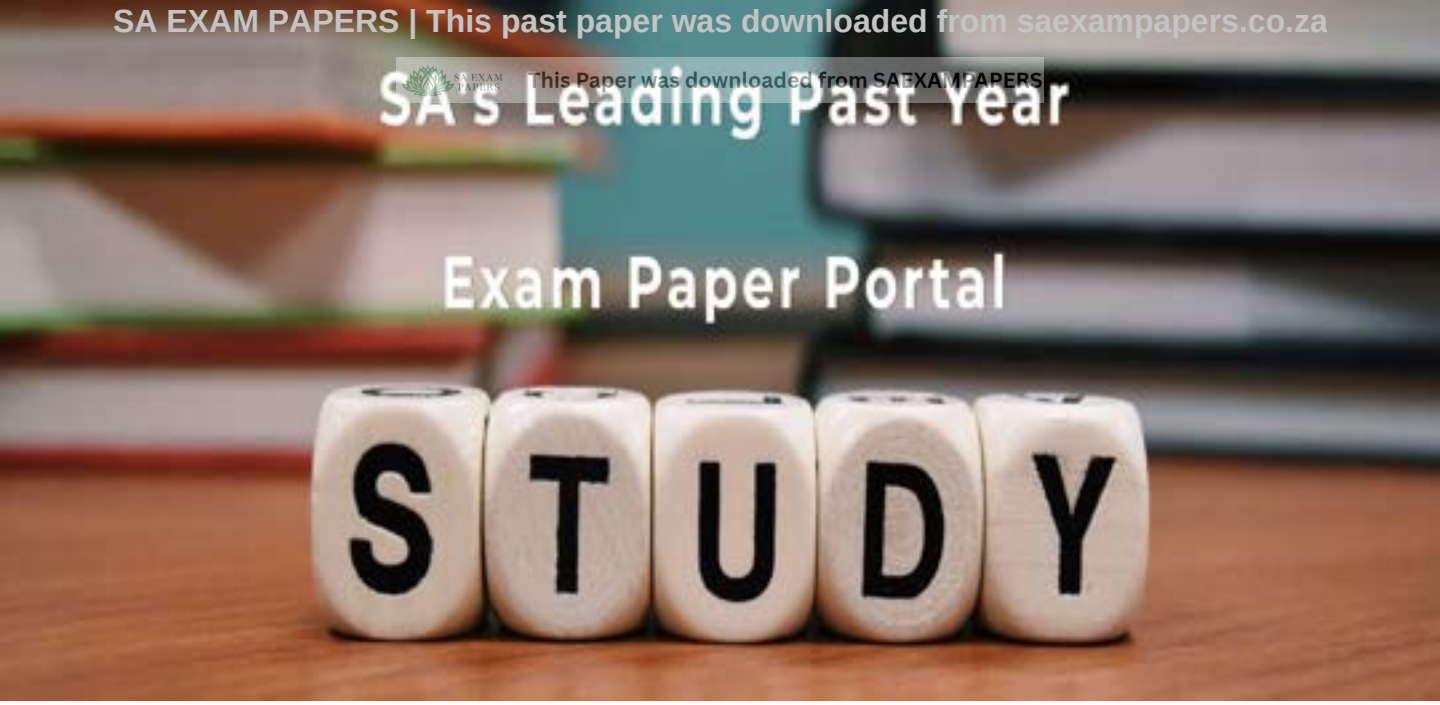


basic education

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

# SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

## INFORMATION TECHNOLOGY P2

## MAY/JUNE 2025

**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 15 pages.**

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of SIX sections:

| | | |
|---|---|---|
| SECTION A: | Short Questions | (20) |
| SECTION B: | Systems Technologies | (30) |
| SECTION C: | Communication and Network Technologies | (25) |
| SECTION D: | Data and Information Management | (25) |
| SECTION E: | Solution Development | (20) |
| SECTION F: | Integrated Scenario | (30) |

