basic education

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

**NATIONAL
SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**NOVEMBER 2011**

**MARKS:  180**

**TIME:  3 hours**

**This question paper consists of 19 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                        (58)
        SECTION C:  Applications and implications                (20)
        SECTION D:  Programming and software development          (49)
        SECTION E:  Integrated scenario                          (43)

2.      Answer ALL the questions.

3.      Read ALL the questions carefully.

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

5.      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    Copyrighted software provided to a user at no cost is known as …

    A    shareware.
    B    freeware.
    C    wrap ware.
    D    adware.    (1)

1.2    The maximum amount of data that can be transmitted over an electronic communication channel during a given period of time is known as …

    A    bandwidth.
    B    a connection.
    C    protocol.
    D    frequency.    (1)

1.3    A … is a recorded audio file stored on a website that can be downloaded to a computer or a portable media player.

    A    blog
    B    wiki
    C    podcast
    D    portal    (1)

1.4    The procedure followed to identify the identity of the sender of an e-mail is known as a digital …

    A    handshake.
    B    signature.
    C    certificate.
    D    fingerprint.    (1)

1.5    … is the name of a well-known and widely used open-source operating system used on desktop computers.

    A    Windows Vista
    B    Linux
    C    Unix
    D    Symbian    (1)

1.6     An operating-system process that sends documents to be printed to a buffer instead of directly to the printer is called …

       A          spoofing.
       B          buffering.
       C          spooling.
       D          formatting.                                        (1)

1.7     Which ONE of the following software items does NOT allow a user to perform maintenance-type tasks on a computer?

       A          Defragmenter
       B          Uninstaller
       C          Windows Explorer
       D          Compiler                                         (1)

1.8     In object-oriented programming, which ONE of the following will NOT be regarded as a suitable object to create in a program for a library?

       A          Book
       B          Librarian
       C          Price of a book
       D          Member of the library                             (1)

1.9     Which ONE of the following files will probably contain some music?

       A          abc.pdf
       B          abc.wav
       C          abc.doc
       D          abc.jpeg                                          (1)

1.10    The component that uses battery power to store the configuration information of a computer is known as the …

       A          BIOS.
       B          RAM.
       C          CMOS.
       D          OS.                                               (1)

**TOTAL SECTION A:    10**

SCENARIO

Yellowdale Secondary School held an ICT expo week. Schools and leading IT industry specialists were invited to create an exhibit or to give a presentation at the expo.

One of the themes for the learners was: *Design a modern computer that will improve the overall performance of your school's IT laboratory (lab).*

Each of the participants was assigned a stall in the school hall equipped with the required hardware to display or exhibit their presentations.

You are a Grade 12 IT learner and were appointed as a member of the judging panel, in order to advise the panel on the various aspects of ICT.

## SECTION B: HARDWARE AND SOFTWARE

## QUESTION 2

2.1 The statement above the first stall read:

'For any electronic computing device to be functional, it requires a motherboard with at least a CPU!'

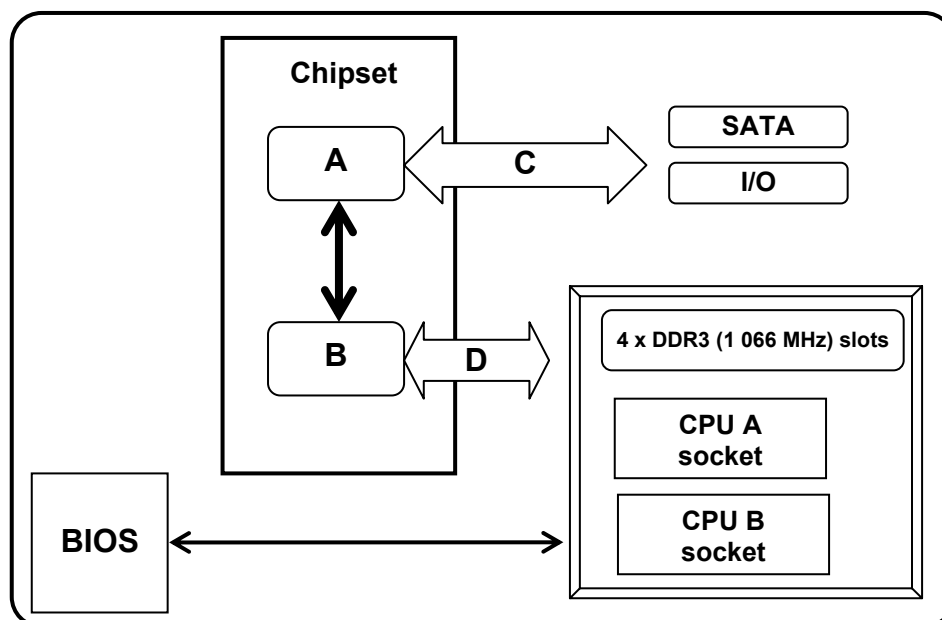This group of learners presented the design below for their modern motherboard. (Refer to DIAGRAM 1.)



