



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**FEBRUARY/MARCH 2013**

**MEMORANDUM**

**MARKS: 180**

**This memorandum consists of 17 pages.**

**SECTION A: MULTIPLE-CHOICE QUESTIONS**

**QUESTION 1**

- |      |     |     |
|------|-----|-----|
| 1.1  | A ✓ | (1) |
| 1.2  | C ✓ | (1) |
| 1.3  | C ✓ | (1) |
| 1.4  | C ✓ | (1) |
| 1.5  | B ✓ | (1) |
| 1.6  | D ✓ | (1) |
| 1.7  | B ✓ | (1) |
| 1.8  | D ✓ | (1) |
| 1.9  | C ✓ | (1) |
| 1.10 | B ✓ | (1) |

**TOTAL SECTION A: 10**

## SECTION B: HARDWARE AND SOFTWARE

### QUESTION 2

- |     |       |   |     |
|-----|-------|---|-----|
| 2.1 | 2.1.1 | Front Side Bus ✓  | (1) |
|     | 2.1.2 | (a) Address bus✓, system bus✓, data bus✓  | (3) |
|     |       | (b) Quad pumping ✓  | (1) |
| 2.2 | 2.2.1 | Intel ✓   | (1) |
|     | 2.2.2 | <i>The keyboard requires an IRQ because when a key is pressed, CPU processing needs to be interrupted to process the keystroke.✓</i><br><i>Also accept any correct description that mentions that the CPU has to be interrupted.</i>  | (1) |
|     | 2.2.3 | <i>CMOS data:</i> <ul style="list-style-type: none"> <li>• Data being read by the BIOS during power on test ✓</li> <li>• Data set by the user e.g. the date and time, boot order, etc. ✓</li> </ul>   | (2) |
|     | 2.2.4 | <i>Accept any ONE item that connects to an IDE port✓</i> <ul style="list-style-type: none"> <li>• Hard drive</li> <li>• Floppy drive</li> <li>• CD-ROM/DVD drive</li> </ul>   | (1) |
|     | 2.2.5 | <i>Accept any TWO correct reasons for replacing PS/2 ✓✓</i> <ul style="list-style-type: none"> <li>• PS/2 is old technology/is no longer viable to manufacture in the competitive market</li> <li>• USB has faster data transfer rates</li> <li>• USB allows different hardware devices (not only keyboard and mouse) to be connected to the same port using daisy chaining</li> <li>• PS/2 only allows PS/2 compatible keyboard and mouse to be connected</li> </ul> | (2) |
| 2.3 | 2.3.1 | 4 ✓   | (1) |
|     | 2.3.2 | <i>Multi-processing is when two or more processors ✓ can perform different tasks/threads at the same time✓</i>  | (2) |
|     | 2.3.3 | <i>Accept any ONE correct example explaining the use of threads ✓</i> <ul style="list-style-type: none"> <li>• Auto save while working on the document</li> <li>• Spellchecking/grammar checking as you type out a document</li> <li>• Rendering of graphics screens while playing a computer game</li> </ul>   | (1) |

- 2.3.4      *Machine cycle*
- Fetch instruction ✓ from RAM to CPU
  - Decode the instruction ✓
  - Transfer the data ✓ from registers to CPU
  - Execute the instruction ✓ (4)
- 2.3.5      (a) *Cache memory* works by pre-fetching the instructions/data ✓ most likely to be used next by the CPU ✓ in order to assist the CPU from not reading the instructions/data from the slower RAM. (2)
- (b) • Cache is very expensive ✓  
              • Cache is located in the CPU and the space is restricted ✓ (2)
- 2.4      2.4.1      *Accept any TWO appropriate facts regarding memory management* ✓✓
- The operating system makes sure that every program gets the memory that it needs.
  - The operating system must ensure that two programs do not access the same piece of memory – prevents access violations in Windows OS.
  - The operating system ensures that no application gains direct access to RAM – gains access only through the memory management unit.
  - Manage the physical amount of RAM assigned to a program so its size may vary according to the programs needs.
  - No matter how much physical memory is available, all new operating systems make use of virtual memory. (2)
- 2.4.2      Virtual memory is an area reserved on the hard drive ✓ that the OS uses as additional RAM ✓ (2)
- 2.4.3      *Thrashing* is when the operating system spends more of its time swapping pages ✓ (parts of a swap file) between the RAM and virtual memory ✓ (paging) than executing application software. (2)
- 2.5      2.5.1      *Accept any ONE* ✓
- 3G/LTE
  - ADSL
  - WiMax (1)

