

INFORMATION TECHNOLOGY

GRADE 12

PAPER 2

TRIAL EXAMINATION

DATE OF EXAM: 30 AUGUST 2019

TIME: 3 HOURS

TOTAL: 150

EXAMINERS: JS, ZBB, SN, YB, AG, RP

MODERATOR: S Muruvan

SECTION A: SHORT QUESTIONS

QUESTION 1

1.1 Different options are provided as possible answers for the following questions. Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.5) in the answer book, for example 1.1.6 C

1.1.1 ... is a protocol used to retrieve messages on an Internet/Intranet e-mail server.:

- A. SMTP
- B. POP3
- C. HTTPS
- D. HTTP

(1)

1.1.2 How many times will the following loop be executed?

```
A ← 5
Repeat
....
A ← Power (A,0) – 2
Until A<=0
```

- A. Five Times
- B. Never
- C. One time
- D. Infinite times

(1)

1.1.3 The licence under which most freeware is distributed is known as ...

- A. FTP
- B. AUP
- C. EULA
- D. GNU

(1)

1.1.4 The ASCII value of the character 'c' is 67. The binary equivalent is:

- A. 01000011₂
- B. 10000011₂
- C. 01001011₂
- D. 10010011₂

(1)

- 1.1.5 A technique used to make electronic communication appear to originate from a legitimate source is known as ...
- A. Spamming
 - B. Spoofing
 - C. Spying
 - D. Streaming
- (1)

1.2 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.2.1 –1. 2.10) in the answer book.

- 1.2.1 A peer-to-peer protocol used to share large files over the Internet. (1)
- 1.2.2 The coordinated processing of programs by more than one computer processor within a single computer system. (1)
- 1.2.3 The amount of data that an ISP (*Internet Service provider*) allows one to upload and download in a month. (1)
- 1.2.4 A set of changes to a computer program or its supporting data designed to update, fix, or improve it. (1)
- 1.2.5 The term used when the functions of more than one device are built in to a multifunctional device. (1)
- 1.2.6 The type of technology that combines the resources of many computers to form a single super powerful computer. (1)
- 1.2.7 Running two or more programs at the same time on a single-processor. (1)
- 1.2.8 A link to the company's favoured search partner is coded onto their web site and returns results from that particular web site only. (1)
- 1.2.9 A standard language that is used to manipulate and query data in a database. (1)
- 1.2.10 The term that describes the large volume of **data** – both structured and unstructured – that inundates a business on a day-to-day basis. (1)

TOTAL SECTION A: [15]

SECTION B: SYSTEM TECHNOLOGY
QUESTION 2

Study the advert below of a smartphone and answer the questions that follow



BEST SMARTPHONE EVER
Aura: Glow, White, Black
6.8" Nearly Bezel-less Infinity Display
Edge
Bluetooth, Air Action Wireless Gestures, Handwriting-to-text
In-Display Fingerprint ID
10MP Selfie Camera with Dual Pixel
12MP Wide, 12MP 2xZoom, 16MP Ultra Wide
256GB Storage/12GB RAM
4,300mAh Superfast Charging, Wireless PowerShare
All-Day Battery

- 2.1 2.1.1 “Bluetooth, Air Action Wireless Gestures, Handwriting-to-Text” is in reference to:
- (a) the screen
 - (b) the camera
 - (c) the stylus pen
 - (d) connectivity (1)
- 2.1.2 List TWO advantages of a smartphone when comparing it to a Laptop. (2)
- 2.1.3 Is the Operating System of smartphones stored in Storage, RAM or ROM? (1)
- 2.1.4 Name the biometrics that comes with the above smartphone (1)
- 2.1.5 Name ONE wearable device that can be used with a smartphone (1)
- 2.1.6 Motivate the importance of the last line of the advert. (1)
- 2.2 A Laptop that you purchased had a 128 GB solid state drive, in addition to a 1 TB hard disk. Briefly motivate the manufacturer’s reason for using the above configuration. (2)

- 2.3 Several factors influence the general performance of computers.
- 2.3.1 Which TWO properties of a CPU would improve a computer's processing power? (2)
- 2.3.2 How does more RAM improve processing power? (2)
- 2.4 One of the functions of the operating system is process management. Briefly explain what process management entails. (2)
- 2.5 The speed of a processor with two cores is 1.58 GHz. Does the presence of two cores mean that tasks will be processed at double the speed of the CPU, that is 3.16 GHz? Explain your answer. (2)
- 2.6 Computers become very slow and sometimes unresponsive when a number of applications are open at the same time, as there is a high level of continuous hard drive activity.
- 2.6.1 Which term is used for the problem described above? (1)
- 2.6.2 When will the operating system use virtual memory? (1)
- 2.6.3 Does the availability of virtual memory mean that adding more RAM to the computer system to improve the performance is no longer necessary? Motivate your answer. (2)
- 2.6.4 Write down TWO tips for preventing performance issues relating to virtual memory. (2)
- 2.7 With regards to cloud computing, explain the following terms:
- 2.7.1 Scalability (1)
- 2.7.2 Ubiquity (1)

TOTAL SECTION C: [25]

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES
QUESTION 3

Today many computer devices are connected to some type of network – from a few devices to form a personal area network, to a wide area network of large organisations, to the global area network such as the internet.

