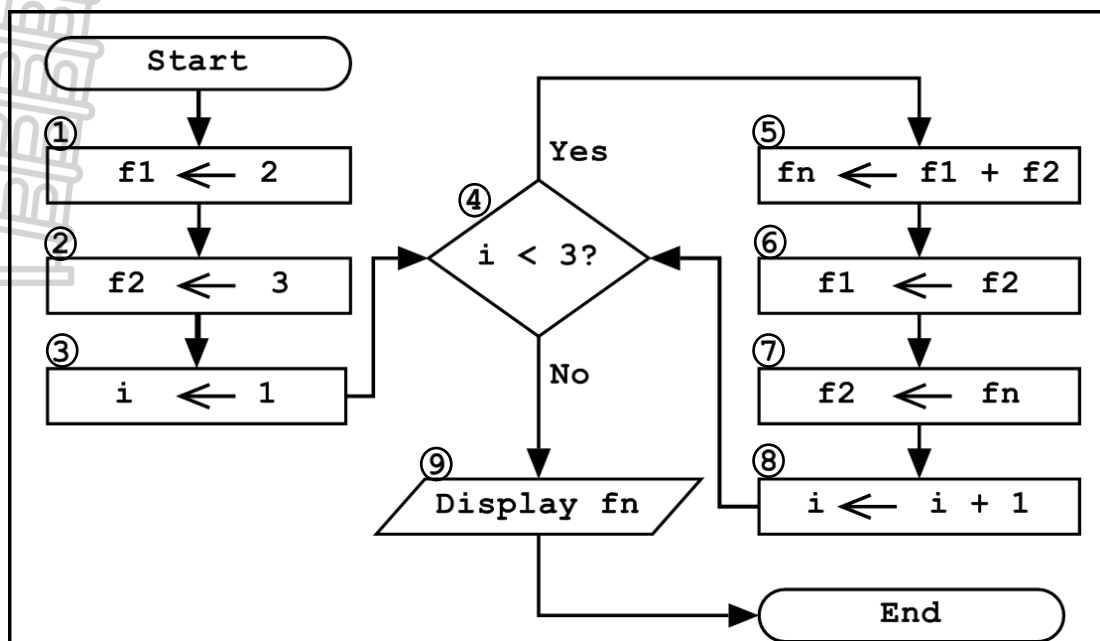
```
27  var
28    I,S: Integer;
29  begin
30    for I := 1 to 5 do
31    begin
32      S := S + I;
33    end;
34    Showmessage (IntToStr (S) );
35  end;
```

5.3.1 The programmer was expecting the final value of the variable *s* to be 15, but the dialog box showed the value of the variable *s* as 38319711.

Give a possible reason for this unexpected result. (1)

5.3.2 Suggest TWO ways in which to improve the code of the novice programmer to be more readable. (2)

5.4 Consider the following flowchart:



Redraw the following incomplete trace table into your ANSWER BOOK. Complete the trace table by tracing step by step through the flowchart depicted above.

Block Nr	f1	f2	i	i < 3?	fn	Output
1	2					
2		3				
3			1			

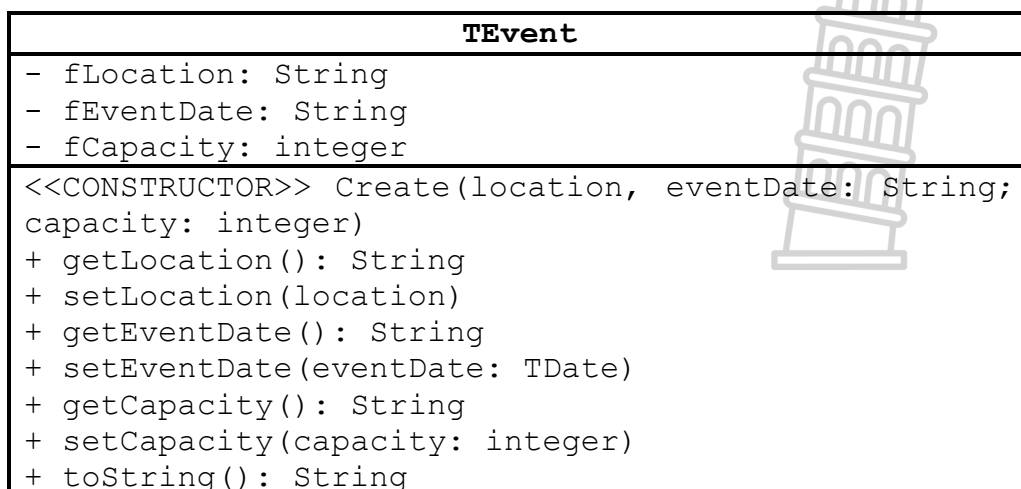
(6)