2.5.2 Accept any TWO advantages of the connection mentioned in Question 2.5.1 ✓✓

3G/LTE	<ul style="list-style-type: none"> <li>widely available in South African cities</li> <li>allows mobile devices an Internet connection</li> <li>fast data transfer rate</li> <li>only pay for data being downloaded/uploaded</li> </ul>
ADSL	<ul style="list-style-type: none"> <li>stable</li> <li>fast data transfer rate</li> <li>high bandwidth available/capped bandwidth</li> <li>simultaneous voice and data</li> <li>low latency</li> </ul>
WiMax	<ul style="list-style-type: none"> <li>fast data transfer rate</li> <li>is distinct from cellphone technology</li> <li>can provide broadband wireless access for up to 50 km for fixed stations and 15 km for mobile stations</li> </ul>

(2)

2.6 2.6.1 Accept any ONE correct way of solving no printer problem ✓

- Drivers need to be installed
- Install the printer

(1)

2.6.2 (a) *Hot-swapping*: Allows components to be replaced while the rest of the system continues to perform its tasks. ✓

(1)

(b) No ✓

(1)

2.7 2.7.1 *Partitioning a disk* - You can split a single physical hard drive into virtual/logical drives each with their own boot sector. ✓

(1)

2.7.2 Accept any TWO advantages for partitioning ✓✓

- Can put different file systems onto one physical disk (example: FAT32 and NTFS) – one for each logical drive
- Can have two or more different operating systems installed on one physical drive (Linux and Windows) – different operating system for each logical drive
- Split the operating system files and the user data files onto the different logical drives.

(2)

2.8 2.8.1 A router manages the bandwidth because it is able to inspect the data packets as they arrive and determine the correct destination ✓ of the data and forward it accordingly ✓.

(2)

2.8.2 Accept any TWO other capabilities of a router ✓✓

- Connect different network types together
- Ensures the safe transfer of data between networks
- Mainly used to connect LAN's into a WAN/Used to connect networks to the Internet
- Routers can also be used for port-forwarding

(2)

- 2.9      2.9.1      *Accept any ONE correct explanation for "non-system disk" error message ✓*
- The user tries to boot from a DVD/CD/Flash/stiffy/hard drive that doesn't contain a bootable sector
  - The boot sector of the C drive is damaged
  - The default drive has not been configured as a boot disk
  - The hard drive with the boot sector is not present in the PC
- (1)
- 2.9.2      *Accept any ONE correct explanation for "safe mode" message ✓*
- The computer restarts after a power failure
  - The user pressed F8/Del repeatedly during the POST in order to select a different start up sequence
  - The user pressed the "reset" button repeatedly
- (1)
- 2.9.3      The BIOS executes a series of tests✓ to make sure that computer hardware is connected properly and operating correctly. ✓
- (2)

**TOTAL SECTION B:      47**

## SECTION C: APPLICATIONS AND IMPLICATIONS

### QUESTION 3: e-COMMUNICATION

3.1 3.1.1 (a) The address will begin with HTTPS ✓

OR

The letter S is added to the HTTP section of the URL. (1)

(b) *Accept any ONE correct explanation ✓*

- There are non-reputable vendors that can sell digital certificates.
- A secure certificate only guarantees the website address and the name of the organization. It does not verify their ethics around their business practices.
- Certificate has expired.
- Another company/individual has taken over the domain. (1)

3.1.2 (a) Online trading through a digital means such as a website. ✓ (1)  
*Accept any similar alternative explanation*

(b) *Accept any ONE correct explanation ✓*

- It scrambles the information with a key so that it can only be unscrambled with the correct key.
- Encryption prevents any plain text information from being sent over a network or Internet. (1)

