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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

INFORMATION TECHNOLOGY P2

MAY/JUNE 2025

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 20 pages.



SECTION A: SHORT QUESTIONS**QUESTION 1**

- | | | | | |
|-----|--------|--|----------------------|-----|
| 1.1 | 1.1.1 | C ✓ | Information overload | (1) |
| | 1.1.2 | C ✓ | Interpreter | (1) |
| | 1.1.3 | B ✓ | Validation | (1) |
| | 1.1.4 | A ✓ | Web 1.0 | (1) |
| | 1.1.5 | C ✓ | Augmented Reality | (1) |
| | 1.1.6 | B ✓ | IP address | (1) |
| | 1.1.7 | B ✓ | BIOS | (1) |
| | 1.1.8 | A ✓ | Integer | (1) |
| | 1.1.9 | C ✓ | DRM | (1) |
| | 1.1.10 | B ✓ | Host | (1) |
| 1.2 | 1.2.1 | IMAP ✓ | | (1) |
| | 1.2.2 | Driver ✓ | | (1) |
| | 1.2.3 | ERD / Entity relationship diagram ✓ | | (1) |
| | 1.2.4 | Wiki ✓ | | (1) |
| | 1.2.5 | Global Unique Identifier/GUID ✓ also accept UUID | | (1) |
| 1.3 | 1.3.1 | False, Cyber gang ✓ | | (1) |
| | 1.3.2 | False, Machine cycle ✓ | | (1) |
| | 1.3.3 | True ✓ | | (1) |
| | 1.3.4 | False, Seeders ✓ | | (1) |
| | 1.3.5 | False, backup ✓ | | (1) |

TOTAL SECTION A: 20

SECTION B: SYSTEMS TECHNOLOGIES**QUESTION 2**

2.1 2.1.1 (a) *Briefly explain what mobile technologies are:*

Provide communication/access to information/devices while on the move ✓ /away from traditional wired environments.

OR

Portable devices to access information. (1) (1)

(b) *Any ONE advantage of using mobile devices as remote controllers for home automation systems: ✓*

- Convenience and reliability of being always on/always connected
- Convenience of only requiring one device (convergence)
- Supports ubiquity

Also accept any other relevant and correct answer. (1)

2.1.2 *Any TWO examples of how home automation is enhanced with mobile devices: ✓✓*

Integration with IoT devices:

- Receive real-time alerts
- Notifications on their smartphones when
 - motion is detected by security cameras,
 - specific conditions are met

Also accept specific examples:

- Answers relating to using the GPS in a mobile device
- Doors are opened
- Open curtains
- Switch on lights
- Check the condition of your systems e.g. batteries. (2)

2.1.3 *Any ONE rule to follow, regarding the security of data, when connecting a mobile device to any public Wi-Fi network: ✓*

- Connect to an approved / secure / encrypted wireless network
- Limit your activity to simple web surfing or watching online videos
- Avoid sending / entering / accessing confidential information that could be intercepted
- Ensure that your device has anti-malware installed

Also ACCEPT any other relevant and correct answer. (1)



2.1.4 Any **TWO types** of digital input that can be captured using mobile devices: ✓✓

- Voice / Audio input
- Video input
- Image/pictures input e.g. QR-Codes
- Biometric input e.g. Fingerprints
- Sensor input e.g. GPS/Location
- Touchscreen input

(2)

2.1.5 Any **ONE** strategy to extend the battery life of mobile devices while maintaining effective system operation: ✓

- Adjust power settings
- Manage background apps
- Reduce screen brightness
- Manage connectivity
- Optimise application usage
- Update software

(1)

2.2 2.2.1 Any **TWO** factors that determine the quality of a CCTV camera: ✓✓

- Resolution
- Sensor type
- Sensor size / Camera size
- Pixel size and count
- Lens quality
- Aperture size
- Frame rate
- Low light performance
- Image sensor
- Field of view
- Compression algorithm used
- Advanced features such as Wide Dynamic Range (WDR), infrared (IR) capabilities for night vision, and image stabilisation.