5.5 Write an alternative line of Delphi code that will have the same effect as the following line of code:

`i := i + 1;`

(1)

5.6 Consider the following class diagram:



5.6.1 What do the plus (+) and minus (-) symbols represent respectively?

(2)



5.6.2 Identify TWO errors in the class diagram provided. (2)

5.6.3 Identify an auxiliary method in the class diagram provided. (1)

TOTAL SECTION E: 20



SECTION F: INTEGRATED SCENARIO

QUESTION 6

A small export company specialising in food-related products are considering upgrading their ICT systems. You are part of an IT company that assists them with advice.

- 6.1 There are many factors that can influence a computer's performance.
- 6.1.1 Give TWO reasons why the use of cache memory allows the CPU to perform tasks faster than when RAM is used. (2)
- 6.1.2 Name TWO other physical aspects of the CPU that have a direct influence on system performance. (2)
- 6.1.3 The available memory (RAM) also has an influence on a computer's performance. Therefore, the operating system allocates additional memory if the available memory is limited.
- (a) What is the additional memory which is allocated by the operating system if required, called? (1)
- (b) Explain how the operating system uses the additional memory when required. (2)
- 6.2 The company considers using free software as an alternative in order to save on licensing costs.
- State TWO disadvantages of using an open and free operating system, such as Linux, as an alternative to an operating system such as Microsoft Windows. (2)
- 6.3 SaaS is a concept related to cloud computing, which in turn relies heavily on virtualisation technologies.
- 6.3.1 State TWO advantages associated with the use of cloud computing. (2)
- 6.3.2 State TWO virtualisation techniques employed by companies that offer cloud services. (2)
- 6.4 Marketing and e-communication play a major role in the company's daily activities.
- 6.4.1 State TWO advantages of using web-based e-mail rather than an ISP-based e-mail. (2)