- 3.1 Conventionally ADSL connects to the internet using twisted pair cable (2)
Name TWO other mediums of connecting to the internet.
- 3.2 List TWO characteristics of ADSL. (2)
- 3.3 In a home, one device combines all functions of a switch, modem, router and wireless base station.
Differentiate between a modem and a router. (2)
- 3.4 When many devices are connected to one another and to the internet, it is important to check which files and folders need to be shared and by whom.
Differentiate between:
- 3.4.1 Read permission and Modify permission. (2)
- 3.4.2 An administrator and a standard user. (2)
- 3.5 One of the worst things that can happen to anyone is to have digital data. stolen.
- 3.5.1 Explain the concept of local encryption. (2)
- 3.5.2 List TWO forms/places where automatic encryption is used. (2)
- 3.5.3 Differentiate between private and public key encryption. (2)
- 3.6 Communication performance in cabled and wireless is often compared.
- 3.6.1 Name a type of cable that has a very low level of attenuation. (1)
- 3.6.2 Explain how poor signal can be addressed when setting up a wireless network. (2)
- 3.6.3 Give two reasons why companies prefer WiMAX instead of Wi-Fi. (2)
- 3.6.4 What is a public Wi-Fi access point called? (1)
- 3.7 Most companies use the Star Topology when connecting a network.
- 3.7.1 Draw a diagram to illustrate the Star Topology. (2)
- 3.7.2 Name one other topology that can be used? (1)
- 3.7.3 List TWO advantages of using Star Topology. (2)

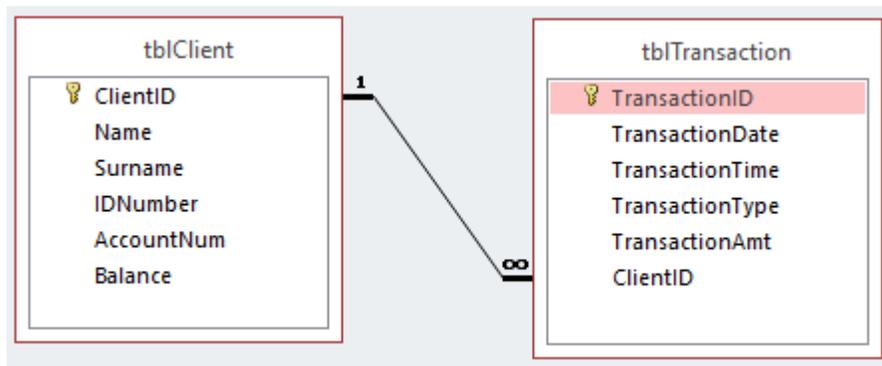
TOTAL SECTION C: [27]

SECTION D: DATA- AND INFORMATION MANAGEMENT

QUESTION 4

The Iron Bank of Braavos is a popular bank in the Free City of Braavos. The bank makes use of a database to keep details of their clients and the transactions they make.

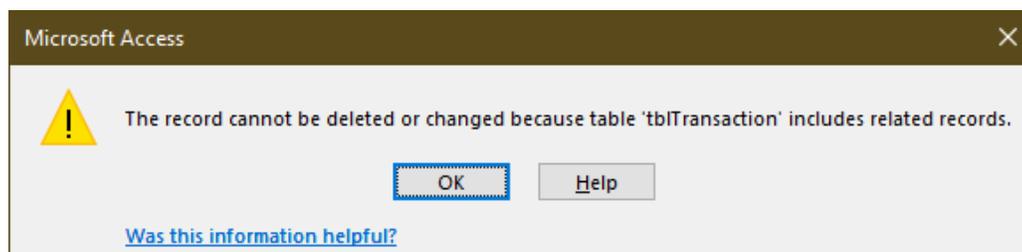
4.1. An extract of two tables from the banks database is shown below:



4.1.1. State and explain the type of relationship that exists between the **ClientID** fields in **tblClient** and **tblTransaction**. (2)

4.1.2. An attempt was made to normalise the table **tblTransaction**. Explain the concept of normalisation. (2)

4.1.3. A client has requested to close their bank account. When the manager at the bank wanted to delete this client, the following message was displayed:



(a) How has the rule related to referential integrity been violated? (2)
(b) What should be done in order for the manager to remove the client from **tblClient**? (1)

4.1.4. The **TransactionID** field has now been removed from **tblTransaction**. The bank wants to use **ClientID**, **TransactionDate** and **TransactionTime** as a key to uniquely identify records. What is this type of key called? (1)

4.2. A distributed database is used at the bank.

4.2.1. Explain what is meant by a distributed database? (2)

- 4.2.2. Why would it not be suitable to use a desktop database for the bank? (2)
- 4.2.3. State one advantage of using a distributed database. (1)
- 4.3. Data mining is very helpful in the banking and finance sector.
- 4.3.1. What is data mining? (2)
- 4.3.2. Discuss any two ways in which data mining would be beneficial for the bank. (2)
- 4.4. A data warehouse is a relational database that is designed for query and analysis rather than for transaction processing.
- 4.4.1 List 2 advantages of a data warehouse. (2)
- 4.5. Large companies such as banks need to ensure that they have well designed databases to ensure security.
- 4.5.1. What is SQL Injection? How can it be used in a poorly designed database? (2)
- 4.5.2. In the context of a DBMS, what is:
 - (a) a record lock?
 - (b) a roll back? (4)

TOTAL SECTION D: [25]

**SECTION E: SOLUTION DEVELOPMENT
QUESTION 5**

5.1 Write Pseudocode to do the following:
The user enters an integer (**n**). Display **n** rows of stars (**asterisk**) in the following pattern:

```
*
**
***
****
.
.
***** (n stars in the n-th row)
```

Eg) If the user entered the number 5, the pattern would be:

```
*
**
***
****
*****
```

(4)

5.2 Consider the following array called **arrNumbers** :

10	5	9	16	8	21
----	---	---	----	---	----

Another array called **arrTemp** is an empty array that can store up to 6 integers. The algorithm below extracts data from **arrNumbers** and stored it in **arrTemp**.

```

Loop i from 1 to 6
  If arrNumbers[i] mod 2 = 1 then
    arrTemp[i] := arrNumbers[i]*2;

```

Copy and complete the trace table below

i	arrNumbers[i]	arrNumbers[i] mod 2 = 1?	arrTemp[i]

(4)

5.3 Three common types of errors can occur during software development. These are **syntax**, **logical** and **runtime** errors.

