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

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

**INFORMATION TECHNOLOGY P2**

**2019**

**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 14 pages.**

## INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX sections as follows:

SECTION A: Short Questions	(15)
SECTION B: System Technologies	(25)
SECTION C: Communication and Network Technologies	(24)
SECTION D: Data and Information Management	(26)
SECTION E: Solution Development	(24)
SECTION F: Integrated Scenario	(36)
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 1.1.5) in the ANSWER BOOK, e.g. 1.1.6 D.

1.1.1 A document that sets out the rights and responsibilities of users in a network environment is called a/an ...

- A firewall restrictions document.
- B access restrictions document.
- C server software policy.
- D AUP.

(1)

1.1.2 A common compression standard used for website images:

- A BMP
- B JPEG
- C MPEG-4
- D MPEG-2

(1)

1.1.3 The technique whereby identical copies of data are kept on a storage device:

- A Disk imaging
- B Distributing
- C Mirroring
- D Partitioning

(1)

1.1.4 The following algorithm for an IF statement needs to be tested:

**IF Number > 5 AND Number < 10 Then  
Display Number**

In order to test this algorithm, the **best** set of test data for the variable **Number** would be ...

- A 2, 6, 10, 14, 15.
- B 3, 4, 5, 6, 10.
- C 4, 5, 6, 10, 11.
- D 3, 4, 5, 10, 11.

(2)

1.1.5 The correct Delphi statement to test if the content of the variable **cChr** is in the range of characters 'A' to 'D' (inclusive):

- A `if (cChr > 'A') AND (cChr < 'D')`
- B `if (not (cChr < 'A')) AND (not (cChr > 'D'))`
- C `if (cChr >= 'A') OR (cChr <= 'D')`
- D `if (cChr = 'A') AND (cChr = 'B')  
AND (cChr = 'C') AND (cChr = 'D')`

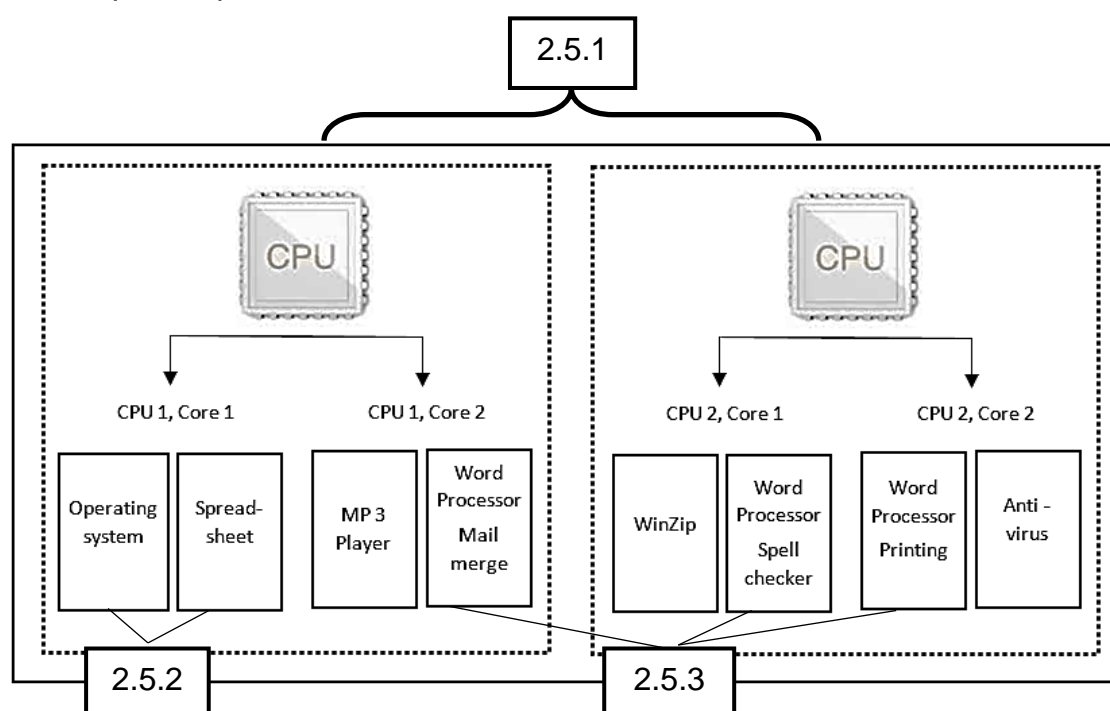
(2)

