basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

INFORMATION TECHNOLOGY P2

NOVEMBER 2015

MARKS: 150

TIME: 3 hours

This question paper consists of 17 pages.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of SIX sections:

        SECTION A: Short questions   (15)
        SECTION B: Systems Technologies   (24)
        SECTION C: Communication and Network Technologies   (25)
        SECTION D: Data and Information Management   (22)
        SECTION E: Solution Development   (24)
        SECTION F: Integrated Scenario   (40)

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   Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1   Programs that are part of the system software, which perform maintenance and administrative tasks   (1)

1.1.2   Measurement and identification of unique physical characteristics of a person that are normally used to do security checks   (1)

1.1.3   A space inside the processor where the result of a calculation or a single value can be kept temporarily   (1)

1.1.4   Programs that make it possible for operating systems to communicate with and control hardware devices   (1)

1.1.5   Software that is freely distributed but can only be used for a limited time or with limited capabilities   (1)

1.1.6   Creating a new platform on an existing computer that is using a different operating system   (1)

1.1.7   When parts of a file are scattered across various sectors of the disk   (1)

1.1.8   The type of compression that sacrifices insignificant/redundant data   (1)

1.1.9   Software, such as flash players, that extend the capabilities of a browser   (1)

1.1.10   A local area network (LAN) in which many workstations contribute to the network resources without using a dedicated server   (1)

1.2   Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

1.2.1   A web application that allows people to create and modify the content of an online knowledge resource is known as a/an ...

A   wiki.
B   microblog.
C   content aggregator.
D   e-mail.   (1)

1.2.2 Which ONE of the following is NOT an advantage of data independence?

    A   The actual data management is left to the DBMS software.
    B   Multiple applications can access the same data.
    C   The user application cannot change the structure or format of the data.
    D   Data is protected from loss or theft.   (1)

1.2.3 Using someone else's unsecured Wi-Fi network without their permission to download gigabytes of data is known as ...

    A   cyber extortion.
    B   spamming.
    C   piggybacking.
    D   bootlegging.   (1)

1.2.4 Which ONE of the following aspects does NOT influence the speed of processing data/instructions?

    A   Size of ROM
    B   Size of registers
    C   Size of cache
    D   Number of processor cores   (1)

1.2.5 A person who uses the Internet or network to destroy or damage computers for political reasons is known as a ...

    A   hacker.
    B   script kiddie.
    C   cyber bully.
    D   cyber terrorist.   (1)

TOTAL SECTION A: 15

SCENARIO

The administrative building of a train station in a town has been extended to include access to bus and taxi transport services. As part of the modifications and extensions to the building, the IT infrastructure has also been upgraded.

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

Desktop computers are used in the administrative office by the employees of the bus transport division.

2.1   The desktop computers are modular in design.

      2.1.1   What is meant by the term *modular design*? (1)

      2.1.2   State TWO advantages of modular design. (2)

      2.1.3   Explain the purpose of each of the following components found on the motherboard of modern computers:

            (a)   SATA connectors (1)

            (b)   ZIF socket (1)

2.2   Open-source software has been loaded onto some desktop computers. Other computers have been preloaded with proprietary software.

      2.2.1   (a)   State ONE disadvantage of using open-source software. (1)

            (b)   State ONE disadvantage of using proprietary software. (1)

      2.2.2   When large programs are executed, the operating system may run out of memory.

            Briefly explain how virtual memory can help to solve this problem. (3)

2.3   The IT department is considering installing thin-client computers in the administrative office.

      2.3.1   What is a *thin-client computer*? (1)

      2.3.2   State TWO advantages of installing thin-client computers. (2)

2.4   Bbox is a new PC that will be supplied to the managers as part of the upgrading process. Bbox has the following specifications:

```
Quad Core Intel Atom Z3735F Processor, 1.33 GHz
2 GB RAM
32 GB SSD
3 USB 2.0 connectors
MicroSD card slot
Ethernet port
HDMI port
Wi-Fi and Bluetooth 4.0
Windows 8.1
```

2.4.1   (a)   Which specific processing technique is made possible by the fact that Bbox has multiple cores? (1)

          (b)   Briefly explain how the technique in QUESTION 2.4.1(a) can still be beneficial when running a single program. (2)

2.4.2   Explain what a *microSD card* is. (2)

2.4.3   What is the benefit of using an HDMI port for video output instead of using a VGA port? (1)

2.4.4   Bbox uses Wi-Fi and Bluetooth technologies.

          Differentiate between *Wi-Fi technology* and *Bluetooth technology*. (2)

2.5   Many computers are structured in such a way that the operating system and applications are installed on the SSD and the data is stored on a conventional hard drive.