Identify the type of error for each of the following:

5.3.1 In the variable declaration statement, when **declaring an integer** the programmer spells the word integer incorrectly and instead types **interger**.

5.3.2 The programmer wants to calculate twice the value of variable **n**. The statement reads: **result := n * 3** instead of **result := n * 2**.

5.3.3 An integer variable (**n**) is declared to store the result of the following calculation : **n := (10 mod 3)/2**

(3)

5.4 The pseudocode below was designed to determine the highest temperature of a certain region over a seven-day period. The user enters the readings over the seven-day period and the algorithm determines the highest temperature, however the code has some errors that need to be corrected.

```

1  high ← 0;
2  count ← 1;
3  while count < 7
4    read temperature
5    Repeat
6      If temperature < 0 then
7        Begin
8          Display "invalid temperature"
9          ..... missing code .....
10       End
11    Until ..... missing code .....
12    If high > temperature then high ← temperature
13    Count ← count + 1;
14  End while
15  Display high

```

5.4.1 The region does not experience temperatures below zero. The repeat statement from line 5 – 11 is meant to prevent the user from entering a negative value,

(a) Complete the missing code in line 9. (1)

(b) Complete the code in line 11 for the repeat-until loop (2)

5.4.2 The program is supposed to capture 7 numbers but instead only captures 6. Fix the error by making a change to only:

(a) Line 2 (1)

(b) Line 3 (1)

5.4.3 The program is supposed to find the highest temperature, but it instead always gives a result of zero. Repair the problem by making an adjustment to **Line 12** (1)

5.4.4 If the algorithm was to be used in regions that experience temperatures below zero the entire week of the survey now that all the errors have been corrected, the program will not correctly determine the highest temperature.

(a) What will the output be in this case? (1)

(b) Solve the problem by making an adjustment in one **Line** only (1)

5.5 Consider the following GUI to capture a person's personal details

Personal Information

Enter Name

Enter Gender

Enter Age

Date of Birth day month year
0 January 1919

CAPTURE

- (a) The choice of a TEdit component to capture gender is a poor one. Explain the disadvantage of this choice in the above context and suggest a better alternative. (2)
- (b) The choice of a Tedit to capture the age is also a poor choice. Explain the disadvantage of this choice in the above context and suggest a better alternative. (2)
- (c) The choice of components to capture the date will not prevent an invalid date from being selected. Motivate this statement and use an example to illustrate your answer. (2)

5.4 Study the UML diagram that follows. schReport will be used to test whether a learner passed or failed.

schReport	
Attribute	Methods
- fAdm : String	+ constructor(sAdm,sSName,sFname)
- fSurname : string	+ CalcTotal(Val1,Val2:integer) : integer
- fName : String	+ ChangePass
-fPass : boolean	+ toString : string

- 5.4.1 Which ONE of the methods is a mutator method? (1)
- 5.4.2 Why are the attributes declared as private? (1)
- 5.4.3 What is the purpose of the toString method? (1)

TOTAL SECTION E: [28]

**SECTION F: INTEGRATED SCENARIO
QUESTION 6**

The owner of a local Salon called Ma Baker’s started offering their clients internet access, while they waited. They also setup a LAN and allowed printing, at a small cost, in order to boost revenue. All their records where now being captured electronically using a spreadsheet. The business website was being used to view products and make appointments. While this was increasing business, the cost of Internet security was also on the increase.

- 6.1 The owner is very strict with company expenses and she is concerned about payments made to the **Computer Technician** and the **Network administrator**. State two role functions of the:
- 6.1.1 network administrator (2)
- 6.1.2 computer technician (2)
- 6.2 One of the key reasons for the owner deciding on taking the business to the next electronic level was “**Green Computing**”.
- List two ways to promote Green Computing

(2)

- 6.3 The network administrator informed the owner to become more aware with protection against bandwidth theft and software theft.
- 6.3.1 What is the meaning of the word bandwidth? (1)
 - 6.3.2 Explain what it means to steal wireless bandwidth. (1)
 - 6.3.3 Explain the difference in meaning between softlifting and hard-disk loading. (2)
- 6.4 Many clients want to receive automatic and immediate notifications on the Salons website.
- 6.4.1 Name the technology responsible for automatic notifications. (1)
 - 6.4.2 Clients are able to stream videos on hairstyling tips while they wait. Differentiate between downloading and streaming. (2)
 - 6.4.3 Most users prefer using apps rather than using web browsers. State two reasons why they prefer this? (2)
- 6.5 The network administrator has to decide whether to use cloud storage or a VPN to access information on the business.
- 6.5.1 Outline the advantages of using a VPN for sharing information. (2)
 - 6.5.2 List two disadvantages of using cloud storage. (2)
 - 6.5.3 The owner wants to be involved in the office activities and wants to have direct access to all business activities even though she is hardly in the office. Explain how this is made possible by:
 - a. File synching (1)
 - b. Remote Access (1)
- 6.6 Many clients have complained about being victims of internet fraud at some stage.
- 6.6.1 Define the term “Social Engineering”. (1)

6.6.2 Social engineers have methods that they use to carry out their tasks. These are referred to as 'weapons' of Social Engineering.

