basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

INFORMATION TECHNOLOGY P2

NOVEMBER 2017

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　　　　　　　　　　　　(27)
　　　　SECTION C:　Communication and Network Technologies　　(22)
　　　　SECTION D:　Data and Information Management　　　　　　(20)
　　　　SECTION E:　Solution Development　　　　　　　　　　　　(25)
　　　　SECTION F:　Integrated Scenario　　　　　　　　　　　　　(41)

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 number (1.1.1–1.1.5) in the ANSWER BOOK, for example 1.1.6 D.

     1.1.1   Altering the sender's address and other parts of an e-mail header to appear as if the e-mail originated from a different source is called …

        A   spoofing.
        B   pharming.
        C   hoaxing.
        D   spamming.   (1)

     1.1.2   Which ONE of the following does NOT refer to an attribute of ROM?

        A   Smaller capacity than RAM
        B   Can be programmed
        C   Permanent memory
        D   More ROM can be plugged into slots on the motherboard   (1)

     1.1.3   The following are computer file management techniques:

        (i)   File compression
        (ii)   File conversion
        (iii)   File archiving

        Which combination of computer file management techniques is used when an image file is changed from bmp format into jpeg format using image software?

        A   (i) and (ii)
        B   (i) and (iii)
        C   (ii) and (iii)
        D   (i), (ii) and (iii)   (1)

     1.1.4   The communication standard most commonly used to connect cellphones to hands-free car kits is …

        A   infrared.
        B   802.11g wireless.
        C   Bluetooth.
        D   a USB cable.   (1)

1.1.5 The following Delphi statements appear in code that has been executed:

```
sLine :='We love the Delphi programming language';
sAnswer := copy(sLine, pos('l', sLine), 4);
```

What will be the content of the sAnswer variable?

A   We l
B   love
C   lphi
D   lang   (1)

1.2 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

1.2.1 An area typically found at airports and in coffee shops where wireless network connectivity is available to the public   (1)

1.2.2 The ability to plug in or remove a device from a computer without switching off the computer   (1)

1.2.3 Malware that spreads itself over networks, normally by mailing itself to all the contacts in a user's address book   (1)

1.2.4 A network of computers that are remotely controlled by malware and then used by criminals to install and run software as they need it   (1)

1.2.5 A web application that allows people to add and modify content on an online knowledge resource   (1)

1.2.6 Hardware and/or software that monitors the traffic between a computer and the Internet for safeguarding against breaches in security   (1)

1.2.7 The type of error that may occur in a database when a change in data necessitates the same data to be altered in multiple records in a table   (1)

1.2.8 A technology used by devices to automatically download e-mail after receiving a notification from the mail server   (1)

1.2.9 A set of programs designed to fraudulently use administrator rights to gain control of a computer to perform illegal activities   (1)

1.2.10 An error condition that occurs when there are not enough bits available to represent an integer value accurately   (1)

TOTAL SECTION A: 15

SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

A school purchased a desktop computer with the specifications below for administrative purposes. Study the specifications and package details and answer the questions that follow.

```
Intel Axom X5-Z8350 Quad Core processor – 2 MB cache memory
10.1 LED touch screen
4 GB RAM
500 GB HDD
Windows 10
24-month contract, 2 GB data price plan and an LTE Wi-Fi router
Office 365 Home – one-year subscription for five PCs
10 GB of OneDrive storage space
4x USB 3.0 ports
```

2.1   All computer systems have an operating system.

     2.1.1   Identify the operating system installed on the computer system above. (1)

     2.1.2   State THREE functions of an operating system in general. (3)

     2.1.3   Operating systems support a variety of processing techniques.

          Briefly explain EACH of the following processing techniques:

          (a)   Multitasking (2)

          (b)   Multithreading (2)

2.2   What does *Quad Core* refer to in the processor description in the computer system? (1)

2.3   Give TWO reasons why the amount of RAM in a computer is limited and is normally less than the amount of secondary storage space. (2)

2.4   The package includes a router.

     2.4.1   What is the function of a router? (1)

     2.4.2   What wireless communication technology is provided as part of the package? (1)

2.5   Explain why the use of a dedicated video card results in increased processing speed of a computer system. (2)

2.6   Why does cache memory improve the performance of the CPU in a computer system? (2)

2.7   When a device, such as a flash drive or a printer, is plugged into a USB port, a message is often displayed indicating it is a plug-and-play device.

