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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**NOVEMBER 2009**

**MARKS: 180**

**TIME: 3 hours**

**This question paper consists of 16 pages and a separate 2-page answer sheet.**

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of SIX questions subdivided as follows:

SECTION A: Multiple-choice questions	(10)
SECTION B: Hardware and software	(54)
SECTION C: Applications and implications	(20)
SECTION D: Programming and development of software	(48)
SECTION E: Integrated scenario	(48)
2. Read ALL the questions carefully.
3. Answer ALL the questions.
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 provided 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 The best way to have continuous Internet access when you are very mobile (moving from one place to another frequently) is to use a ...
- A fibre-optic cable.
  - B 3G card/adapter.
  - C network card.
  - D satellite dish. (1)
- 1.2 Most users prefer this way of interacting with their computers:
- A GUI
  - B CLI
  - C punch cards
  - D Teletext (1)
- 1.3 The preferred method of physically carrying large amounts of data around for daily use, is using a(n) ...
- A floppy disk.
  - B magnetic tape.
  - C CD-ROM.
  - D external hard drive. (1)
- 1.4 The recommended way to connect a cellphone to other devices (such as hands-free kits/photo kiosks/other cellphones) is ...
- A infrared.
  - B 802.11g wireless.
  - C Bluetooth.
  - D a USB cable. (1)
- 1.5 The performance (speed) of your computer may be improved by adding ...
- A more RAM.
  - B more hard drive space.
  - C an Internet connection.
  - D an optical drive. (1)

- 1.6 The method of processing where the processor is able to read new instructions from memory before the instruction that is busy being processed is completely processed, is known as ...
- A caching.
  - B hyperthreading.
  - C pipelining.
  - D RAID. (1)
- 1.7 The most popular LAN communication standard used today is ...
- A Ethernet.
  - B WAP.
  - C ADSL.
  - D URL. (1)
- 1.8 The connection on the motherboard between the CPU and the RAM is known as the ...
- A CLI.
  - B PCI.
  - C USB.
  - D FSB. (1)
- 1.9 When a device is 'hot-pluggable' it ...
- A means that the computer must be switched off before the device can be connected/disconnected.
  - B means that the device gets hot and needs a heat sink and cooling fan.
  - C can be connected/disconnected even when the computer is switched on.
  - D can only be used in cooled/air-conditioned environments. (1)
- 1.10 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)

**TOTAL SECTION A: 10**

**SCENARIO**

In 2010 South Africa will be proud to be the first African country to host the FIFA Soccer World Cup. This year has seen many South Africans working hard to prepare for the thousands of spectators who will come to watch the games. The hospitality and transport sectors have had to rethink their strategies in order to improve service delivery. In most of these sectors, IT has been used to make their services more effective and efficient and will play a significant role in South Africa successfully hosting the event.

**SECTION B: HARDWARE AND SOFTWARE****QUESTION 2: HARDWARE AND SOFTWARE**

Phumzile is the co-owner of a Bed and Breakfast (B&B). She has decided to open a 'cyber centre' with 30 computers for the people who will be staying in the B&B. She realises that most of the other B&Bs in the area will not be able to provide the tourists with the computers and communication facilities that they need.

Listed below are two quotations she has been given for the computers for the centre. She needs you to help her understand the quotations and make a choice.

<b>COMPUTER A</b>	<b>COMPUTER B</b>
<b>CPU</b> – 2.4 GHz (4 MB cache) Quad Core <b>RAM</b> – 2 GB DDR2 <b>HDD</b> – 200 GB Motherboard with a clock speed of 100 MHz  Gigabit (1 Gbps) network card DVD Writer NVidia GForce graphics card (512 MB VRAM) 15" LCD monitor  Windows Vista Internet Explorer Microsoft Office Skype (VoIP Software) Google Maps Google Earth Microsoft Outlook (e-mail program)	<b>CPU</b> – 2.8 GHz (1 MB cache) Dual Core <b>RAM</b> – 2 GB DDR2 <b>HDD</b> – 250 GB Motherboard with a clock speed of 100 MHz  802.11 g (50 Mbps) wireless network adapter Blu-Ray drive Integrated graphics (32 MB VRAM) 17" LCD monitor  Ubuntu Linux Mozilla Firefox OpenOffice Skype (VoIP Software) Google Maps Google Earth Thunderbird (e-mail program)
<b>R13 795</b>	<b>R7 995</b>