Discuss the meaning of the following weapons of social engineering:

- a. Dumpster diving (1)
- b. Role Playing (1)

6.7 After finding out about trends and emerging technologies, the owner has become more motivated to keep up with trends and improve her skills as the internet evolves.

6.7.1 State the main difference between static and dynamic websites by defining each one. (2)

6.7.2 To improve searching on the web, one must be able to identify the type of search that is required. (2)

Explain how **semantic** search seeks to improve search accuracy?

6.7.3 There are many supporting Internet technologies that make the user's internet experience more efficient than it used to be.

Outline the main purpose of:

- a. Rich Internet Applications (1)
- b. Plug-in-applications (1)

TOTAL SECTION F: [30]

INFORMATION TECHNOLOGY

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PAPER 2

TRIAL EXAMINATION

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MEMORANDUM

TIME: 3 HOURS

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EXAMINERS: JS, ZBB, SN, YB, AG, RP

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SECTION A: SHORT QUESTIONS

QUESTION 1

1.1.1 B ✓

1.1.2 C ✓

1.1.3 D ✓

1.1.4 A ✓

1.1.5 B ✓

1.2.1 Torrent ✓

1.2.2 Multi-processing ✓

1.2.3 CAP ✓

1.2.4 Patch ✓

1.2.5 Convergence ✓

1.2.6 Virtualisation ✓

1.2.7 Multi-tasking ✓

1.2.8 Mediated Search ✓

1.2.9 SQL ✓

1.2.10 Big Data ✓

TOTAL SECTION A: [15]

SECTION B: SYSTEM TECHNOLOGY
QUESTION 2

Study the advert below of a smartphone and answer the questions that follow



BEST SMARTPHONE EVER
Aura: Glow, White, Black
6.8" Nearly Bezel-less Infinity Display
Edge
Bluetooth, Air Action Wireless Gestures, Handwriting-to-text
In-Display Fingerprint ID
10MP Selfie Camera with Dual Pixel
12MP Wide, 12MP 2xZoom, 16MP Ultra Wide
256GB Storage/12GB RAM
4,300mAh Superfast Charging, Wireless PowerShare
All-Day Battery

- 2.1 2.1.1 “Bluetooth, Air Action Wireless Gestures, Handwriting-to-Text” is in reference to:
- (a) the screen
 - (b) the camera
 - (c) **the stylus pen ✓**
 - (d) connectivity
- (1)
- 2.1.2 List TWO advantages of a smartphone when comparing it to a Laptop.
Always on, Always connected, Convergence device, small and portable, built in sensors, longer battery life ✓✓ (any two)
- (2)
- 2.1.3 Is the Operating System of smartphones stored in Storage, RAM or ROM?
ROM ✓
- (1)
- 2.1.4 Name the biometrics that comes with the above smartphone
Fingerprint ID ✓
- (1)
- 2.1.5 Name ONE wearable device that can be used with a smartphone
Smart watch, fitbit, Google glasses ✓ (any one)
- (1)
- 2.1.6 Motivate the importance of the last line of the advert.
Mobile devices depend on battery power hence the longer the battery lasts the the more likely users are going to buy the phone. ✓
- (1)
- 2.2 A Laptop that you purchased had a 128 GB solid state drive, in addition to a

1 TB hard disk. Briefly motivate the manufacturer's reason for using the above configuration. (2)

The SSD drive is much faster than the HDD. The OS and other applications will be stored on the SSD to improve speed ✓ and data will be stored on the HDD. ✓

2.3 Several factors influence the general performance of computers.

2.3.1 Which TWO properties of a CPU would improve a computer's processing power?

Speed of processor ✓ and number of cores ✓ (2)

2.3.2 How does more RAM improve processing power?

More RAM means that more data and programs ✓ can be processed simultaneously. ✓ (2)

2.4 One of the functions of the operating system is process management. Briefly explain what process management entails. (2)

The OS must allocate resources to processes, enable processes to share and exchange information ✓, protect the resources of each process from other processes and enable synchronization among processes. ✓

2.5 The speed of a processor with two cores is 1.58 GHz.

Does the presence of two cores mean that tasks will be processed at double the speed of the CPU, that is 3.16 GHz? Explain your answer. (2)

No ✓ Each core can process one task at a speed of 1.58GHz ✓

2.6 Computers become very slow and sometimes unresponsive when a number of applications are open at the same time, as there is a high level of continuous hard drive activity.

2.6.1 Which term is used for the problem described above? (1)

Thrashing ✓

2.6.2 When will the operating system use virtual memory? (1)

- Too many applications open
- Programs too large to run from available RAM 1

Any ONE ✓✓

2.6.3 Does the availability of virtual memory mean that adding more RAM to the computer system to improve the performance is no longer necessary? (2)

Motivate your answer.

No, ✓ access to virtual memory is slower than access to RAM ✓

2.6.4 Write down TWO tips for preventing performance issues relating to virtual memory. (2)

- Close all unnecessary programs. ✓
- Buy more RAM for your computer. ✓
- Ensure you have a 64 bit version of the operating system.

