Western Cape Education Department

E X E M P L A R

JUNE EXAMINATION – 2013

INFORMATION TECHNOLOGY

PAPER 2 – THEORY

TIME: 3 HOURS MARKS: 180

This paper consists of 14 pages

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE sections subdivided as follows:

SECTION A:	Multiple-choice questions	(10)
SECTION B:	Hardware and software	(52)
SECTION C:	Applications and implications	(23)
SECTION D:	Programming and software development	(49)
SECTION C:	Integrated scenario	(46)

2. Answer ALL the questions.

3. Read ALL the questions carefully.

4. Number the answers correctly according to the numbering system used in this question paper.

5. Write neatly and legibly.

SECTION A: MULTIPLE CHOICE QUESTIONS

QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A-D) next to the question number (1.1-1.10) in the ANSWER BOOK.

1.1 A heat sink is …

A a program that monitors the internal temperature of a computer
B a device that is used to regulate heat produced by the power supply
C software used to measure the power consumption of a computer
D a device that regulates the heat away from components like the CPU (1)

1.2 A USB 2 port …

A is slower than a USB 1 port
B is most suitable for video communication
C is generally used to connect a printer to a personal computer
D is used to connect the BIOS with the CPU (1)

1.3 Most indoor networks use this technology to give access to computers in different rooms, without using cables:

A Ethernet
B Wi-Fi
C UTP
D Fibre optical (1)

1.4 Which of the following is the smallest part of a hard drive that can store data?

A Read- and write heads
B Cluster
C Sector
D Track (1)

1.5 Which ONE of the following statements is TRUE?

A A class may NOT have more than ONE constructor.
B A mutator method provides the facility to change a class variable.
C A class is an instantiation of an object.
D An accessor method provides the facility to change a class variable. (1)

1.6 Anti-virus software …

A needs to be updated regularly in order to ensure protection from newly created viruses.
B needs to be installed only when your computer is networked.
C works best when you have multiple anti-virus programs from different companies installed on your computer.
D needs to be installed once you have detected a virus on your computer. (1)

1.7 When an object class protects its data from access by other code, it is known as …

A parameter passing.
B abstraction.
C encapsulation.
D modular programming. (1)

1.8 Netiquette refers to …

A guidelines to trap errors on computers.
B special software designed to trap malware.
C special software designed to identify errors in programming code.
D guidelines to appropriately use the Internet and its utilities. (1)

1.9 A … is a recorded audio file stored on a website that can be downloaded to a computer or a portable media player.

A blog
B wiki
C podcast
D portal (1)

1.10 One of the primary tasks of the kernel of an Operating System is to handle interrupts. A hardware interrupt is…

A what happens when the power fails and the computer stops working.
B used when printers need to be shut down.
C how a peripheral device is able to gain the CPU's attention when it needs to communicate.
D the way in which RAM controls all devices on the system. (1)

TOTAL THIS SECTION: 10

The scenario below must be used to answer the questions in SECTION B, C, D and E.

With the RCL election in mind, the Teacher Liaison Officer (TLO) Mr Voterson has decided to use the fileserver in Lab1 as the central fileserver. Information will be sent to the central fileserver from the FIVE computers in the hall where the voting will take place. The Grade 12 IT forms the IT committee and has to run the whole e-voting process.