(2)

2.2.2 Explain why an SSD is considered to be more durable and how this impacts on the maintenance of the drive:

SSD's do not have moving parts / stores electronically ✓ and are easier to maintain as they are less prone to physical damage. ✓

(2)



2.2.3 *Motivate why an SSD is a better storage device than an HDD, excluding the answer provided in Question 2.2.2:*

Allocate marks:

Concept ✓

Explanation ✓

Speed and Access Time:

SSDs: The electronic nature of SSDs leads to significantly faster data access and transfer speeds compared to HDDs.

HDDs: The mechanical nature of HDD's leads to slower data access times and transfer speeds compared to SSDs.

OR

Boot Time and System Responsiveness:

SSDs: Due to their fast read/write speeds, SSDs contribute to faster boot times and overall system responsiveness.

HDDs: HDDs generally result in longer boot times and slower system responsiveness compared to SSDs.

OR

File Transfer and Copy Operations:

SSDs: SSDs excel in file transfer and copy operations, offering rapid data transfer rates.

HDDs: While HDDs can handle file transfer and copy operations, they are slower compared to SSDs.

(2)

2.3 *Explain ONE advantage of biometric authentication over traditional password-based authentication.*

Biometric traits are unique to each individual, ✓ difficult to replicate ✓ / unlike passwords, which can be forgotten, shared, or easily guessed.

Concepts:

- Advantage (1)
- Explanation (1)

(2)



- 2.4 2.4.1 *Explain how bus performance can have an influence on the performance of a computer system:*
- Bus performance determines the speed at which data is transferred ✓ between the components. ✓ (2)
- 2.4.2 *Explain how the CPU clock speed and multiprocessing capabilities are able to increase the overall performance and efficiency of a computer system:*
- A higher CPU clock speed enables the device to process more instructions per second. ✓
The multiprocessing capabilities enable the splitting of tasks/processes between the different cores of the CPU ✓ that are executed simultaneously/parallel. ✓ (3)
- 2.4.3 *Any ONE explanation of the importance of RAM in influencing the performance of a computer system: ✓✓*
- Located close to the CPU (1) which allows the CPU to access data and instructions quickly during active tasks. (1)
 - A larger RAM capacity allows the system to store more data and programs in memory (1), reducing the need to access slower storage devices frequently. (1)
 - RAM acts as a bridge between CPU caches and permanent storage (1), ensuring that data can be transferred between them at high speeds. (1)
 - More RAM (1) allows efficient multitasking / limits paging. (1) (2)
- 2.4.4 *Which expansion card is required if the speaker system must be connected to a motherboard with a limited number of auxiliary ports?*
- Sound / Audio card ✓ (1)
- 2.5 2.5.1 *Explain the concept of scalability in terms of cloud computing:*
- Scalability in cloud computing refers to the ability to handle increasing/decreasing workloads ✓ by efficiently adding or removing resources. ✓ (2)



2.5.2 Any TWO advantages of using SaaS: ✓✓

- No upfront infrastructure costs / saving on local resources like storage and processing power
 - Software always up to date / Always access to the latest version
 - Synchronisation of data
 - Pay-Per-Use model
 - Scalability
 - Ubiquity
 - Cross-Platform compatibility
 - Maintenance and support available
 - Minimal setup
- (2)

2.5.3 Any TWO security concerns associated with cloud computing: ✓✓

- Data breaches / Data could be hacked
 - Data visibility / Unauthorised access / Limited Access Controls
 - Service outages / server down / DDOS attacks
 - Data loss / SaaS provider closing down
- (2)

TOTAL SECTION B: 30



SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES**QUESTION 3**

3.1 3.1.1 *Briefly explain what a NOS is (Network Operating System) AND its role in a networked environment.*

System software installed on a server ✓ to manage and control other computing devices connected to the network. ✓ (2)

3.1.2 *Any TWO essential components, besides network enabled devices required to establish a network connection between nodes: ✓✓*

- Network Interface Card (NIC)
- Communication media e.g. Cables / UTP / Fibre cables / Wireless
- Connecting devices such as switches, routers, modems, repeaters, bridges
- Wireless base station / access point (2)

3.1.3 *Evaluate the importance of user rights management in a networked environment:*

User rights management ensures control ✓ over what resources users can access, modify, or delete within the network.
Proper access control reduces the risk of unauthorised access ✓ by limiting users' capabilities to only what is necessary.

