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GRADE 12

INFORMATION TECHNOLOGY P2

FEBRUARY/MARCH 2013

MARKS: 180

TIME: 3 hours

This question paper consists of 20 pages and 1 annexure.

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	(47)
SECTION C: Applications and implications	(24)
SECTION D: Programming and software development	(50)
SECTION E: Integrated scenario	(49)
2. Answer ALL the questions.
3. Read ALL the questions carefully.
4. The mark allocation, in general, gives an indication of the number of facts/reasons required.
5. Number the answers correctly according to the numbering system used in this question paper.
6. ONE diagram sheet for QUESTION 5.1.3 is attached at the end of this question paper. Write your centre number and examination number on this sheet in the spaces provided and insert the sheet inside the back cover of your ANSWER BOOK.
7. Write neatly and legibly.

SECTION A: MULTIPLE-CHOICE QUESTIONS**QUESTION 1**

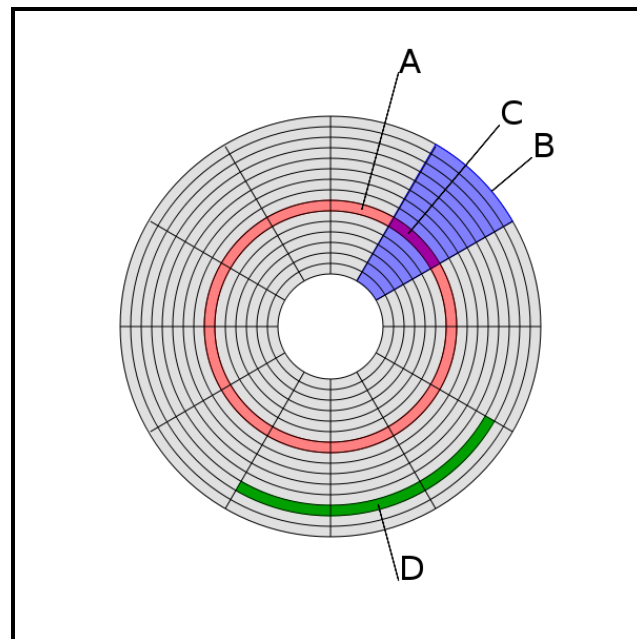
Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.10) in the ANSWER BOOK.

- 1.1 Which term applies when a person behaves offensively towards another member of an e-mail news group, thereby inciting argumentative behaviour?

A Flaming
B Phishing
C Lurking
D Spamming

(1)

- 1.2 Which shaded area in the diagram below represents a cluster of disk space?



A The shaded ring
B The shaded, wedge-shaped area
C The area where A and B overlap
D The shaded arc

(1)

- 1.3 An approach to developing software in which the main task/problem is broken up into smaller, manageable tasks is known as ...

A extreme programming.
B GUI programming.
C modular programming.
D sequential programming.

(1)

- 1.4 Which ONE of the following statements regarding Wi-MAX is TRUE?
- A Wi-MAX stands for Worldwide Internet for Microwave Access.
 - B The rules of Wi-Fi and Wi-MAX are defined by the same IEEE specification.
 - C Wi-MAX is more secure than Wi-Fi.
 - D Wi-MAX can transmit a signal within a range of about 10 metres. (1)
- 1.5 Which part of the URL below is referred to as the domain name?
- <http://www.sars.gov.za/server1/documents/irp/instructions.html>
- A www
 - B sars.gov.za
 - C http
 - D instructions.html (1)
- 1.6 Which ONE of the following is NOT a suitable application of Bluetooth technology?
- A Wireless communication between a mobile phone and a hands-free headset
 - B Wireless communication between PCs in a confined space
 - C Wireless communication with PC input and output devices
 - D Wireless communication between mobile devices which are in line of sight (1)
- 1.7 Which ONE of the statements below is TRUE regarding embedded operating systems?
- A They are complex operating systems developed for desktop computers.
 - B They are stored on EEPROM chips.
 - C They have more graphical features than traditional operating systems.
 - D They need to be region-encoded to ensure compatibility with application software such as a word processor. (1)
- 1.8 Which ONE of the following refers to an encryption process used to authenticate the identity of the sender of an e-mail message?
- A Digital certificate
 - B Digital divide
 - C Digital handshake
 - D Digital signature (1)
- 1.9 Which ONE of the following represents a set of operating systems for smartphones?
- A Windows XP, Windows Mobile, Windows Vista
 - B Linux, Unix, MacOS
 - C Symbian, Windows Mobile, Android
 - D Symbian, Garnet OS (Palm OS), Windows 7 (1)