Explain the benefit of using this storage configuration. (2)

2.6   An interrupt signal is sent from the printer to the CPU.

Give an example of an interrupt message that can be received from the printer. (1)

TOTAL SECTION B: 24

           Please turn over

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

The computers in the administrative building of the train station are connected to the local area network. All users will have access to the Internet.

3.1   The management has decided NOT to use a Wi-Fi network.

State TWO limitations of Wi-Fi that could have led to this decision.   (2)

3.2   The network will use both UTP and fibre-optic cables.

3.2.1   Suggest TWO reasons for the use of fibre-optic cables for the backbone of this network.   (2)

3.2.2   What medium is used to transfer data in UTP cables?   (1)

3.3   An ADSL connection will be used for Internet connection in the offices.

3.3.1   State TWO advantages of an ADSL connection.   (2)

3.3.2   Which device is needed in a wired network to connect the LAN to the Internet?   (1)

3.3.3   VoIP will be used for video calls over the Internet.

Briefly discuss TWO possible problems that could be experienced when using VoIP.   (2)

3.4   All electronic communication from the administrative offices will use either a digital certificate or a digital signature.

3.4.1   Explain the purpose of a digital signature.   (1)

3.4.2   The digital signature is included in the digital certificate.

Name TWO other details found on the digital certificate.   (2)

3.5   The administrative employees will have access to the train station's Intranet.

What will the Intranet typically be used for in an environment such as the train station?   (2)

3.6   The managers will have access to the office network via a VPN.

Briefly explain why it would be an advantage for the managers to use a VPN.   (2)

3.7   The IT technician was asked to download a training video onto an office computer using BitTorrent.

      3.7.1   What is *BitTorrent*?   (2)

      3.7.2   State TWO risks associated with downloading files when using BitTorrent.   (2)

3.8   Employees browsing the Internet will interact with Web 3.0 technologies. One of the trends of Web 3.0 is the Internet of Things.

      3.8.1   Explain what is meant by the *Internet of Things*.   (2)

      3.8.2   Describe the type of interaction for users using Web 3.0 technologies.   (2)

TOTAL SECTION C: **25**

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

A database server will be used to store the details of the drivers of all public transport vehicles, as well as the routes.

4.1   The following tables have been designed for the database:

tblDrivers		
Key	**FieldName**	**DataType**
🔑	DriverID	Text
	DName	Text
	DSurname	Text
	DContact	Text

tblRoutes		
Key	**FieldName**	**DataType**
🔑	RouteNumber	Text
🔑	DriverID	Text
	ModeOfTransport	Text
	DepartureTime	Text

Example of data from the **tblDrivers** table:

DriverID	DName	DSurname	DContact
P123	Peter	Granger	0714254255
D145	Dali	Hlatswayo	0845465896
H741	Happy	Nkosi	0735478987
K851	Keshan	Pillay	0838741113

Example of data from the **tblRoutes** table:

RouteNumber	DriverID	ModeOfTransport	DepartureTime
8	P123	Bus	08h00
8	D145	Taxi	10h15
12	K851	Train	07h30
10	K851	Train	11h30

4.1.1   Name the design concept that was used to set up the tables in such a way that data redundancy would be prevented.   (1)

4.1.2   The given tables are linked with the DriverID fields.

(a)   What kind of relationship exists between the **tblDrivers** and the **tblRoutes** table?   (1)

(b)   In the **tblRoutes** table each record is uniquely identified by using the RouteNumber and DriverID fields in combination.