2.7.1   Briefly explain the *plug-and-play process*. (2)

2.7.2   When a device such as a flash drive or a printer is used, how does it indicate that it requires the attention of the CPU? (1)

2.8   OneDrive is an example of an online storage service that allows the synchronisation of files.

What is the advantage of file synchronising services? (2)

2.9   Indexing of files can be applied by an operating system if instructed to do so.

Briefly explain what *indexing of files* means AND state the benefit of applying this feature. (2)

2.10   The school wants to buy a laptop computer or a tablet to provide mobile facilities when required.

2.10.1   Where is the operating system on a mobile device stored? (1)

2.10.2   State TWO factors to take into account when developing software for mobile devices. (2)

TOTAL SECTION B: 27

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

Network technologies are applied in many areas of everyday life.

3.1 Computers used for administrative tasks are normally connected in a network. An Ethernet LAN could be used for this purpose.

    3.1.1 Name ONE type of cable that is commonly used in an Ethernet network. (1)

    3.1.2 Which topology allows every computer to be connected with its own cable to a switch? (1)

    3.1.3 Which network protocol would be used to:

        (a) Access the Internet (1)

        (b) Browse web pages (1)

3.2 What is the benefit of using a virtual private network (VPN)? (2)

3.3 When an Internet transaction is done, data can be captured without the user's knowledge or consent.

    3.3.1 What is this type of data capturing called? (1)

    3.3.2 Give ONE example of a real-life situation in which this type of data capturing takes place AND name the type of information that can be captured. (2)

    3.3.3 The captured data is often used for user profiling purposes.

        What is user profiling mostly used for? (1)

3.4 An essential part of making websites interactive is to include programming code to be executed.

    Name THREE types of code a website can implement to provide interactivity. (3)

3.5 A warning about the use of cookies is displayed when connecting to a website.

    3.5.1 What is a *cookie*? (2)

    3.5.2 What is the effect of deleting cookies for the user? (1)

3.6   VoIP can be used to make telephone calls over the Internet.

        State TWO disadvantages of using VoIP.   (2)

3.7   Most mobile devices include a GPS.

        What is the purpose of a GPS?   (1)

3.8   Digital rights management (DRM) is a controversial topic in the IT industry.

        3.8.1   Explain what *DRM software* is.   (2)

        3.8.2   Name ONE area of application of DRM software.   (1)

                                                            TOTAL SECTION C: 22

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1 The supervisor of the maintenance team at the school needs assistance with a database for the employees. The two tables below were created to save the information of the employees and the maintenance jobs that had been assigned to them.

tblEmployees
🔑 ID
EmployeeName
EmployeeSurname
Gender
Age

tblJobCards
🔑 JobCardNumber
DateStarted
DateCompleted
NumDaysTaken
Description

4.1.1 In the **tblEmployees** table the ID field is intended to save the identity number of the employee, for example 0210255017084.

Give ONE reason why it would be incorrect for this field to be an integer data type. (1)

4.1.2 The **JobCardNumbe**r field is selected as the primary key in the **tblJobCards** table.

Explain why none of the other fields in this table would be a suitable primary key. (1)

4.1.3 The **NumDaysTaken** field indicates how many days it took to complete the job. It has been suggested that the **NumDaysTaken** field in the **tblJobCards** table should be removed because it is unnecessary.

Motivate this suggestion. (1)

4.1.4 The manager wants to view a list of jobs that have been assigned to a specific employee. A relationship must be created between the two tables to be able to generate the list.

A field must be added to one of the tables for a relationship to be created.

Indicate the name of:

(a) The field that must be added

(b) The table this field must be added to (2)

4.2 Information must always be verifiable.

What does *verifying information* entail? (1)

4.3   The gender of an employee was entered in an edit box. The format of the input data (gender) was not specified, which resulted in the following input data being entered by different users:

<div align="center">Male; M; Female; F; m; female</div>

Explain how the programmer can ensure, by using code, that only valid data items ('M' or 'F') will be available for use in the rest of the program.

NOTE: Validity must be ensured using code; NOT with the use of any specific GUI components.   (2)

4.4   Each year the teachers order cleaning equipment for their classrooms.

The **tblEquipment** table contains all the orders for cleaning equipment placed by teachers for the past two years.

The structures of the **tblEquipment** table and the **tblClassroom** table are shown below.