- 1.2 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question numbers (1.3.1 to 1.3.8) in the ANSWER BOOK.
- 1.2.1 The action of conning or tricking a person into providing personal information, such as passwords, willingly (1)
- 1.2.2 A digital audio or video file or recording that can be downloaded from a website to a portable media player or computer (1)
- 1.2.3 A method of gaining illegal access to a computer system by bypassing normal computer authentication systems (1)
- 1.2.4 Records that are created to keep track of who made changes to a database and when the changes were made (1)
- 1.2.5 A peer-to-peer protocol which is used for sharing large files across a network such as the internet (1)
- 1.2.6 The web version that allows consumers of content to also become creators of content (1)
- 1.2.7 An electronic device in a computer system that issues a steady high-frequency signal that synchronises all the internal components (1)
- 1.2.8 The use of an unprotected Wi-Fi connection without the permission and knowledge of the owner (1)
- TOTAL SECTION A: 15**

**SECTION B: SYSTEM TECHNOLOGIES****QUESTION 2**

- 2.1 State TWO main functions of a motherboard. (2)
- 2.2 What is the main difference between a *bus* and a *point-to-point connection*? (2)
- 2.3 Expansion slots are used to add components to a computer system.
- 2.3.1 State ONE type of controller card that can be connected through an expansion slot. (1)
- 2.3.2 Name ONE port that is commonly used to connect a wide variety of devices to a computer system. (1)
- 2.4 The configuration settings of the BIOS can be changed during the start-up process of a computer system.
- 2.4.1 Where will the changes made to the configuration settings of the BIOS be saved? (1)
- 2.4.2 Why don't the changes made to the configuration settings get lost when the computer is switched off and unplugged? (1)
- 2.5 Multitasking, multiprocessing and multithreading are processing techniques that are used by operating systems.

Identify the processing techniques illustrated and numbered as QUESTIONS 2.5.1, 2.5.2 and 2.5.3 in the diagram below. In EACH case, write down the question number shown on the diagram and the processing technique it represents.



(3)

- 2.6 Define the following terms:
- 2.6.1 Cache memory (2)
  - 2.6.2 Hardware interrupt (1)
- 2.7 Use an example to explain why plug-in software, such as Flash or QuickTime, is sometimes required by your browser to access certain websites. (2)
- 2.8 2.8.1 Write out the acronym *POS*. (1)
- 2.8.2 State TWO benefits of using barcodes with barcode scanners in a POS system. (2)
- 2.9 Scalability is one of the features of a cloud-based service, which ensures stability when a service, such as hosting a blog on a site, is rendered.
- Define the term *scalability* in a cloud-based computing environment. (2)
- 2.10 2.10.1 Give TWO reasons why the software needs to be updated regularly. (2)
- 2.10.2 State TWO advantages of software updates that are managed by a service provider for a company that uses cloud-based computing services. (2)

**TOTAL SECTION B: 25**

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

- 3.1 Explain the function of a network switch. (2)
- 3.2 State the common use/purpose of EACH of the following technologies:
- 3.2.1 Wi-Fi (1)
- 3.2.2 Bluetooth (1)
- 3.2.3 3G (1)
- 3.3 An Ethernet network was set up with star topology to connect four computers.
- 3.3.1 Name TWO types of cables that are commonly used in an Ethernet network. (2)
- 3.3.2 Draw a diagram to illustrate the layout of a star topology network for the four computers. Use labels to show the components the network will consist of. (3)
- 3.4 State TWO disadvantages of using a peer-to-peer network. (2)
- 3.5 3.5.1 Explain what is meant by the term *encryption*. (2)
- 3.5.2 Give ONE reason why services, such as Skype, use encryption processes. (1)
- 3.5.3 Encryption software is often used to control access to media files to prevent unauthorised copying of digital books or movies.
- What is this category of encryption software called? (1)
- 3.6 The two main components of an expert system are the knowledge base and the inference/decision engine.
- 3.6.1 Briefly describe how the inference/decision engine functions. (3)
- 3.6.2 What does the term *fuzzy logic* refer to? (1)
- 3.7 What is meant by the term *distributed computing*? (2)
- 3.8 What is the JavaScript programming language used for? (2)

**TOTAL SECTION C: 24**

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

The information for a large international company is stored in a database.