Concepts:

- User rights management ensures control (1)
- Unauthorised access - limiting users' capabilities (1) (2)

3.1.4 *Any ONE possible disadvantage of using a network: ✓*

- Security risks / network vulnerabilities / cybercrime
- Complex configurations
- Network administrator required
- Infrastructure costs / maintenance and upkeep
- Single point of failure / service outages (1)



- 3.2 3.2.1 *Any TWO requirements for a local network to obtain access to the Internet: ✓✓*
- ISP Connection / Subscribe to an ISP for internet access
 - Internet Gateway Device / Router / Modem
 - Area must have internet coverage (2)
- 3.2.2 *Any ONE role of Certificate Authorities (CAs) in the context of digital certificates and SSL encryption: ✓✓*
- CAs are entities trusted to issue digital certificates that bind cryptographic keys (such as public keys) (1) to an entity's identity, such as a website, organization, or individual. (1)
 - CAs perform authentication and identity verification processes (1) to ensure that the entity requesting the SSL certificate is legitimate and has control over the domain or server for which the certificate is being issued. (1)
 - CAs use digital signatures to sign SSL certificates they issue. (1) These signatures validate the authenticity and integrity of the certificates. (1)
- Concepts:**
- Role of certificate authority
 - Explain how a certificate authority can be used (2)
- 3.3 3.3.1 *Any justification of the use of Ethernet cables versus wireless connections: ✓✓*
- Ethernet connections are more reliable and stable (1) compared to wireless connections that can be unstable due to physical obstructions and/or weather constraints (1)
 - Ethernet connections have lower latency (1) and faster speeds (1) compared to wireless connections
 - Ethernet connections are not susceptible to common wireless security risks such as Wi-Fi hacking (1), although access to physical connections must be restricted (1)
 - Wired networks are not affected by RF interference (1) leading to signal degradation (1)
- Also ACCEPT any TWO of: (2)**
- Less prone to interferences such as EMI.
 - UTP cables have a higher bandwidth compared to Wi-Fi
 - Better security because data transfer is not as easily intercepted as Wi-Fi
 - Less influenced by objects such as buildings and trees (2)



3.3.2 *Describe the function of a wireless base station in a wireless network.*

A wireless base station serves as a central connection point ✓ for wireless / mobile devices to communicate / connect to the network / Internet. ✓

(2)

3.4 *Motivate why the employees' laptop should have two NIC's instead of one:*

1st NIC: Used for wired connections. ✓

2nd NIC: Used for wireless connections. ✓

Also ACCEPT:

- Acts as a backup (1) with explanation (1)
- Allows to connect to more than one network (1) with explanation (1)

(2)

3.5 3.5.1 *Any TWO aspects needed, besides mobile devices, for effectively using location-based services: ✓✓*

- Positioning system for device / GPS
- Communication networks to enable a device to transfer location data / Satellites / Internet access / Cell tower triangulation
- Location must be activated on the device
- Location based application software required
- Authorising device permissions to access GPS

(2)

3.5.2 *Any TWO benefits to the security company when using location-based services: ✓✓*

- Allows for profiling of customers
- Improved response time by dispatching the nearest security personnel or vehicle
- Automated alerts
- Tracking security guards / vehicles / locations
- Invisible data capturing to provide the company with more information about customers
- Providing specific information / services to specific customers / advertising services to a specific target group

(2)



- 3.6 3.6.1 *How can RFID technology be used to improve the stocktaking process: ✓✓*
- During stock taking, RFID readers automatically identify and track tagged items (1) without requiring line-of-sight scanning or manual barcode scanning (1)
 - RFID technology provides real-time visibility (1) into inventory levels and locations (1)
 - RFID readers can scan multiple RFID tags simultaneously (1), reducing the time and effort required for inventory checks (1)
 - Human errors such as misreads, miscounts, or missed items are minimised (1), leading to more accurate inventory records (1)
 - RFID tags can be used for security (1) and anti-theft purposes (1) (2)
- 3.6.2 *Any TWO potential challenges that the security company might encounter during the implementation of RFID technology for stock taking: ✓✓*
- Large cost of RFID infrastructure
 - Difficult to integrate with existing systems
 - Tagging and tag placement
 - RFID read range and interference
 - Training of employees to use the new technology (2)

