basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

INFORMATION TECHNOLOGY P2

NOVEMBER 2013

MARKS: 180

TIME: 3 hours

This question paper consists of 17 pages.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of FIVE sections subdivided as follows:

        SECTION A: Multiple-choice questions   (10)
        SECTION B: Hardware and software   (49)
        SECTION C: Applications and implications   (23)
        SECTION D: Programming and software development   (48)
        SECTION E: Integrated scenario   (50)

2.   Answer ALL the questions.

3.   Read ALL the questions carefully.

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: MULTIPLE-CHOICE QUESTIONS

QUESTION 1

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 (1.1–1.10) in the ANSWER BOOK.

1.1   A … is the smallest addressable unit of space on a hard disk drive.

      A   sector
      B   cluster
      C   track
      D   partition   (1)

1.2   The encryption protocol using public key encryption for encoding data sent over the Internet is known as …

      A   HTML.
      B   FTP.
      C   TCP/IP.
      D   SSL.   (1)

1.3   Which ONE of the following is NOT part of the machine cycle?

      A   Fetch data.
      B   Decode instruction.
      C   Encode data.
      D   Execute instruction.   (1)

1.4   A hardware interrupt is …

      A   a method used by peripherals to gain the CPU's attention when they need to communicate.
      B   used to stop a printer when it continues printing an unwanted print job.
      C   used by the memory of a computer to interrupt (or stop) a peripheral when communicating with the CPU.
      D   the process that occurs when the power supply unit fails and the computer stops working.   (1)

1.5   Quad pumping is …

      A   accessing RAM four times per clock cycle.
      B   using the CPU four times per clock cycle.
      C   a pipelining technique.
      D   an alternative to hyperthreading.   (1)

1.6   Which ONE of the following Boolean expressions is correct?

	EXPRESSION	RESULT
A	TRUE AND NOT FALSE	FALSE
B	FALSE AND (TRUE OR NOT FALSE)	TRUE
C	TRUE OR NOT (TRUE OR NOT FALSE)	TRUE
D	TRUE AND NOT (TRUE AND FALSE)	FALSE

(1)

1.7   A rootkit is …

A   a backdoor program.
B   malicious software that activates when a computer system boots up.
C   a program that logs key presses.
D   a kit of programs that a hacker uses to infiltrate computer systems.   (1)

1.8   … takes place when the sender address and other parts of an e-mail header are altered to appear as though the e-mail originated from a different source.

A   Hoaxing
B   Phishing
C   Spoofing
D   Pharming   (1)

1.9   Which ONE of the following is an example of a correctly constructed URL for a secure website?

A   http://www.questionbank.co.za
B   https://www.myonlineshop.co.za
C   http://www.secure.co.za
D   htts://www.secureweb.com   (1)

1.10   The two files below are examples of music files.

Beethoven's Symphony No. 9 (Scherzo) Ludwig van Beethoven, comp…

New Stories (Highway Blues) Marc Seales, composer. New … Speakin' Out
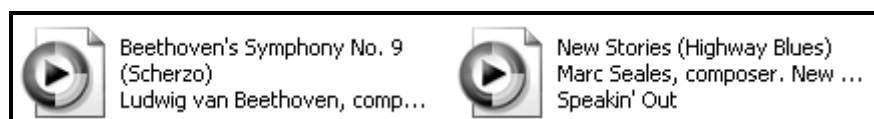
Which ONE of the following file extensions is most likely to be associated with these two files?

A   wma
B   docx
C   bmp
D   ico   (1)

TOTAL SECTION A: 10

SCENARIO

A countrywide competition is being held in an effort to discover singing, dancing and acting talent among young people. A website has been created to promote the competition. Each week elimination rounds will be held and judged at different centres around the country. Managers have been appointed at the centres to capture and save results, type reports and ensure that video footage of each performance is captured.

