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INFORMATION TECHNOLOGY PAPER I
Grade 11
NOVEMBER EXAMINATION 2019

Marks: 150
Time: 2 ½ hours
Reading Time: 10 minutes

Examiner: J Marx
Moderator: Dr G Blieden

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of pages (including the extra page and front cover). Please check that your question paper is complete.
2. Read the questions carefully and make sure that you answer all parts of each question.
3. Answer ALL questions in the space provided
4. Show all working where applicable.
5. A non-programmable calculator may be used.
6. It is in your own interest to write legibly and to present your work neatly.

	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Total
Possible Marks	20	12	18	22	13	22	12	120
Actual Marks								

Question 1**Terminology****20 Marks**

Define the following terms. **DO NOT** expand the acronym. May use an example to support your answer once you have provided a definition. Please note that examples on their own will not be given any credit. Please do not use brand names.

1.1 Access point (2)

Also called a base station, consists of a sender/receiver (transceiver) and an antenna which transmits and receives radio signals ✓ so that the devices that have a wireless network card are able to communicate with the rest of network. ✓

1.2. Multiprocessing (2)

A technology where 2 or more complete microprocessors✓ are built into a single CPU✓ chip, e.g. Dual-core; Quad-core.

1.3 NIC (2)

The physical interface or connection between the computer✓ and the network cable ✓✓

1.4 Static Field (2)

Property of class✓ that belongs to the class ✓ – no copy is made in the object

1.5 Actual Parameter (2)

Variable or value✓ in the call statement ✓ sent to the formal parameter

1.6 Attenuation

(2)

Attenuation is the reduction in signal strength while transmitting data. The further the signal gets from the source the weaker it will become.

1.7 Buffering

(2)

Storing video in RAM or HDD✓ due to slow internet connection✓

1.8 Proxy server

(2)

Stores a cache of a web site✓ in a network✓

1.9 Northbridge

(2)

Connect✓ fast components✓ – CPU RAM and Graphics card

1.10 Encapsulation

(2)

Combine fields and methods✓ in a class✓

Scenario for Questions 2,3,4,5 and 6

The National Society for the Prevention of Cruelty to Animals (NSPCA) was founded in 1955 as the federation of SPCAs to provide a forum to bring uniformity to welfare legislation and standards.

They are to take legal action over the controversial export by ship of an estimated 57,000 sheep destined for the Middle East from the East London harbour this week.

They need volunteers and have asked for your help.

Question 2**Hardware****12 Marks**

- 2.1 For volunteers who need advice on acquiring a device, the organization provides the following recommended specifications for an entry level laptop.



Lenovo Ideapad 120S-11IAP Intel Celeron N3350 11.6" Notebook

Processor	Intel Celeron N3350 Processor 2.4 GHz, 2MB of cache
Memory	2GB LPDDR4
Graphics	Intel HD Integrated graphics
Storage	32 GB eMMC
I/O (Input/Output) Ports	2 x USB 3.0 1 x Type-C 3.0 HDMI MicroSD Card Reader
Connections	WLAN: 1 x 1 WiFi 802.11 ac Bluetooth: Bluetooth 4.0
OS	Windows 10 Home

2.1 The CPU has 2MB of cache. Name the type of cache this is.

(1)

L1, internal cache✓

2.2 The notebook that is being considered contains 2.4 GHz processor with 2 MB cache memory and 32 GB eMMC.

2.2.1 What is cache memory?

(2)

Cache is a small amount of high-speed memory✓ where data and instructions likely to be used next by the CPU or repeated instructions, ✓ are stored, eliminating the need to fetch it from the slower RAM.

2.2.2 Would it be possible to upgrade the 2 MB cache memory in the CPU of the notebook?

(2)

No, ✓ Cache is embedded on the processor / It is built on the processor and is not removable. ✓

2.3 In a review on the laptop the reviewer states:

(2)

Read and write speeds are comparable to a mechanical drive (108 MB/s write, 167 MB/s read), but the main drawback lies in storage space.

Explain how you would improve the storage speed. What implication would this upgrade have?

Replace with SSD. ✓ This is very expensive. ✓

- 2.4 Would the user of this laptop, in terms of the scenario, need an Optical Drive? (2)
Motive your answer by explaining what an Optical Drive is.