2. Read ALL the questions carefully.

3. Answer ALL the questions.

4. The mark allocation generally gives an indication of the number of facts/reasons required.

5. Number the answers correctly according to the numbering system used in this question paper.

6. Write neatly and legibly.

## SECTION A: SHORT QUESTIONS

### QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

1.1.1 Which ONE of the following is NOT a reason for the digital divide?

A Lack of internet connection in certain areas
B People with disabilities find it difficult to use ICT
C Information overload
D Lack of exposure to technology (1)

1.1.2 Software that translates the code line by line into machine language, while the program is running:

A Compiler
B API
C Interpreter
D Driver software (1)

1.1.3 A programming technique used to test whether a user's input is in an acceptable range and ensures that data meets a set of requirements:

A Verification
B Validation
C Debugging
D Encryption (1)

1.1.4 Static web pages where all users see the same content:

A Web 1.0
B Web 2.0
C Web 3.0
D Semantic web (1)

1.1.5 The integration of digital information with the user's environment in real time:

A Virtual reality
B VPN
C Augmented reality
D Geotagging (1)

1.1.6 A unique number that consists of four sets of numbers from 0–255, separated by periods/dots, e.g. 196.14.2.244:

A Voice over internet protocol
B IP address
C URL
D Domain name (1)

1.1.7 Software stored on the ROM chip which contains instructions for the boot-up process of a device:

A CMOS
B BIOS
C Operating system
D Freeware (1)

1.1.8 What is the resulting data type of the 'MOD' operator in Delphi programming?

A Integer
B Boolean
C Real
D String (1)

1.1.9 The use of data encryption to prevent unauthorised access to digital copyrighted content:

A SSL
B ATM
C DRM
D POP3 (1)

1.1.10 Any computer or device that provides services and connections to other computers or devices on a network:

A Client
B Host
C ISP
D Domain (1)

1.2 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 CPU.

1.2.1 A protocol used to leave copies of e-mails on the server to allow users to read, send and organise their e-mails from multiple devices (1)

1.2.2 Software that allows the operating system to communicate with and control hardware devices connected to the computer (1)

1.2.3 A visual illustration used to describe the relationship between two tables in a database (1)

1.2.4 An online platform containing information that allows users to collaborate by adding and editing content (1)

1.2.5 A hexadecimal code used to uniquely identify entities, e.g. hardware, software and documents (1)

1.3 Indicate whether the following statements are TRUE or FALSE. Write 'true' or 'false' next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK. If the statement is true, write 'TRUE'. If the statement is false, write 'FALSE' and change the underlined word(s) to make the statement TRUE. (Do NOT simply use the word 'NOT' to change the statement.)

NO mark will be awarded if FALSE is written without a correct answer.

1.3.1 A group of people that work together to commit cybercrimes, each with their own speciality is called a botnet. (1)

1.3.2 The IRQ is repeated for every instruction executed by the CPU. (1)

1.3.3 Multiprocessing is when the computer has more than one CPU core and the operating system splits tasks and processes, in parallel, between the different cores. (1)

1.3.4 Leechers are peers that make files available for others to download using BitTorrent. (1)

1.3.5 An archive is a duplicate of a file, program or media that can be used if the original file, program or media is lost, damaged or destroyed. (1)

**TOTAL SECTION A: 20**

## SECTION B: SYSTEMS TECHNOLOGIES

## QUESTION 2

**SCENARIO**

Security companies are increasingly utilising home automation systems to provide solutions for their clients. These systems integrate various devices and technologies to enhance security, convenience and efficiency within residential settings.

2.1 Mobile technologies play an important role in home automation systems.

2.1.1 (a) Briefly explain what *mobile technologies* are. (1)

(b) State ONE advantage of using mobile devices, such as smartphones or tablets, as remote controllers for home automation systems. (1)

2.1.2 Give TWO examples of how mobile technologies can be utilised in enhancing home automation systems. (2)

2.1.3 Suggest ONE rule to follow regarding the security of data, when connecting a mobile device to any public Wi-Fi network. (1)

2.1.4 Name TWO types of digital input that can be captured using mobile devices. (2)

2.1.5 Suggest ONE strategy to extend the battery life of mobile devices while maintaining effective system operation. (1)

2.2 The storage of data related to video monitoring using CCTV (closed circuit television) cameras is key to the safety of residents.