SECTION B: HARDWARE AND SOFTWARE

QUESTION 2

2.1   The managers at the centres were given a choice to use one of the following two devices to perform their tasks:

DEVICE	SPECIFICATIONS
Laptop	- Intel Core i7 2.4 GHz CPU - 8 GB RAM - 1.5 TB HDD
Tablet	- nVidia Tegra 1.2 GHz CPU - 1 GB RAM - 32 GB SSD

2.1.1   Give TWO reasons why the managers requested to be issued with the laptop rather than the tablet.   (2)

2.1.2   A tablet uses an SSD for storage of data and files.

     (a) What does the acronym *SSD* stand for?   (1)

     (b) List THREE comparative differences between the features and performance of an SSD and an HDD in **table format**.   (3)

2.1.3   The tablet has a system recovery partition on its SSD.

     (a) Explain what *partitioning* of a disk means.   (2)

     (b) Briefly explain why there is a need for a system recovery partition, specifically on tablets.   (1)

2.1.4   Both a tablet and a laptop use cache memory. Explain the purpose of cache memory in a computer system.   (3)

2.1.5   DDR RAM improves the transfer of data between the RAM and the CPU when compared to SD RAM. Explain how this improvement is accomplished.   (3)

2.1.6   Give TWO reasons why a tablet and a laptop cannot use the same type of RAM.   (2)

2.2   All the laptop and desktop computers that will be used during the competition have Intel Core i7 CPUs while the tablets have ARM CPUs.

    2.2.1   List FOUR of the basic components a CPU must contain to be able to execute instructions.   (4)

    2.2.2   Different CPUs use different instruction sets. What is a *CPU instruction set*?   (2)

    2.2.3   Both types of CPU support multithreading. Explain the concept of *multithreading*.   (2)

    2.2.4   Name TWO physical aspects of CPUs that are built in during the manufacturing process to improve the performance of CPUs.   (2)

2.3   The managers have been told that they can use FireWire 800 or USB 3.0 to upload video material of the performances of contestants to the competition's website.

    2.3.1   State TWO advantages of USB over FireWire.   (2)

    2.3.2   Would the software used for the editing of videos be considered application software or system software?   (1)

2.4   Cellular modems are used to connect to the Internet and upload the results of the competition each week. The results are stored in a 'cloud'.

    2.4.1   Name the type of connection the modem will use with the uploading of results.   (1)

    2.4.2   Explain what is meant by the term *cloud* in this context.   (2)

    2.4.3   Is the storing of results in a cloud a good idea? Motivate your answer.   (2)

2.5   The results need to be printed each week. The volume of printing is large because of the high number of contestants at each venue.

    2.5.1   The managers decided to use inkjet printers because they are less expensive. Persuade them to use laser printers instead by giving TWO good arguments in favour of laser printers.   (2)

    2.5.2   Spooling is a technique that is used to accommodate large volumes of printing. Explain what *spooling* is.   (2)

    2.5.3   The USB-port used to connect the printer uses serial data transfer. Explain the difference between *serial* and *parallel* data transfer.   (2)

2.6   Each week the managers have a group conference call to discuss results and some of the outstanding performances. It is suggested that they use VoIP in order to save costs.

      2.6.1   Briefly explain the basic concept *VoIP*.   (2)

      2.6.2   Name a VoIP client that the managers could use to host the conference call.   (1)

      2.6.3   Name ONE other way (besides a conference call) in which the managers could have discussions and collaborate online.   (1)

2.7   The error message 'Missing DLL files' appeared when one of the managers wanted to use an application installed on his laptop.

      2.7.1   Give ONE possible reason why the DLL files are missing.   (1)

      2.7.2   What needs to be done so that the manager will be able to use the software again?   (1)

      2.7.3   When new software is installed on a computer system running a Windows operating system an entry is made into the registry of the system. Explain in computing terms what the *registry* is.   (2)

TOTAL SECTION B: 49

SECTION C: APPLICATIONS AND IMPLICATIONS

QUESTION 3: e-COMMUNICATION

Friends and family of the contestants requested that video footage of the two best performances after each round be made available to them to watch again.