Yes✓, an optical drive uses laser light to read and write and works with CD/DVD/BluRay disks. Useful for backup and archiving of data or useful for loading new software or useful for updating drivers and/or software ✓

OR No✓ The user can use a flash drive or cloud storage✓

- 2.5 The laptop does NOT have a LAN Ethernet point. Explain the impact of this on the user. (2)

Will not be able to connect to a LAN via a cable. ✓ Will need to rely on WLAN✓

- 2.6 Name **ONE** device that could be connected to the HDMI port. (1)

An audio/video source, such as a set-top box, DVD player, ✓ or A/V receiver and an audio and/or video monitor, such as a digital television (DTV), over a single cable.

Question 3

Software

20 Marks

- 3.1 The notebook computer will be issued with Windows 10 Home operating system.

- 3.1.1 Name **TWO** primary functions of an operating system. (2)

Any two - Provides a user interface✓✓
I/O management
Process management
File management
Security
Manages system memory
Optimises efficiency/speed

- 3.1.2 Besides windows operating systems, there are a range of other operating systems. (2)
Briefly state what area(s) of application each of the following operating systems were primarily designed for:

i) Android - Android is designed for mobile devices such as smartphones and tablets. ✓

ii) Linux Ubuntu - Linux Ubuntu is designed to be used in a network or server or desktop environment (not by mobile devices). ✓

- 3.2 A computer system can use several different processing techniques.
Explain the following processing techniques:

3.2.1 Multitasking (2)

Multitasking is when a computer appears to run multiple programs✓ at the same time by splitting the CPU time between the tasks. ✓

3.2.2 Multithreading (2)

A program✓ can be divided into various tasks✓ (such as browsing 2 websites on the WWW in a web browser) and each task is carried out by the Operating System and app software simultaneously and separately.

- 3.3 The management are investigating having a mobile app developed to be used by the volunteers at the collection centres.

3.3.1 Give TWO factors to consider when designing a mobile app. (2)

Screen resolution
Operating system
Time to load page
Supported languages
Dynamic content ANY TWO✓✓

- 3.4 The mobile app to be developed will be coded using a desktop computer. The developer will release the executable version to the mobile store. The developer could use a compiler or an interpreter. (4)

3.4.1 Define both a compiler and an interpreter

Compiler: ✓ converts source code to object code line by line ✓
Interpreter: ✓ Converts source code to object by first creating a separate file ✓

- 3.4.2 Which should the developer use? A compiler or an interpreter? Justify your answer. (4)

Compiler ✓ – do not have to release the source code OR executes faster ✓

- 3.5 A volunteer is afraid that the primary memory would not be enough.

- 3.5.1 What happens when a computer runs out of primary memory? Give a name for the solution to this problem and explain how it is solved. (4)

Virtual memory ✓ – use HDD as an extension to RAM ✓, RAM divided into pages ✓ which is swapped ✓ in and out of RAM when needed.

Question 4**Networks****22 Marks**

There are more than 90 member SPCA's in South Africa. Due to the nature of their business network access and communication is important. You are considering setting up a Wi-Fi network to connect the SPCA networks together and have decided on the below layout.



4.1 A friend suggests setting up a wired network.

4.1.1 Give TWO reasons why you need a network.

(2)