2.2.1 State TWO factors that determine the quality of a CCTV camera. (2)

2.2.2 Explain why an SSD is considered to be more durable AND how it impacts on the maintenance of the drive. (2)

2.2.3 Motivate why an SSD is a better storage device than an HDD, excluding the answer that you gave to QUESTION 2.2.2. (2)

2.3 The use of secure methods to access sensitive information is critically important to a security company.

Explain ONE advantage of using biometric authentication over traditional password-based authentication. (2)

2.4 A high-performance computer/laptop and a speaker system are used by the company to do presentations during meetings.

2.4.1 Explain how bus performance can have an influence on the performance of a computer system. (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. (3)

2.4.3 Discuss how the RAM influences the performance of a computer system. (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? (1)

2.5 The use of cloud computing in home automation can have many risks and benefits.

2.5.1 Explain the concept of scalability in terms of cloud computing. (2)

2.5.2 State TWO advantages of using SaaS solutions in cloud computing environments. (2)

2.5.3 State TWO security concerns associated with cloud computing. (2)

**TOTAL SECTION B: 30**

## SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

### QUESTION 3

Security companies rely heavily on communication and network technologies to improve access to data on a global scale.

3.1 A security company utilises a network on their premises.

3.1.1 Briefly explain what a *NOS (network operating system)* is AND its role in a networked environment. (2)

3.1.2 Besides workstations, computing devices and servers, name TWO other essential components required to establish a connection between nodes in a network. (2)

3.1.3 Evaluate the importance of user rights management in a networked environment. (2)

3.1.4 State ONE possible disadvantage of using a network. (1)

3.2 Having a network connected to the internet has many risks associated with the safety and security of data.

3.2.1 State any TWO requirements of a local network to obtain access to the internet. (2)

3.2.2 Describe the role of certificate authorities (CAs) in the context of digital certificates and SSL encryption. (2)

3.3 The security company is considering implementing a wireless local area network at their premises.

3.3.1 Justify the use of Ethernet cables versus wireless media. (2)

3.3.2 Describe the function of a wireless base station in a wireless network. (2)

3.4 A laptop supplied to one of the employees at the security company has two NICs.

Motivate why the employee's laptop should have two NICs instead of one. (2)

3.5 Location-based computing is used by the security company in many aspects of their business.

3.5.1 State TWO other aspects that are required, besides mobile devices, for effectively using location-based services. (2)

3.5.2 Briefly explain TWO benefits for the company when using location-based services. (2)

3.6 A local shop supplying security devices to the company will need to take stock of their devices once a week.

3.6.1 Briefly explain how RFID technology can be used to improve the stocktaking process. (2)

3.6.2 Identify TWO potential challenges that the security company might encounter during the implementation of RFID technology for stock taking. (2)

**TOTAL SECTION C: 25**

## SECTION D: DATA AND INFORMATION MANAGEMENT

### QUESTION 4

A home automation system keeps track of activities on devices within a smart home.

A database with a table called **tblDevices** is used in the system. The table contains the following fields:

| Field | Description |
|---|---|
| DeviceID (Primary Key) | A unique ID for each device |
| DeviceName | The name of the device |
| RoomName | The name of the room where the device is located |
| RoomArea | The area of the room where the device is located (measured in $m^2$) |
| DeviceStatus | The status of the device – if the device is currently on or off/open or closed |
| StartTime | A time when the device should switch on/activate |
| EndTime | A time when the device should switch off/deactivate |