What is this type of identification key called?   (1)

4.1.3   Write SQL statements for each of the following queries based on the tables on the previous page.

      (a)   Display the names, surnames and contact details of all the drivers in alphabetical order according to surnames.   (3)

      (b)   Display the route numbers of the taxi routes departing at 08h00.   (4)

      (c)   Add a record for a new driver, Sanele Mahlangu, who may be contacted on 060 161 0525. The driver has been allocated the code S784 as DriverID.   (3)

4.1.4   The following incorrect SQL query was written to display how many times each mode of transport (train, taxi and bus) had been used:

```
SELECT ModeOfTransport, SUM(*) AS [TOTAL]
FROM tblRoutes ORDER BY ModeOfTransport
```

      Write the correct SQL statement.   (2)

4.2   Explain why it would be suitable for the administrative office to use a database server.   (2)

4.3   Data integrity has two broad categories, namely physical and logical data integrity.

4.3.1   Name ONE technique that could be used to overcome practical issues that threaten the physical integrity of the data.   (1)

4.3.2   Explain how a transaction processing system maintains data integrity.   (3)

4.4   The improvement of the public transport services for the town is under review.

What term is used for the process of discovering patterns in large data sets, for example data of the current use of the transport system?   (1)

TOTAL SECTION D: 22

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

New programs to be used by the administrative office are being developed.

5.1   The following class diagram has been suggested as part of the transport program to manage their drivers:

Driver	
Attributes	**Methods**
-driverID:String -surname:String -firstName:String -cellNumber:String -fullTime:Boolean	+getDriverID():String +getSurname():String +getFullTime():Boolean +setFirstName(firstName:String) +toString():String +calculateAge():Integer

5.1.1   (a)   The minus sign (-) indicates that the declaration is private. The plus sign (+) indicates that the declaration is public.

Explain the difference between a *public declaration of attributes* and a *private declaration of attributes*.   (2)

(b)   Write down an example of an auxiliary method from the **Driver** class.   (1)

(c)   What is the purpose of a toString method?   (2)

5.1.2   Constructors are special methods in a class. However, a class can be coded without having a constructor method. Explain how this is possible.   (1)

5.2   Ticket numbers need to be allocated to tickets for each mode of transport.

Each ticket number is made up of five digits and a control digit. The control digit is determined as follows:

*   The first five digits of the ticket number are multiplied by descending numbers, starting at five.
*   Each of the answers is then added.
*   The control digit is the remainder after dividing the total by five.

Example:

Ticket number: 43452
Control digit: 1 (4*5 + 3*4 + 4*3 + 5*2 + 2*1 modulus 5 = 1)
Six-digit ticket number: 434521

Write pseudocode to enter a five-digit number. Generate and add the control digit to the five-digit number and display the six-digit ticket number.   (7)

5.3   In one of the existing programs a segment of the code was designed in the form of an algorithm to calculate the value of a number raised to a power.

```
(1)  base ← 5
(2)  answer ← base
(3)  power ←3
(4)  Loop index from 1 to power
(5)      answer ← answer * base
(6)  Display the answer
```

5.3.1   Use the following headings and complete the trace table:

base	power	answer	Loop index	Display

(5)

5.3.2   Indicate TWO different ways in which a single line of the given algorithm can be changed to display the correct answer.

Indicate the line number that can be changed, as well as the changed code for the line.   (2)

5.4   An array called **arrMonths** has been declared to contain the names of the months of the year.

5.4.1   A loop must be used to display the month names.

Motivate whether a conditional or an unconditional loop should be used.   (2)

5.4.2   A parallel array of integer type, called **arrPassengers**, has been declared to contain the number of passengers that passes through the train station each month.

Why is it NOT possible to use a two-dimensional array instead of two separate parallel arrays to store this data?   (2)

TOTAL SECTION E: 24

SECTION F: INTEGRATED SCENARIO

QUESTION 6

The administrative building will be the central hub from which all public transport in the area will be managed and monitored. The train station's website can be used to purchase tickets online, check timetables, make reservations and give feedback.

6.1   The train station's website was upgraded to include both interactive and dynamic web pages.

      6.1.1   State ONE advantage of interactive web pages from the perspective of a station website user.   (1)

      6.1.2   How will the web page file extension help you to determine whether the page is dynamic?   (1)

      6.1.3   To register for electronic ticketing, a user must complete the online form shown below.

      (a)   When purchasing tickets online, users need to provide personal information in order to create a user account.

             State TWO precautions to prevent identity theft, which could take place during this process.   (2)

      (b)   What is the purpose of the asterisk character ('*') next to most of the labels?   (1)

(c)   There is no indication of how to enter the gender.