3.1.3 (a) *Phishing* is an Internet scam whereby someone sends you an e-mail that attempts to trick you into believing they are a secure organisation such as your bank. ✓ When you access their own copy of the original website, your details are stolen so that your account can be accessed. ✓ (2)  
*Accept any alternative similar explanation*

(b) *Pharming* takes you to a fraudulent website that looks similar to that of the bank which requests your banking details✓ (1)

3.1.4 *Accept any TWO correct pieces of advice given to repond to a hoax ✓✓*

- Don't always believe the information received from unknown e-mail users.
- Delete the unsolicited e-mail immediately.
- The more desperate the plea that the message is not a hoax, the bigger the chances are that it is a hoax. Ignore and delete.
- If the information seems real – check the validity thereof against other sources from the Internet. (2)

3.2 *Accept any ONE valid reason for using a firewall ✓*

- Users from other branches might try to access the server at head office for some reason, e.g. gain access to personal data of other employees
- Firewall prevents unauthorised connections from outside the company, e.g. the opposition, to any ports of the network server.
- Communication from software on the server to any outside source is restricted/prevented.

(1)  
**[10]**



#### QUESTION 4: SOCIAL AND ETHICAL ISSUES

- 4.1      4.1.1      SPAM is electronic junk mail✓ sent to someone without them requesting it (i.e. unsolicited).✓ (2)
- 4.1.2      *Accept any TWO ethical problems ✓✓*
- Violates the privacy of the clients
  - List can be sold by husband to third parties./Misuse of personal information
  - List can be used by husband to advertise business
  - The information belongs to the company and making a copy of it is theft. (2)
- 4.1.3      *Identity theft: When someone is taking on someone else's identity✓ and acting in that person's name. ✓* (2)
- 4.2      4.2.1      A *travel blog* is an electronic journal/diary✓ through which tourists can share knowledge and experiences about holiday destinations✓ (2)
- 4.2.2      *Accept any TWO ways of planning a holiday using ICT ✓✓*
- Using the Internet for booking of flights, transport, hotel, etc
  - Doing research on the destination
  - Easy to compare prices for different tour packages
- (or any explanation that correlates with this description)* (2)
- 4.3      4.3.1      *Accept any TWO **advantages** from the company's perspective ✓✓*
- If client is involved in an accident any notice about allergies is immediately available
  - If the client visits a malaria infected region, the immunisation records can be verified
  - If the client's prescription medication is finished – new medication can be dispensed from a local pharmacy because the prescription is available online
- Accept any similar valid explanations* (2)
- 4.3.2      *Accept any TWO **disadvantages** from the client's perspective ✓✓*
- The medical information of the client is confidential – any leak of the information can be seen as an invasion of privacy
  - The results of sensitive tests (e.g. HIV test) will be made available online – information not privileged for all to see.
  - The online prescriptions can be downloaded and edited by fraudsters and misused.
- Accept any similar valid explanations* (2)
- [14]**

**TOTAL SECTION C:      24**

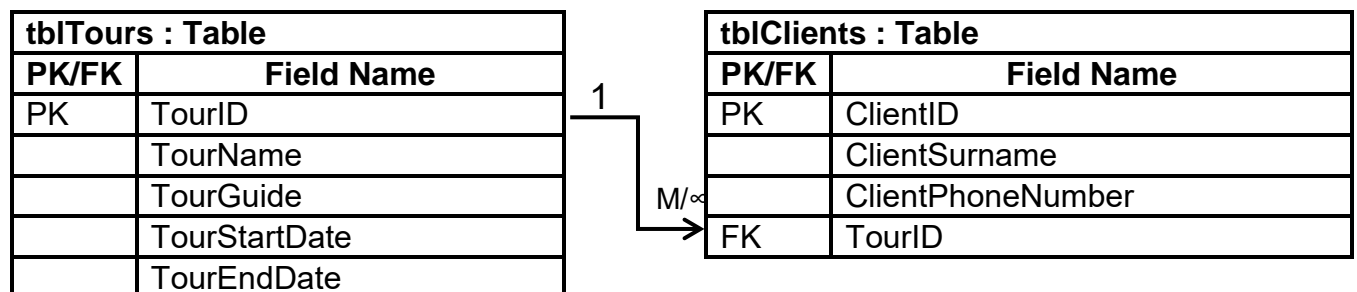
## SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT

### QUESTION 5: ALGORITHMS AND PLANNING

- 5.1 5.1.1 (a) A *primary key* is used to uniquely identify✓ every record✓ in a database table. (2)
- (b) TourID ✓ (1)
- 5.1.2 (a) The field size is limited to 50 characters. ✓ (1)
- (b) Accept any ONE valid comment on suitability of validation ✓
- A surname may be shorter than 10 characters; therefore the validation is not suitable.
  - It is not a good practice to validate text data such as surnames, names and addresses. (1)
- (c) Accept any ONE explanation ✓
- If Required = Yes:
- it indicates that the field must contain data
  - it is not allowed to be left empty / contain the NULL value (1)

5.1.3 Marked on Annexure A

A possible solution for 2NF (see criteria in (a) – (d)):



- (a) All the fields correct ✓✓✓✓  
**NOTE:** Subtract 1 mark per error (4)
- (b) Indicate each primary key for each table:
- TourID in tblTours ✓
  - ClientID in tblClients ✓ (2)
- (c) Relationship
- Draw line between tables indicating relationship ✓
  - Indicate relationship as a one-to-many relationship ✓ (2)
- (d) Indicate foreign key (TourID) in tblClients ✓ (1)

- 5.1.4      *Any TWO correct facts about referential integrity* ✓ ✓  
Referential integrity:  
  - ensures that fields linked via a relationship can not be deleted or removed without destroying the relationship.
  - protects related data.
  - ensures that when inserting data no orphan data is created – where there is no such record in the "1" of the relationship. (2)
- 5.2      5.2.1      *Algorithm:* To define a step by step working solution to a particular problem usually written in pseudo-code. ✓ (1)
- 5.2.2      *Extreme data:* e.g. 4560 ✓  
**NOTE:** *The value must be FOUR characters and the year must be extreme!* (1)
- 5.2.3      *Correct data:* The correct year of birth of the client, e.g. 1980✓.  
*Valid data:* Any valid year value that falls within the range of 1900 to 2013. ✓ (2)
- 5.2.4      (a)      *Accept any TWO correct logical errors* ✓ ✓  
  - Check only if the current year is FOUR characters long.
  - The year entered is only checked against the current year
  - There is no valid interval for a valid range of birthdays, because someone born in 1645 won't be a current client. (2)
- (b)      *Accept any TWO correct explanations to correct EACH logical error of question 5.2.4 (a)* ✓ ✓ ✓ ✓ (2 x 2 marks each)  
**NOTE:** *No programming code is acceptable!*  
  - Add an ELSE statement to the first IF-statement for checking if the year is FOUR characters long
  - Change IF statement to test a valid range of year values that will be appropriate for current customers, e.g. dates ranging from 1900 – 2013
  - Change the second IF statement to: IF (year bigger than 1900) OR (year less than current year) (4)
- 5.2.5      (a)      *A syntax error* occurs when the rules of the programming language are violated which prevents the program from running✓ OR a syntax error occurs before the program executes.
- Runtime error* occurs when the program is running and there is a fault in the algorithm that only appears once the program is running. ✓ (2)

- (b) (i) *Accept any ONE practical example of a syntax error ✓*
- WHLE instead of WHILE (or any example of an incorrectly spelled key word)
  - Missing semicolon (;) or any other punctuation from statements where required.
- (1)

- (ii) *Accept any ONE correct example of a runtime error ✓*
- No file available/file not found/no access to file
  - Division by zero
  - Invalid input from user/file/any other source
  - Printer not available when a printing statement is executed
- (1)

- 5.3 *Accept any FOUR ways of improving GUI ✓✓✓✓*
- The buttons at the top should be in a logical order, e.g. New, Help and Exit
  - The heading label at bottom of form should be at the top
  - The caption of the "Accept data" Button should be more descriptive
  - Add a label to instruct the user to enter the details of a new client/All the textboxes have no labels to indicate there purpose
  - The text fields should be in sequence next to each other or below each other, first surname and then phone number.
  - The button should be below textboxes – to help in logical flow
- (4)