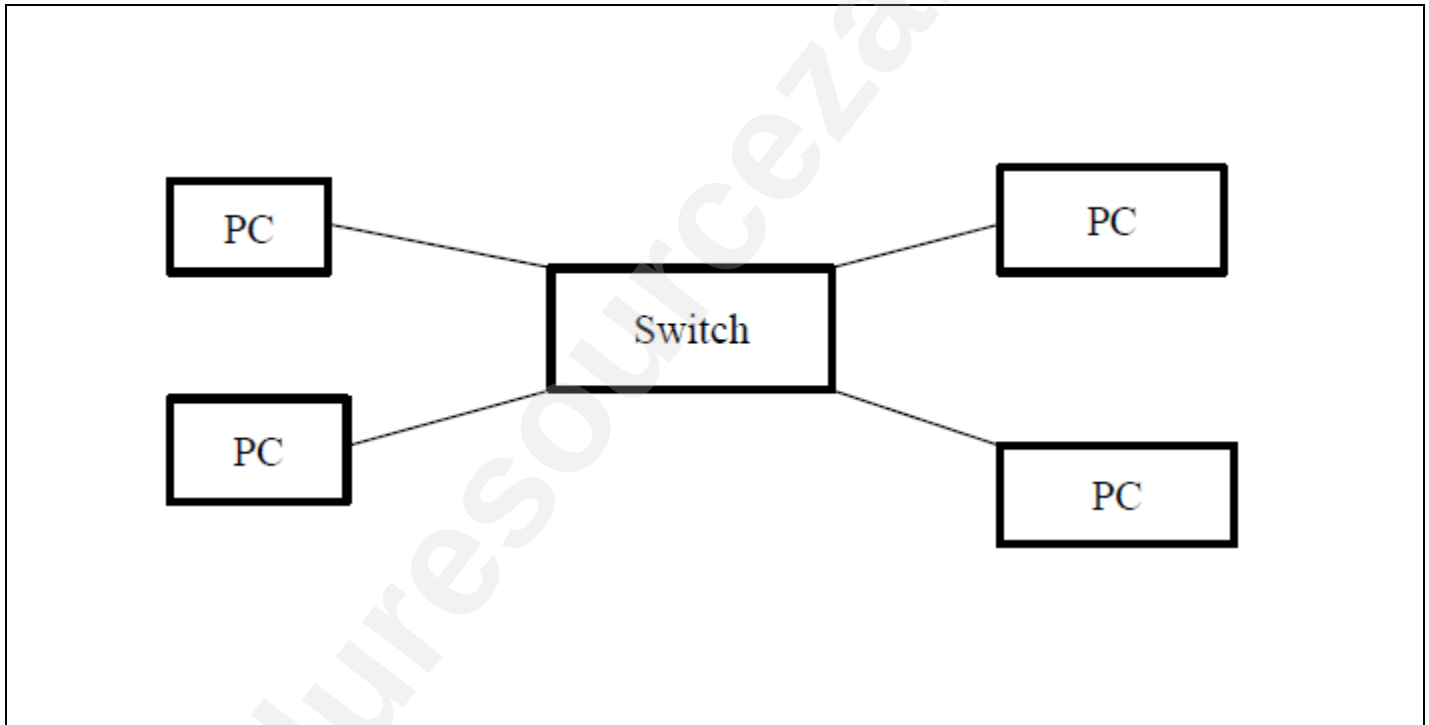
Any TWO of ✓✓
To share resources
To share data
To communicate
Entertainment
Security Control

- 4.2 When setting up a network, you need to consider the MAC address of each node in a branch's network. Explain what the function of a MAC address is. (2)

Each device✓ or node in the network needs to have its own unique identifying✓ Media Access Control Address to distinguish it from other nodes in the network.

- 4.3 Star topology is a popular choice for the set-up of networks for businesses.

- 4.3.1 Draw a simple diagram to illustrate a star topology. ✓each node, ✓ switch, (3)
✓connections to switch



- 4.3.2 State TWO advantages of using a star topology. (2)

Easy to troubleshoot✓
Easy to set-up✓
Easy to add new devices
Faster transmission of data to correct computer through a switch
Can remove any computer that does not work without affecting the network

- 4.3.3 State one advantage of using UTP cables other than cost. (1)

Cheap to install ✓
Easy to install
Flexibility of cables
High bandwidth over short distances

4.4 You have decided to use Wi-Max technology to connect to the Internet.

4.4.1 State TWO other technologies you could have used to connect to the Internet. (2)

3G/Cell ✓ and ADSL ✓

4.4.2 Name the device that you will need to link your local network to the Internet. (1)

Router ✓

4.5 You will have to use a VoIP and SMTP to communicate with the volunteers.

4.5.1 What is a protocol? (2)

Set of rules ✓ governing the transfer of data across a network. ✓

4.5.2 Provide an example of where each protocol would be used. (2)

Any TWO
VOIP - Skype, Viber, Whatsapp call, Facebook messenger, etc. ✓
SMTP – email ✓

4.6 Archiving and Backup are two important tasks the user of each laptop should undertake.

4.6.1 Explain, in terms of the scenario, what the difference between an **ARCHIVE** and a **BACKUP** is. Use an example for backup and another for archiving from the scenario to illustrate support your answer. (4)

An **archive** is a collection of historical records that are kept for long-term retention ✓ and used for future reference. Typically, archives contain data that is not actively used. Basically, a **backup** is a copy of a set of data ✓, while an **archive** holds original data that has been removed from its original location.