2.7 With regards to cloud computing, explain the following terms:

2.7.1 Scalability (1)

Ability to increase or decrease in size and power quickly and efficiently ✓

2.7.2 Ubiquity (1)

As long as there is internet connectivity, the cloud is available anywhere, anytime. ✓

**TOTAL SECTION C: [25
]**

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES
QUESTION 3

Today many computer devices are connected to some type of network – from a few devices to form a personal area network, to a wide area network of large organisations, to the global area network such as the internet.

- 3.1 Conventionally ADSL connects to the internet using twisted pair cable (2)
Name TWO other mediums of connecting to the internet.

Fiber ✓
Cellular ✓

- 3.2 List TWO characteristics of ADSL. (2)

Different packages are available from service providers ✓
Download speed is faster than upload speed. ✓
Different bandwidth specifications are available.
Can be used for small and large networks.
{Any TWO}

- 3.3 In a home, one device combines all functions of a switch, modem, router and wireless base station.

Differentiate between a modem and a router. (2)

Modem is a device that converts the data or signal from a computer to a format that can be transmitted over a communication channel e.g. ADSL ✓

Router is a device that makes communication between networks over the internet possible by directing data to its correct destination. ✓

- 3.4 When many devices are connected to one another and to the internet, it is important to check which files and folders need to be shared and by whom.
Differentiate between:

- 3.4.1 Read permission and Modify permission. (2)

Read permission allows the user to read or copy a file or folder ✓
Modify permission allows reading, writing and deletion of files or folders ✓

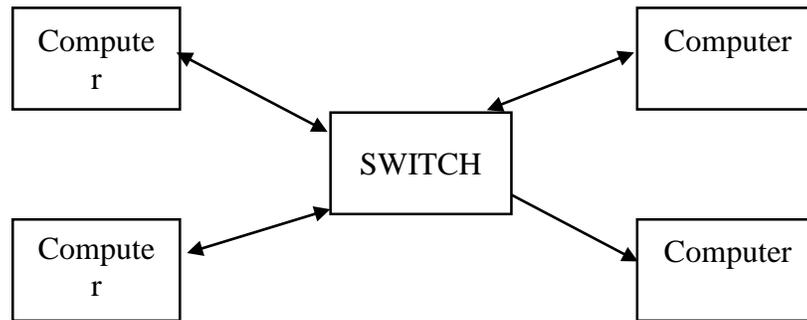
- 3.4.2 An administrator and a standard user. (2)

Administrator has full control over the system.
Can install software and hardware drivers.
Can create and modify new user accounts.
Can reset passwords.
Has full access to files and folders ✓ (any one)

Standard User: Are permitted to log on to the computer, run programs and customize their accounts and work with their files and folders.
Can change their own password only.
Are restricted from making system changes. ✓ (any one)

- 3.5 One of the worst things that can happen to anyone is to have digital data. stolen.
- 3.5.1 Explain the concept of local encryption. (2)
Changing the format (encrypting) your files and data stored on your local storage✓ to protect them from being accessed by unauthorised people. ✓
- 3.5.2 List TWO forms/places where automatic encryption is used. (2)
Digital Rights Management(DRM) ✓
ATM✓
Internet browsers
Skype calls
Online storage services
{ANY TWO}
- 3.5.3 Differentiate between private and public key encryption. (2)
Private key uses a single key shared between both sender and receiver and must be used to encrypt and decrypt the message. ✓
Public key creates two keys for encryption and decryption process.
One keys is used to encrypt and the other is used to decrypt✓
- 3.6 Communication performance in cabled and wireless is often compared.
- 3.6.1 Name a type of cable that has a very low level of attenuation. (1)
Fibre Optic Cables✓
- 3.6.2 Explain how poor signal can be addressed when setting up a wireless network. (2)
Provide sufficient/multiple access points. ✓
Limit Interference by structures by strategically placing access points. ✓
Limit the noise by making use of different frequencies.
{ANY TWO}
- 3.6.3 Give two reasons why companies prefer WiMAX instead of Wi-Fi. (2)
Provide higher bandwidth✓
Better security✓
Greater range.
{ANY TWO}
- 3.6.4 What is a public Wi-Fi access point called? (1)
Hotspot✓
- 3.7 Most companies use the Star Topology when connecting a network.

3.7.1 Draw a diagram to illustrate the Star Topology. (2)



Connecting lines ✓
Blocks showing nodes and switch ✓

3.7.2 Name one other topology that can be used? (1)

Bus ✓
Ring {ANY ONE}

3.7.3 List TWO advantages of using Star Topology. (2)

A signal computer or cable breaks, network still functions. ✓
Easy to add-on new computers/devices to the network ✓

{ANY OTHER SUITABLE ADVANTAGE}

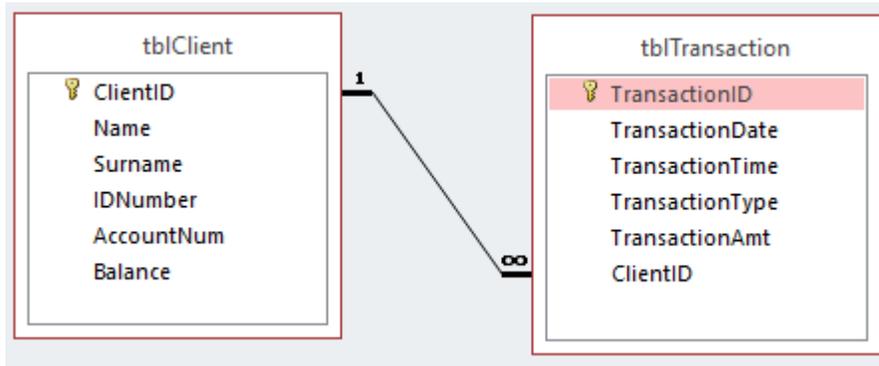
TOTAL SECTION C: [27]

SECTION D: DATA- AND INFORMATION MANAGEMENT

QUESTION 4

The Iron Bank of Braavos is a popular bank in the Free City of Braavos. The bank makes use of a database to keep details of their clients and the transactions they make.

