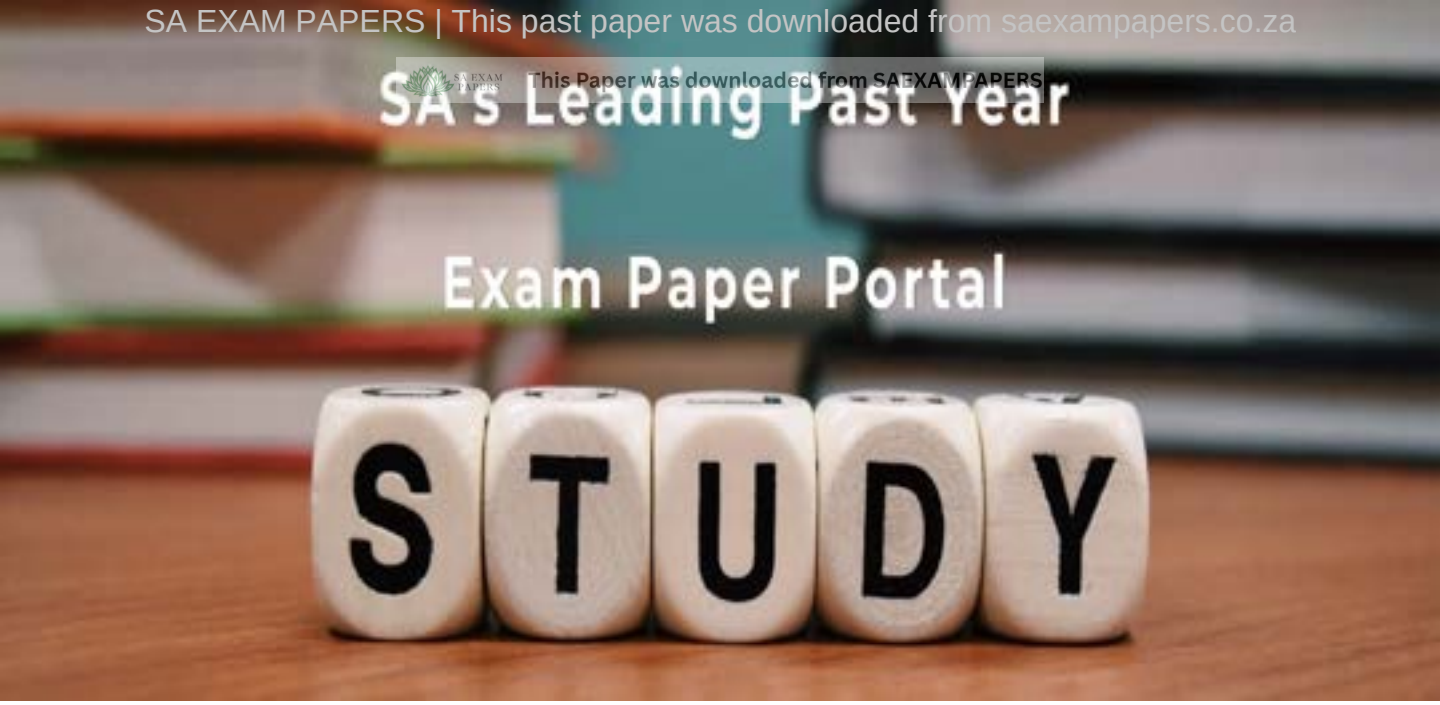


basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

INFORMATION TECHNOLOGY P2

MARKING GUIDELINES

NOVEMBER 2025

MARKS: 150

These marking guidelines consist of 22 pages.