Example of an archive – removing and storing in another location, all records of donations from last year ✓

Example of Backup – making a copy of the day to day running expenses of the branch ✓

4.6.2 Give **ONE** advantage and **ONE** disadvantage of storing shared software on the server computer. (2)

Advantage - Capital saving on software purchase, Regular reliable upgrades and easy to upgrade the main server instead of having to upgrade each node ✓

Disadvantage - Depends on reliability of network infrastructure OR when the network goes down, the software is not available for use. AND Telkom for support and quality ✓

Question 5 e_Communication and security

13 Marks

5.1 The NSPCA website is an important interface for the company. Websites can be categorised as static or dynamic.

5.1.1 What do we mean when we say a website is static? (1)

Information does not change therefore every viewer sees the same information. ✓ Can only be changed by the webmaster. No interaction between the viewer and the website

5.1.2 Name TWO features of a dynamic website? (2)

Dynamic website content is customisable. ✓ User can control their view ✓ eg Facebook – have

own profile. There is online interaction between the user and the website
ANY TWO

- 5.2 It is the responsibility of the SPCA to protect the data of all users who register on their website. (2)

Name and describe two measures the SPCA can take to ensure that the users' data is safe.

ANY 2 of the following:

Encrypt data✓

restrict access to the websites to registered users by using logins and passwords✓

set up Firewalls

set up an Anti-Virus Program scan on any incoming data.

- 5.3 Scripting can be used both client side and server side.

- 5.3.1 Explain how client side and server side scripting could be used in the SPCA website? (2)

Server side – Create the specialised HTML pages for each individual user✓

Client side – images scrolling✓

- 5.3.2 Can a cookie be considered as malware? Justify your answer (2)

No✓, it is not causing damage to your system although it is storing personal data, it is stored only on your computer. ✓

OR

Yes, and a logical explanation, ie., stores personal data, are we sure that the cookie is never used by the company that produced it for nefarious purposes?

- 5.4 You can ensure that a Web site is secure.

5.4.1 Explain how pharming affects a browser.

(2)

User types in URL ✓ the browser loads another page ✓

Protocol Used – https

5.4.2 List TWO precautions you can take regarding your own personal Internet privacy.

(2)

Don't enter too much info online ✓✓
Run antivirus
Disconnect when not using Internet
Set privacy settings to high security
Don't "friend" people you don't know
Don't trust everyone – be suspicious
ANY TWO

Question 6

Social

22 Marks

6.1 The SPCA has become aware of social engineering. Provide TWO ways in which social engineering could be used in this scenario.

(4)

Shoulder surfing- look over shoulders as password is typed.
Dumpster diving – find sensitive info that has been thrown away
Role playing – pretend to be helpful to gather info
Trojan horse – trick user to download harmful programs
Phishing – send emails to get user to give up info
ANY TWO ✓✓ one for name one for explanation ✓✓

6.2 A volunteer was accessing a banking website when a message appeared

warning that the entered data was incorrect.

6.2.1 Explain the difference between Data Verification and Data Validation. (2)

Data verification is a way of ensuring the user types in what he or she intends, in other words, to make sure the user does not make a mistake when inputting data. ✓

Data validation has nothing to do with what the user wants to input. Validation is about checking the input data to ensure it conforms with the data requirements of the system to avoid data errors. ✓

6.2.2 Give **ONE** example **each** of **Data Verification** and **Data Validation** from the scenario. (2)

An example of Data Verification is making a new volunteer enter their new password twice to prevent incorrect data input. ✓

An example of Data Validation is a range check to avoid inputting a number of dogs in the branch as a negative number. ✓

6.2.3 Name and explain **TWO** different types of malware. (4)

Any Two from:

Virus – self-replicating, attached to a program or file

Worm – self-replicating, mines your computer for data

Trojan Horse – do not self-replicate, usually appear as some useful code or program

Logic Bomb – designed to go off at a particular time or after an event has taken place

Etc.