1.10 A cookie is a(n) ...

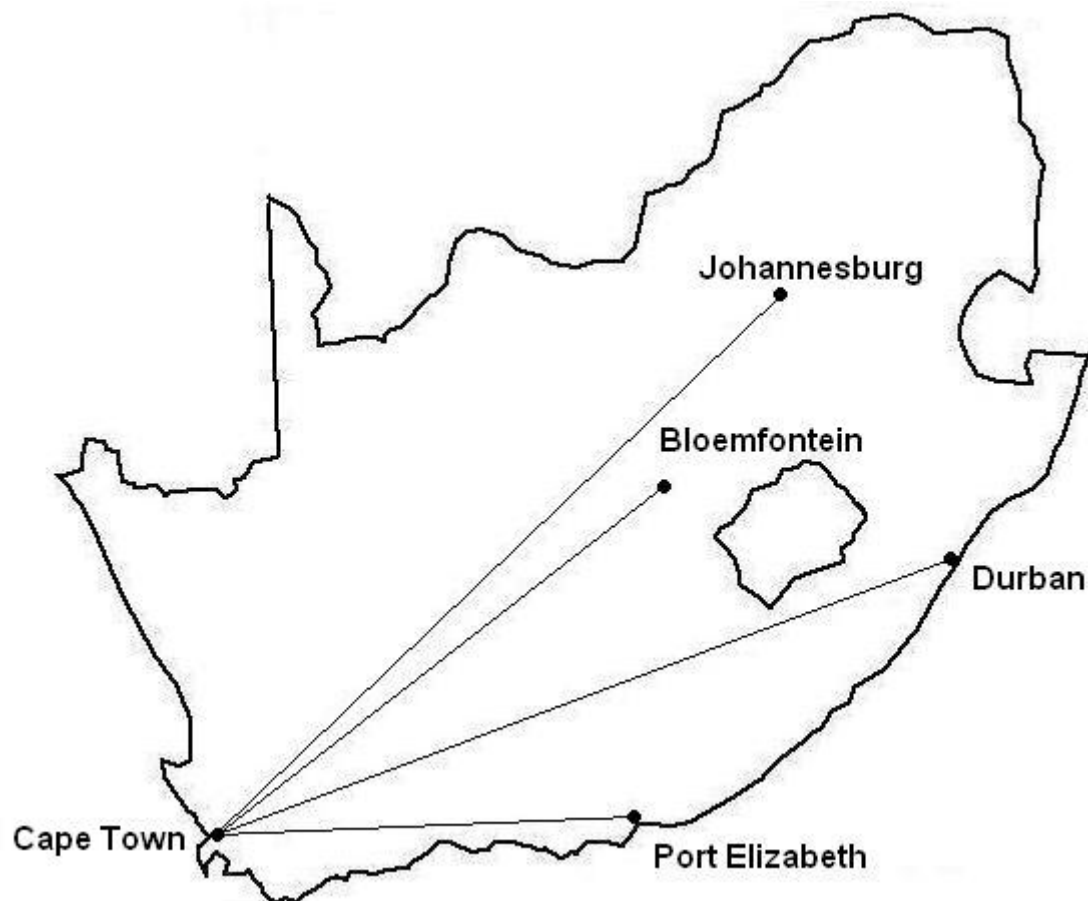
- A binary file that allows a program to run.
- B text file that stores information relating to websites.
- C HTML file that contains Internet settings.
- D file that stores information about a database table. (1)

TOTAL SECTION A: 10

SCENARIO

Blue Crane Tours is a business offering sightseeing tours all over South Africa.