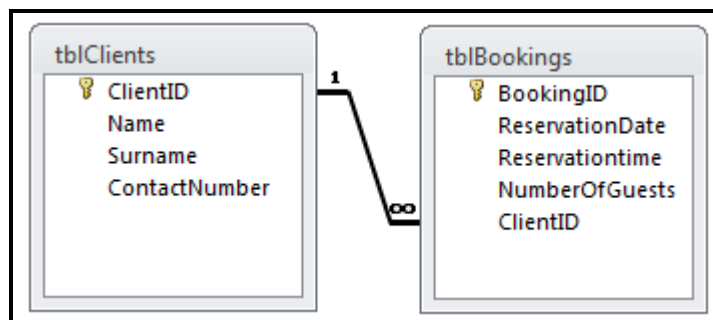
- 4.1 A data capturer captures all organisational data.
- 4.1.1 Explain what the *GIGO principle* is. (2)
- 4.1.2 Name TWO types of checks to ensure that the captured data is valid. (2)
- 4.1.3 What does the concept *logical integrity of data* refer to in general? (1)
- 4.2 The company runs a DBMS (database management system) on their server.
- 4.2.1 Explain how SQL injection can be used in a poorly designed DBMS to gain unauthorised access to data. (2)
- 4.2.2 What is *record locking* in the context of a DBMS? (2)
- 4.3 A distributed database server is used at the company.
- 4.3.1 Explain what a *distributed database system* is. (2)
- 4.3.2 State TWO situations where a single-server database will not be able to operate efficiently and the use of a distributed database becomes necessary. (2)
- 4.4 Clients must make reservations to use the company's dining facilities.

A database with the table **tblBookings** is used to save information about clients attending a restaurant daily.

Field Name	Data Type
BookingID	AutoNumber
Name	Text
Surname	Text
ContactNumber	Number
ReservationDate	Date/Time
Reservationtime	Date/Time
NumberOfGuests	Number

- 4.4.1 Differentiate between the **Number** and **AutoNumber** data types. (2)
- 4.4.2 The data type of one of the fields shown in the diagram above is not suitable for its purpose.
- Name the field and motivate a more suitable alternative data type. (3)
- 4.4.3 Give ONE reason why it is good practice to limit the length of a text field. (1)

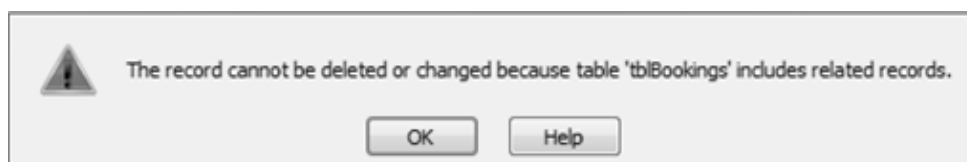
- 4.5 An attempt has been made to normalise the table **tblBookings** using the following table structure:



4.5.1 Explain the term *normalisation*. (2)

4.5.2 State the type of relationship that exists between the **ClientID** fields in the **tblClients** table and the **tblBookings** table. (1)

4.5.3 The following message is displayed when an attempt is made to delete a record from the **tblClients** table:



(a) Explain how the rule related to referential integrity has been violated. (2)

(b) What needs to be done before the record can be deleted successfully from the **tblClients** table? (1)

4.5.4 If the **BookingID** field is removed from the **tblBookings** table, a combination of the **ClientID**, **ReservationDate** and **ReservationTime** fields can be used to form a unique key.

What is this type of key called? (1)

**TOTAL SECTION D: 26**

**SECTION E: SOLUTION DEVELOPMENT****QUESTION 5**

5.1 Software that is designed goes through multiple development stages.

5.1.1 Complete the statement:

Software development entails the processes of analysis, design, development, implementation and ... (1)

5.1.2 Name ONE visual tool (diagram) that can be used for design purposes. (1)

5.1.3 The *Repeat...until* and *While...do* loops are both conditional loops.

Write down which loop structure (*Repeat...until*/*While...do*) would be more suitable for EACH of the following purposes:

(a) A loop that must be executed at least once (1)

(b) A loop that must check a condition before execution (1)

5.1.4 What type of error (syntax, logical or runtime) occurred if the following result is obtained when code is compiled or executed?

(a) Division by zero (1)

(b) When the output of a calculated value is incorrect (1)

5.2 The form below was designed to be used for online registration on a website.

5.2.1 Comment on the layout of the GUI by analysing the placement of any TWO components on the form. (2)

5.2.2 Identify ONE component on the form that should be replaced with a component that is more suitable for its purpose. Suggest a more suitable component to use instead. (2)

- 5.3 An object-orientated software program was developed to manage bookings at the company restaurant. The **TBooking** class was designed, as shown below.

<b>TBooking</b>
<b>Attributes</b>
-ReservationNumber -ClientID -ReservationDate -ReservationTime -NumberOfGuests -AmountSpent
<b>Methods</b>
+Create() +setAmountSpent(amount) +getClientID() +getReservationNumber() +getAmountSpent()

- 5.3.1 Name TWO types of methods that can be used to **change the value** of a private attribute of an object. (2)
- 5.3.2 The **Create** method will be used to instantiate the **Booking** object.  
What is the general term used in OOP to refer to a method that instantiates an object? (1)
- 5.3.3 Name the standard method used in OOP to return a description of the attributes of an object as a string. (1)
- 5.3.4 All the attributes in the **TBooking** class are declared as private.  
(a) Explain how private attributes affect other classes that use the **TBooking** class. (1)  
(b) Write down the term used in OOP to describe the concept of enforcing private access to the attributes of an object. (1)

- 5.4 The lowest common multiple (LCM) of any two numbers is the smallest number that both numbers can divide into without a remainder.