Example of the first 11 records of the **tblDevices** table:

| DeviceID | DeviceName | RoomName | RoomArea | DeviceStatus | StartTime | EndTime |
|---|---|---|---|---|---|---|
| 1 | Aircon | Sitting room | 22 | ☑ | 12:00 | 16:00 |
| 2 | Lights | Sitting room | 22 | ☐ | 17:00 | 22:00 |
| 3 | TV | TV room | 25 | ☑ | 17:15 | 23:30 |
| 4 | Alarm | Garage | 18 | ☑ | 23:00 | 6:00 |
| 5 | Aircon | Bedroom1 | 24 | ☑ | 11:00 | 15:00 |
| 6 | Aircon | Bedroom2 | 20 | ☐ | 12:00 | 17:00 |
| 7 | Lights | Bedroom1 | 24 | ☑ | 19:30 | 22:00 |
| 8 | Sound system | TV room | 25 | ☐ | 17:00 | 18:00 |
| 9 | Coffeemaker | Kitchen | 27 | ☐ | 6:30 | 7:00 |
| 10 | Window blinds | Bedroom1 | 24 | ☑ | 7:00 | 18:30 |
| 11 | Window blinds | Bedroom2 | 20 | ☑ | 7:30 | 18:00 |

4.1 The **DeviceID** field is the primary key in the **tblDevices** table.

4.1.1 Briefly explain what a *primary key* in a database table is. (1)

4.1.2 Justify why the field **DeviceID** is a suitable primary key in the table **tblDevices**. (2)

4.2 Redundant fields in a table are removed during the process of normalisation.

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

Give a brief explanation to substantiate your conclusion. (2)

4.2.2 Discuss how having redundant data could affect the efficiency of the database. (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. (6)

4.4 Each field in a table must have a data type.

4.4.1 Identify the most suitable data type for EACH of the following fields:

(a) DeviceStatus (1)

(b) StartTime (1)

4.4.2 Discuss the importance of using appropriate data types during database design. (2)

4.5 The data from the table **tblDevices** is stored by the security company.

4.5.1 Discuss a potential privacy issue related to the collection and storage of data from devices within a smart home. (2)

4.5.2 State TWO measures that could be implemented to address the issue, discussed in QUESTION 4.5.1, while still maintaining the benefits of home automation. (2)

4.6 Describe how changes made in a database can be tracked. (2)

4.7 Metadata is additional information about a database that is saved in a file or within the database.

Name TWO items that typically form part of the metadata of a database. (2)

**TOTAL SECTION D: 25**

## SECTION E: SOLUTION DEVELOPMENT

## QUESTION 5

5.1 You have been provided with the following class diagram for a security employee object, as well as a line of code:

| TSecurityEmployee |
|---|
| - fEmployeeID: Integer<br>- fName: String<br>- fPosition: String |
| + constructor create (iEmployeeID: Integer; sName: String)<br>+ getName: String<br>+ setPosition (sPosition: String)<br>+ accessAllowed (sLocation: String): Boolean<br>+ toString: String |

An object was declared in the main form using the following code:

```
objSecurityEmployee : TSecurityEmployee;
```

5.1.1 The plus (+) and the minus (-) symbols in the class diagram indicates whether the attributes and methods have public or private scope.

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

```
objSecurityEmployee.fName := 'Johann';
```

(1)

(b) State any TWO ways in which to change the value of a private attribute from a different form/class. (2)

5.1.2 The **getName** method is known as an accessor method.

Explain why an accessor method normally does not have a parameter. (1)

5.1.3 Identify TWO auxiliary methods in the class diagram. (2)

5.1.4 The name of the employee and whether he/she has access to a specific location must be displayed. A string with the necessary information must be returned to the main form.

Motivate why the **toString** method will not be used for this purpose. (2)

5.1.5 Study the following Delphi code that is used to instantiate a new `objSecurityEmployee` object and answer the question that follows:

```
objSecurityEmployee := TSecurityEmployee.create();
```

Briefly explain what `TSecurityEmployee` refers to. (1)

5.1.6 Write Delphi code for a method called `determineInitial`, that will return the first letter (initial) of a security employee's name.