6.4.2 The internet is used to search for suppliers of products to export.

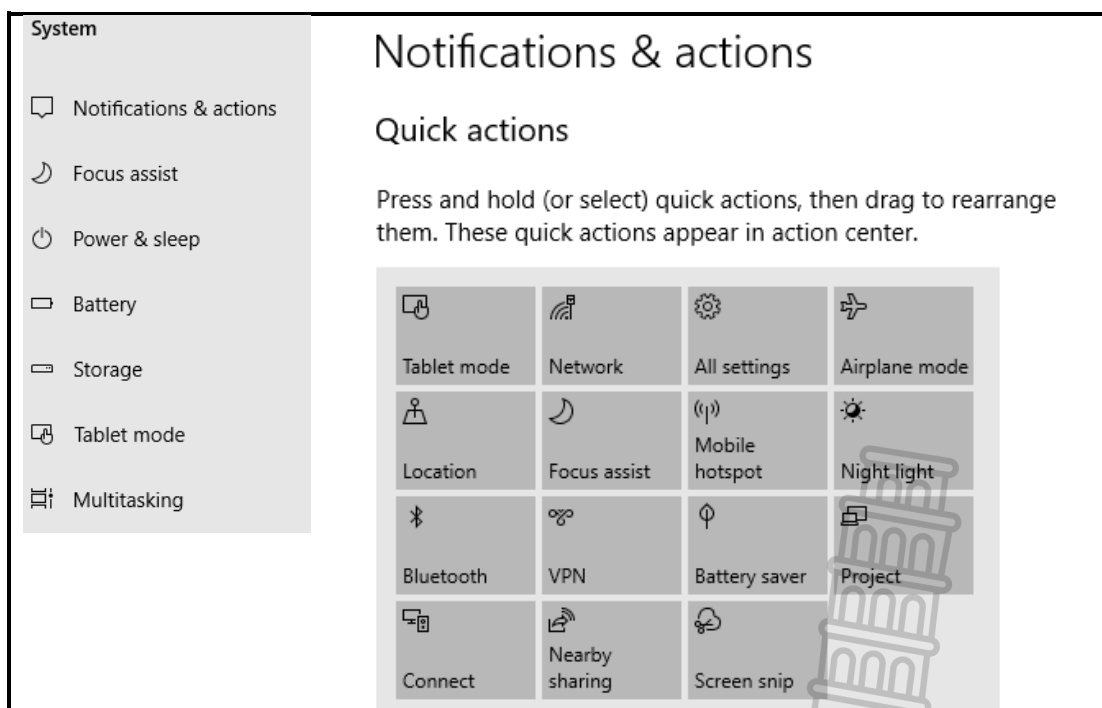
- (a) Explain how a search engine uses customised searching to customise search results according to a user's profile. (2)
- (b) Explain what *context-aware searches* entails. (1)
- (c) How can the business benefit from context-aware searches? (1)

6.4.3 Give TWO reasons why the company should invest in the development of a mobile app if a website has already been created. (2)

6.5 The business is currently using a centralised database. They have been advised to switch to a distributed database system.

Give TWO reasons why you would recommend that they do NOT switch to a distributed database system. (2)

6.6 An employee was exploring the system settings on his/her computer and encountered a screen displaying the following information:



6.6.1 Why is a VPN useful to employees? (2)

6.6.2 Indicate ONE option in the screenshot above that is related to green computing. (1)



- 6.6.3 Define the term *mobile hotspot*. (2)
- 6.6.4 (a) Briefly explain what *multitasking* is. (2)
- (b) How does *multiprocessing* differ from *multitasking*? (2)
- 6.6.5 Explain what *nearby sharing* in this context entails. (1)
- 6.7 As part of upgrading their ICT systems, the company considers cancelling their landline in favour of using VoIP for communication with their customers.
- State TWO possible disadvantages of relying solely on VoIP for communication with customers. (2)
- 6.8 The company often needs to store food in their industrial fridges until it can be shipped for exporting.
- Make TWO recommendations on how Internet of Things (IoT) technology can be used to ensure that the company does not suffer damage due to possible problems with keeping the temperatures in their fridges at optimal levels. (2)
- 6.9 The company uses security badges with embedded RFID tags to apply access control at its premises.
- 6.9.1 What medium is used by RFID to identify objects? (1)
- 6.9.2 State TWO advantages of using RFID rather than barcode technology. (2)

TOTAL SECTION F: 40
GRAND TOTAL: 150





basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE/
NATIONAL SENIOR CERTIFICATE**

GRADE 12

INFORMATION TECHNOLOGY P2

NOVEMBER 2020

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	D ✓		(1)
	1.1.4	C ✓		(1)
	1.1.5	D ✓		(1)
1.2	1.2.1	E ✓	RAID	(1)
	1.2.2	R / C ✓	Alternate key/ Foreign key	(1)
	1.2.3	P ✓	Biometrics	(1)
	1.2.4	L ✓	SSL	(1)
	1.2.5	A ✓	Digital divide	(1)
	1.2.6	O ✓	Disk defragmentation	(1)
	1.2.7	Q ✓	Drivers	(1)
	1.2.8	M ✓	FTP	(1)
	1.2.9	J ✓	Rollback	(1)
	1.2.10	H ✓	Utility software	(1)