They have offices in each of the major cities as shown in the map below. The head office is situated in Cape Town and all the other offices are electronically connected to the head office.



The Cape Town head office has a main server to which the servers at the other branches connect. Custom software was developed and is used from this location. A database which stores information about tours and clients is managed here.

Blue Crane Tours also has their own website (www.bluecranetours.co.za) which is used for information and bookings.

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

- 2.1 The senior manager at the head office complained about the performance of his computer and wanted it to be replaced. A quotation with specifications for a new computer system refers to a 266 MHz FSB.

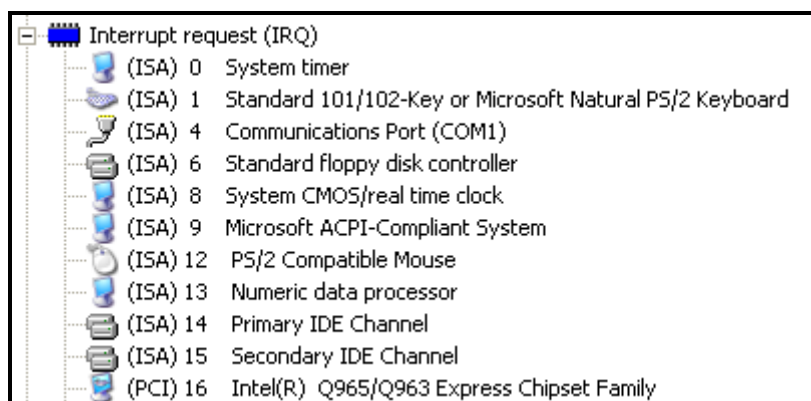
2.1.1 Expand the acronym *FSB*. (1)

2.1.2 One of the ways to improve the performance of a computer is to increase the data transfer rate of the internal bus system.

(a) List the THREE types of buses that the internal bus system comprises. (3)

(b) A technique has been developed where the RAM is accessed four times during one tick of the system clock instead of only once. What is this technique called? (1)

- 2.2 The diagram below is an extract from the device manager of the computer currently used by the senior manager.



2.2.1 Name the manufacturer of the chipset of this computer system. (1)

2.2.2 Why does a keyboard require an IRQ? (1)

2.2.3 Name the TWO different types of data that is stored in a CMOS memory chip. (2)

2.2.4 Name ONE hardware device that is normally controlled by an IDE controller. (1)

2.2.5 Give TWO reasons why the PS/2 port has been replaced with a USB port on modern motherboards. (2)

2.3 The graphic designer at the head office wants a new computer with an Intel i7 CPU. The i7 is a quad-core hyperthreading 64-bit processor with the following features:

- 2.93 GHz core speed
- 8 MB of cache memory

2.3.1 How many CPUs does a quad-core chip have? (1)

2.3.2 The suggested processor uses the multiprocessing technique to process tasks. Define the term *multiprocessing*. (2)

2.3.3 Give ONE practical example of how hyperthreading technology is applied by a software application. (1)

2.3.4 List FOUR steps the CPU repeats for every instruction it has to execute, which is also known as the machine cycle. (4)

2.3.5 The senior manager is not sure about the significance of cache memory in a computer system.

(a) Briefly explain how cache memory works. (2)

(b) He asks the following question: 'If cache memory is so important, why does the suggested computer only have 8 MB of cache memory?'