- 5.4 5.4.1 The *constructor is overloaded* with three different versions. ✓  
Methods with the same name but different parameter options are called overloaded because the same method name can be called with different parameter options. ✓
- (2)

- 5.4.2 (a) *Accessor methods are required* because attributes are declared as private to protect them ✓ therefore a method is needed to return the data stored in the attribute. ✓
- (2)

- (b) *Any ONE of ✓*  
getFirstName()  
getSurname()
- (1)

- 5.4.3 *Purpose of toString() → To output in a string format the attributes of the class in a meaningful way. ✓*
- (1)

- 5.5 5.5.1 *Accept any TWO valid reasons for using a WHILE loop with a flag ✓✓*
- A while loop will make use of its checking condition to stop the loop once the condition is true, i.e. the correct client is found.
  - The FOR-loop will check every client in the array even when the correct client is found – wasting valuable processing time.
  - The number of clients in the database is not constant and may change. (2)
- 5.5.2 (a) The flag needs to be:
- I – initialised before the loop starts ✓
  - T – tested in the loop condition/be part of the condition ✓
  - C – changed inside the loop using an IF statement ✓ (3)
- (b) *Accept any ONE correct example of an infinite WHILE loop ✓✓*
- The programmer could not set the flag variable correctly.
  - The client name could not be found (does not exist). (2)
- 5.5.3 Line 4:
- `If (Surname = ClientSurname) OR ✓`  
`(First three letters of Surname = First three`  
`letters of ClientSurname) ✓` (2)

**TOTAL SECTION D: 50**

## SECTION E: INTEGRATED SCENARIO

### QUESTION 6

- 6.1      6.1.1      *Accept any THREE advantages of a network ✓✓✓*
- Easier to share data and information – transfer rather than copy to flash/DVD
  - Cost effective to share hardware resources and software
  - Facilitating communication, e.g. e-mails, instant messaging, blogs, etc.
  - Easier to maintain – only have to repair one device/software application
- Also accept any other suitable advantage.*
- NOTE:** No marks for the same reason mentioned again with revised wording. (3)
- 
- 6.1.2      (a)      *Accept any TWO advantages of peer-to-peer network ✓✓*
- Does not need a server – cheaper
  - Does not need a server – easier to install
  - Computers can be used as standalone – more flexible
- Also accept any other sensible answer* (2)
- (b)      *Accept any TWO advantages of server-based network ✓✓*
- Better security – securities easier to set
  - Larger number of computers can be connected – depends on number of employees
  - Clients don't need to be powerful but powerful server required – can be cheaper
  - Better performance – Powerful server enhances system
- Also accept any other sensible answer* (2)
- 
- 6.1.3      (a)      *Accept any TWO advantages of WLAN ✓✓*
- Mobility – can easily use mobile devices
  - Cost – use less cables
  - Planning – network doesn't need to be planned beforehand
  - Flexible – can move or add device, no extra cables
- (2)
- (b)      *Accept any ONE disadvantage of WLAN ✓*
- Security is low
  - Range is limited
  - Data transfer rate is slow
  - Reliability is questionable
- (1)
- (c)      *UTP cables are easier to install/don't need expertise to install✓*
- NOTE:** No mark for low cost (1)