Structure of tblEquipment:

Field name	Data type	Size
OrderNum	Text	4
Description	Text	50
OrderDate	Date/Time	Short date in the format yyyy/mm/dd
RoomNumber	Number	Value between 1 and 50 (inclusive)
Delivered	Boolean	true/false

Structure of tblClassroom:

Field name	Data type	Size
RoomNumber	Number	Value between 1 and 50 (inclusive)
Teacher	Text	25

Examples of the records of the two tables above are shown below.

Table: **tblEquipment**

OrderNum	Description	OrderDate	RoomNumber	Delivered
A001	Dustbin	2016/02/02	1	✔
A002	Dustbin	2016/02/20	2	✔
A003	Bucket	2016/09/22	5	✔
A004	Broom	2016/09/22	5	☐
A005	Bucket	2017/02/02	4	☐
A006	Broom	2017/03/27	2	✔
A007	Broom	2017/04/03	3	☐
A008	Broom	2017/10/06	4	☐
A009	Duster	2017/10/12	4	☐

Table: **tblClassroom**

RoomNumber ▾	Teacher
1	Mrs Johnson
2	Mrs Heyns
3	Mr Nel
4	Ms Karelse
5	Mr Naidoo
6	Ms Forbes

Write SQL statements to perform EACH of the following tasks:

4.4.1   Display the OrderNum, Description and OrderDate of all orders that
were placed in 2016 and not delivered yet.   (4)

4.4.2   All the brooms that were ordered have been delivered.

Change the content of the **tblEquipment** table to indicate that there
are no outstanding deliveries for brooms.   (3)

4.4.3   Display the names of the teachers who placed orders AND the total
number of orders placed by each teacher. Store the calculated value
in a new field called **numOrders**.   (5)

TOTAL SECTION D: 20

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1   Procedures and functions are used to enhance modularity in programs.

      5.1.1   State TWO advantages of modular programming.   (2)

      5.1.2   Distinguish between a *private function* and a *public function*.   (2)

5.2   The variables x, y and z have been initialised as follows:

```
x := false;
y := 4;
z := 4;
```

      Determine the result of the Boolean variable, **bAnswer**, in EACH of the following statements:

      5.2.1   `bAnswer :=  y  =  z;`   (1)

      5.2.2
```
If  (NOT (x))  AND (y <> 4) then
    bAnswer := true
else
    bAnswer := false;
```
      (2)

5.3   A palindrome is a word that reads the same forwards and backwards, for example noon.

      Complete the missing block of the pseudocode below to construct the word that was entered in reverse format in the **reverseWord** variable to determine whether the word is a palindrome, or not.

      Input word
      reverseWord ← empty string

      If word = reverseWord then
          Output 'Word is a palindrome'
      else
          Output 'Word is NOT a palindrome'   (4)

5.4   The diagram below uses a 5 x 5 two-dimensional array called **arrLightBulbs** to store the total number of light bulbs that has been replaced in each block of the school building (A, B, C, D, E) on each day of the week for the past year.

arrLightBulbs is declared as follows:

```
arrLightBulbs : array[1..5, 1..5] of integer;
```

NOTE: The labels are NOT part of the content of the array.

5.4.1   The values in the array indicated in the diagram (left diagonal area) must be added to find a total value.

Example of correct solution:

```
iSum := 0;
iRows:= 5;
iColumns := 5;
for r := 1 to iRows do
  for c := 1 to iColumns do
    if r = c then
      iSum := iSum + arrLightBulbs[r,c];
```

Copy and complete **line 4** of the following alternative solution that uses a single loop to achieve the same result:

```
1   iSum := 0;
2   iRows := 5;
3   for loop := 1 to iRows do
4     iSum := ...
```
(4)

5.4.2   Some of the mistakes that were made while coding are listed below.

Indicate in EACH case the **type of error** (syntax/runtime/logical) that occurred as a result of the incorrect statement.

(a)   `arrLightBulbs(5, 3) := 7;`   (1)

(b)   `arrLightBulbs[2, 3] := -2;`   (1)

(c)   `arrLightBulbs[6, 5] := 3;`   (1)

5.4.3   Code must be added to save the data in a text file.

Distinguish between the file handling tasks performed by the *Reset statement* and the *Rewrite statement*.   (2)

5.5   A software program has been designed to use the class **TSchool**, as shown in the UML diagram below.

TSchool
-fSchoolName
-fNumberLearners
-fNumberTeachers
+constructor create(SchoolName:String; Learners:Integer)

5.5.1   As part of the testing phase, attempts were made to instantiate **objSchool** objects using incorrect statements.

