basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS**

INFORMATION TECHNOLOGY P2

2023

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 18 pages.

SECTION A: SHORT QUESTIONS

QUESTION 1

1.1	1.1.1	E ✓	Metadata	(1)
	1.1.2	K ✓	Record	(1)
	1.1.3	H ✓	Mbps	(1)
	1.1.4	N ✓	Exception handling	(1)
	1.1.5	A ✓	WWW	(1)
	1.1.6	O ✓	Spam	(1)
	1.1.7	F ✓	Plug-in	(1)
	1.1.8	Q ✓	Parameter	(1)
	1.1.9	C ✓	mp3	(1)
	1.1.10	L ✓	Semantic search	(1)
1.2	1.2.1	C ✓	VPN	(1)
	1.2.2	C ✓	Botnets	(1)
	1.2.3	D ✓	Data mining	(1)
	1.2.4	A ✓✓	Answer: 3	(2)

TOTAL SECTION A: 15

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

2.1 2.1.1 *The purpose of the CPU:*

Performs calculations and other instructions. ✓

Also accept:
Processing of data (1)

2.1.2 (a) *Explain what the term multicore refers to:*

A *processor* that has more than one processing unit/core ✓ on a single processor chip. ✓ (2)

2.1.2 (b) *Any ONE processing technique that will allow the full benefit of multicore technology:* ✓

- Multi-processing
- Multi-threading
- Parallel processing technique (1)

2.1.2 (c) More than one processing core, allows multiple tasks or threads to be processed at the same time ✓ improves the speed at which tasks are completed/done. ✓

Any TWO of the following concepts:

- Due to the use of multiple cores
- Multiple tasks/threads
- Processed simultaneously
- To speeds up the time it takes to complete tasks (2)

2.1.3 Graphics processor has its own resources/processor/RAM which handles the processing of graphical images/rendering ✓, thus lessening the load on the CPU. ✓

Concepts:

- GPU handles processing of images/rendering
- Lessens the load on the CPU (2)

2.2   2.2.1   Diagonally from one corner to the opposite. ✓   (1)

        2.2.2   HDMI ✓

                  ANY ONE motivation for using HDMI: ✓
                  • It allows for faster transfer of data
                  • Also carries sound
                  • Better image quality
                  • Carrying control signals   (2)

2.3   *Any TWO positive properties of flash disk technology:* ✓✓

        • High access speeds /higher read/write speeds
        • No noise
        • Very low heat dissipation
        • No moving parts – more robust
        • Low power use
        • Smaller physical dimensions   (2)

2.4   *ANY TWO advantages of Wi-fi compared to Bluetooth*: ✓✓

        • Wi-Fi has a higher bandwidth/speed
        • The range that a Wi-Fi signal can travel is further than a Bluetooth signal
        • Wider variety of devices can connect
        • Larger number of devices can be connected
        • Wi-Fi has better security   (2)

2.5   2.5.1   An operating system is system software ✓ which controls/manages all
                  the activities that take place in a computer. ✓

                  Concepts:
                  • System software
                  • Controls/manages activities or processes   (2)

        2.5.2   Proprietary OR open-source ✓

                  Any TWO motivations/reason specific to the software selected: ✓✓

                  Open-source
                  • Source code is available for further development
                  • Can be customised with necessary skills
                  • Often available for free
                  Proprietary
                  • Formal support
                  • Creators accept greater responsibility for the product
                  • Fewer versions/more standardised
                  • Improve integration with other software
                  • Regular updates and patches
                  • Updates and features are released throughout the life cycle   (3)

2.6   2.6.1   *Any ONE example of what SaaS model entails:* ✓

- Software is not bought, but rented
- Software is accessed over the internet/cloud   (1)

       2.6.2   *Any TWO of the following merits in SaaS:* ✓✓

- Easier to roll out updates and fixes
- Better control over piracy
- More control of licensing management
- More constant income stream
- Can provide mobile and Web access/Ubiquity
- Faster deployment time
- Scalability / different pricing options / different features   (2)