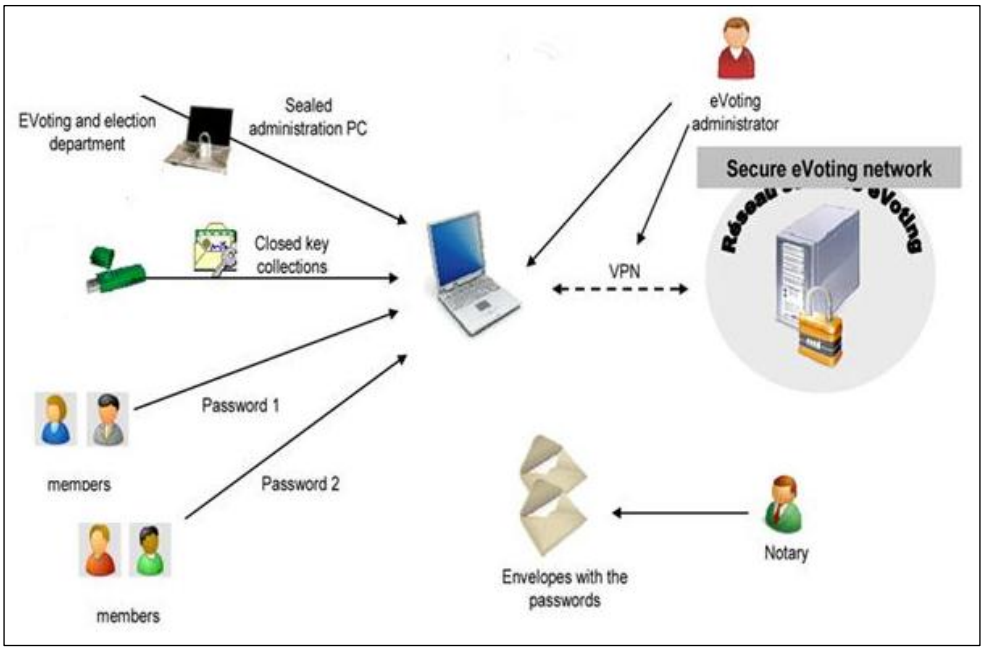


Figure 1

SECTION B: HARDWARE AND SOFTWARE

QUESTION 2

Study figure 1 and answer the following questions:

2.1 The server is very slow and one of the learners suggests that the school improve the memory to solve the problem. Study the information in figure 2 and then answer the following questions:

Figure 2

2.1.1	How much memory does this server have?	(1)	
2.1.2	Give TWO ways to improve the memory of the server.	(2)	[3]
2.2	The CPU is another component that influences the performance of the computer. The server has a Quad core processor.		
2.2.1	Explain the difference between a Core 2 Duo processor and a Quad Core processor.	(2)	
2.2.2	Explain the concepts of hyperthreading and multiprocessing.	(3)	
2.2.3	Discuss how pipelining will improve CPU performance.	(4)	[9]
2.3	It is vital that no votes be lost. It has been suggested that RAID should be used to protect the data.		
2.3.1	What does the acronym RAID stand for?	(1)	
2.3.2	Explain how RAID uses mirroring to protect data.	(1)	
2.3.3	a. Is this the best application of RAID for this scenario?	(1)	
	b. Name and briefly explain how the other two RAID levels work.	(4)	[7]
2.4	Bus design also influences the speed of a computer.		
2.4.1	What is the function of a bus?	(1)	
2.4.2	Which TWO areas are especially important when it comes to the improvement of bus design?	(2)	
2.4.3	List the 3 components of the system bus (also called the internal bus or front side bus) and briefly describe the function of each.	(6)	[9]
2.5	Ridaa, chairperson of the IT committee informs Mr Voterson that the computers in the hall must be linked to the main computer in the admin block.		
2.5.1	Is this a Client-server or Peer-to-peer network?	(1)	
2.5.2	Give THREE advantages of a Client-server network.	(3)	
2.5.3	a. Suggest a network topology to be used for this setup.	(1)	
	b. Give TWO reasons for your answer in 2.5.3.a.	(2)	
2.5.4	The IT committee feels that setting up the network would not be too costly since the school has an existing network with all the network components.		
	Besides the computers and the server, list THREE other network components.	(3)	
2.5.5	Would this be a LAN or a WAN? Motivate your answer.	(2)	
2.5.6	Suggest a type of cable for this type of network.	(1)	[13]

2.6 Mr Voterson wants to know if it is possible for the learners to vote using their smart phones since smart phones have operating systems.

2.6.1 Identify the following examples of operating systems:


A


B


C

(3)

2.6.2 Write down the letter of the operating system that is most commonly used for cell phones. (1)

2.6.3 If the cell phones would be allowed to be used for voting, by joining the school's network, what type will the school's network have to be? (1)

2.6.4 Mr Voterson wants to know on what the operating system is stored on the cellphone seeing that it does not have a hard drive. (1)

2.6.5 Why are hard drives not used in cellphones? (1) [7]

2.7 Modern Operating Systems facilitate the use of **virtual memory** in order to ensure that more programs can run.

2.7.1 What is virtual memory? (1)

2.7.2 Briefly explain how virtual memory works. (3) [4]

52

TOTAL THIS SECTION:

SECTION C: APPLICATIONS AND IMPLICATIONS

QUESTION 3: e-COMMUNICATION

The RCL has decided to make the first project to create a lab for the school.