TOTAL SECTION A: 15

SECTION B: SYSTEM TECHNOLOGIES

QUESTION 2

- 2.1 2.1.1 Any ONE: ✓
- Faster data access speed/ reading speed
 - Does not need to be defragmented
 - Greater reliability due to the absence of moving parts
 - Uses less power / more energy efficient
 - Smaller in physical size
- (1)
- 2.1.2 Any ONE: ✓
- More expensive when compared to hard drives
- The inability to recover old data
- (1)
- 2.2 2.2.1 RAM loses its contents when power is lost ✓/computer is switched off
- Or any other correct explanation
- (1)
- 2.2.2 Any ONE: ✓
- If the operating system/machine is 64-bit it can use more than 4 GB of RAM.
- OR
- If the operating system/machine is 32 bit, it would not be able to use more than 4 GB of RAM.
- (1)
- 2.2.3 (a) Solid state drive ✓
- (1)
- (b) Any TWO: ✓✓
- Operating system and program performance / access time will be faster
 - Bulk data can be stored on the cheaper hard disk drive, while programs that require high performance is stored on the more expensive SSD.
 - Does not need to be defragmented
 - Greater reliability due to the absence of moving parts
 - Uses less power / more energy efficient
- (2)
- 2.3 2.3.1 Any ONE:
- Virtualisation/ Emulator/or examples of virtualisation software
- (1)
- 2.3.2 Any TWO of the following concepts: ✓✓
- New features
 - Fixes to problems
 - Updates
 - Adding onto the existing operating system
 - Provides updated security
- (2)

2.4 2.4.1 A language that is easy for humans to write and understand/ language closely related to the language we use✓, because it relates to the English language. (1)

2.4.2 (a) Difference: An interpreter translates line by line ✓
The compiler translates the whole program ✓ (2)

(b)

Interpreter	Compiler
An interpreter displays error message(s) line by line	The compiler provides a list of error messages ✓
Does not provide an executable file	Provides an executable file ✓

(2)

(c) Delphi uses a compiler (1)

2.4.3 An API is an interface between the programming language✓ and operating system/ software/ services/ hardware ✓ (2)

2.5 2.5.1 DIMM slots ✓ (1)

2.5.2 SATA connectors/ USB/ Firewire/ Thunderbolt ✓ (1)

2.5.3 Any ONE: ✓
PCI-Express slot OR PCI-e OR AGP OR USB (1)

2.6 The system clock generates pulses✓ that regulates the rate at which data is transferred between components. ✓

Concepts

Pulses are generated (1 mark)

The rate at which data is transferred (1 mark)

(2)

2.7 2.7.1 Machine cycle ✓ (1)

2.7.2 Point-to-point connection ✓ (1)

TOTAL SECTION B: 25

SECTION C: COMMUNICATIONS AND NETWORK TECHNOLOGIES

QUESTION 3

- 3.1 3.1.1 (a) Bandwidth is the total amount of data that can be sent and received/transferred in a network in a given period of time. ✓ (1)
- (b) Mega bits per second ✓ (1)
- 3.1.2 Any TWO: ✓✓
- Low/No signal degradation over a distance/ (Lower attenuation)
Mostly not affected by electro-magnetic interferences (EMI).
Immune to eavesdropping/more secure
Immune to crosstalk (2)
- 3.1.3 Any TWO: ✓✓ (2)
- UTP is less prone to Interference
UTP is not as slow when shared between multiple users
UTP is not as influenced by objects like walls and trees
UTP has better security
- Alternative:
Answers can be provided from the perspective of Wifi.
- 3.1.4 A cable that connects different network segments or LANs together. ✓
OR
A backbone is part of a computer network that interconnects various pieces of a network providing a path of information exchange. (1)
- 3.1.5 Any ONE: ✓ (1)
- A NIC facilitates/provides communication/connection between a computer and a network medium.
OR
Functions to encode and decode messages between computer and network
- 3.2 Any ONE: ✓
- The ability to choose what the user wants to watch
A service which allows users to watch video content on demand (per request – users do not need to watch scheduled content) OR
Any other suitable description. (1)