- 2.1 The first thing she looks at is the CPU of each computer, because she knows that this is where the work gets done.
- 2.1.1 Name TWO leading manufacturers of CPUs. (2)
- 2.1.2 Computer A is described as 'Quad Core' and Computer B as 'Dual Core'. Briefly explain what each of these two terms means. (2)
- 2.1.3 Both quotations give the CPU speed of the computers as being much greater than the clock speed of the motherboard (which is only 100 MHz).
- (a) Briefly explain how it is possible that the CPU can work at a greater speed than the motherboard. (1)
- (b) What is the name of the technique used in QUESTION 2.1.3 (a)? (1)
- (c) Give an example of how the improved speed of the CPU is calculated using data from any ONE of the two given quotations. (2)
- 2.1.4 The two CPUs have different amounts of cache memory. What is *cache memory*? (You are only required to define the concept.) (3)
- 2.1.5 Each CPU has an instruction set which can have an influence on its performance. What is an *instruction set* of a processor? (2)
- 2.1.6 One of the other ways of improving the performance of CPUs is to reduce the size of its components (make the parts of the CPU smaller). Explain TWO ways in which making the components smaller can improve the performance of a computer. (2)
- 2.1.7 Phumzile says she has always been curious about how a CPU actually works. Explain the process to her by naming the stages of the machine cycle and briefly explain what happens during each stage. (8)
- 2.2 Both computers have DDR2 memory. DDR refers to "Double Data Rate".
- 2.2.1 Which specific aspect of the performance of a computer will be improved by using DDR memory? Motivate your answer. (2)
- 2.2.2 Briefly explain how DDR works. (2)

- 2.3 Phumzile expects that some of her customers will want to play games on the computers. Advise her on which computer (according to the quotations) would be best for games and why. (2)
- 2.4 The computers have a significant difference in price because of the difference in the hardware and software. What is it about the software that may cause this price difference? (2)
- 2.5 The operating systems of both computers support multitasking and multithreading.
- 2.5.1 What does it mean when an operating system allows a computer to multitask? (2)
- 2.5.2 Explain what *multithreading* means. (3)
- 2.5.3 Give a practical example of multithreading taking place when using a computer. (1)
- 2.6 Phumzile expects that some of the customers will want to use the computers for communication. This means that networking and communication utilities will be important.
- 2.6.1 On both quotations Skype has been listed as VoIP software.
- (a) What does the acronym VoIP stand for? (1)
- (b) What does VoIP allow the user to do? (1)
- (c) How (and why) would VoIP benefit Phumzile's customers? (2)
- 2.6.2 What software does Computer B use to browse the Internet? (1)
- 2.7 A statement has been made indicating that both Windows and Linux support plug-and-play and will therefore not need any drivers.
- 2.7.1 Explain why this statement is incorrect. (1)
- 2.7.2 In the context of computing, briefly explain what a driver does. (3)



- 2.8 Phumzile says that she often sees her computer slowing down when she has many programs open and the hard drive light shows that the hard drive is working all the time. You tell her that the operating system uses virtual memory and that thrashing is probably taking place on her computer.
- 2.8.1 What is *virtual memory*? (3)
- 2.8.2 Explain what happens when thrashing takes place. (2)
- 2.8.3 Suggest the only real solution to thrashing. (1)
- 2.9 Phumzile says that she often continues working on her computer while she is printing very large documents. You tell her that spooling has taken place. Briefly explain what *spooling* is. (2)
- TOTAL SECTION B: 54**

**SECTION C: APPLICATIONS AND IMPLICATIONS****QUESTION 3: e-COMMUNICATION**

Phumzile says that before you talk about setting up the network, she wants to make sure that she clearly understands what e-communication is about.