TOTAL SECTION C: 25



SECTION D: DATA AND INFORMATION MANAGEMENT**QUESTION 4**

4.1 4.1.1 A primary key is a unique identifier for each record ✓ in a database table. (1)

4.1.2 *Justify why the field **DeviceID** is a suitable primary key in the table **tblDevices**:*

It is a field that can be used to distinguish one device activity from another, ✓ and it ensures that there are no duplicate entries ✓ for the same device. (2)

4.2 4.2.1 *Evaluate the design of the **tblDevices** table and establish whether a redundant field exists in the table. Briefly explain.*

Yes, DeviceStatus can be determined ✓ using the StartTime and EndTime fields. ✓

OR

No, a user might need to verify if the system clock/timer is working (1) by checking the On/Off status of the device. (1)

OR

Yes, RoomArea field is dependant (1) on the RoomName field. (1) (2)

4.2.2 *Any TWO regarding redundant data and how it could affect the efficiency of the database: ✓✓*

- Redundant data can lead to:
 - larger storage requirements (1)
 - slower performance (1)
 - increased chances of data anomalies or inconsistencies (1)
- Updating redundant data can be complex and time-consuming, leading to maintenance challenges. (1) (2)



- 4.3 Suggest an improved design/structure for the table *tblDevices* by separating the table into TWO tables.

Indicate the primary and foreign keys, where applicable, including the relationship type that must be established between the tables.

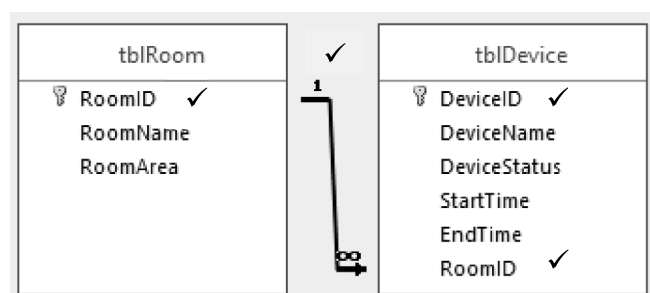
Concepts:

- Create TWO tables, **tblDevice** and **tblRoom** (1)
- Add the fields to the correct tables (1)
- Indicate correct PK's (2)
- Indicate correct FK (1)
- Correct one : many relationship from *tblRoom* to *tblDevice* (1)

Example of possible field names and structure (next page):

NOTE:

- DeviceStatus may be excluded from *tblDevice*
- RoomArea may be excluded from *tblRoom*



✓ Two tables created

✓ Correct fields in each table

(6)

- 4.4 4.4.1 (a) DeviceStatus – Yes/No or Boolean ✓ (1)
- (b) StartTime – DateTime / Time ✓ (1)

4.4.2 Any TWO reasons why using appropriate data types are important during database design: ✓✓

- Optimising storage space/storage efficiency
- Facilitating efficient data retrieval and processing / calculations
- Ensuring data integrity / accuracy
- Improving query performance
- Avoiding data inconsistencies
- Limit data anomalies

(2)



4.5 4.5.1 *Discuss any ONE potential privacy implication of collecting and storing data regarding device activities within a smart home: ✓✓*

- Invasion of privacy (1): The data collected can reveal personal habits, routines and behaviours of individuals, which can be exploited or misused. (1)
- Security risks (1): Storing sensitive data can make it a target for hackers, leading to potential breaches, unauthorised access, or misuse of personal information. (1)

Also ACCEPT any other relevant and correct answer. (2)

4.5.2 *Any TWO measures that could be implemented to address the security concerns while still maintaining the benefits of home automation: ✓✓*