**NOTE:** You can assume that a security employee has only one name. (2)

5.2 The number of tiles that will be required to tile a room must be calculated. The following Delphi code has been provided:

```
tilesRequired := Ceil(AreaOfRoom / AreaOfSingleTile);
```

Explain the purpose of the function **Ceil**, and its relevance in calculating the total number of tiles required. (3)

5.3 A global array with the following declaration was provided:

```
arr : array[1..10] of Integer = (10, 20, 30, 40, 50, 60, 70,
                                 80, 90, 100);
```

Study the Delphi code below and answer the questions that follow:

```
1:  var
2:      i, j, temp: Integer;
3:  begin
4:      for i := length(arr) downto 1 do
5:      begin
6:         j := Random(i) + 1;
7:         temp := arr[i];
8:         arr[i] := arr[j];
9:         arr[j] := temp;
10:     end;
11: end;
```

5.3.1 Assume that the first time the loop was executed, a random number 7 was assigned to the variable `j`.

Show the content of the array after the first iteration of the loop. (2)

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

```
Line 6:    j := Random(i) + 1;
```

(2)

5.3.3 State the purpose of the code provided in lines 1 to 11. (2)

**TOTAL SECTION E: 20**

## SECTION F: INTEGRATED SCENARIO

### QUESTION 6

Home automation systems have become more common in households.

6.1 Some companies offering home automation services enable users to pay for services using cryptocurrency.

6.1.1 Cryptocurrency utilises blockchain technology.

Define the term *blockchain* in this context. (2)

6.1.2 State TWO disadvantages of using blockchain technology for the company. (2)

6.2 Compression technologies in home automation systems are used when storing files and when home owners stream videos from their systems.

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

6.2.1 Image files (1)

6.2.2 Video files (1)

6.3 Physical integrity issues have been identified on some of the storage devices.

6.3.1 Define the concept of *physical integrity*. (2)

6.3.2 State TWO factors that affect the physical integrity of storage devices. (2)

6.4 The website used to monitor the automation system at a home uses both private and public encryption techniques.

Differentiate between *private key encryption* and *public key encryption* within the context of SSL encryption. (2)

6.5 The Fourth Industrial Revolution is an integration of technologies, such as IoT, robotics, AI, AR, big data and VR, to change the way people live and work.

6.5.1 Define *virtual reality (VR)*. (2)

6.5.2 Name TWO types of smartphone features/sensors that is required for using AR. (2)

6.5.3 Give any possible use of IoT in a home automation system. (1)

6.6 Home automation devices can be used as zombies.

6.6.1 Explain what a *zombie* is. (2)

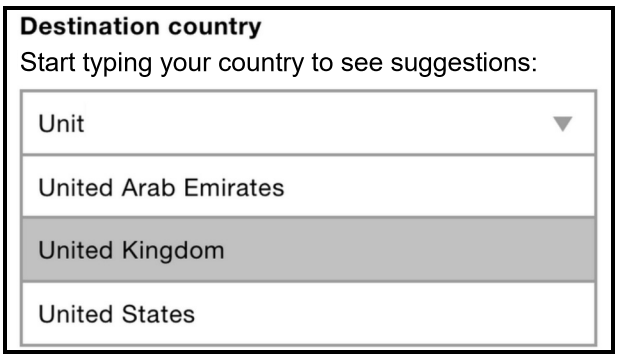
6.6.2 Why would a cybercriminal create and use a zombie device? (1)

6.7 Protecting one's online identity is vital.

6.7.1 State TWO ways in which users can protect their online identity. (2)

6.7.2 Motivate why updating software can contribute towards a user's online safety. (1)

6.8 The AJAX-based semantic web search widget shown below has been integrated into the website of an automation management company.




6.8.1 Explain the purpose of using AJAX as part of a website. (2)

6.8.2 Discuss the role that AI can play in enhancing the semantic search. (2)

6.9 Home automation devices must be delivered to households using a courier company.

Two different users have used the word 'RAM' to obtain information about courier companies online. Information about a courier company was displayed to the first user, while information about computer hardware was displayed to the second user.

Explain why this happened by referring to a customised search in your answer. (3)

**TOTAL SECTION F: 30**
**GRAND TOTAL: 150**