- 5.4.1 The following algorithm determines the LCM of the number 3 and the number 4:

Line number	Statement
1	Biggest $\leftarrow$ 4
2	Smallest $\leftarrow$ 3
3	Counter $\leftarrow$ 0
4	Repeat
5	Increase Counter
6	Multiple $\leftarrow$ Smallest x Counter
7	Until remainder of (Biggest / Counter) = 0
8	Display Multiple

Copy the trace table provided below into your ANSWER BOOK and complete the table by tracing through the given algorithm.

**NOTE:** Add more lines to the table as required.

Line number	Biggest	Smallest	Counter	Multiple	Remainder of Biggest / Counter = 0?	Output
1,2,3	4	3	0			
5			1			

(6)

- 5.4.2 (a) The algorithm can be improved by changing ONE of the statements, which will cause the loop to be executed one less time without affecting the result.

Identify and write down the improved statement.

(1)

- (b) Explain why your suggestion in QUESTION 5.4.2(a) will result in one less repetition of the loop without affecting the result.

(1)

**TOTAL SECTION E: 24**

**SECTION F: INTEGRATED SCENARIO****QUESTION 6**

The school's technology centre has been upgraded and now includes a LAN and a hotspot. Users of the technology centre will have access to the internet and be able to print documentation on research that has been done. The technology centre uses an electronic database to record and issue all stock, e.g. stationery, cartridges and paper.

- 6.1 A biometric access system has been installed for access control at the technology centre.
- 6.1.1 Define the term *biometric*. (2)
- 6.1.2 State TWO possible biometric properties that could be used for access control at the centre. (2)
- 6.2 Many learners bring their mobile devices to school to use the hotspot at school.
- 6.2.1 State ONE disadvantage of using a hotspot. (1)
- 6.2.2 Give TWO reasons why many well-known websites have specifically developed apps that can be used on mobile devices. (2)
- 6.2.3 State TWO advantages of allowing the use of mobile devices at school in terms of teaching and learning. (2)
- 6.2.4 Learners often use the hotspot to listen to music.
- Give TWO reasons why learners would prefer to stream music instead of downloading it. (2)
- 6.2.5 Learners are encouraged to use a media repository.
- Explain what a *media repository* is. (2)
- 6.3 The DVDs that the learners can borrow from the technology centre are fitted with RFID tags.
- 6.3.1 Write out the acronym *RFID*. (1)
- 6.3.2 State TWO advantages of using RFID tags on items in the technology centre. (2)
- 6.4 The school website has a link to a blog for the community project. The blog is maintained by the chairperson of the project and is entitled 'Community service – 67 minutes for Mandela Day'.
- 6.4.1 What is a *blog*? (2)
- 6.4.2 Name ONE advantage for the project team that might be gained by users contributing to the blog. (1)

- 6.5 The networking of computers can have a negative impact on our lives in some instances.
- 6.5.1 A hacker stole a large amount of money from the bank account of one of the teachers.
- State ONE general precaution that both the teacher and the bank could have taken to minimise the risk of exposure to hacking. (2)
- 6.5.2 Some schools block learners' access to Facebook and other social websites on the school's network.
- Give ONE reason why you agree with this practice, or not. (1)
- 6.6 Transaction processing is used in the technology centre for the issuing of stock.
- Briefly explain how transaction processing ensures that data integrity is maintained. (3)
- 6.7 State TWO advantages for learners who use online storage services, such as Dropbox. (2)
- 6.8 State ONE advantage of using remote desktop software. (1)
- 6.9 Name ONE task performed by EACH of the following role players who assisted with upgrading the LAN in the technology centre:
- 6.9.1 PC technician (1)
- 6.9.2 Network administrator (1)
- 6.10 They consider the use of a robot for cleaning the technology centre.
- Besides wheels, a CPU and software, state ONE component that will be essential for a robot to be able **to navigate** as it cleans the floor. (1)
- 6.11 Learners often conduct searches on the internet as part of research for school projects.
- 6.11.1 State ONE distinctive characteristic of EACH of the following types of search processes:
- (a) Mediated search (1)
- (b) Semantic search (1)
- 6.11.2 What is a *sponsored link*? (1)
- 6.11.3 Briefly explain what *click farms* are and how they can negatively affect the quality of results produced via search engines. (2)

**TOTAL SECTION F: 36**  
**GRAND TOTAL: 150**