SECTION A: SHORT QUESTIONS

QUESTION 1

1.1	1.1.1	B - SMTP ✓	(1)
	1.1.2	C - CPU Cache; VRAM; RAM; SSD; HDD ✓	(1)
	1.1.3	D - Intranet ✓	(1)
	1.1.4	C - system configuration ✓	(1)
	1.1.5	B - General Public License ✓	(1)
	1.1.6	C - Includes content of text format only ✓	(1)
	1.1.7	C - botnet ✓	(1)
	1.1.8	C - String ✓	(1)
	1.1.9	B - sString := UpCase(sString); ✓	(1)
	1.1.10	C - TRUE AND (FALSE OR TRUE) ✓	(1)
1.2	1.2.1	Algorithm ✓	(1)
	1.2.2	Netiquette ✓	(1)
	1.2.3	Uniform Resource Locator / URL ✓	(1)
	1.2.4	Device Driver ✓ Also accept: Driver	(1)
	1.2.5	Wiki/Wikipedia ✓	(1)
1.3	1.3.1	FALSE, Randomrange(10,**13**) ✓ OR Random(3) + 10	(1)
	1.3.2	FALSE, Android / iOS / Harmony OS ✓	(1)
	1.3.3	TRUE ✓	(1)
	1.3.4	TRUE ✓	(1)
	1.3.5	FALSE, source ✓	(1)
		TOTAL SECTION A:	**20**

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

2.1 2.1.1 *State TWO functions of a motherboard.*

Any TWO of: ✓✓

- Provides slots/ports/connectors for components
- Distributes power to components
- Enables communication between components (2)

2.1.2 *Explain why a bus communication path is slower than a point-to-point communication path on a motherboard.*

Any TWO of: ✓✓

- Bus is a shared communication path between components
- Delay caused by only one component/device being able to communicate at a time
- Point-to-point is a dedicated communication path (2)

2.1.3 *Explain why a GPU will improve the processing performance.*

GPU releases CPU of Graphic related tasks/rendering / GPU performs all the graphic related tasks ✓
CPU has more time to process other tasks / speeding up the processing of other tasks ✓

Any TWO of:

- The GPU performs all graphical-related tasks
- This lessens the burden on the CPU
- The CPU has more time to process other tasks (2)

2.1.4 *Compare the role of RAM and VRAM.*

RAM stores data/instructions ✓ to be processed by the CPU
VRAM stores images/video data ✓ to be processed by GPU (2)

2.2 2.2.1 *Essential hardware requirement of the CPU to enable multiprocessing*

The CPU must consist of more than one CPU core. ✓ (1)

2.2.2 *Virtual memory is managed by the operating system. Explain what virtual memory is.*

Any TWO of: ✓✓

- Virtual memory is an area on the secondary storage
- Used as RAM / when the system RAM is full/insufficient
- Used by the Operating system to store data temporarily (2)

2.3 *Give a term for the process that removes documents that are no longer actively used from the computer's primary storage and stores the documents in a secondary storage space.*

Archiving ✓ (1)

2.4 2.4.1 *Apart from drones, suggest ONE other mobile technology that can be used to observe migration patterns.*

Any ONE of: ✓

- GPS / Satellite tracking of animals
- RFID / Tags / Trackers and mobile receivers
- Tracking apps
- Apps using AI to identify animals/species
- Motion sensing cameras linked to mobile devices

Accept any reasonable example which requires a mobile device to monitor the animals except for drones. (1)

2.4.2 *State TWO constraints of using mobile technologies.*

Any TWO of: ✓✓

- Limited battery life
- The tower providing signals may be out of range (availability of wireless networks)
- Limited computing power
- Limited storage
- Smaller screens are challenging to read
- Input methods are a challenge
- Not able to run desktop applications
- May not include a full operating system
- Not easy to upgrade or repair (2)

2.5 2.5.1 *Suggest TWO biometric authentication methods that can be used to gain access to the database*.