Give TWO reasons why cache memory in computers is limited. (2)

2.4 The senior manager wants to know more about the management of RAM.

2.4.1 State TWO aspects regarding RAM that the operating system has to manage. (2)

2.4.2 Virtual memory is often used while managing RAM. Explain what *virtual memory* is. (2)

2.4.3 The use of virtual memory can result in thrashing. Explain what *thrashing* is. (2)

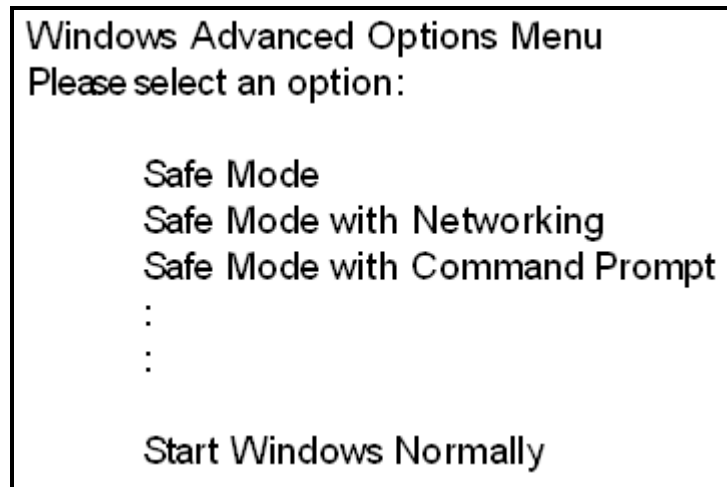
2.5 The branch office in Durban needs an Internet connection.

2.5.1 Name ONE type of broadband Internet connection that could be used. (1)

2.5.2 State TWO advantages of the type of broadband connection mentioned in QUESTION 2.5.1. (2)

- 2.6 A laser printer is connected to the senior manager's computer.
- 2.6.1 The senior manager needs to print documents but the printer does not display in the print dialog box. State how this problem can be solved. (1)
- 2.6.2 A new colour inkjet printer and an external hard drive have been delivered to his office. Plug-and-play and hot-swapping should allow him to use these hardware devices without assistance from the IT department.
- (a) Briefly explain what *hot-swapping* means. (1)
- (b) Is it correct to say that with plug-and-play you don't need any driver programs? (1)
- 2.7 The computers used by volunteer staff at the Johannesburg branch were donated to the company. The computers' hard disk drives were already partitioned and formatted by the previous owners.
- 2.7.1 What does it mean when we say that a hard disk has been *partitioned*? (1)
- 2.7.2 State TWO advantages of having a hard disk partitioned. (2)
- 2.8 The cabinet housing the network server in Bloemfontein also contains a router.
- 2.8.1 Briefly explain why a router is able to manage the bandwidth of a network efficiently. (2)
- 2.8.2 State TWO other functions of a router. (2)
- 2.9 The senior manager is concerned about several complaints from users about different messages that are displayed on the screen during the boot-up process of their computers.
- 2.9.1 Give ONE possible reason why the message 'Non-system disk' appears on the screen during the boot-up process. (1)

- 2.9.2 The screen below is displayed during the boot-up process. It refers to 'Safe Mode'.



What could be a possible reason why a computer system has to boot up in safe mode? (1)

- 2.9.3 The BIOS is responsible for displaying these messages. Briefly explain the role of the BIOS during the boot-up process. (2)

TOTAL SECTION B: 47

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

Blue Crane Tours uses a number of online tools to manage their business.

3.1 The company uses online banking to receive and make payments.

3.1.1 A lock symbol appears in the browser interface when using the online banking website to indicate security.



(a) How else could you tell whether the website is secure? (1)

(b) Why is a website not guaranteed to be secure even if there is a lock symbol? (1)

3.1.2 e-Commerce websites use public key encryption to ensure that transactions are secure.