The RCL committee has made a huge amount of money from a fundraising event. The chair person decides to pay the companies electronically

3.1 There are so many internet scams these days. How can she make sure that the bank sites or any site she goes onto are secure. (1) [1]

3.2 A number of categories of internet-based criminals have emerged in recent years.

a. What is a hacker and what is his purpose? (2)

b. Use examples and explain what phishing is. (2)

c. Use examples and explain what identity theft is. (2) [6]

3.3 In today's world there are many ways of communicating.

Mention 3 ways that RCL can communicate with the learners and the community to keep them up to date with what's happening at the school. (3) [3]

10

QUESTION 4: SOCIAL AND ETHICAL ISSUES

Voters need to be aware of social and ethical issues associated with electronic voting. With this in mind answer the questions that follow.

Sue wants to look for information on computers and how to set them up. She came across a blog.

4.1 Would it be wise for her to take advice from a blog?

a. Yes or No? (1)

b. Motivate your answer in a. (1) [2]

The principal decides to get one of the RCL members to give the learners some information with regards to legal issues surrounding internet usage.

4.2 Explain the term *computer ethics*. (2) [2]

4.3 Define each of the following terms

a. plagiarism (2)

b. copyright (2) [4]

4.4 The learners are excited to use the computers and the internet, especially for social networking.

4.4.1 Why are tools such as social networking sites (for example Facebook) and IM (Instant Messaging) often associated with identity theft? (1)

4.4.2 The company decides to rather give the school a fully equipped new computer laboratory.

Name TWO job positions that will be required in order to make this project a success. (2) [3]

4.5 The school considers e-mailing all their voters about the SGB and RCL election informing them about the election and how to vote electronically.

Would you regard these e-mails as spam? Justify your answer. (2) [2]

13

TOTAL FOR THIS SECTION **23**

SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT

QUESTION 5: ALGORITHMS AND PLANNING

The school must still compile a database of its learners and their parents so that it can be linked to the voting program.

5.1 The school has been given a database table design that looks as follows:

LearnersTbl: Table	
Field Name	Data Type
LearnerID	Number
LearnerSurname	Text
LearnerFirstName	Text
LearnerEntryDate	Date/Time
Grade	Number
DateOfBirth	Date/Time
ParentGuardianSurname	Text
ParentGuardianFirstName	Text
ParentGuardianTelephone	Text

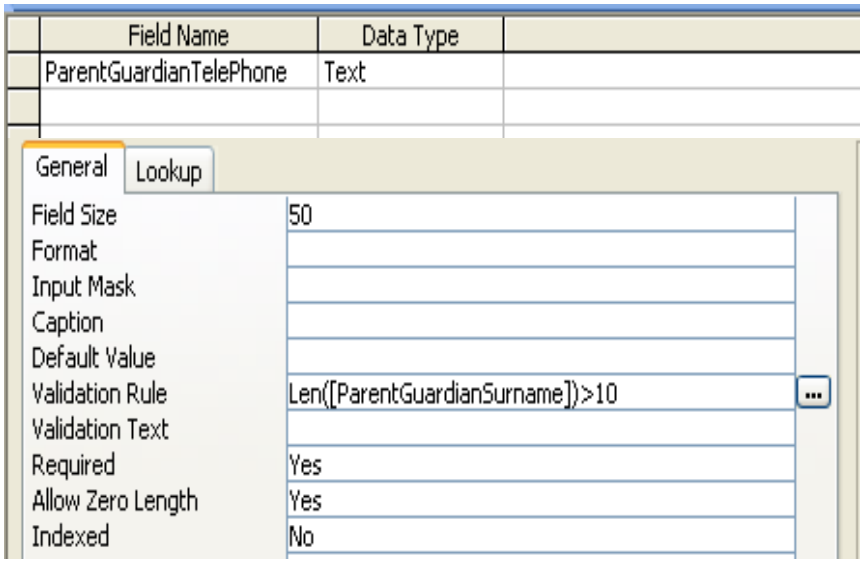
FIGURE 5.1

5.1.1 The LearnersTbl table has no primary key.

a. What is the purpose of the primary key? (2)

b. Which field would be the most suitable to use as the primary key? (1)