4.1. An extract of two tables from the banks database is shown below:



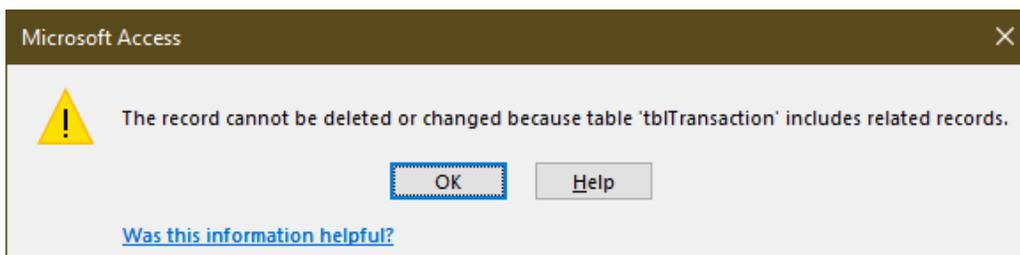
4.1.1. State and explain the type of relationship that exists between the **ClientID** fields in **tblClient** and **tblTransaction**. (2)

One-to-many. ✓ Each client can have more than one transaction. ✓

4.1.2. An attempt was made to normalise the table **tblTransaction**. Explain the concept of normalisation. (2)

Normalisation is a series of steps ✓ followed to ensure that a database is in optimal state with no chance of anomalies ✓/data is not repeated and queries and reports can be created with ease.

4.1.3. A client has requested to close their bank account. When the manager at the bank wanted to delete this client, the following message was displayed:



(a) How has the rule related to referential integrity been violated? (2)

Cannot delete records from a parent table when related records are in the child table. ✓✓

(b) What should be done in order for the manager to remove the client from **tblClient**? (1)

All records in **tblTransaction** with the respective client ID must first be deleted/removed in order to delete the client from **tblClient**. ✓

4.1.4. The **TransactionID** field has now been removed from **tblTransaction**. The bank wants to use **ClientID**, **TransactionDate** and **TransactionTime** as a key to uniquely identify records. What is this type of key called? (1)

Composite key ✓

4.2. A distributed database is used at the bank.

4.2.1. Explain what is meant by a distributed database? (2)

A distributed database is a system where parts of a database ✓ are spread (distributed) across servers in separate locations. ✓

4.2.2. Why would it not be suitable to use a desktop database for the bank? (2)

A desktop database would be insufficient to maintain the volume of data for a bank. ✓

Desktop database would not cater for connected users. ✓

4.2.3. State one advantage of using a distributed database. (1)

Caters for a large number of users / Beneficial when a company or business is spread over a large geographical location. ✓

4.3. Data mining is very helpful in the banking and finance sector.

4.3.1. What is data mining? (2)

Data mining is the process of analysing data from different perspectives ✓ and summarizing it into useful information. ✓

4.3.2. Discuss any two ways in which data mining would be beneficial for the bank. (2)

- Can be used to determine relationships among "internal" factors such as price, product positioning, or staff skills, and "external" factors such as economic indicators, competition, and customer demographics. ✓
- Can determine the impact on sales, customer satisfaction, and corporate profits. ✓
- Companies could use records of customer purchases to send targeted promotions based on an individual's purchase history.
- Demographic data from comment or warranty cards, the retailer could develop products and promotions to appeal to specific customer segments.

4.4. A data warehouse is a relational database that is designed for query and analysis rather than for transaction processing.

4.4.1 List 2 advantages of a data warehouse. (2)

(Any 2) ✓✓

- Improved user access
- Better consistency of data
- Advanced query processing
- Retention of data
- Disaster recovery (acts as a backup)

4.5. Large companies such as banks need to ensure that they have well designed databases to ensure security.

4.5.1. What is SQL Injection? How can it be used in a poorly designed database? (2)

A code injection attack used in data-driven applications in which SQL statements are inserted into an entry/text field ✓ for execution. A poorly designed database will allow for sensitive data to be revealed. ✓

4.5.2. In the context of a DBMS, what is:

(a) a record lock?

When a record is open for either editing or inserting, the record is flagged to be in use. ✓ That means that no other user can make changes to that specific record. ✓ (4)

(b) a roll back?

that the state of the data is returned ✓ to the way it was before ✓ changes were made.