- 3.3 3.3.1 Any ONE: ✓
• Decrease the likelihood of illicit/harmful downloads on the network through BitTorrent clients.
• So that the network's bandwidth is not dominated by traffic from BitTorrent downloads. (1)
- 3.3.2 No downloading of copyrighted material. ✓ (1)
- 3.4 Blogs can be published by anyone. ✓
Information is not verified. ✓ (2)
- 3.5 A static webpage displays the exact same information every time it is viewed ✓ while the information displayed by a dynamic webpage may differ ✓ based on the user/ time/environment/ more interactive. (2)
- 3.6 Any ONE: ✓
• The document has not been changed.
• The signature can verify the signer/sender of an electronic document. (1)
- 3.7 3.7.1 Web browser ✓
Also accept a correct example such as Internet explorer/Mozilla Firefox (1)
- 3.7.2 Any TWO: ✓✓
• Styles can be defined only once/in a single file that are referenced and used by HTML files.
• If a change is made in the CSS file, all HTML files that reference the styles defined in the CSS file will be updated.
• Styles are centralised and changes scale well without having to change formatting/styling settings in multiple places across HTML files.
- Concepts:**
Centralised design in a single file/only once
All web pages can access the design from the CSS files (2)
- 3.7.3 Combines JavaScript with a browser command to allow the browser to download data ✓ without refreshing the entire webpage. ✓
OR
Allows parts of a webpage to be updated (1 mark) without updating the entire webpage. (1 mark) (2)

- 3.8  3.8.1 A group of computers ✓ controlled by a hacker/computer criminal/ malicious software ✓ and that work together to be used in an illegal manner (2)
- 3.8.2 Using a large number of computers ✓ to overload servers/service with a large number of requests ✓ making it inaccessible. ✓ (3)
- 3.8.3 It is the computer used/controlled by a computer criminal/ malware ✓ in a DDoS attack or other criminal activity. (1)
- 3.9 3.9.1 A type of malware that records keystrokes ✓ and sends it off to a third party. (1)
- 3.9.2 Any TWO: ✓✓
- Installing/using anti-malware/ anti-virus software.
 - Using a firewall.
 - Keeping all your software up to date.
 - Following a good password policy.
 - Do not open unknown emails and attachments.
 - Only use secure websites.
 - Be updated with the new trends.
 - Be guarded when sharing personal details.
 - Do not install/add/open suspicious files. (2)

TOTAL SECTION C: 30

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

- 4.1 4.1.1 Data in field of primary key must be unique (no duplicates). ✓ Cannot be null/empty. ✓ (2)
- 4.1.2 (a) ImporterID ✓ tblApplications/ tblImporters ✓ (2)
- (b) One to Many ✓ (1)
- 4.1.3 Entity Relationship Diagram ✓
- Also accept ER diagram / ERD/ Relationship diagram* (1)
- 4.2 Any ONE ✓
- Boolean
- Yes/No
- True/False (1)
- 4.3 The number of days it takes to process the request can be calculated/derived. ✓ (1)

- 4.4 4.4.1 Any ONE: ✓
- A version of a piece of software that is made available for testing. Typically tested by a limited number of users.
 - Version before its general release.
 - A trial version of the software.
- (1)
- 4.4.2 Any ONE: ✓
- Validation rule/ Range check/ Format check
 - Limit input with a component OR an example listbox/combobox
- (1)
- 4.5 4.5.1 TWO Marks:
- Test for correct range (0 or 1)
- OR
- ONE Mark each:
- Ensure/test for acceptable data
- Test for correct data type (Number)
- (2)
- 4.5.2 Data verification:
- Checking the correctness ✓ of data against the source/ human perspective.
- (1)
- 4.6 Any TWO: ✓✓
- Controlled access to building by means of NFC / RFID.
 - Using biometric security to control access to a building.
 - Placing servers/storage devices in lockable room / cabinet.
 - Hiring security personnel to enforce access control to data.
 - Using a cloud server/ off site server
- (2)