Answer the following questions to help her understand some of the do's and don'ts in e-communication:

- 3.1 "Do not send spam to people." Define the term *spam*. (2)
- 3.2 "Don't believe everything you read on the Internet." State THREE guidelines to follow in an effort to verify the validity of information found on the Web. (3)
- 3.3 Phishing poses a serious threat to e-communication. Give an example of a phishing e-mail and describe what it attempts to do. (3)
- 3.4 Phumzile has to convince potential stakeholders that Information and Communications Technology (ICT) is a good investment in terms of making the world a better place. List TWO arguments that she can raise in order to support this point of view. (2)
- [10]**

**QUESTION 4: SOCIAL AND ETHICAL ISSUES**

- 4.1 Phumzile has complained to the seller of Computer A about the price. The seller has offered to reduce the price by R6 000 if she is prepared to receive the computer with the software already installed but without the original CDs and manuals for the software. Do you think she should accept this offer? Substantiate your answer. (2)
- 4.2 Phumzile is concerned about some of her customers and their children who may spend too much time in front of the computers at her cyber centre. This may have an adverse effect on them. State TWO ways in which spending too much time in front of a computer can adversely affect one's health. (2)
- 4.3 Phumzile wants to be able to assist her customers to socialise during the Soccer World Cup by using e-communication facilities. List TWO forms of e-communication that soccer fans most probably will use to discuss soccer results and/or the performance of the players. Write ONE sentence about each to explain the usage thereof. (4)
- 4.4 Suggest TWO ways in which Phumzile could use the cyber centre to the benefit of her community after the Soccer World Cup. (2)
- [10]**

**TOTAL SECTION C: 20**

**SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT****QUESTION 5: ALGORITHMS AND PLANNING**

Phumzile wants you to be part of a team of programmers asked to develop software that will be used to help manage the administrative side of the business at the guest house.

- 5.1 The software must, amongst other things, assist in handling queries. To be able to provide consistent answers to queries, the data has to be valid and reliable.
- 5.1.1 The ID numbers of guests will normally be entered from the keyboard. Briefly discuss THREE tests that can be done using programming code to ensure that the date-of-birth section of the ID number (the first 6 digits) is valid. (3)
- 5.1.2 Input, such as the date-of-birth section of the ID number, can still be entered incorrectly even though programming code is in place, to check for the validity of the input from the user.
- (a) Give ONE example to confirm the above statement. (1)
- (b) Briefly describe TWO strategies that can be followed to try to reduce the number of undetected input errors as far as possible. (2)
- 5.2 A new text file is created daily with the names and the times of arrival of the guests in order to be able to answer queries.

The format of the contents of the text file is as follows:

- The first line contains the date on which the file was created.
- Each of the lines thereafter has the following format:
  - Name of the guest#time of arrival

Example of the contents of the text file:

```
12/10/2009
Peter#10:15
Sam#14:40
Joe#08:00
and so on ...
```

One of the queries is from the kitchen staff who need to know how many people will have lunch and how many will have dinner. They need a list of names for lunch and another for dinner. Lunch is served at 13:00 and dinner is served at 19:00.

The lists are closed at least one hour before each meal. The names of guests who arrive at least one hour before lunch are added to both the lunch and dinner lists. The names of guests who arrive after the lunch list has been closed and up to one hour before dinner, will be added to the dinner list only.

The following algorithm has been created in an attempt to compile the lunch and dinner lists. The following words in the algorithm will be used as variables in the program: **oneLine**, **name**, **time**, **date**.

1. Open the file
2. Read the first line and assign to **date**
3. Repeat until end of file
4.     Read the next line and assign to **oneLine**
5.     Get the position of the # in **oneLine**
6.     Extract the **name** from **oneLine**
7.     Extract the **time** from **oneLine**
8.     If the **time** is less than or equal to 12:00
9.         add **name** to lunch list
10.        add **name** to dinner list
11.     If the **time** is less than or equal to 18:00
12.        add **name** to dinner list
13. End of loop
14. Close the file

The given algorithm results in a logical error when programmed and executed.

- 5.2.1 Complete the trace table in ANSWER SHEET A to identify the logical error in the given algorithm. Write your examination number and centre number in the spaces provided on ANSWER SHEET A and hand it in with your ANSWER BOOK. Use the following test data:

12/10/2009  
Peter#10:15  
Sam#14:40  
Joe#08:00

(6)

- 5.2.2 Identify the statement in the algorithm that causes the logical error and rewrite the statement correctly.

(3)

- 5.2.3 Explain the difference between a *runtime error* and a *logical error* in a program.

(2)

5.3 Study the following class diagram representing a Guest object.

NOTE: A minus (-) indicates a private declaration and a plus (+) indicates a public declaration.