**DIAGRAM 1: DESIGN OF A MODERN MOTHERBOARD**

2.1.1 Why does a motherboard need a chipset? (2)

2.1.2 The basic design principles for chipsets were followed. Identify the TWO parts of the chipset by writing down the names of component A and component B. (2)

2.1.3     Structures C and D are different bus types.

    (a)    Explain what a *bus* is in terms of computer hardware.     (2)

    (b)    Which bus (C or D) is known as the system bus?     (1)

    (c)    Name and briefly explain the function of any TWO system buses.     (4)

2.1.4     State THREE advantages of using a USB port.     (3)

2.1.5     Cache memory, the ALU and registers are three components of the CPU.

    (a)    What is the function of the ALU?     (1)

    (b)    Does any change in the size of the registers influence the CPU's performance? Motivate your answer.     (2)

2.1.6     How does overclocking affect the speed of the CPU?     (1)

2.1.7     A group member states that the CPU (Intel Pentium 2.0 GHz) can be replaced by any newer version of the CPU that the user wants. Is this possible? Motivate your answer.     (2)

2.1.8     One of the factors that has an influence on the performance of a processor is the design of its instruction set.

    (a)    Explain what the *instruction set* of a processor is.     (1)

    (b)    Give ONE example of an extended instruction set.     (1)

2.1.9     Two CPUs on the motherboard will generate a lot of heat. Name TWO ways to prevent the CPUs from overheating.     (2)

2.2     The learners from another stall emphasised some important aspects about secondary storage.

2.2.1     Users should be aware that metadata exists for each file.

    (a)    Explain what *metadata* is.     (1)

    (b)    Give ONE example of metadata that will be provided with a FAT32 file system.     (1)

2.2.2 DIAGRAMS 2a and 2b below show the properties of a zipped file saved on an NTFS file system.
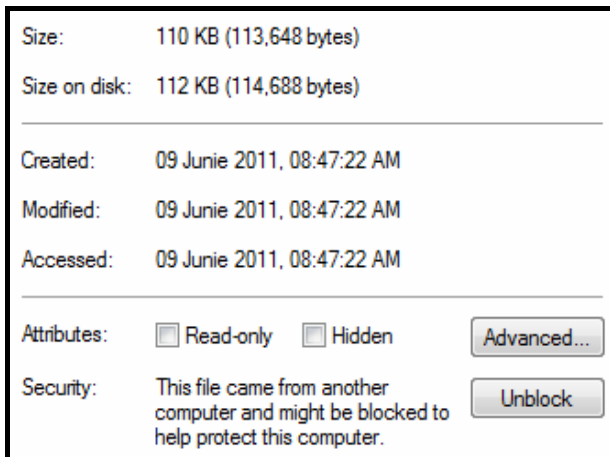
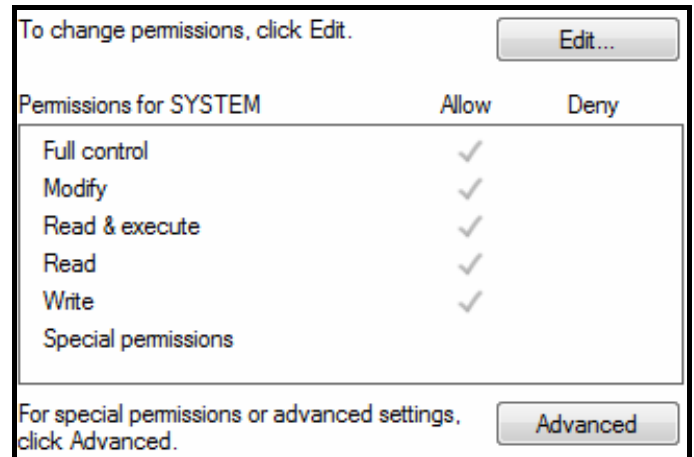| | |
|---|---|
| Size: 110 KB (113,648 bytes)<br>Size on disk: 112 KB (114,688 bytes)<br><br>Created: 09 Junie 2011, 08:47:22 AM<br>Modified: 09 Junie 2011, 08:47:22 AM<br>Accessed: 09 Junie 2011, 08:47:22 AM<br><br>Attributes: ☐ Read-only ☐ Hidden [Advanced...]<br>Security: This file came from another computer and might be blocked to help protect this computer. [Unblock] | To change permissions, click Edit. [Edit...]<br><br>Permissions for SYSTEM   Allow   Deny<br>Full control ✓<br>Modify ✓<br>Read & execute ✓<br>Read ✓<br>Write ✓<br>Special permissions<br><br>For special permissions or advanced settings, click Advanced. [Advanced] |
| **DIAGRAM 2a** | **DIAGRAM 2b** |