3.1 Someone requested the managers to e-mail them the video footage as an attachment. Give TWO reasons why this request is possibly not feasible. (2)

3.2 The organisers made the videos available as podcasts.

    3.2.1 Explain the concept of *podcasting*. (1)

    3.2.2 Why will podcasting be an advantage for people who want to watch the video more than once? (1)

    3.2.3 Name ONE example of an electronic medium that can be used to inform friends and family when a new podcast is available. (1)

3.3 Friends and family who want to download multimedia files of all the events must preferably have a broadband Internet connection.

    3.3.1 Explain the term *broadband*. (2)

    3.3.2 ADSL is an example of a cabled broadband connection.

        (a) Is ADSL a digital or an analogue connection? (1)

        (b) Give ONE advantage of an ADSL connection. (1)

    3.3.3 Give an example of another cabled broadband connection. (1)

[10]

QUESTION 4: SOCIAL AND ETHICAL ISSUES

The organisers are hosting a website for the competition that publishes results and information about the contestants.

4.1 The parents of the contestants are concerned about personal information such as contact details that are published on the competition's website.

4.1.1 Justify the parents' concerns by describing TWO ways in which personal information provided on a website can be misused. (2)

4.1.2 Suggest ONE measure that a contestant can take to protect personal information that needs to be published on the Internet. (1)

4.2 Even though personal information can be protected an activity known as social engineering could be used to gain access to the information.

4.2.1 Explain what *social engineering* is. (2)

4.2.2 Describe ONE way in which social engineering can be prevented. (1)

4.3 One of the contestants has been removed from the competition because he tweeted insulting remarks about another contestant.

4.3.1 What is meant by the term *tweet*? (1)

4.3.2 What term is used to refer to the practice of publishing insulting remarks about people on an online or public forum? (1)

4.4 Some of the contestants want the organisers to create a blog for the competition.

4.4.1 What is a *blog*? (1)

4.4.2 How would the contestants be advantaged by the blog? (1)

4.5 Entries must be done electronically on the website. A request was made that there must also be an alternative way to handle the entries because of the digital divide in South Africa. What is meant by the term *digital divide*? (1)

4.6 Members of the IT team can work on the voting system from home instead of at the head office. Discuss the disadvantages of working from home from the IT members' point of view. (2)

[13]

TOTAL SECTION C: **23**

SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT

QUESTION 5: ALGORITHMS AND PLANNING

> The organisers of the competition need to capture, store and manage information about the contestants. An IT team was appointed to develop software to help the organisers to perform these tasks.

5.1   Before the start of the competition the IT team had to create a user-friendly interface for the organisers to capture information about the contestants. They had to decide on suitable controls for the GUI for the entering of the information.

      5.1.1   The category options of the competition are Dance, Drama and Music. The following two controls have been suggested:

            Suggestion A:
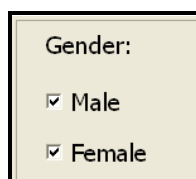
            Suggestion B:

            Give TWO reasons why Suggestion A is a better choice.   (2)

      5.1.2   The input control in the screen shot below may cause users to select both options when they enter the gender of a contestant.
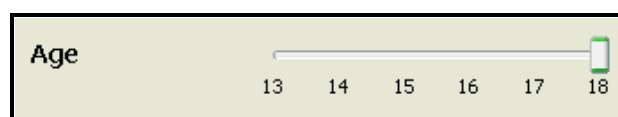
            Suggest how this situation can be prevented.   (1)