- Implementing strong encryption methods / password policies to protect the stored data.
- Regularly updating security protocols / ensuring secure access controls (e.g. biometrics) to limit data exposure / Security risk management with Firewall implementation (2)

4.6 *Describe how changes made in a database can be tracked: ✓✓*

Concepts:

- Create a parallel data set (1)
- Store all activity within the database in the parallel data set (1) (2)

4.7 *Any TWO items of information that will form part of the metadata of a database used: ✓✓*

- Table names
- Field names
- Description of field
- Data types
- Primary keys
- Foreign keys
- Relationships
- User permissions
- Size of File
- Size on Disk
- Date Created
- Date Modified

Also ACCEPT any other relevant and correct answer. (2)

TOTAL SECTION D: 25



SECTION E: SOLUTION DEVELOPMENT**QUESTION 5**

- 5.1 5.1.1 (a) *Why would the following code in the main form provide an error during runtime?*

`objSecurityEmployee.fName := 'Johann';`

A private attribute can only be used within the class it is defined in. ✓

Also ACCEPT: fName cannot be used in the main form as it is private in the object class. (1) (1)

- (b) *Any TWO ways to assign values to a private attribute from a different form/class:*

- Public methods (setMethods / Mutator methods) ✓ / Use of the set method for the corresponding attribute
- Use constructor / Create method to set the attributes to values in the parameter list ✓ (2)

- 5.1.2 *State why the getName method does not have a parameter:*

The **getName** method simply returns the value of the fName attribute. ✓ (1)

- 5.1.3 *Any TWO auxiliary methods from the class diagram:*

+ accessAllowed (sLocation: String): Boolean ✓
+ toString: String ✓ (2)

- 5.1.4 *Any ONE motivation why the toString method will not be used: ✓✓*

- A toString method is used to create and return a string with all the attributes of the object. (1) There is no attribute that describes the access allowed. (1)
- The getName (1) and the accessAllowed methods will be used (1) (2)

- 5.1.5 *Briefly explain what TSecurityEmployee refers to:*

The object class name. ✓ (1)



5.1.6 Function determineInitial : char ✓
 Begin
 Result := fName[1]; ✓
 End;

Alternative:

Function determineInitial : String (1)
 Begin
 Result := copy(fName,1,1); (1)
 End;

(2)

5.2 *Explain the relevance of the function Ceil and its relevance in calculating the total number of tiles required.*

The result is rounded up ✓ to the nearest / higher integer. ✓
 Ensures enough tiles to cover the entire area of the room without leaving any uncovered spaces / accommodate a fraction of a tile. ✓ (3)

5.3 5.3.1 *Show the content of the array after the first iteration of the loop.*

(10, 20, 30, 40, 50, 60, **100** ✓, 80, 90, **70** ✓);

Concepts:

- Replace 70 with 100 (1)
- At correct indices (1) (2)

5.3.2 *Explain the purpose of the + 1 part of the statement in line 6 of the code, in the context of the provided code:*

Ensures that the value that is generated is incremented / changed / adjusted to be in the range from 1 to 10 ✓ which is within the valid index range of array **arr**. ✓

NOTE: Do not accept the range 0 to 10. (2)

5.3.3 The purpose of the code is to swap each element of the array **arr** with a randomly selected element ✓ starting with the last element down to the first. ✓ (2)

TOTAL SECTION E: 20



SECTION F: INTEGRATED SCENARIO**QUESTION 6**

6.1 6.1.1 *Define the term blockchain in terms of cryptocurrency:*

Blockchain is a distributed database / ledger with a growing list of records ✓ (called blocks), linked together using cryptography. ✓ (2)

6.1.2 *Any TWO disadvantages of using blockchain technology for the company: ✓✓*

- It is slower than a traditional database as it needs to create hashes, which takes a lot of processing time
- High cost to a company wanting to implement blockchain
- The technology requires a lot of computer processing power which uses a lot of energy – negative environmental impact
- Since blocks cannot be altered it is hard to correct mistakes (2)

6.2 *Name the most suitable compression file type used to save space for the following files:*