(a) State TWO advantages of using an NTFS file system over using a FAT32 file system. (2)

(b) Using DIAGRAM 2a, briefly explain why there is a difference in the size of the file (110 kB) and the size of the file on the hard drive (112 kB). (2)

(c) Changing the 'Hidden' attribute of a file to 'true' will not always prevent other users from modifying the file.

Suggest TWO other ways in which one can prevent other users from modifying a file. (2)

2.2.3 DIAGRAM 3 below is a representation of the management console of the hard drive of a computer.

| Volume | Layout | File System | Capacity | Free Space | % Free | Fault Tolerance | Overhead |
|---|---|---|---|---|---|---|---|
| ⬜ (C:) | Partition | NTFS | 141.04 GB | 117.29 GB | 83 % | No | 0% |
| ⬜ HP_RECOVERY (D:) | Partition | NTFS | 8.00 GB | 6.24 GB | 78 % | No | 0% |

| | | |
|---|---|---|
| 💾 **Disk 0**<br>Basic<br>149.04 GB<br>Online | **(C:)**<br>141.04 GB NTFS<br>Healthy (System) | **HP_RECOVERY (D:)**<br>8.00 GB NTFS<br>Healthy |

**DIAGRAM 3: MANAGEMENT OF DISK 0**

(a) Explain what is meant by the term *partition*. (1)

(b) State TWO advantages of having the hard drive partitioned. (2)

(c) Partitioning should take place before the logical formatting of the hard drive is done. Explain the purpose of the logical formatting of a hard drive. (2)

2.2.4 Hard drives store a huge amount of data. For some users, like banks, their data is critical and therefore RAID technology is often used.

(a) What is *RAID technology*? (1)

(b) Briefly explain how RAID Level 5 works. (2)

2.3 The computers in the IT lab are currently networked, as shown in DIAGRAM 4 below. Another group of learners recommends the use of a star topology for the IT lab's network.
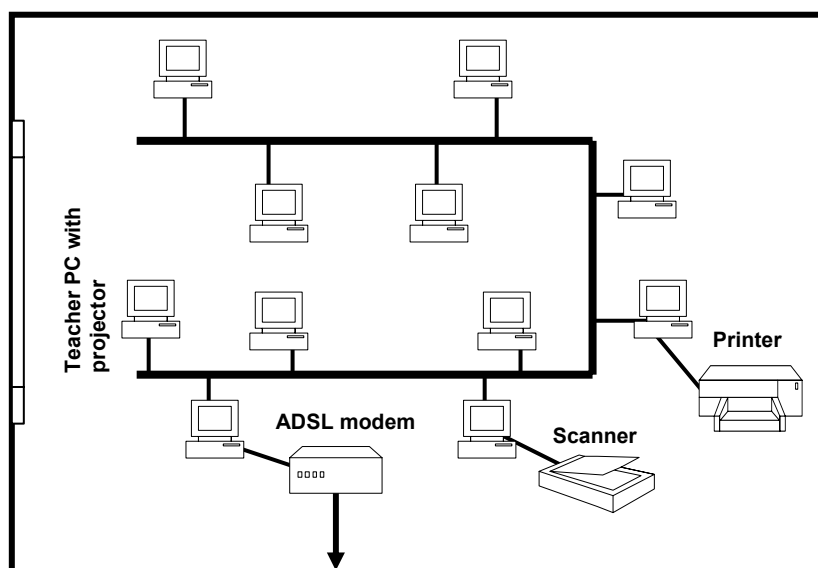


**DIAGRAM 4:  CURRENT NETWORK LAYOUT OF IT LAB**

2.3.1 What does the term *topology* refer to in relation to computer networks? (1)

2.3.2 Identify the network topology currently used (DIAGRAM 4). (1)

2.3.3 In order to change the current network topology to a star topology, a switch and additional cables are required.

(a) What type of cables will be required? (1)

(b) State ONE disadvantage of using the type of cable named in QUESTION 2.3.3(a). (1)

(c) State ONE advantage and ONE disadvantage of using a star topology. (2)

2.3.4 It is recommended that a network administrator should be appointed. State THREE functions of a network administrator. (3)

2.3.5    One of the members proposed the use of thin clients.

        (a)  What is meant by a *thin-client computer network*?    (1)

        (b)  State TWO disadvantages of a thin-client computer network.    (2)

2.4    One of the groups indicated that the software requirements of the IT lab needed to be addressed.

    2.4.1    Is a device driver part of system software or application software?    (1)

    2.4.2    The school acquired a computer with a 32-bit bus system. The principal wants to install a 64-bit multithreading operating system on this computer.