5.1.2 The general properties for the ParentGuardianSurname field are shown below.



a. Explain what it means to specify a field size of 50 for this field. (1)

b. What does the validation rule for this field test. (1)

c. What is the purpose of the *Required* property? (1)

5.1.3 The school has asked you to examine the database design to make sure it is as effective and efficient as possible. This means that you have to normalise the database.

a. Explain to the school what *normalisation* is by giving them a rule for normalising the database to 1NF (1st Normal Form). (1)

b. Give them a rule for normalising the database to 2NF (2nd Normal Form). (1)

c. Separate the fields in the LearnerTbl table into two new tables, **LearnerTbl** and **ParentsTbl**. (4)

d. Clearly indicate which field(s) will serve as primary key(s) (PK). (2)

e. Clearly indicate the relationship between the two tables using a line drawn between the relevant fields. (2)

f. Indicate any relevant foreign key field(s) (FK). (1)

g. What is the purpose of referential integrity in a relationship? (2) [19]

5.2 Getting data into the database and making sure that it is accurate is only the first step in making a database work. The real power of a database lies in how you get information out of it. To do this you need to know how to query the database. The best way to do this is to use SQL.

5.2.1 What does the acronym *SQL* stand for? (1)

5.2.2 Write out the SQL statements to get the following data from the table:
All the Learners at the school sorted by grade in descending order. (4) [5]

5.3 It has suggested that a special program be developed to track the voters as they log on and off the network. We also need to keep track if they voted or not. An object class was designed to do this job. Study the class diagram below and then answer the questions that follow. The names of the methods indicate what they should do.

FIELDS	METHODS
- LearnerID - ParentID - TeacherID - StaffID - voted	+constructor(ID, voted) +getLearnerID() +getParentID() +getTeacherID() +getStaffID() +toString() +getVote()

5.3.1 What is the difference between a *class* and an *object*? (2)

5.3.2 What will the toString method be used for? (2)

5.3.3 Explain the purpose of the following methods in object-oriented programming:

a. Set methods (1)

b. Get methods (1)

c. What is the purpose of the constructor method of a class? (2)

5.3.4 Methods are normally declared as public and fields as private.

a. Explain why methods are normally declared as public and not as private. (1)

b. What is the reason for declaring an instance field as private and not as public? (1) [10]

5.4 The school is in possession of a csv file that carries details of learners' parents. A sample of the contents of the file is as follows:

```
ParentID,Title,LastName,FirstName,Contact
1,Mr,Brooke,Mike,021 456 3212
2,Dr,Webb,Samuel,021 456 3452
3,Mrs,Govender,Shanti,021 678 1244
4,Mr,Adams,Arthur, 011 553 1123
5,Pastor, Dickens,Wayne,012 948 4432
```

As you can see each field is separated by a comma.

5.4.1 What is the purpose of the first line in the file? (2)

5.4.2 How will this data be stored in a database? (3)

5.4.3 Besides a comma, give ONE other character that can be utilised to separate the fields in a .csv file. Motivate your choice of character. (2)

5.4.4 You are required to develop software to process the .csv file (referred to in QUESTION 5.4) and to store the data. You develop a simple algorithm that can be used to process the file:

1. Enter the file name from the keyboard
2. Open the file for input
3. Read each line of data from the file
4. Extract each piece of data from the line
5. Store the data that has been extracted
6. Close the file

a. In line 1 of the given algorithm the user has to enter the name of the file. Suggest how on can make sure that the user enters the file name in the correct format. (1)

b. Assume that the user has entered the **correct** filename. Give ONE possible error that may still occur when line 2 of the algorithm is executed, that is when trying to open the file. (1)

c. Will you choose a for loop or a while loop to read in the file? Give a reason for your answer. (2)

d. Describe how the data extracted in line 5 is stored in data structures. (2) [15]