- 6.2      6.2.1      *A thin client workstation* is a computer with no hard drive(s)/little or no storage facilities ✓ and is nearly always dependant on the server ✓ for storage and execution of applications. (2)
- 6.2.2      *Accept any TWO valid reasons* ✓✓
- No hard drive therefore no viruses or other malware can be saved on local hard drive
  - Better security facilities/settings available on the server to enforce on network hard drive
- (2)
- 6.3      6.3.1      *Web server:* Server permanently connected to the Internet ✓ hosting the company's websites ✓ (2)
- 6.3.2      *Proxy server:* Server that allows all other computers in the network ✓ to connect to the Internet ✓ (1)
- 6.3.3      *Accept any TWO advantages for using a proxy server* ✓✓
- Better control on websites visited
  - Better security, for example virus control
  - Easier to setup
  - Web caching of more websites visited by different users
- (2)
- 6.4      6.4.1      VoIP ✓ (1)
- 6.4.2      *Any of the following for **one mark each**:* ✓✓
- Headphone or speakers
  - Microphone
- OR**
- Any ONE of the following for **two marks**:*
- Skype phone
  - Headset
- (2)
- 6.5      6.5.1      *Hot spot:* Wireless Access Point ✓ that provides Internet connection for mobile devices ✓ (2)
- 6.5.2      *Accept any ONE device* ✓
- Laptop
  - Cellphone
  - Smart phone
  - PC with WiFi card
  - Or any other mobile device with WiFi ability
- (1)
- 6.5.3      WiFi ✓ (1)
- 6.6      6.6.1      WAN ✓ (1)

- 6.6.2      *Accept any TWO valid reasons why VPN is security risk ✓✓*
- Any employee can connect to company's server from anywhere an Internet connection is available.
  - Any person (doesn't have to be an employee) can try to access the server
  - Making use of telephone cables EMI and eavesdropping can become a problem. (2)
- 6.7      6.7.1      Web designer ✓ (1)
- 6.7.2      *Accept any TWO distinctive features of WAP website ✓✓*
- It must be developed to work in a smaller display area
  - Fewer keyboard functions
  - Touch screen optimised
  - Lower reliance on graphical output (2)
- 6.8      6.8.1      (a) *Accept any ONE disadvantage of printing (excluding cost) ✓*
- Smaller area to advertise
  - Not eco-friendly
  - Not always suitable for visually impaired people
- Also accept any correct alternative (1)*
- (b) *Accept any ONE disadvantage using DVD (excluding cost) ✓*
- Not everybody has DVD players
  - Overload of information
  - Cannot always look at info while visiting destination.
- Also accept any valid alternative (1)*
- 6.8.2      *Accept any ONE fact about each ✓✓*
- WIKI:** (source of information)
- Is a reference source (encyclopaedia) or article published on the Internet, usually written by a group of volunteers?
  - The main idea of a wiki is that any person can contribute to the content.
  - The final published articles on a wiki does not belong to anyone – they normally make it accessible in the public domain. (1)
- FORUM:** (More interactive – ask questions)
- Is an online place where people discuss issues or obtain online help
  - People ask a series of structured questions which is answered either by fellow subscribers to the forum or by the forum's expert
  - Specialised forums may need you to register before you are allowed to publish questions or answer other questions. (1)



- 6.9 *Accept any THREE ways of verifying the trustworthiness of data/information*  
✓✓✓
- Check if data is authentic
  - Is the data from where it says it comes/Author?
  - Check data for validity/Is source valid?
  - Is data up-to-date?
  - Does the data correlate with other sources? (3)
- 6.10 6.10.1 **Data:**  
Raw facts and numbers usually type into the database tables/excel spreadsheets.✓
- Example:*  
The raw numbers of tourists arriving in the country
- Information:**  
Results of queries/data filtered or sorted to answer questions.✓
- Example:*  
A report on the number of tourists grouped per country of origin
- NOTE:**  
Give ONE mark for a correct example of data/information (3)
- 6.10.2 Record-locking is required:
- if more than one employee works on the same record some of the changes done will be lost. ✓
  - because if the record is locked only one person is allowed to work on that specific record.✓ (2)
- 6.10.3 Both ✓
- A query is needed to extract all promoted employees.  
A report is required to present the names in a presentable format to the board. ✓  
*Accept any correct alternative explanation* (2)
- 6.10.4 *Any TWO duties of a database administrator* ✓✓  
(excluding planning and creating database)
- Control access to the database – setting up user accounts/password
  - Creating backups of the database/get recovery procedure in place/do recovery of data
  - Create the queries required by the people using the database
  - Creates and maintains a data dictionary
  - Monitor performance of the database (2)

**TOTAL SECTION E: 49**  
**GRAND TOTAL: 180**