2.7   The antivirus needs to scan files for viruses ✓ before it is executed, adding more tasks that continuously run in background. ✓

     Concepts:
- Scanning of files before use
- Taking up resources   (2)

                                               TOTAL SECTION B: **25**

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

3.1 3.1.1 (a) *Any ONE function of a switch:* ✓

- Connects the devices
- Regenerates signals
- Directs the traffic between devices in the network (1)

3.1.1 (b) *Wireless access point:*

Sends and receives ✓ radio waves. ✓
OR
Makes connection possible to a network (1) by means of radio
waves. (1) (2)

3.1.1 (c) *Router:*

Directing data to its correct destination ✓
OR
Allowing communication between different networks/connecting to
the internet (1) (1)

3.1.1 (d) *Any ONE function of a server:* ✓

- Provides resources to clients in a network/ share network
  resources
- Management of access/security (1)

3.1.2 *Any TWO other types of security measures to safeguard your data
on a network*: ✓✓

- Using anti-virus/anti-malware software
- Keeping all your software up to date
- Being aware of current trends in computer crime
- Passwords
- Encryption
- Deploying and managing a network policy
- Control user management/Access control
- Perform regular back-ups
- Intrusion detection
- Using a VPN

Also accept any other suitable examples. (2)

3.1.3 *Any TWO possible causes for the decrease in transmission rate on Wi-Fi networks*: ✓✓

- Large number of users connected to AP
- Electromagnetic interference
- Distance from the access point
- Excessive data usage by any connected user
- Impacted by bad weather (2)

3.1.4
- Files are broken up into smaller parts ✓
- Parts are downloaded from different peers/seeders ✓
- Parts are recombined to form files ✓

Alternative concepts:
- Have the necessary software installed (1)
- Find/select the relevant torrent file (1)
- Download from a user that has shared the file/seeder/peer (1) (3)

3.1.5 (a) Switch ✓ (1)

3.1.5 (b) If the switch malfunctions, the entire network will not function. ✓
OR
Single point of failure (1) (1)

3.2 3.2.1 *Difference between a file syncing service and a backup service:*

Synchronisation is ensuring all devices have the latest copy of files. ✓
Backup is making an additional copy to be used in case of damage/loss. ✓ (2)

3.2.2 *Any TWO disadvantages of using cloud storage:* ✓✓

- You need internet access
- Data costs
- Security risk
- Company could go out of business leading to loss of data
- Cost for additional space on cloud storage if needed

Also accept other suitable examples. (2)

3.2.3 *Any TWO why optical fibre is the recommended choice of a communication medium to upload vast amounts of data to the cloud:* ✓✓

- Higher bandwidth/faster
- Does not degrade over long distances
- Immune against crosstalk
- Immune against EMI (2)

3.3   3.3.1   Locally ✓   (1)

     3.3.2   *Any ONE example of data stored by a cookie:* ✓

- User information/preferences for the website
  - Location
  - Language
  - Email address
  - Unique ID
  - Password
- General information of previous visits
  - Date/time visited   (1)

     3.3.3   *Any TWO motivations for the use of apps:* ✓✓

- Transfers less data, leading to faster speeds
- Gives the user a more user-friendly control
- Gives the user more control on what they can do
- Allows the user to receive automatic notifications when content on the webpage is updated.
- Easy access
- Personalised
- More mobile
- No cookies being stored/created on your computer
- Allows offline use of content
- Improved security   (2)

3.4   3.4.1   (a)   People that group together online ✓ based on common interests and/or beliefs.   (1)

                (b)   *Any ONE of the following Web 2.0 developments:* ✓

- Dynamic webpages were developed
- Users became contributors of content
- Websites have become interactive
- Led to the development of social networking   (1)

     3.4.2 (a)   Multiple devices are connected to the internet. ✓ These devices can independently communicate with each other ✓ and make 'intelligent'/ rule-based logic decisions based on the input received.