GUEST	
FIELDS	METHODS
<ul style="list-style-type: none"> <li>- fID:String</li> <li>- fName:String</li> <li>- fNumDays:byte</li> <li>- fFullyPaid:boolean</li> <li>- fAmountToPay:double</li> </ul>	<ul style="list-style-type: none"> <li>+ constructor (ID, name)</li> <li>+ getID():String</li> <li>+ getName():String</li> <li>+ getAmountToPay():double</li> <li>+ calcAmount(tariffPerDay)</li> <li>- setNumDays (days)</li> </ul>

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

(b) Is it acceptable for a class not to contain a user-defined constructor? Substantiate your answer with a brief explanation. (2)

5.3.2 The set method (mutator) has been defined as a private method.

(a) Do you think that this method should be defined as private? (1)

(b) Substantiate your answer to QUESTION 5.3.2(a). (2)

(c) Write a pseudocode statement that would typically be the content of the setNumDays method. Use the information in the given class diagram. (2)

5.4 Phumzile specifically requested that the software must be user-friendly.

5.4.1 State THREE guidelines that should be considered when designing software, that will make navigation (for example, moving from one screen to the next or choosing the correct options from a menu) easier for the user. (3)

5.4.2 Good programming principles must be applied when programming the requested software.

(a) One of the good programming principles is modular programming. Name TWO advantages of modular programming. (2)

(b) Name any TWO other good programming principles that should be considered when programming. (2)

5.4.3 Runtime errors will result in the display of error messages. State THREE guidelines in constructing user-friendly and useful error messages. (3)

- 5.5 The table below has been designed to manage information of cleaners and the rooms at the guest house for which they are responsible. Each cleaner is responsible for a number of rooms at the guest house.

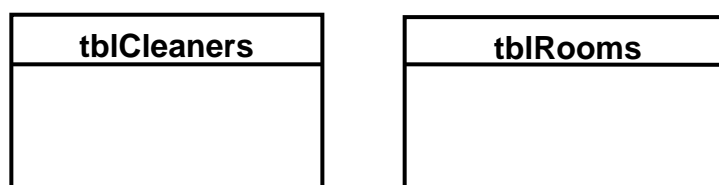
Field Name	Data Type	
CleanerID	Text	Unique ID of the cleaner such as C001, C002 etc.
CleanerName	Text	First name of the cleaner
CleanerAppointment	Text	Date of appointment
RoomNumber	Text	Unique room number such as R001, R002 etc.
RoomBeds	Text	How many beds in the room?
RoomSmoking	Text	Is smoking allowed in this room?

**FIGURE 5.1**

- 5.5.1 It has been suggested that all the fields in the given table (FIGURE 5.1) should not be only text-type fields. For each of the data types below, name a field from the table that should be of that data type:

- (a) Number (1)
- (b) Boolean (1)
- (c) Date/Time (1)

- 5.5.2 The table in FIGURE 5.1 contains information on two separate groups or categories of data, viz. tblRooms and tblCleaners and should therefore be normalised. Using the following diagram, show how you can normalise the data in the given table (FIGURE 5.1) into Second Normalised Form (2NF).



Indicate the following on the diagram:

- (a) The fields that each of the new tables will contain (4)
- (b) The primary key of each table (2)
- (c) The foreign key and the table that will contain the foreign key needed to establish a one-to-many relationship/link between the tables (2)
- (d) The one-to-many relationship between the tables (1)

**TOTAL SECTION D: 48**

**SECTION E: INTEGRATED SCENARIO****QUESTION 6**

The AmaNdlovhu Company plans to provide various services to members of the media during the Soccer World Cup. They will provide transport, hotel bookings and communications facilities to journalists, photographers and TV reporters. They plan to have a media-friendly press room at each of the 2010 soccer stadiums around the country. You have been called in as a consultant to examine, comment on and give advice on their plans.