- 4.7 4.7.1 Data independence refers to the separation between software ✓ that uses the database application and the actual data structure ✓ managed by the DBMS server. (2)
- 4.7.2 Logical independence ✓ (1)
- 4.7.3 Any TWO ✓✓
- The user software/application cannot alter the structure or format of the data
 - Multiple applications can interface the same data because the physical structure is not a factor
 - DBMS software handles the actual data management. (2)
- TOTAL SECTION D: 20**

]



SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

- 5.1 5.1.1 A syntax error occurs when the rules of the programming language (or an example of a programming language error) are violated ✓ OR an error that prevents the program from running.

A runtime error occurs when the program is executed/run and a problem is encountered (or an example of a runtime error). ✓

(2)

- 5.1.2 Any TWO sensible guidelines: ✓✓

- Explain the error in understandable terms to the user.
- Provide an indication of whether the error is due to a problem with the software or hardware.
- Explain how to solve the problem.
- Give an indication whether it has been a program error or an error due to something that the user did.

(2)

- 5.2 The array list needs to be sorted ✓ before binary search can be done.

(1)

- 5.3 5.3.1 Any ONE ✓

- Variable S is not given an initial value (not initialised).
- Variable S needs to be initialised before the loop is executed.

(1)

- 5.3.2 Any TWO ✓✓

- Indentation to provide a readable structure
- Descriptive variable name to assist in understanding the purpose of the code
- Add a comment(s) to explain the purpose of the program
- Including blank lines between code segments

(2)

- 5.4

Block Nr	f1	f2	i	i < 3?	fn	Output
1	2					
2		3				
3			1			
4				Yes ✓		
5					5 ✓	
6	3 ✓					
7		5 ✓				
8			2 ✓			
4				Yes ✓		
5					8 ✓	
6	5 ✓					
7		8 ✓				
8			3 ✓			
4				No ✓		
9						8 ✓

12/2
=(6)

5.5 Inc(i) ✓ OR Inc(i,1) (1)

5.6 5.6.1 + indicates public ✓ members/methods/attributes
- indicates private ✓ members/ methods/attributes
Also accept Public and Private if provided in that order without symbols. (2)

5.6.2 Any TWO: ✓✓
• setLocation()'s parameter doesn't specify a data type.
• getCapacity() method should return an integer data type.
• setEventDate()'s parameter should be a String data type OR
fEventDate should be a Date data type.

Note:

Also accept the name of the incorrect method without an explanation. (2)

5.6.3 toString ✓ (1)

TOTAL SECTION E: 20



SECTION F: INTEGRATED SCENARIO

QUESTION 6

- 6.1 6.1.1 Any TWO: ✓✓
- Cache memory is physically closer to/on the CPU.
Cache memory stores frequently/recently/likely to be used instructions.
Type of memory used for cache memory is faster than RAM.
Do not accept only faster (2)
- 6.1.2 Any TWO: ✓✓
- The CPU speed in GHz - higher speed improves performance
Number of cores - more for better performance
Number of threads - more for better performance (2)
- 6.1.3 (a) Virtual memory ✓ (1)
- (b) By swapping information not being used ✓ between the hard disk space/virtual memory/additional memory and the RAM. ✓
- Two of the following concepts:
- Content not being used,
 - Moved from the RAM to storage
 - Allocates a segment of hard drive as temporary RAM
 - Saved until required again (2)
- 6.2 Any TWO: ✓✓
- Not such a wide array of supported software applications available for Linux, (limited compatibility).
 - Official support limited.
 - No-one held accountable.
 - Might include bugs in the source code.
 - Many different versions exist, which might be confusing to users. (2)
- 6.3 6.3.1 Any TWO: ✓✓
- Scalability
 - Ubiquity, Can be accessed anywhere at any time
 - Enables collaboration
 - No need for maintenance and upgrades of hardware
 - No need for software installation and upgrades
 - Saves local resources/ storage space (2)
- 6.3.2 The distribution/sharing of resources of powerful computers between users ✓
- The combining of resources of different computers to create a super powerful service ✓ (2)