TOTAL THIS SECTION: 49

SECTION E: INTEGRATED SCENARIO

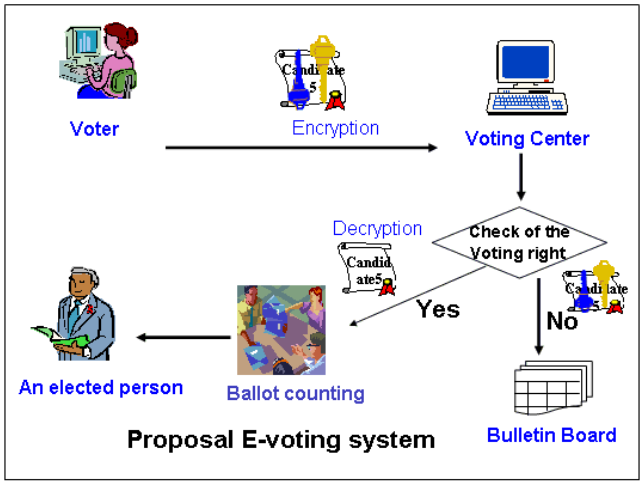
QUESTION 6

6.1 In Figure 1, at the beginning of the paper, another type of network mentioned is a VPN - a Virtual Private Network.

6.1.1 Define a *VPN*. (2)

6.1.2 Give ONE advantage of using a VPN (1) [3]

6.2 Ridaa found the following picture about e-voting on the internet. Study the picture and answer the following questions.



6.2.1 Explain what *Encryption* is? (2)

6.2.2 Public Key Encryption uses SSL. What does the abbreviation *SSL* stand for? (1)

6.2.2 Briefly describe how Public Key Encryption works. (3) [6]

6.3 The IT committee has proposed to use laptops instead of desktops in the hall for the voting.

6.3.1 Give **THREE** reasons why this is **NOT** a good option. (3)

6.3.2 Laptops have LCD or LED screens. Give THREE reasons why these monitors are preferable to the older CRT monitors. (3) [6]

6.4 The school is concerned about the privacy of information on their computer system.

6.4.1 One way of applying identification verification is to enter a username and a password to log into a program. Give TWO hints to users about selecting passwords that will not be easy to decipher. (2)

6.4.2 The user entered a wrong password and receives an error message. "errrror 365 – no matching string found. You fool don't do that again!"

Give THREE things that to keep in mind when writing an error message. (3)

6.4.3 It was suggested that the school consider installing the device shown below for identification verification:

a. What is the term that describes the use of personal characteristics to authenticate the identity of a person? (1)

b. Name TWO other personal characteristics that are often used for authentication verification purposes. (2) [8]

6.5 Voting for the RCL will take place in the school hall. A network will be established, connecting 10 computers. To facilitate communication, computers on a network require a protocol.

6.5.1 What is a protocol? (2)

6.5.2 TCP/IP is the most common suite of protocols used for Internet communication. List and briefly explain the basic feature of any TWO of the protocols included in the TCP/IP protocol suite. (4) [6]

6.6 Due to the fact that most of the learners at school have cellphones the voting committee wants to find out more about online voting and how it can be used on cellphones.

6.6.1 They have heard about ADSL and that it makes use of packet-switching. Briefly explain how *packet-switching* works. (3)

6.6.2 The idea of voting online bothers the committee. They have seen Idols and have noticed that the rules state that no-one can vote more than ten times from the same number using SMSs.

a. What is the problem if some people could vote more than once? (2)

b. Give TWO suggestions for how multiple voting can be eliminated. (2)

c. Explain how a system would work. (3)

6.6.3 Someone suggests that cellphone voting can also make use of the website.

a. Name TWO ways cellphones can connect directly to the internet? (2)

b. If a special site is set up to be accessed by cellphones, what would the URL end with? (instead of .com or .co.za) (1)

c. Give THREE things to keep in mind when designing a website in terms of good GUI design. (3)

d. Why could a thunderstorm make it difficult for a cellphone to communicate with the cellular towers, even if the towers are not struck by the lighting? (1) [17]

TOTAL THIS SECTION: 46
GRAND TOTAL: 180