TOTAL SECTION D: [25]

SECTION E: SOLUTION DEVELOPMENT
QUESTION 5

5.1 Write Pseudocode to do the following:
The user enters an integer (**n**). Display **n** rows of stars (**asterisk**) in the following pattern:

```
*
**
***
****
***** (n stars in the n-th row)
```

Eg) If the user entered the number 5, the pattern would be:

```
*
**
***
****
*****
```

```
Read n
Loop k from 1 to n ✓
Begin
  Sline = ""
  Loop j from 1 to k ✓
  Begin loop
    Sline = sline + "*" ✓
  End j loop
  Display sline ✓
End k loop
```

(4)

5.2 Consider the following array called **arrNumbers** :

10	5	9	16	8	21
----	---	---	----	---	----

Another array called **arrTemp** is an empty array that can store up to 6 integers. The algorithm below extracts data from **arrNumbers** and stored it in **arrTemp**.

```

Loop i from 1 to 6
  If arrNumbers[i] mod 2 = 1 then
    arrTemp[i] := arrNumbers[i]*2;

```

Copy and complete the trace table below

i	arrNumbers[i]	arrNumbers[i] mod 2 = 1?	arrTemp[i]
1	10	false	0
2	5	true	5
3	9	true	9
4	16	false	0
5	8	false	0
6	21	true	21
✓	✓	✓	✓

(4)

5.3 Three common types of errors can occur during software development. These are **syntax**, **logical** and **runtime** errors.

Identify the type of error for each of the following:

5.3.1 In the variable declaration statement, when **declaring an integer** the programmer spells the word integer incorrectly and instead types **interger**.

syntax ✓

5.3.2 The programmer wants to calculate twice the value of variable **n**. The statement reads: **result := n * 3** instead of **result := n * 2**.

logical ✓

5.3.3 An integer variable (**n**) is declared to store the result of the following calculation : **n := (10 mod 3)/2**

syntax ✓

(3)

5.4 The pseudocode below was designed to determine the highest temperature of a certain region over a seven-day period. The user enters the readings over the seven-day period and the algorithm determines the highest temperature, however the code has some errors that need to be corrected.

```

1  high ← 0;
2  count ← 1;
3  while count < 7
4    read temperature
5    Repeat
6      If temperature < 0 then
7        Begin
8          Display "invalid temperature"
9          ..... missing code .....
10       End
11    Until ..... missing code .....
12    If high > temperature then high ← temperature
13    Count ← count + 1;
14  End while
15  Display high

```

5.4.1 The region does not experience temperatures below zero. The repeat statement from line 5 – 11 is meant to prevent the user from entering a negative value,

(a) Complete the missing code in line 9. (1)

Read temperature ✓

(2)

(b) Complete the code in line 11 for the repeat-until loop

Temperature >= 0 ✓

5.4.2 The program is supposed to capture 7 numbers but instead only captures 6. Fix the error by making a change to only:

(a) Line 2: count ← 0; ✓ (1)

(b) Line 3: count <= 7; ✓ (1)

5.4.3 The program is supposed to find the highest temperature, but it instead always gives a result of zero. Repair the problem by making an adjustment to **Line 12** (1)

If high < temperature ✓

5.4.4 If the algorithm was to be used in regions that experience temperatures below zero the entire week of the survey now that all the errors have been corrected, the program will not correctly determine the highest temperature.

(a) What will the output be in this case? (1)

0 ✓

(b) Solve the problem by making an adjustment in one **Line** only (1)

Line 1: set high to first value in the list ✓

OR

(a) Line 6: If temperature ≥ 0 ✓
{ANY ONE}

5.5 Consider the following GUI to capture a person's personal details

The screenshot shows a window titled "Personal Information". It contains the following controls:

- "Enter Name" followed by a TEdit text box.
- "Enter Gender" followed by a TEdit text box.
- "Enter Age" followed by a TEdit text box.
- "Date of Birth" followed by three spinners labeled "day", "month", and "year". The "day" spinner shows "0", the "month" spinner shows "January", and the "year" spinner shows "1919".
- A "CAPTURE" button at the bottom center.

(a) The choice of a TEdit component to capture gender is a poor one. Explain the disadvantage of this choice in the above context and suggest a better alternative.

Allows for spelling errors and input of other words besides male/female. ✓
Radio group ✓

(b) The choice of a Tedit to capture the age is also a poor choice. Explain the disadvantage of this choice in the above context and suggest a better alternative. (2)

Entry of letters instead of digits. ✓ (2)
spinner ✓

(c) The choice of components to capture the date will not prevent an invalid date from being selected. (2)

Motivate this statement and use an example to illustrate your answer.

Although the format of the date entered will be correct, the user can erroneously or intentionally enter a wrong date of birth. ✓ Eg. A date of birth of 20 January 1989 can be entered as 19 January 1981 ✓

5.4 Study the UML diagram that follows. schReport will be used to test whether a learner passed or failed.

schReport	
Attribute	Methods
- fAdm : String - fSurname : string - fName : String -fPass : boolean	+ constructor(sAdm,sSName,sFname) + CalcTotal(Val1,Val2:integer) : integer + ChangePass + toString : string

- 5.4.1 Which ONE of the methods is a mutator method? (1)
CalcTotal(Val1,Val2:integer) : integer ✓
- 5.4.2 Why are the attributes declared as private? (1)
To limit its scope to this class only so that other classes cannot directly access its values. ✓
- 5.4.3 What is the purpose of the toString method? (1)
To report on the contents of the private fields in a prescribed format. ✓

TOTAL SECTION E: [28]

SECTION F: INTEGRATED SCENARIO
QUESTION 6

The owner of a local Salon called Ma Baker’s started offering their clients internet access, while they waited. They also setup a LAN and allowed printing, at a small cost, in order to boost revenue. All their records where now being captured electronically using a spreadsheet. The business website was being used to view products and make appointments. While this was increasing business, the cost of Internet security was also on the increase.