Any TWO of: ✓✓

- Facial recognition
- Fingerprint scanning
- Voice recognition
- Retina/Iris/Eye scanning (2)

2.5.2 *Explain the effect of GIGO in relation to data collection in wildlife tracking systems.*

Any ONE example ✓ *and effect* ✓

Possible examples (1):
- Incorrect coordinates
- Misidentified animal species

Possible effect (1):
- The location of the animal species will be inaccurate which will result in time wastage to find the animals
- The resulting analysis will be flawed
- The decisions taken will be unreliable (2)

2.5.3 *In order to safeguard critical data, state TWO precautions that can be taken to prevent hardware failure.*

Any TWO of: ✓✓

- Safe handling/keeping/storing of hardware devices
- Regular maintenance
- Surge protection/ Use an UPS
- Controlling environmental factors
- Use tools to monitor drivers (health checks)
- Upgrading hardware

Accept relevant and correct examples of the above. (2)

2.6 2.6.1 *State TWO limitations of VR technology.*

Any TWO of: ✓✓

- High cost
- Requires powerful hardware specifications
- Possibility of motion sickness/may impact on health
- Promotes social isolation / Reduces social interaction
- Physical space limitation
- Setup can be technical / Training required
- Latency / Lagging (between device and PC) (2)

2.6.2 *Discuss TWO advantages of using VR for conservation awareness.*

Any TWO of: ✓✓

- Users can experience wildlife/ecosystems in a realistic/interactive way.
- Conservation education made available to a broader audience / more people.
- Decreases/restricts impact on wildlife ecosystems / remains undisturbed/undamaged.
- Safer environment by not being physically exposed to dangerous animals such as lions, hippos, etc.
- No need to travel to wildlife facilities / no paying for expensive real-life encounters with wildlife.
- Is convenient since you can experience wildlife in the comfort of your home.

NOTE: Any other correct answer(s) related to the scenario can be accepted. (2)

TOTAL SECTION B: 25

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

3.1 *Give TWO reasons why a client-server network will be a suitable network to be used at the lodge.*

Any TWO of: ✓✓

- Centralised management
- Better control over user authentication and encrypted storage of sensitive data/More sophisticated security
- Scalability – ease of adding more clients
- Backups are made on the server
- Network may become congested on peer-to-peer, whereas a server can manage network traffic more efficiently.
- Suitable for a large number of devices.
- No need for powerful client devices.
- Easier communication between users - transferring of data from central device (2)

3.2 3.2.1 *Type of network used between smartwatch and phone.*

PAN/WPAN ✓ (1)

3.2.2 *Type of network used when connecting to an international wildlife database via the internet.*

WAN/GAN ✓ (1)

3.3 *Apart from saving time and improving efficiency, give TWO other reasons why file transfer protocol (FTP) should be used to share large files.*

Any TWO of: ✓✓

- Transfers can be interrupted and resumed
- Offers remote access
- Cross-platform compatibility
- Allows transfer of large files / large number of files
- Transfers can be automated with scripts
- No restriction on file size
- Directory structure preservation

Do NOT accept reliable (2)

3.4 3.4.1 Switch/Hub ✓ (1)

3.4.2 Router/Modem ✓ (1)

3.5 3.5.1 *Differentiate between range and bandwidth in wireless networks.*

Range: Distance that is covered by the signal ✓ before weakening
Bandwidth: Amount of data that can be transmitted per time unit / speed of transmission ✓ (2)

3.5.2 *Give TWO possible reasons why there may be streaming delays and more buffering challenges at the chalets than at the main building where a wired network is used.*

Any TWO of: ✓✓

- The bandwidth capacity of a wireless network is lower
- There may be more data used / traffic in the chalets than in the main building sharing the same network channel
- Some guests may be located further away from the router
- Signal interference/obstacle interference/weather (2)

3.6 3.6.1 *Discuss TWO benefits of a dynamic website for the lodge's customers.*

Any TWO of: ✓✓

- Customers can log in and see bookings, special offers, or content tailored to their preferences (Personalised experience).
- Availability, prices, or promotions can be updated instantly without needing to reload the entire website. (Real-time information).
- Customers can make reservations directly on the website instead of making phone calls or using e-mail. (Online bookings).
- Features like contact forms, reviews, or feedback can improve customer interaction. (Interactive features). (2)

3.6.2 *The tasks of a web author:*

Any TWO of: ✓✓

- Creates text/images/photos/video/content for a website
- Structures/format the content of a website
- Hyperlink and SEO management
- Update and maintain content of website
- Collaborate with designers, other authors and developers
- Publish and share content that is accessible and functional. (2)