Concepts:

- A range of devices are connected to the internet (1)
- These devices can independently communicate (1)   (2)

     Please turn over

3.4.2 (b)   Any suitable example ✓✓

Example 1:
The alarm clock and the kettle are both connected to an app over the internet. When the alarm goes off, the kettle is switched on.

Example 2:
The app that manages the swimming pool is connected to a sensor in the pool as well as to other devices such as the pool pump. The sensor communicates the need for chemicals. The app then switches on the pump.

Concepts:

- Different IoT enabled devices are connected
- Communication/control between the devices   (2)

TOTAL SECTION C: **[30]**

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1   4.1.1   An ERD provides a visual representation ✓ of how the data/tables
                  are linked in a relational database. ✓

                  Concepts:
                  • Mapping/visual representation (1) of a relationship between
                  • relational/linked tables or entities (1)   (2)

        4.1.2   (a)   Entity ✓

                  (b)   One ✓

                        ALSO ACCEPT:
                        Mandatory (due to the dual stripes)

                  (c)   Relationship ✓

                  (d)   Many ✓

                        ALSO ACCEPT:
                        Mandatory (due to the single stripe)   (4)

        4.1.3   *Requirement of a primary key:*

                  Cannot be null ✓/empty/needs to contain a value/compulsory field.   (1)

        4.1.4 (a) *Any TWO reasons why the table does not adhere to the rules of
                  normalisation*: ✓✓

                  • No primary key
                  • There should be no repeating fields
                  • The "Number of songs" field can be derived/calculated (the
                    field value should not be dependant on the value from another
                    field)
                  • The "Number of songs" field will need to be updated as songs
                    are added or removed from the table
                  • The songs must be placed in a separate linked table

                  Also accept any other valid explanations   (2)

        4.1.4 (b) *Any ONE reason why it is more suitable to save the playlist
                  information in a database rather than in a text file*: ✓

                  • Easy to filter information
                  • Perform queries
                  • Easier to maintain the database   (1)

4.2   4.2.1   The mark/grade must be an integer ✓
                    OR
                    The ID number must contain only digits (1)   (1)

         4.2.2   The range of marks is 0 to 150 ✓   (1)

         4.2.3   Each learner must have an ID/grade/mark ✓   (1)

4.3   **Physical independence:**
A change in the physical level usually does not need change at the application program level. ✓
OR
The application does not need different code to take the location where the database is stored/ on which media the database is stored into account.

Logical independence:
You do not need to make changes in the application program if the structure of the database is changed such as when fields are added or deleted from the database. ✓
OR
When you change the design of a table/field in an existing database, the application will remain unaffected.   (2)

4.4   4.4.1   To ensure the integrity of data. ✓
                    OR
                    To ensure that changes made are reflected/made in all related records/tables. (1)   (1)

         4.4.2   Rollback ✓   (1)

         4.4.3   Record locking ✓   (1)

         4.4.4   Many people work at the agency ✓ and it will be difficult to establish who made which changes without an audit trail. ✓
                    OR
                    The playlists contain copyright material of which the rights need to be protected, (1) thus access and changes to this need to be monitored. (1)

                    Any other valid example that includes the following **TWO concepts**:

                    •   A motivation for tracking access/changes.
                    •   Indicating that an audit trail tracks who accessed/made changes and when they were made.   (2)

                                                 TOTAL SECTION D: 20

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1   5.1.1   *Any ONE reason for the use of selection components rather than entry fields:* ✓

- Ensures validation
- Easier to choose than to type/faster capturing
- Eliminates the risk of capturing incorrect information/improves accuracy   (1)

5.1.2   *Benefit of saving the applicants' details in a text file:*

The text file allows for permanent storage of information. ✓   (1)

5.1.3   *Any ONE reason why a bit button would be more suitable:* ✓

- Linked to a prewritten/provided event or code
- Has an icon that graphically indicates the purpose of the button   (1)