        Suggest TWO ways that could be used to ensure that input
        for the gender is valid.   (2)

(d)   The following error message appears when the 'Confirm
        Registration' button is clicked:

        Password is not strong.

        OK
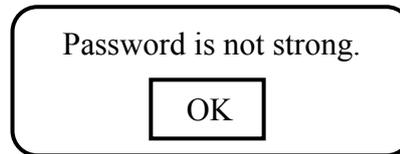
        Suggest TWO ways to ensure that a password is strong.   (2)

6.1.4   The public can provide feedback about the service they receive in
        the form of complaints or compliments.

        The following GUI has been provided:

        Feedback from the public

        Select type of feedback | Complaint   ▼ |

                                 | List of Compliments   ▼ |

                                 | List of Complaints   ▼ |

                                 Submit

(a)   Combo boxes have been used for the list of complaints
        and the list of compliments.

        Motivate why the combo box is NOT the most appropriate
        component for this application.   (1)

(b)   Explain how the dynamic instantiation of components could
        improve the GUI from a user's point of view.   (1)

6.1.5   Users complained that the website was continuously unavailable for two consecutive days.

According to the administrator, this was a deliberate attack on the website, which overloaded the website with an excessive number of requests in order to prevent users from obtaining information from the website.

Name this type of attack.   (1)

6.2   Wi-Fi Internet is available to passengers on the trains.

6.2.1   Give TWO possible reasons why Wi-Fi is now also provided with public transport services and not only at fixed locations such as hotels.   (2)

6.2.2   Name TWO technologies that can be used for trains to remain connected to the Internet, in order to provide Wi-Fi Internet to the passengers.   (2)

6.3   The following advertisements were placed on advertising boards outside the administrative building:

Advertisement A

3G Hotspot & Wireless Repeater

* Creates HotSpot from 3G
* Feed 3G to Lan
* Chargers USB devices
* Powerbank

Advertisement B

Cloud Storage & Wifi Media Streamer

* Stream Movies and Music via Wifi
* View & Share Documents
* Connect up to 5 devices Simultaneously, access different files

Advertisement C

Cloud Services

Use a cloud service to store and sync all your files.

6.3.1   What is a *hotspot*?   (1)

6.3.2   Advertisement B suggests that movies can be streamed.

Explain the term *streaming*.   (2)

6.3.3 Give TWO reasons why Advertisement C recommends the use of a cloud service to store and sync files. (2)

6.3.4 Briefly explain the difference between *cloud backup services* and *cloud syncing services*. (2)

6.4 The new buses and taxis are fitted with a GPS system to assist the drivers with directions. Buses are also fitted with webcams to record bus journeys.

6.4.1 The video with metadata is saved on an SSD.

(a) What is *metadata*? (1)

(b) The GPS coordinates are recorded each time a bus stops for a rest period.

Give TWO practical reasons for saving the GPS coordinates. (2)

6.4.2 Motivate why the software for a GPS navigation system must be updated regularly. (1)

6.4.3 Before proceeding with the installation of the new software update, the end-user licence agreement (EULA) must be agreed to.

State TWO aspects that the end user will typically agree to in the EULA. (2)

6.5 The power supply in the administrative building is under constraint.

State TWO power-saving methods that can be put in place to reduce the power used by the computers in the administrative building. (2)

6.6 Public transport users often watch videos on their electronic devices while travelling. Videos take up a significant amount of space on an electronic device.

Name a compression method suitable for videos. (1)

6.7 Passengers have requested that smartcards and smartphones should be allowed as a means of paying fares.

6.7.1 What is a *smartcard*? (2)

6.7.2 State ONE way in which a smartphone can be used to make payments. (1)

6.8   The train station administration has employed a web designer.

      6.8.1   State TWO skills that a web designer must have to create a website. (2)

      6.8.2   Public transport users can access the station website from their mobile devices.

            State TWO factors that a web designer needs to take into consideration in order for the website to be accessible on mobile devices. (2)

6.9   Transport schedules are displayed on the station website.

How can the users remain informed of changes in the transport schedules without having to visit the website? (1)

TOTAL SECTION F: 40
GRAND TOTAL: 150