6.1	The owner is very strict with company expenses and she is concerned about payments made to the Computer Technician and the Network administrator . State two role functions of the:	
	6.1.1 network administrator <ul style="list-style-type: none"> - Connects devices to form fast and efficient networks. ✓ - Maintain links and solve network problems. ✓ - Consult with clients about system requirements - Budgeting for equipment and assembly costs - Maintaining current software and hardware and their necessary upgrades. - Provide network administration and support. 	(2)
	6.1.2 computer technician <ul style="list-style-type: none"> - Install and tests PC's ✓ - Fix performance related issues ✓ - Diagnose hardware related problems - Performs Services and upgrades - Maintaining and troubleshooting peripherals connected to PC 	(2)
6.2	One of the key reasons for the owner deciding on taking the business to the next electronic level was " Green Computing ". List two ways to promote Green Computing <ul style="list-style-type: none"> - Think twice before buying electronic gadgets ✓ - Don't dump electronic waste ✓ - Do not waste paper on printing – print on both sides of page - Send documents electronically via e-mail etc. Instead of hardcopies 	(2)
6.3	The network administrator informed the owner to become more aware with protection against bandwidth theft and software theft.	

	6.3.1	What is the meaning of the word bandwidth? - The total data handling capacity ✓	(1)
	6.3.2	Explain what it means to steal wireless bandwidth. It is connecting to the internet through a wireless router which does not belong to you or you do not have permission to use. ✓	(1)
	6.3.3	Explain the difference in meaning between softlifting and hard-disk loading. softlifting – borrowing and installing a copy of software application from colleagues ✓ hard-disk loading – installing and selling unauthorised copies of software on refurbished or new computers. ✓	(2)
6.4	Many clients want to receive automatic and immediate notifications on the Salons website.		
	6.4.1	Name the technology responsible for automatic notifications. push technology ✓	(1)
	6.4.2	Clients are able to stream videos on hairstyling tips while they wait Differentiate between downloading and streaming. Downloading – is extracting a copy of the file from the internet and storing on the hard disk and viewing it at your own leisure ✓ Streaming – viewing the file(video) online live while still connected to the internet ✓ without storing on your computer.	(2)
	6.4.3	Most users prefer using apps rather than using web browsers. State two reasons why they prefer this? - Better interface ✓ - Transfers less data / faster speeds ✓ - Clients have more control over what they can do - Can receive automatic updates when content changes on website	(2)
6.5	The network administrator has to decide whether to use cloud storage or a VPN to access information on the business. Explain how this is made possible by:		

	6.5.1	Outline the advantages of using a VPN for sharing information. The user will be provided with a secure connection ✓ to the business network server over a public network ✓ like the internet.	(2)
	6.5.2	List two disadvantages of using cloud storage. - a public service has limited security ✓ - uses bandwidth / data cap ✓ - require internet connection to be accessed	(2)
	6.5.3	The owner wants to be involved in the office activities and wants to have direct access to all business activities even though she is hardly in the office. Explain how this is made possible by:	
		a. File synching Any file you save on the storage facility will instantly and automatically be reflected in your computers, smartphones, tablets, laptops etc. ✓	(1)
		b. Remote Access It uses desktop sharing software to give you access to your computers files from anywhere in the world. ✓	(1)
6.6		Many clients have complained about being victims of internet fraud at some stage.	
	6.6.1	Define the term “Social Engineering”. Manipulating people into divulging personal/confidential information with a view of committing some sort of fraud or gaining unauthorised access to a computer system ✓	(1)
	6.6.2	Social engineers have methods that they use to carry out their tasks. These are referred to as ‘weapons’ of Social Engineering. Discuss the meaning of the following weapons of social engineering:	
		a. Dumpster diving Searching through a companies bins (trash) for items like phonebooks, organisational charts, company policy manuals, calendars of events etc. which hackers may use to gain information about the company, employees and network structures. ✓	(1)

		<p>b. Role Playing</p> <p>Hackers gather information from online chat sessions, e-mails, phone-calls. They pretend to be help desk staff, technicians etc. In order to gain personal information. ✓</p>	(1)
6.7		<p>After finding out about trends and emerging technologies, the owner has become more motivated to keep up with trends and improve her skills as the internet evolves.</p>	
	6.7.1	<p>State the main difference between static and dynamic websites by defining each one.</p> <p>Static websites use only HTML and CSS(Web 1.0) and allow only reading of the page without any response from the reader. ✓</p> <p>Dynamic websites with scripting (Web 2.0) and allow for interaction with and between users. ✓</p>	(2)
	6.7.2	<p>To improve searching on the web, one must be able to identify the type of search that is required.</p> <p>Explain how semantic search seeks to improve search accuracy?</p> <p>It considers the searcher's intent and context to generate more accurate and relevant results. ✓ It takes care of the searcher who just does not want a website but rather an answer to a question. ✓</p>	(2)
	6.7.3	<p>There are many supporting Internet technologies that make the user's internet experience more efficient than it used to be.</p> <p>Outline the main purpose of:</p>	
		<p>a. Rich Internet Applications</p> <p>Web based application designed to offer the user the features and functions normally provided with desktop applications ✓</p>	(1)
		<p>b. Plug-in-applications</p> <p>These are programs that can be installed and used as part of your web browser. ✓</p> <p>It is automatically recognised by the browser and it's function is integrated into the browsers interface.</p>	(1)
		TOTAL SECTION F:	[30]