3.7 3.7.1 *State and explain a technique used in Invisible data capturing.*

ONE technique ✓ and explanation ✓

Technique	Explanation	Common examples
Cookies	Small files stored on your browser that track websites you visit, clicks, and preferences.	Browsing-history recommendations, remembering items in online shopping carts.
Loyalty / Bank Cards	Tracks your shopping history and spending patterns when you make purchases.	Purchase history at stores or online if using a linked loyalty card.
Location / Digital Tracking	Uses IP address, GPS, Wi-Fi, or mobile sensors to track your location and movement.	Maps apps, location-based ads, search results for "near me."
Metadata tracking	Collects information about the context of your activity without you actively providing it.	Email headers (sender, recipient, time), photo EXIF data, file properties online.
Device / Browser Fingerprinting	Collects information about your device and browser (screen size, fonts, hardware) to identify you uniquely.	Identifying repeat visitors without using cookies.
Clickstream Tracking / Scripts	Scripts on websites that secretly record how you navigate, click, and scroll.	Analysing which products you view or which pages you spend time on.

Concepts:

- Name / describe technique
- Provide an explanation of the technique (2)

3.7.2 *How will location-based data, used collectively with invisible data capturing contribute to the safety of guests at the game reserve?*

Concepts: ✓✓

- Evidence of invisible data / location-based data capturing
- Result of using the data to ensure safety of guests

For example:

- Monitor guest locations (1) to stop them entering dangerous or restricted areas/to assist if they get lost (1).
- Quickly identify a guest's exact location (1) during medical/ security incidents for faster ranger response (1).
- Provide automatic wildlife/weather/terrain warnings (1) based on the guest's current position (1).
- Use geo-fencing (1) and crowd-management data to guide safe movement around the reserve (1).
- Analyse behaviour patterns (1) to prevent risks/send personalised safety tips (1).

Also accept other examples using invisible or location-based data regarding the safety of the guest(s). (2)

3.8 3.8.1 *Explain the concept of MFA.*

Authentication requires two or more verification methods ✓ (1)

3.8.2 *Motivate why one-time pin (OTP) is an effective mechanism for verifying staff login.*

Any ONE of: ✓

- The staff member will receive the OTP on their personal device/ not accessible by others
- Extra layer of security – even if password is compromised
- They are time sensitive, reducing the risk of re-use / One time use (1)

3.9 3.9.1 *Which transmission medium would be the most appropriate to transfer footage from the cameras to the research centre?*

Any ONE of: ✓

- Fibre optic
- Radio/electromagnetic waves
- Satellite (1)

3.9.2 *Any TWO reasons for communication media stated in QUESTION 3.9.1.* ✓✓

Fibre optic:
- Reliable over long distances
- High bandwidth
- Not affected by weather
- Not affected by EMI

Radio waves:
- No need for physical cables
- Suitable for remote or difficult terrain

Satellite:
- Suited for long distances
- High-speed data transfer
- Cost-effective for long distances
- Reliable in emergencies (2)

TOTAL SECTION C: 25

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1 4.1.1 *Why would it be better to change the Experience field data type and data to integer?*

Any ONE of: ✓

- To be able to update the years' experience by incrementing it.
- To perform calculations/processing/sorting/queries.
- Simplifies data validation
- Avoid data inconsistencies
- Avoid redundant data (1)

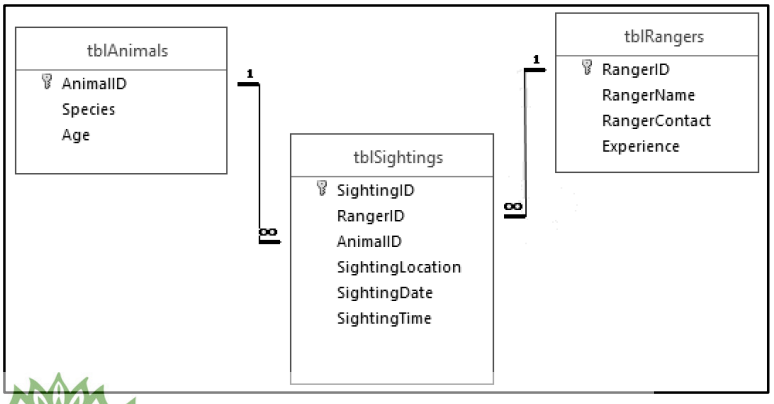
4.1.2 *State and explain the anomaly by having the fields RangerContact and Experience in the tblAnimalSightings table.*