(a) What is *e-commerce*? (1)

(b) Briefly explain what an encryption algorithm does. (1)

3.1.3 Phishing is always a risk when users are online.

(a) Explain what *phishing* is. (2)

(b) How does *pharming* differ from *phishing*? (1)

3.1.4 Online users often receive hoax e-mails. Give TWO pieces of advice on how to respond to a hoax. (2)

3.2 Why is it advisable to have a firewall installed at the head office? (1)
[10]

QUESTION 4: SOCIAL AND ETHICAL ISSUES

Blue Crane Tours has been confronted with some ethical issues regarding the use of ICT.

- 4.1 While going through the log of sent items on the e-mail server, the office manager saw an e-mail that the secretary had sent to her husband. Her husband is an estate agent selling holiday flats. A list of all the e-mail addresses of the company's clients from the company's database was attached to the e-mail.
- 4.1.1 These e-mail addresses can be used to send spam. Explain what *spam* is. (2)
- 4.1.2 Name TWO ethical issues regarding the e-mail that was sent by the secretary (excluding the possibility of spamming people). (2)
- 4.1.3 The office manager incorrectly refers to the sending of the e-mail as identity theft. Explain what *identity theft* is. (2)
- 4.2 Due to the increasing availability of online information, such as travel blogs and forums, the tourism industry might find itself out of business.
- 4.2.1 Define a *travel blog*. (2)
- 4.2.2 Give TWO examples of how ICT can be used to assist potential travellers in planning and organising their own holiday trips. (2)
- 4.3 The company has been advised to request potential tourists to register for an online health service. Their personal medical history, for example prescriptions, allergies and immunisation records can be stored online.
- 4.3.1 State TWO advantages from the company's perspective of having the clients' health records available online. (2)
- 4.3.2 State TWO disadvantages from the clients' perspective of having the clients' health records available online. (2)

[14]**TOTAL SECTION C: 24**

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

Blue Crane Tours uses custom software that has been developed to keep track of all their tours in a central database. This database is available to all their branches across South Africa.

- 5.1 A database named **CraneDB** was created with the table **tblToursInfo** to store information on the different tours and their clients.

tblToursInfo : Table		
	Field Name	Data Type
	TourID	Number
	TourName	Text
	TourGuide	Text
	TourStartDate	Date/Time
	TourEndDate	Date/Time
	SurnameClient1	Text
	Client1PhoneNumber	Text
	SurnameClient2	Text
	Client2PhoneNumber	Text
	SurnameClient3	Text
	Client3PhoneNumber	Text
	SurnameClient4	Text
	Client4PhoneNumber	Text
	SurnameClient5	Text
	Client5PhoneNumber	Text

- 5.1.1 The **tblToursInfo** table has no primary key.

- (a) What is the purpose of a primary key? (2)
- (b) Which field in this table would be most suitable to use as the primary key field? (1)

- 5.1.2 The general properties for the **SurnameClient1** field are shown below.

General		Lookup	
Field Size	50		
Format			
Input Mask			
Caption			
Default Value			
Validation Rule	Len([SurnameClient1])>10		
Validation Text			
Required	Yes		
Allow Zero Length	Yes		
Indexed	No		
Unicode Compression	Yes		
IME Mode	No Control		
IME Sentence Mode	None		
Smart Tags			

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

(b) Comment on the suitability of the validation rule for this field. (1)

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

5.1.3 You need to normalise the **tblToursInfo** table to 2NF. Answer this question on ANNEXURE A (attached) by doing the following:

(a) Separate the fields in the **tblToursInfo** table into two new tables, **tblTours** and **tblClients**. (4)

(b) Clearly indicate which field(s) in the **tblTours** and **tblClients** tables will serve as the primary key field(s) (PK). (2)

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

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

5.1.4 Explain the purpose of referential integrity when establishing relationships between fields of different tables. (2)

5.2 The programmers developed the following algorithm to validate clients' birth dates. The following applies:

- The year of birth should be entered as a 4-digit value.
- Assume that the algorithm will only be used during the year 2012.