5.2   5.2.1   Line 9 ✓   The square root of the number value must be assigned to a real variable. ✓   (2)

5.2.2   Line 13 ✓   The formula should be `iSquare := iNumber * iNumber` ✓
OR
`iSquare := SQR(iNumber)` (1)   (2)

5.2.3   Line 15 ✓   Division by zero is undefined ✓   (2)

5.3   5.3.1   Correct ✓   (1)

5.3.2   Incorrect ✓   (1)

5.4   5.4.1   Private access ✓   (1)

5.4.2   A method such as the toString() is made accessible ✓ from other classes outside the object class. ✓   (2)

5.5

Text	Count	Index	Text [Index] = one of Y&$6@?	Index <= Length?	Count >=3 AND Length>=8?	Display
Y&$6@	0	1	True			
	1	2		True		
			True			
	2	3		True		
			True			
	3	4		True		
			True			
	4	5		True		
			True			
	5	6		False		
					False	
						INVALID
	✓	✓	✓	✓	✓	✓

(6)

TOTAL SECTION E: **20**

SECTION F: INTEGRATED SCENARIO

QUESTION 6

6.1   6.1.1   Video on demand (VOD) is a content delivery platform/streaming service ✓ that allows viewers to choose when and what they watch. ✓

Concepts:

- Content delivery platform/streaming service
- The ability to choose when and what to watch   (2)

6.1.2   *Any TWO aspects that will be addressed by a EULA:* ✓✓

- Copyright provisions
- Restrictions in terms of the number of installations/devices
- Set the conditions of your license agreement with a user
- Specifying what the videos may be used for
- Conditions for changing/termination of service

Also accept other valid answers.   (2)

6.1.3   Geo-blocking works by establishing the user's Internet Protocol (IP) address. ✓ The IP address is used to determine geographical location of the user and then block content based on the location.✓

Concepts:
- Uses IP address to establish geographical location (1)
- The geographical location is used to apply restrictions (1)   (2)

6.2   *Any TWO ergonomic guidelines to avoid potential health problems*: ✓✓

- Sit up straight with your back perpendicular to the ground.
- Your forearms should be at the same height as your mouse and keyboard.
- Your feet should be placed firmly on the ground.
- The back of your chair, height of your chair and height of the armrests of the chair should be adjusted to support your body in this position.
- Your monitor should be positioned at eye level and roughly 50 cm away from you.
- Your monitor should be tilted to reduce glare.
- You should take regular breaks while using the computer.
- Using ergonomic hardware
- Wearing anti-glare glasses/accessories
- Ensure correct level of lighting

Also accept other valid answers.   (2)

6.3   6.3.1   *Any TWO motivations for streaming*: ✓✓

- Users want to start watching content immediately
- Copies of material will fill up user's storage
- Material is mostly copyright protected/makes piracy more difficult   (2)

           6.3.2   (a)   Lossy compression ✓   (1)

                        (b)   *Any TWO justifications for the use of lossy compression:* ✓✓

- Inconsequential data is lost/accuracy not essential because we are not working with numbers
- Less data needed to stream content
- Less storage needed to store content (by service provider)   (2)

6.4   6.4.1   *Any ONE way in which secure connections can be checked:* ✓

- Lock symbol
- URL starts with https
- Checking digital certificate   (1)

           6.4.2   (a)   Sensitive/private information is communicated over the internet during online payments,✓ encryption will ensure that unlawful access is not obtained to this information on a public network like the Internet. ✓

                                   Concepts:
- Private information is sent over public network/internet
- Access to this information is prevented by encryption   (2)

                        (b)   • Public key is obtained over the network from secure site ✓
                                   • Session key / data is encrypted using the public key ✓   and sent to secure site.
                                   • Session key/data is decrypted with the matching private key ✓ retained at secure site.