6.4



6.4.1

Any TWO: ✓✓

- Can access e-mail from anywhere if you have Internet access.
- No additional costs for email facility.
- Using your web browser to access e-mail.
- Scalability
- Ubiquity, Can be accessed anywhere at any time
- Outsources maintenance and upgrades of hardware
- Outsources software installation and upgrades
- Saves local resources/ storage space

(2)

6.4.2

(a) Any TWO: ✓✓

Browser tracks everything done by the user logged in.
Builds a detailed profile based on general interests and habits.
Filters results based on search history.

Accept any valid aspect that can be linked to the users profile.

(2)

(b) The search engine uses situational data ✓ (e.g. location) to make search results more relevant.

(1)

(c) Any ONE: ✓

The search results will have less hits/more relevant.
More suppliers can be located.

(1)

6.4.3

Any TWO: ✓✓

- Mobile devices are more readily available.
- More streamlined interface.
- Able to easily receive notifications on user's device.
- Can use a mobile app on the go (anywhere).
- Ability to cache data locally on device so that data can be accessed offline.
- Less data usage.
- Don't have to memorise long URL's/App is dedicated to a specific website.

(2)

6.5

Any TWO: ✓✓

- The company runs a small business which does not require the complexity of a distributed database
- It is more expensive to set up/maintain a distributed database.
- A distributed database is more complex to set up/maintain.
- Synchronisation of data is more complex
- More complex security

(2)

6.6

6.6.1

Any TWO ✓✓

- To access files and documents on the business computer from anywhere /connect to your business
- with the same security as in the office/LAN
- with the same resources/ software as in the office

(2)



- 6.6.2 Any ONE: ✓
• Battery saver
• Power & sleep
• Mobile hotspot
• Airplane mode
• Location
• Bluetooth (1)

- 6.6.3 Sharing a cellular internet connection ✓ to connect devices via Wi-Fi/Radio ✓ (2)

- 6.6.4 (a) Multitasking: Operating System shares processing time ✓ between multiple applications/ tasks/ programs ✓ (2)

- (b) Multiprocessing differs from multitasking in the following way:
More than one CPU core required, ✓
Different tasks or threads are processed simultaneously. ✓ (2)

- 6.6.5 Allows communication/sharing between electronic devices at a short distance from each other. ✓
OR a correct and suitable description. (1)



- 6.7 Any TWO: ✓✓
- Call quality is affected by Internet connection speed and traffic.
 - To communicate over VoIP, all parties partaking in communication needs to use the same client software.
 - To make video calls on the Internet can be expensive.
 - Both parties need to have a high speed, stable internet connection. (2)
- 6.8 Any TWO: ✓✓
- IoT can be used to monitor/ control temperatures remotely.
 - IoT can be used to notify management of anomalies in fridge temperature.
 - IoT can be used to keep a log of temperatures, showing the history of the temperature levels which can aid in decision-making.
 - Any other acceptable answer. (2)
- 6.9 6.9.1 Any ONE✓
- Radio/Radio waves
Electromagnetism/Electromagnetic waves (1)
- 6.9.2 Any TWO✓✓
- More than one tag can be read at a time
 - Tags can be hidden
 - Tags can be read even if they are moving at speed
 - Increased accuracy
 - Speed of capturing
 - Can be read over distances
- In terms of security related issues (scenario in question):
RFID cannot be easily copied as in the case of barcodes.
Any other security related examples. (2)

TOTAL SECTION F: 40
GRAND TOTAL: 150