Any ONE: Anomaly ✓ *and Explanation* ✓

- Insert: New sighting cannot be added without adding ranger details
- Delete: Deleting a sighting may result in losing ranger contact details
- Update: When a ranger contact number changes, all records of sightings by that ranger must be updated with the new contact number (2)

4.1.3 *Redraw diagram with tables and the provided fields. Show the relationships.*

- Diagram correctly copied with table names and primary key field names ✓
- In tblSightings
  - Two foreign keys: RangerID ✓, AnimalID ✓
  - Fields for tblSightings: SightingLocation, SightingDate, SightingTime ✓
  - Relationships
    - 1 to Many on AnimalID from tblAnimals to tblSightings ✓
    - 1 to Many on RangerID from tblRangers to tblSightings ✓



(6)

4.2 *Differentiate between currency and relevance as characteristics of data.*

- Currency refers to timelines (up to date) ✓
- Relevance refers to usefulness / applicability (appropriate for applications, have a specific context or purpose) ✓ (2)

4.3 4.3.1 *Give TWO potential benefits for a lodge when implementing a guest loyalty card programme.*

Any TWO of: ✓✓

- Track guest behaviour/Data collection
- Targeted marketing
- Increased lodge revenue
- Strengthens guest relationships/Guest personalisation/Guest recognition
- Improves lodge services/Saves time with the booking system
- Differentiate the lodge from competitors
- Determine which booking times/seasons are more popular (2)

4.3.2 *Identify the TWO open-source DBMS software applications*:

- MySQL ✓
- PostgreSQL ✓ (2)

4.4 4.4.1 *Define the following terms.*

(a) *What is a data warehouse?*

Any TWO of: ✓✓

- A central database that
- stores large collections
- of historical data
- gathered from multiple sources. (2)

(b) *What is data mining?*

Any TWO of: ✓✓

- Find patterns/trends
- in large datasets
- using algorithms to
- to make informed decisions. (2)

4.4.2 *Give ONE example of data mining related to wildlife conservation.*

Any ONE of: ✓

- Identify the animal species that signal extinction, by analysing sighting trends over time.
- Find locations where certain animals are commonly sighted (e.g., elephants near rivers during dry season).
- Predict migration routes based on past routing patterns.
- Prediction of poaching hotspots
- Planning for feeding during problem seasons/times
- Influence of tourism on animals to be controlled if necessary

Also accept any other reasonable example. (1)

TOTAL SECTION D: 20

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1 5.1.1 iResult `:= CEIL (-2.3)`

iResult = -2 ✓ (1)

5.1.2 iResult := TRUNC (-2.3)

iResult = -2 ✓ (1)

5.2 5.2.1 *Line 7: iAnsw := iNum/5;*

Incorrect ✓

Any ONE explanation ✓

- The result must be *real* as it is real division
- The /-operator should be replaced by the DIV-operator (2)

5.2.2 *Line 8: rAnsw := 15 MOD 3;*

Correct ✓

The result of the MOD-operation can be assigned to a real or integer variable ✓ although the result of the MOD-operation is an integer value (2)

5.2.3 *Line 9: iAnsw := rNum MOD 3;*

Incorrect ✓

rNum must be an integer data type. ✓

Also accept: The MOD operator can only be used on integer values (2)

5.3 5.3.1 (a) *Name ONE other form of verification that can be applied on the date of the sighting:*

The date of sighting selected from the date time picker must correspond/match to the actual date of the sighting. ✓

Also accept:

- Test if the date selected is not in the future
- Test if the date selected is realistic
- Use the system date
- Visual checks/ double entry/ cross referencing (1)

(b) *Use the example of the date selected to illustrate the difference between valid and correct data in this scenario:*

Valid data:

The use of the date time picker will ensure that the format/range/data type of the date is correct. ✓

Correct data:

The date of sighting selected from the date time picker must correspond/match to the actual date of the sighting. ✓ (2)

5.3.2 *Give the name of a suitable component that can be added to the interface to ensure a valid location is selected by the user:*

Any ONE of: ✓

- Combo box
- List box
- Radiogroup (1)

5.3.3 *Design a UML diagram using the information provided on the "Big Five - Animal sighting" interface"*

TSighting
- fAnimal: String - fNumSighted: Integer - fLocationSighted: String - fDateSighted: TDate - fTimeSighted: TTime
+ Constructor create () + getAnimal: String + getNumSighted: Integer + setNumSighted(numSighted: Integer)

Also accept the following accessor methods:
+ getDateSighted: TDate
+ getTimeSighted: TTime
+ getLocationSighted: String

Also accept the following mutator methods:
+ setDateSighted(DateSighted: TDate)
+ setTimeSighted(TimeSighted: TTime)
+ setAnimal(Animal: String)
+ setLocationSighted(LocationSighted: String)

Mark allocation:

- UML diagram, with heading TSighting ✓
- 5 correct attributes ✓
- All data types of attributes correct ✓
- Constructor without parameters ✓
- Accessor method with the correct data type ✓
- Mutator method with correct parameter and data type ✓
- Correct indication of private (all the attributes) and public (all the methods) ✓ (7)

5.4 5.4.1 *State ONE reason why a conditional loop will be a suitable loop to use to read data from the text file.*

Any ONE of: ✓

- To accommodate an unknown number of bird watchers / lines in text file / loop until end of file (EOF).
- Lines of text can be added to, or removed from the text file without changing the code. (1)

5.4.2 *Procedure used to create a new text file following the AssignFile():*

Rewrite() ✓ (1)

5.4.3 (a) *Give ONE reason why the names of the bird watchers should NOT be included as a part of the two-dimensional array arr2DSpotted.*

Any ONE of: ✓

- The data type of the name of the bird watcher is String and the data type of the number of species spotted is Integer.
- The data types of all data in a two-dimensional array must be the same.
- The two-dimensional array will need to be declared as integer to allow for calculations to be done. (1)

(b) *Write an algorithm that can be used to determine the highest number of bird species spotted by each bird watcher over a period of four days, and populate column 5 of the two-dimensional array arr2DSpotted with these values.*

```
Loop Row from 1 to iNumBirdWatchers ✓
   Highest ← arr2DSpotted[Row , 1] ✓
   Loop Col from 2 to 4 ✓
      If Highest < ✓ arr2DSpotted[Row , Col] ✓
         Highest ← arr2DSpotted[Row , Col] ✓
   arr2DSpotted[Row ,5] ✓ ← Highest ✓
```
(8)

TOTAL SECTION E: 30

SECTION F: INTEGRATED SCENARIO

QUESTION 6

6.1 6.1.1 *What does IPTV stand for?*

Internet Protocol Television ✓ (1)

6.1.2 *TWO challenges that may be experienced by IPTV providers.*

Any TWO of: ✓✓

- Requires fast, stable internet; outdated infrastructure causes buffering, latency or packet loss. (High bandwidth and network limitations)
- High licensing costs, differing regional laws, and competition from illegal IPTV services. (Licensing and legal challenges)
- Device compatibility problems and difficulty scaling to many users. (Technical and compatibility issues)
- Data costs, infrastructure upgrades, and limited payment options for customers. (High operating costs)
- Protecting user data and preventing attacks is an ongoing challenge. (Cybersecurity threats)
- Some regions block or limit IPTV access due to laws, censorship or weak networks. (Regional restrictions) (2)

6.1.3 *Explain the relationship between the video quality, and the speed of delivery, of compressed video data.*

There is an inverse relationship between quality and speed:

Any ONE of: ✓✓

- The higher the quality, the lower the speed of delivery
- The lower the quality, the higher the speed of delivery (2)

6.2 6.2.1 *Explain what social engineering is.*

The process of manipulating/tricking a person ✓ to give out their personal details ✓ (2)

6.2.2 *State TWO ways how users can identify phishing e-mails.*

Any TWO of: ✓✓

- Unofficial or unusual email domains. (Suspicious sender address)
- "Dear Customer/Client/Sir/Madam" instead of your name. (Generic greetings)
- Pressure to act immediately or accounts "being closed." (Urgent or threatening language)
- Unexpected files or links that look incorrect when hovered over. (Suspicious links or attachments)
- Unprofessional or error-filled wording. (Poor spelling or grammar)
- Prizes, competitions, or winnings when not entered. (Too-good-to-be-true offers)
- Asking to provide passwords or confidential details. (Requests for personal information)

Also accept any example related to the concepts above. (2)

6.2.3 *What is the task of a digital forensic investigator?*

Digital forensic investigator analyses/ identifies digital evidence ✓ from computers, networks, and other devices to uncover facts about cybercrimes / data breaches / other digital incidents. ✓ (2)

6.3 6.3.1 *Describe how a security token works*

- After the successful authentication of a user, a security token is generated and sent to the user ✓
- The user stores the token and uses it for every subsequent request ✓
- The server validates the token by either checking the expiry date or verification of a signature ✓

Any THREE concepts:

- Successful authentication of user
- Token generated and sent to user
- Token used/stored for subsequent request
- Server validates the token (3)

6.3.2 *Explain how the use of SSL will improve website security.*

Any TWO of: ✓✓

- Provides encrypted data transmission
- between website and guest
- to prevent unauthorised access (2)

6.4 6.4.1 *Suggest TWO techniques that may be used to enhance search engine optimisation to improve the website's visibility.*

Any TWO of: ✓✓

- Use relevant keywords
- High quality content
- Webpage optimisation (metatags, headers, image texts)
- Secure website (HTTPS) improves trust and ranking in search engines.
- Mobile friendly
- Page loading times (use caching techniques, compression, etc)
- Social media integration
- Regular updates

Do not accept: Paying a search engine or paying for marketing as this is not part of SEO. (2)

6.4.2 *Is the URL an example of Web 1.0 or Web 3.0?*

Web 3.0 ✓ (1)

6.4.3 *Discuss how a semantic search could improve the accuracy of search results.*

Any TWO of: ✓✓

- Semantic search focuses on meaning
- No emphasis on keywords
- Uses metadata (data that defines and describes the characteristics of other data).
- Uses Natural Language Processing (NLP) (2)

6.4.4 *Briefly explain what the characteristic of a mediated search method is.*

Any method that addresses the need for human/system involvement ✓ to refine or filter results (1)

6.5 *Identify the type of technology that is used by this app.*

Augmented Reality / AR ✓ (1)

6.6 6.6.1 *Differentiate between passive tag and active tag by referring to the power source of each of these types of tags.*

An active tag includes ✓ a battery/power source
A passive tag receives power from the reader's antennae ✓ (2)

6.6.2 *Explain how RFID works and how rangers were able to locate the poisoned birds in time.*

RFID use radio waves ✓ to read a unique identifier/tag ✓ to pinpoint the beacon/location of the bird ✓ using GPS capabilities. (3)

6.7 *Motivate this suggestion by giving TWO reasons why distributed computing would benefit research projects.*

Any TWO of: ✓✓

- Researchers pool computing power and storage they would not have individually. (Shared resources)
- Tasks run in parallel on multiple devices, speeding up calculations. (Faster processing)
- More devices can be added easily as research needs grow. (Scalability)
- If one device fails, others continue to work. (High reliability)
- Lower system requirements (lower cost) instead of expensive high-end systems used. (Cost-effective)
- Researchers can access shared data and resources from different locations. (Geographic access)

(2)

TOTAL SECTION F: 30
GRAND TOTAL: 150