Identify AND briefly explain the error(s) in EACH statement below.

(a)   `objSchool.create('MySchool',500);`   (1)

(b)   `objSchool:= TSchool.create(805,'MySchool');`   (1)

(c)   `objSchool:= TSchool.create('MySchool','745');` (1)

5.5.2   Methods have to be added to the **TSchool** class.

Choose the appropriate method type from the list of available method types (Accessor, Mutator, Auxiliary, Constructor) to perform EACH of the following tasks:

(a)   Change the number of learners from 1150 to 1200.   (1)

(b)   Calculate the ratio of the number of learners per teacher.   (1)

TOTAL SECTION E: 25

SECTION F: INTEGRATED SCENARIO

QUESTION 6

Your school is launching a major drive to embrace the digital era. The expansion of their network, linked with increased Internet availability, has made it possible for them to better utilise new technologies and ICT. Apart from all the benefits, the increased use of computers and online services pose challenges in terms of providing improved hardware and educating users.

6.1 Name TWO IT-related jobs that will be created when setting up and expanding the network. (2)

6.2 Access to the server room must be controlled.

6.2.1 The administrative staff members use biometrics to gain access to the server room.

(a) Explain the term *biometrics*. (1)

(b) Give a suitable example of biometrics to be used in this scenario. (1)

6.2.2 It has been suggested that the other staff members use RFID cards to gain access to the server room.

State TWO disadvantages of using RFID cards for this application. (2)

6.3 Learners complain that their computers become very slow quickly when they open more applications. It has been suggested that they may be using too much virtual memory.

6.3.1 What is *virtual memory*? (2)

6.3.2 Which software implements and manages virtual memory in a computer system? (1)

6.3.3 How can the use of virtual memory be limited? (1)

6.4 File compression techniques can be used to reduce the size of files.

Distinguish between the results when a file is compressed using *lossless compression* and *lossy compression*. (2)

6.5 Some of the teachers requested that the SMT protocol settings be provided to them.

    6.5.1 Explain what a *protocol* is. (2)

    6.5.2 What is the SMT protocol used for? (1)

6.6 The school uses a school management system that uses a distributed database system.

    6.6.1 What is a *distributed database*? (2)

    6.6.2 State TWO advantages of using a distributed database. (2)

6.7 The development of the Web from version 1.0 into various other versions has greatly improved the value of the Web.

    6.7.1 Briefly describe the main feature of Web 1.0. (2)

    6.7.2 Web 3.0 is often referred to as the Semantic Web.

        (a) Explain why Web 3.0 is referred to as the Semantic Web. (2)

        (b) Web 3.0 allows a range of interrelated computing devices to be connected to the Internet which enables them to independently communicate with one another.

        What is this feature called? (1)

6.8 While searching for instructional videos on the Internet, a staff member saw a link to a webinar on education.

    6.8.1 What is a *webinar*? (1)

    6.8.2 State ONE way in which the staff member may benefit from signing up for the webinar. (1)

6.9 A logical effect of the improvements at the school has been an increase in the use of cloud computing and SaaS.

    6.9.1 What does the acronym *SaaS* stand for? (1)

    6.9.2 Cloud computing includes cloud software services, such as Office365.

    Explain how cloud applications work in general. (2)

    6.9.3 State TWO disadvantages of using online software services. (2)

6.10   Teachers can subscribe to websites that publish educational articles. These websites also provide RSS (really simple syndication) services.

Explain what an *RSS service* is.   (2)

6.11   Parents/Custodians are concerned about learners' exposure to social networking sites and cybercrime.

6.11.1   Suggest TWO ways of using social networking sites responsibly.   (2)

6.11.2   Give TWO reasons why cybercrime is prevalent.   (2)

6.11.3   A general crime people commit is using unsecured Wi-Fi Internet connections without permission.

What term is used to describe this crime?   (1)

6.12   The IT learners are considering constructing a drone as part of an awareness drive for new technology. A 3D printer will be used to print the parts of the drone.

6.12.1   What is a *drone*?   (1)

6.12.2   State TWO possible benefits of using a 3D printer for printing the parts of the drone.   (2)

TOTAL SECTION F: 41
GRAND TOTAL: 150