                                   Concepts:
- Encryption using public key (1)
- Decryption using private key (1)
- Public key is sent / private key retained at secure site (1)   (3)

6.4.3 *An explanation* ✓✓ *of any one example of a cyber technique used to obtain banking details of a user:*

NOTE: Both marks must be allocated to the explanation of a cyber technique (one mark per fact)

- Phishing –
  - o Tricking someone to obtain sensitive information
  - o by sending emails to users that look like official emails
- Spoofing –
  - o Changing electronic communication's information
  - o to make it seem as if it originated from a legitimate source
- Pharming –
  - o Create an official-looking website
  - o that requests sensitive information.
- Hacking –
  - o Breaking through security of networks
  - o to gain illegal access to personal information
- Man-in-the-middle attack –
  - o Cyber criminals intercept communication
  - o between users and legitimate banking websites
- Social engineering –
  - o Manipulating (gain trust) someone
  - o into giving out their personal information
- Malware (Keylogger, spyware) –
  - o Malicious software used to
  - o communicate personal/private information to a 3rd party (2)

6.5   6.5.1   (a) The ability to adapt the size/scale of the service to the changing requirements. ✓ (1)

               (b) *TWO ways to use virtualisation*:
Combining the resources of many computers into one powerful service ✓
Sharing the resources of one powerful machine between many users ✓ (2)

6.5.2   (a)   *Any TWO facts to motivate ✓✓ a distributed model:*

NOTE: Both marks must be allocated to the motivation of a distributed model (one mark per fact)

- Duplication –
  - All servers will have to be able to handle any user
  - because users can log on from anywhere
- Partitioning –
  - Users will be mostly distributed in certain geographical areas
  - data is accessible locally based on the need of users in a geographical area

NOTE: The motivation must fit with the concept of duplication having all the data, while partitioning only stores data needed by the specific server.   (2)

(b)   Regular synchronisation of databases. ✓

OR suitable description of synchronisation   (1)

6.6   6.6.1   Artificial intelligence is computer software/systems ✓ that simulates human intelligence. ✓

Concepts:
- Intelligence based in computer systems/technologies (1)
- Simulates human intelligence (1)   (2)

6.6.2   *Any ONE advantage of using a chatbot:* ✓

- Facilitate seamless live communication
- Make customer service available 24/7
- Improve response time
- Saving on personnel costs
- Automates tedious time-consuming tasks
- Get constant improvement over time with machine learning   (1)

6.6.3   *Any TWO motivations for using a real person:* ✓✓

- Can handle a wider variety of questions/answers
- Provides employment to people
- Unwillingness of people to use service because they know it is a machine
- Negative perceptions of AI
- Machines are not equipped to handle context/emotions   (2)

6.7   6.7.1   *Any TWO steps ✓✓ of data analytics with examples ✓✓*

- Cleaning the data (1)
  - by removing unwanted/redundant data like user preferences that are now outdated. (1)
- Analysing data (1)
  - to identify which age groups makes more use of VOD services and what their preferences are. (1)
- Visualisation/Modelling (1)
  - where the popularity of VOD services can be shown in terms of time of day/night being watched/categories of VOD services in terms of a graph. (1)

NOTE: Other examples related to the scenario can also be used.   (4)

6.7.2   *Any TWO challenges with big data: ✓✓*

- Extreme processing power needed to process very large amounts of data
- Large amount of storage required for large amounts of data
- Algorithms must be able to process variety of data
- Mechanisms to collect / capture data from variety of sources
- Time consuming due to the large amount of data to work with

OR any other applicable challenge   (2)

6.7.3   *Any TWO negative impacts on users to provide content to the user which specifically matches their viewing history: ✓✓*

- User's field of interest is artificially limited
- Negative or incorrect perceptions might be continuously re-affirmed
- Process can be used to manipulate user for other intentions
- Information from analytics can be sold to 3rd parties
- Can expose private information to others

OR any other suitable example of negative impact   (2)

TOTAL SECTION F: 40
GRAND TOTAL: 150