      5.1.3   Only contestants between the ages of 13 and 18 are allowed to take part in the competition.

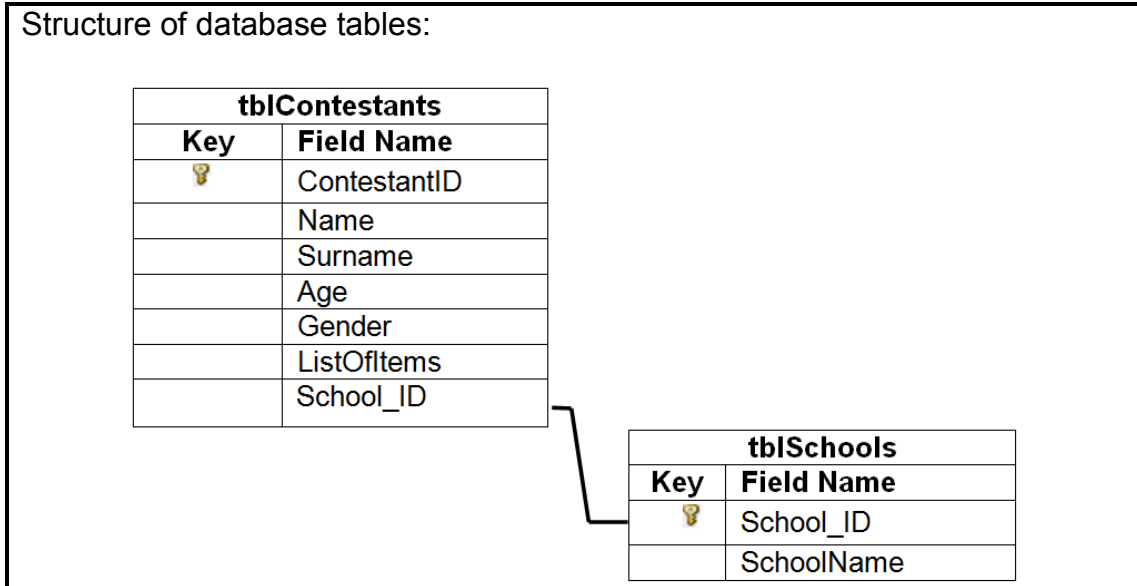   The following control is used to enter the age of the contestants:

            Explain why data entered using this control will be valid but not necessarily correct. Use an example with actual values as part of your explanation.   (2)

5.2   A database has been created with two tables (**tblContestants** and **tblSchools**) containing data about the contestants. Study the structure of the database tables along with the additional information below and answer the questions that follow.

Structure of database tables:

tblContestants	
Key	**Field Name**
🔑	ContestantID
	Name
	Surname
	Age
	Gender
	ListOfItems
	School_ID

tblSchools	
Key	**Field Name**
🔑	School_ID
	SchoolName

Additional information:

- Contestants may enter for up to three items.
- Each item is performed in a specific category.
- The **ListOfItems** field contains the list of items the contestant entered for in the following format:

```
<Category, Description of first item>;<Category, Description
of second item>;<Category, Description of third item>
```

EXAMPLE: Joanne Johnson is registered to perform a monologue in the drama category and a keyboard item in the music category. For this contestant the **ListOfItems** field in the **tblContestants** table contains the following information:

```
Drama,Monologue;Music,Keyboard
```

5.2.1   When the secretary tries to add data of newly registered contestants into the **tblContestants** table, an error message is displayed when she enters a value into the **School_ID** field.

(a)   Select the type of error that occurs in this case from the given list below. Write only the letter (A–C) next to the question number (5.2.1(a)).

      A   Update anomaly
      B   Insert anomaly
      C   Delete anomaly   (1)

(b) What needs to be done to be able to register the new contestants that cannot be registered currently? (1)

5.2.2 It has been decided to use a database rather than a text file to store the data about the contestants.

(a) Give TWO reasons why a database is a better structure to keep data about contestants than a text file. (2)

(b) What type of key is the **School_ID** field in the **tblContestants** table? (1)

(c) Another table needs to be added to convert the database into first normal form. Draw the new table, indicating the name of the table and appropriate fields and keys.