6.3 One of the effects of **Digitilisation** on the workplace is **mobile offices**.

6.3.1 Explain the concept of a mobile office? (1)

The worker does not need a permanent office to visit daily. They can do their work as long as they have the correct equipment with them. Can be available anywhere , 24/7. ✓

6.3.2 What technologies are needed to set up a mobile office? (2)

Mobile device(s) laptop, tablet and / or mobile phone ie., audio and video capabilities
Access to the internet ANY TWO ✓✓

6.3.3 How can the NSPCA benefit from mobile offices? (1)

Volunteer centres can be set up temporarily at eg in school hall / pop up store without any infrastructure cost ✓

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6.4 A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a database.

6.4.1 Name three characteristics of quality data. (3)

Accuracy, correctness, currency, completeness, relevance. ANY THREE ✓✓✓

6.4.2 Explain TWO input methods/mechanisms that can be used to ensure the correct data has been entered. (4)

GUI components – rather let the user select item to input
Bar code/QR code Scanners – print a sticker with the data to be entered to be scanned
Exception handling – check data that is entered and not allow incorrect data
ANY TWO ✓✓ one for name one for explanation ✓✓

Question 7**Software development****12 Marks**

- 7.1 Complete the following table to differentiate between the terms declare, initialise and instantiate. Some of your answers can be more than one. Cross out the incorrect term(s).

(7)

Gogga bug;	declare✓ / ~~initialise~~ / ~~instantiate~~
int x = 5;	declare✓ / initialise ✓ / ~~instantiate~~
y = 5.5 (in the first line of a program)	~~declare~~ / initialise✓ / ~~instantiate~~
Friend fr = new Friend('Themba',23);	declare ✓ / initialise✓ / instantiate✓

- 7.1 Study the class diagram below and then answer the questions that follow.

Employee
- name: string - surname: string - initials: string - yearlySalary: double - monthlySalary: double
+ Constructor (string nm, string srnm, integer yearSal,) + setYearsInService (int yis); + getYearlySalary : double + getMonthlySalary : double + toString : string

- 7.2.1 Why are the fields declared as private and the methods declared as public? (2)

Information hiding ✓ – control access to fields via method✓

- 7.2.2 What would the name of the constructor be for this class? (1)

Employee✓

- 7.2.3 Given an example of a mutator and accessor method from the class diagram. (2)

Mutator method: setYearsInService✓

Accessor method: getYearlySalary / getMonthlySalary✓

7.2.4 Why does the constructor only have three parameters when the class has five fields? (2)

The other two can be generated ✓ using the three fields/parameters ✓

7.2.5 Write the code for the constructor method taking into account your answer to 7.2.4. (8)

```
+ Employee✓ (string nm, string srnm, integer yearSal )  
{  
    name = nm; ✓  
    surname = srnm; ✓  
    yearlySalary = yearSal; ✓  
    monthlySalary✓ = yearSal/12; ✓  
    initials ✓= nm.charAt(0) + srnm.charAt(0); ✓  
}
```

7.3

Line No	size	i	i < size - 1?	k	k < size?	p	p < size - 1?	intArr							intArr[i] = intArr[k]?
								[0]	[1]	[2]	[3]	[4]	[5]	[6]	
								1	2	2	4	6	9	11	
1	7														
2		0	T												
3				1	T										
4															F
3				2	T										F
4															F
3				3	T										F
4															F
3				4	T										F
4															F
3				5	T										F
4															F
3				6	T										F
4															F
2		1	T												
3				2✓	T✓										
4															T✓✓
5						2	T✓								
6										2					✓
5						3	T								
6											2				✓
5						4	T								
6												2			✓
5						5	T								
6													2		✓
7	6✓														

7.4 Identify the line number(s) which causes the error in the trace table and explain how you would correct it. (4)

Line no 5✓ and 6✓

The loop must run from size-1 down to k✓ and the elements must be copied using `intArr[p] = intArr[p+1]` ✓

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