- 6.1 Each press room will need to accommodate up to 30 people at a time and will need to provide Internet connectivity. AmaNdlovhu has to decide on the type of Internet connection they want to establish in each press room. Some of the options being considered are ADSL, 3G and iBurst.
- 6.1.1 Indicate the type of communication media used by each of the following THREE types of Internet connections:
- (a) ADSL (1)
  - (b) 3G (1)
  - (c) iBurst (1)
- 6.1.2 The different needs of the media people will play a role in deciding on the type of Internet connection to be used.
- (a) Journalists tend to have their own laptops for their work. They normally need to connect to the Internet to send short e-mails with text-based attachments. Which ONE of the three options mentioned in QUESTION 6.1.1 will be most suitable for them? (1)
  - (b) Photographers and TV reporters need to send larger files containing high-resolution photos/video snippets. Which ONE of the three options mentioned in QUESTION 6.1.1 will be most suitable for them? (1)
- 6.1.3 A network will be established, connecting the computers in each press room. To facilitate communication, computers on a network require a protocol.
- (a) TCP/IP is the most common suite of protocols used for Internet communication. List and briefly explain the basic feature of any THREE of the protocols included in the TCP/IP protocol suite. (3)
  - (b) ADSL makes use of packet-switching. Briefly explain how *packet-switching* works. (3)

6.1.4 Since an Internet connection is a priority, the press room at each stadium will have to contain equipment necessary to connect the network to the Internet. This equipment includes:

- A router
- A firewall

(a) Briefly describe THREE functions of a router. (3)

(b) One of the company directors suggests that the firewall is not necessary because each computer will have anti-virus software installed. Is this statement correct? (1)

(c) Briefly explain how a firewall protects a computer. (2)

6.2 Even though the press room will be expensive to set up, AmaNdlovhu decides to proceed since it will be to the benefit of all stakeholders.

6.2.1 List THREE economic benefits that the press rooms will have for people of the press. (3)

6.2.2 AmaNdlovhu realises that setting up these press rooms will create job opportunities. List THREE IT-related jobs that the setting up and managing of the press rooms will create. (3)

6.3 The company needs to decide on a peer-to-peer network or a client-server network in each of the press rooms. You should be aware that the press room will host many journalists at each match and that there will probably be different journalists at every match (the journalists will probably follow their country's team). Journalists will only be using the Internet.

6.3.1 What are the main features of a client-server network that make it different from a peer-to-peer network? (4)

6.3.2 The company has chosen a client-server network. Give TWO possible reasons for their choice. (2)

6.4 The Internet and their computers will be the main means through which media people keep contact with their families at home. They need to be aware of security and safety issues. The company wants to give them a memo about some of these issues.

6.4.1 Write short notes on *spyware*, saying ...

(a) what it is. (1)

(b) how to avoid it. (1)



6.4.2	Trojan horse software can be problematic. Briefly explain ...	
	(a) what <i>Trojan horse</i> software is.	(2)
	(b) how to avoid it.	(2)
6.5	The company wants to provide backup facilities in each press room. Many people are going to do backups and many of the files will be large.	
6.5.1	What is the technology called that will allow you to combine multiple disks into a single, large, high-speed disk?	(1)
6.5.2	This technology has many different formats or 'levels'. Name the technique used to do a backup on level 1.	(1)
6.6	Many of the media people allow the public to follow their work by using social networking sites. The most popular of these is Facebook.	
6.6.1	Briefly explain what a <i>social networking site</i> like Facebook is.	(2)
6.6.2	One of the risks of using Facebook is identity theft. Use an example to describe what <i>identity theft</i> is and how it could occur on a website such as Facebook.	(3)
6.7	To make sure that no other journalist can steal their data, the media people want to have SSL connections to some websites.	
6.7.1	What does SSL stand for?	(1)
6.7.2	Almost all computer security relies on passwords. State THREE rules to follow when creating a password that will be very secure.	(3)
6.7.3	Some new hard drives have encryption built in on the hardware level. Briefly explain what <i>encryption</i> is.	(2)
TOTAL SECTION E:		48
GRAND TOTAL:		180

ANSWER SHEET A

Examination number: \_\_\_\_\_

Centre number: \_\_\_\_\_

QUESTION 5.2.1

State- ment number	Date	oneLine	Name	Time	Time <= 12:00?	Time <= 18:00?	Lunch list	Dinner list

Examination number: \_\_\_\_\_

Centre number: \_\_\_\_\_

QUESTION 5.2.1 (continued)

State- ment number	Date	oneLine	Name	Time	Time <= 12:00?	Time <= 18:00?	Lunch list	Dinner list