Line	
1	Current year \leftarrow 2012
2	Year \leftarrow Input year of birth (four digits)
3	Valid \leftarrow True
4	If Year is 4 characters long
5	If Year is greater than Current year
6	Valid \leftarrow False
7	Display the content of Valid

5.2.1 What is the purpose of an algorithm? (1)

5.2.2 Standard and extreme test data are used as input to determine the reliability of a program. Give ONE example of extreme test data that can be entered to test the reliability of this algorithm. (1)

5.2.3 Data entered by a user should be valid and correct. Use the year of birth to explain the difference between *valid* and *correct* data. (2)

5.2.4 There are logical errors in the given algorithm which means that it will not always give a correct indication of whether the year of a birth date value is valid.

- (a) Identify TWO logical errors contained in the algorithm. (2)
- (b) Explain how you could correct EACH of the errors identified in QUESTION 5.2.4(a). (2 x 2) (4)

5.2.5 Syntax and runtime errors can occur during the development and testing of the software.

- (a) Explain the difference between a *syntax error* and a *runtime error*. (2)
- (b) Give ONE practical example of an error in a program that can be classified as a:
- (i) Syntax error (1)
- (ii) Runtime error (1)

5.3 The agency uses an online application form to capture the details of new clients. The following GUI has been designed for this purpose:

Help Exit New

Accept data

ENTER CLIENT DETAILS

Button

Text fields to enter data, for example the surname and phone number of a new client

Label

List FOUR ways in which the layout and user-friendliness of the interface can be improved. (4)

- 5.4 The programmers who created the software for the company used object-oriented programming (OOP) principles. The following class diagram has been designed to represent a client object. Study the class diagram below and answer the questions that follow.

CLIENT	
<ul style="list-style-type: none"> – ClientID – ClientFirstName – ClientSurname 	Private attributes
<ul style="list-style-type: none"> + Constructor() + Constructor(ClientID) + Constructor(ClientID, ClientFirstName, ClientSurname) + getFirstName():String + getSurname():String + setFirstName(ClientFirstName) + setSurname(ClientSurname) + toString():String 	Public methods

- 5.4.1 Use examples from the class diagram above to explain the concept of *overloading*. (2)
- 5.4.2 Classes can contain accessor and mutator methods.
- (a) Briefly explain why a class requires an accessor method. (2)
- (b) Give ONE example of an accessor method from the given class diagram. (1)
- 5.4.3 What is the purpose of the *toString()* method? (1)

- 5.5 The programmers developed the following algorithm for users to search for any given client in their database:

NOTE: **arrClients** is an array of client objects already populated from the database.

Line	
1	ClientSurname ← Input ClientSurname
2	For loop from first to last element in arrClients array
3	Surname ← Get Surname of current object in arrClients array
4	If Surname = ClientSurname
5	Display current arrClients's object information
6	End Loop

- 5.5.1 Give TWO reasons why a WHILE loop with a flag would be more effective in this algorithm than the FOR loop. (2)
- 5.5.2 It is possible for a WHILE loop with a flag to become an infinite loop.
- (a) Explain the ITC (initialise, test and change) concept when using a WHILE loop with a flag. (3)
- (b) Give ONE example of a WHILE loop with a flag formulated to replace the FOR loop in this algorithm that will cause the loop to become an infinite loop. (2)
- 5.5.3 Rewrite line 4 of the given algorithm to be able to process either the full surname or only the first three letters of the surname entered by the user when searching for a client. (2)

TOTAL SECTION D: 50

SECTION E: INTEGRATED SCENARIO**QUESTION 6**

The computers in the different offices in the head office building need to be connected in order to allow all the employees to have access to the company's client database.