6.2.1 *Image files: ✓*

JPG / JPEG / PNG (1)

6.2.2 *Video files: ✓*

MPEG / MP4 / AVI / MKV / Webm / MOV / HEVC (1)

6.3 6.3.1 *Define the concept of physical integrity:*

Physical integrity is ensuring that data stays protected / safe (complete and accurate) ✓ against physical threats / (power failure, natural disasters, theft of hardware) ✓ as it is accessed, stored and retrieved. (2)

6.3.2 *Any TWO factors that affect the physical integrity of storage devices: ✓✓*

- Mechanical shocks or vibrations / robust handling
- Exposure to extreme temperatures or humidity levels
- Power surges or fluctuations
- Improper handling or installation
- Dust accumulation
- Magnetic interference (2)



6.4 *Differentiate between private key encryption and public key encryption within the context of SSL encryption:*

Public key encryption uses a pair of keys, a public key and a private key, to encrypt and decrypt data. ✓

Private key encryption uses a single key for both encryption and decryption. ✓

(2)

6.5 6.5.1 *Define Virtual reality (VR):*

Virtual reality is an artificial environment ✓ that is created with software. ✓

Any TWO concepts:

- Artificial/simulated environment
- Created with software / computer generated
- Appears as 3D space / interacted with via VR equipment

(2)

6.5.2 *Any TWO types of smartphone features/sensors that is required for using AR: ✓✓*

- Camera
- GPS
- Accelerometer / Motion detector
- Gyroscope
- Microphones
- Fingerprint scanners
- Facial recognition
- Touch screen

(2)

6.5.3 *Any ONE possible use of IoT in a home automation system: ✓*

- Robotic vacuum cleaners.
- Lights of house can be automatically switched off/on.
- Air-conditioning can be set according to preferences.
- Smart fridges contain cameras that allows a user to view content while shopping.
- Communication between the device and the manufacturer e.g. fault reporting / update

Also ACCEPT any other relevant and correct answer.

(1)



- 6.6 6.6.1 *Explain what a zombie is:*
- The devices infected by malware ✓ that are being controlled by a remote computer. ✓ (2)
- 6.6.2 *Any ONE reason why a cybercriminal would create and use a zombie device: ✓*
- Send spam
 - DDoS attacks / overloading the network with Internet traffic
 - Spread malware
 - Manipulate data
 - Unethical purposes
 - Anonymity – activity is traced back to the IP-address of the zombie and not the cybercriminal (1)
- 6.7 6.7.1 *Any TWO ways how a user would protect their online identity: ✓✓*
- Do not give out personal details
 - Use the block/unfriend features of social media applications
 - Disable cookies
 - Enable privacy setting on social media applications
 - Disable location sharing on applications
 - Limit the use of third-party applications
 - Use strong passwords
 - Use two-factor authentication (2FA / MFA)
 - Avoid suspicious links (2)
- 6.7.2 *Motivate how updating software can ensure your online safety:*
- Any ONE:✓
- Fixes/Prevents security weaknesses in software
 - Adds/Improves security features (1)
- 6.8 6.8.1 *Explain the purpose of using AJAX as part of a website:*
- Update a web page dynamically / as interaction takes place ✓ only reloading the necessary parts of a web page ✓ / without requiring a full page reload / refresh the page (2)



6.8.2 *Discuss the role that AI can play in enhancing the semantic search:*

Artificial intelligence can search for / create images and other creative content ✓, rather than just including keywords and the contextual factors of the user. ✓

(2)

6.9 *Two people have searched for the word "RAM" when looking for courier companies. One of them gets results about a courier company and the other gets results about computer hardware.*

Explain why this happened by referring to a customised search in your answer.

Over time users generate a digital footprint / history containing information about their preferences and online browsing activity / searches. ✓

Their digital footprint / history is used to generate more relevant results when they perform a search. ✓

The results are generated by / based on an algorithm that takes personal preferences, browsing behaviour, and geographical location into account ✓

Concepts:

- Personalisation
- History / previous searches
- Results are based on an algorithm

(3)

TOTAL SECTION F: 30
GRAND TOTAL: 150