NOTE: Draw only the new table and NOT the two given tables. (5)

(d) Explain the relationship between the newly defined table in QUESTION 5.2.2(c) and the relevant given table (**tblContestants** or **tblSchools**) with specific reference to the fields involved. (2)

5.2.3 When developing a program to manipulate the database it was decided to work with objects.

(a) Define an *object* in computer programming terms. (2)

(b) Give ONE example of an object that needs to be created for this program. (1)

(c) A class for this program has been defined with public attributes. Give TWO reasons why this is NOT good programming practice. (2)

5.3 The name and score of each contestant in the Drama category of the competition are saved using two parallel arrays named **arrNames** and **arrScores**. The scores are in the range 0–100 (both included).

The following algorithm was developed to determine the winner:

```
Line
1      highest score ← 100
2      Initialise loop counter
3      Repeat for all the elements of arrScores
4          if highest score < arrScores [counter]
5              arrScores [counter] ← highest score
6          End if
7          Increase loop counter
8      End repeat
9      Display highest score
```

5.3.1   The output will not be correct due to TWO logical errors. Identify the instructions causing the logical errors and write down their line numbers and the correct instructions.   (4)

5.3.2   The **name** of the contestant with the highest score must also be displayed.

Write line(s) of pseudocode that need to be added to the given algorithm to accomplish this task. Use the line numbers to indicate the position where the new line(s) of pseudocode should be inserted into the given algorithm.   (4)

5.4   Programmers who created the software were requested to create a test plan along with other technical documentation to ensure that the software is up to standard.

5.4.1   The system design document (SDD) is one of the first documents developed. List THREE aspects that form part of the SDD.   (3)

5.4.2   List THREE aspects that should be included in the test plan.   (3)

5.4.3   Why is it important to include hardware and software requirements in user documentation?   (1)

5.5   A text file is used to store the date, time and password of each user that logs onto the local server at each centre where the elimination rounds of the competition take place.

Example of the content of the text file:

```
Date: 15/08/2013
Time: 15:00:00
Password: AB1002
Date: 15/08/2013
Time: 15:30:00
Password: PS1022
:
```

Activities are suspicious when either of the following applies:

- A person logs onto the network before 07:30 in the morning or after 16:00 in the afternoon.
- The password is not in the prescribed format – two capital letters and four digits.

An algorithm is supplied that should be able to read the data from the text file, to test whether the time or password is suspicious (meets the conditions set out above) and to write all the information of a suspicious activity to a new text file.

(The algorithm is given on the next page.)

```
Line
1      Open text file with logon information
2      Open new suspicious_activity file
3      Repeat while not end of log file
4          Read three lines from log file
5          Extract the date, time and password
6            validTime ← call code to test for a valid login time with
                       the hour and minute when the user logged in as
                       parameters
7            validPass ← call code to test for a valid password with
                       the password as parameter
8          IF ...
9              Save date, time and password to suspicious_activity file
10         Close the log file
11     End repeat
12     Close suspicious_activity file
```

5.5.1   The function/method called in line 6 uses the following two parameters:

- Hour
- Minute

    (a)   What are *parameters* in terms of programming?   (2)

    (b)   Suggest a suitable data type for these parameters. Explain your choice of data type.   (2)

5.5.2   The function/method called in line 7 will use 'try …' protection blocks.

     Write down the general structure of a 'try …' protection block AND briefly explain the purpose of each section.   (3)

5.5.3   Write down the logical condition to complete the IF-statement in line 8 of the given algorithm.   (2)

5.5.4   If this algorithm is correctly coded and executed, it will cause an error in line 4 due to a mistake that was made in line 10.

    (a)   Explain the cause of the error.   (1)

    (b)   Briefly explain how to correct the mistake.   (1)

TOTAL SECTION D: 48

SECTION E: INTEGRATED SCENARIO

QUESTION 6

During the final round of the competition the audience in the auditorium votes for contestants to determine a winner. The event is also broadcast live on television. Members of the television audience at home are also able to vote by SMS.