- 6.1 The head office manager suggests that they create a LAN to link the computers.
- 6.1.1 Give THREE reasons why connecting the computers in a network would be to the benefit of the company. (3)
- 6.1.2 The manager needs to choose between a server-based network and a peer-to-peer network.
- State TWO advantages of a:
- (a) Peer-to-peer network (2)
- (b) Server-based network (2)
- 6.1.3 He needs to choose between installing a wireless LAN (WLAN) and a LAN using UTP cables.
- (a) Give TWO reasons why a WLAN has been recommended by the IT department. (2)
- (b) Name ONE negative aspect of using a WLAN. (1)
- (c) State ONE advantage of using UTP cables other than cost. (1)
- 6.2 Installing thin-client workstations is an option for the office.
- 6.2.1 What is meant by a *thin-client workstation*? (2)
- 6.2.2 From a security perspective, give TWO reasons why thin-client workstations will be a better choice than fat-client workstations. (2)
- 6.3 The head office manager is advised to install a dedicated server to provide Internet connection.
- 6.3.1 Define a *web server*. (2)
- 6.3.2 Define a *proxy server*. (1)
- 6.3.3 Give TWO reasons for using a proxy server rather than a web server. (2)

- 6.4 It is often necessary for the employees to communicate with clients. One month, the telephone bill was too high and the office manager asked the employees to use Skype instead as a means of communication.
- 6.4.1 What protocol is used in Skype communication? (1)
- 6.4.2 What hardware will be required for every employee's computer in order to communicate via Skype? (2)
- 6.5 The office manager has decided to create a hotspot for prospective clients to use for research on possible destinations.
- 6.5.1 Define a *hotspot* in the context of computing. (2)
- 6.5.2 Name ONE device that can be connected to a hotspot. (1)
- 6.5.3 Identify the type of network communication used at hotspots. (1)
- 6.6 The head office in Cape Town is electronically connected to the four other offices in the country using a VPN.
- 6.6.1 Is this network a WAN or a GAN? (1)
- 6.6.2 Give TWO reasons why a VPN can be a risk in terms of security. (2)
- 6.7 Clients want to access the official website of Blue Crane Tours while they are on tour. The office manager needs to contact a professional to develop a WAP website.
- 6.7.1 What will be the job title of the professional he needs to contact? (1)
- 6.7.2 State TWO features of a WAP website. (2)
- 6.8 The competition between different travel agencies is more intense than ever. The Blue Crane Tours company needs to modernise their way of advertising.
- 6.8.1 A decision needs to be made on whether marketing material should be printed or copied to DVDs to distribute.
- (a) State ONE disadvantage of printing rather than copying marketing material to DVDs, other than cost. (1)
- (b) State ONE disadvantage of copying marketing material to DVDs, other than cost. (1)
- 6.8.2 *Wikis* and *forums* are seen as new media. Briefly explain the difference between the two concepts. (2)

- 6.9 A pamphlet received from JoJo's Game Reserve contained the following information:

98,9% of all tourists who visited South Africa in 2010 during the Soccer World Cup, visited JoJo's Game Reserve.

Someone queried this statistic, believing it to be incorrect. State THREE ways of verifying the trustworthiness of data/information.

(3)

- 6.10 A database was planned and created by the database administrator at the Bloemfontein branch. The data on all the clients and employees were entered into the database tables. All the employees have access to the database.

6.10.1 Explain the difference between *data* and *information*. Use examples as part of your answer.

(3)

6.10.2 Explain why record-locking is necessary when different employees are working on the same table in a database.

(2)

6.10.3 The office manager needs to present information to the board of directors regarding all employees that were promoted during the last six months. Will he create a query, a report or both for this purpose? Motivate your answer.

(2)

6.10.4 Besides planning and creating a database, name TWO other tasks that a database administrator has to perform as part of his/her duties.

(2)

TOTAL SECTION E: 49
GRAND TOTAL: 180

ANNEXURE A**CENTRE NUMBER:** _____**EXAMINATION NUMBER:** _____

tblTours : Table	
PK/FK	Field Name

tblClients : Table	
PK/FK	Field Name