6.1 The audience in the auditorium has been provided with remote voting controllers that allow them to press a button to transmit their vote wirelessly via Bluetooth technology to a local server at the auditorium.

6.1.1 Is Bluetooth a suitable technology to use in this scenario? Motivate your answer. (2)

6.1.2 What is the transmission rate of standard Bluetooth devices (3 Mbps or 3 Gbps)? (1)

6.1.3 An audience member's voting controller does not connect to the wireless network although the member is within range of the server.

Name TWO possible troubleshooting steps that can be followed to solve the problem. Replacing the voting controller is not an option. (2)

6.2 All the votes received from the audience in the auditorium and SMSs from the television audience are stored in a relational database. The database is maintained by a database administrator.

6.2.1 Explain what a *relational database* is. (2)

6.2.2 Give the name of ONE example of an existing database system that could be used to create this database. (1)

6.2.3 Name TWO specific responsibilities of a database administrator. (2)

6.3 The live broadcast of the final round of the event can be streamed.

6.3.1 Explain what is meant by *streamed*. (2)

6.3.2 Name TWO components that are required to be able to stream a live event. (2)

6.3.3 An entrepreneur is recording the live broadcast on his home computer. He plans to sell copies of the recording. Discuss the ethical issues of these activities. (2)

6.4   An existing cabled network is used by the judges at the event centre to transmit their scores electronically to a server at the centre. The organisers are planning to use a wireless network for this purpose in future.

6.4.1   State TWO advantages of a wireless network over a cabled network.   (2)

6.4.2   State TWO additional hardware components that are required to create the wireless network.   (2)

6.4.3   Which network protocol would be appropriate to use for the wireless network?   (1)

6.5   While uploading results, one of the organisers noticed suspicious activities on his computer. He suspects unauthorised software is running on his computer to gain access to competition results.

6.5.1   State TWO types of programs that can be used to retrieve data from a computer without the permission or knowledge of the user.   (2)

6.5.2   Explain how the organiser could check whether there is any unauthorised software running on his computer.   (1)

6.5.3   Describe TWO ways in which the organisers can prevent their computers from being accessed by unauthorised software.   (2)

6.6   Some judges use Apple Mac computers while others use computers running on the Microsoft Windows operating system. Both these operating systems are proprietary software.

6.6.1   Describe THREE functions of an operating system.   (3)

6.6.2   State TWO advantages of a proprietary operating system over an open source operating system.   (2)

6.6.3   Explain why software designed for the Apple Mac cannot run on a computer that uses the Microsoft Windows operating system.   (2)

6.7   The organisers of the competition have been advised to use cloud storage for the video material.

6.7.1   The cloud server probably uses RAID technology. Briefly explain what *RAID* is. (Expanding the acronym will NOT be accepted as an answer.)   (2)

6.7.2   Several levels of RAID can be implemented. Motivate why the cloud server will probably use RAID 1 rather than RAID 0.   (2)

6.7.3   'Cloud computing' can be beneficial for green solutions in terms of hardware. Explain this statement briefly.   (2)

6.8   Projects such as this create a variety of IT-related job opportunities.

6.8.1   Give a summary of the main responsibilities of a systems analyst.   (2)

6.8.2   Apart from a database administrator and a systems analyst, name TWO other types of IT specialists who will most probably be employed by the organiser of this project.   (2)

6.9   ICT provides more effective solutions for the capturing of data and generating results than a paper-based voting system.

Motivate why the above statement is valid by referring to TWO of the following aspects:

- Faster and improved data processing
- Improved data storage
- Improved communication   (2)

6.10   Some of the parents who do not use the Internet regularly often need some basic information about browsing the Internet.

6.10.1   Give ONE example of a well-known Internet search engine.   (1)

6.10.2   Give TWO hints for conducting an effective Internet search AND give an example with each hint which is applicable to a search for the website for this competition.   (4)

TOTAL SECTION E: 50
GRAND TOTAL: 180