        (a)  What is meant by the term *multithreading*?    (2)

        (b)  Give ONE reason why is it not advisable to install the new 64-bit operating system on the computer acquired by the school.    (1)

    2.4.3    'Why pay for software?'

        The statement above is one of the slogans of the stall.

        State TWO disadvantages of using open-source software in the network environment of the school.    (2)

**TOTAL SECTION B:    58**

**SECTION C:  APPLICATIONS AND IMPLICATIONS**

**QUESTION 3:  e-COMMUNICATION**

One of the groups of learners was requested to man an e-communication stall at the expo where visitors can get information and advice on e-communication issues.

3.1     The use of the Internet is an essential part of life today. Prospective Internet users often have questions on how to get connected to the Internet.

3.1.1     Users are often advised to get an ADSL (asymmetric digital subscriber line) connection rather than a dial-up connection. Briefly explain what an *ADSL connection* is.                    (3)

3.1.2     A 3G connection is another popular way of connecting to the Internet.

(a)     Do you need a modem for a 3G connection? Explain your answer.                    (1)

(b)     What type of technology is used with a 3G connection?                    (1)

3.1.3     It is possible for someone else to use your Internet connection if you have a wireless connection. How can you detect that this is taking place?                    (1)

3.2     E-mail is one of the most popular uses of the Internet, but users are often frustrated by the lack of netiquette. What is *netiquette*? Give an example as part of your answer.                    (2)

3.3     Businesses cannot be competitive today without doing business electronically (e-commerce). Security is always an issue when conducting business electronically.

3.3.1     Briefly explain how the secure socket layer (SSL) can ensure that private electronic communication takes place.                    (2)

3.3.2     All web pages do not use SSL. Why not?                    (1)

**[11]**

**QUESTION 4:  SOCIAL AND ETHICAL ISSUES**

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The learners manning the e-communication stall have to make computer users aware of the responsible use of computers when communicating via electronic media.

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4.1     Many companies monitor or intercept employees' e-mail messages. Do you think this practice is acceptable? Briefly motivate your answer.                    (2)

4.2     Computer users often have to spend long hours working on their computers.

        4.2.1     Name TWO possible effects that working long hours on a computer could have on a person's health.                                          (2)

        4.2.2     Computer users should be aware of ergonomics. Explain what *ergonomics* is.                                                              (2)

4.3     It is estimated that about 1 billion computers were discarded during 2010. E-waste, such as old computers, contains toxic elements.

        Suggest TWO ways in which e-waste can be dealt with more effectively in order to avoid pollution.                                                  (2)

4.4     In several recent high-profile cases, major news sources have published purposefully altered photos. Explain why this practice can be regarded as fraud.                                                                       (1)
                                                                                **[9]**

                                                        **TOTAL SECTION C:     20**

## SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT

## QUESTION 5: ALGORITHMS AND PLANNING

> The organisers of the expo have recruited a team of software developers, analysts and engineers to coordinate academic games and activities to encourage local learners to improve their knowledge of software design concepts. Learners from different schools have been invited to interact with these experts and to participate in these activities.

5.1 The first activity is a matching exercise that learners have to complete. The learner that completes the exercise first, with all the answers correct, will be rewarded with a special prize.

Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A–E) next to the question number (5.1.1–5.1.5) in the ANSWER BOOK, for example 5.1.6 F.

| COLUMN A | | COLUMN B | |
|---|---|---|---|
| 5.1.1 | Data type | A | an object keeping its fields/ data private |
| 5.1.2 | Data structure | B | specifies the area in which a variable can be used |
| 5.1.3 | Scope of a variable | | |
| 5.1.4 | Encapsulation | C | determines the possible values that can be stored in a variable |
| 5.1.5 | Access modifier | D | specifies whether a field is private or public |
| | | E | organises and stores related data |

(5 x 1)     (5)

5.2 The software developers emphasise the importance of modular programming in an object-oriented environment.

     5.2.1     Explain what *modular programming* is.                            (2)

     5.2.2     State THREE advantages of modular programming.              (3)

     5.2.3     Would you refer to a constructor as being a method? Motivate your answer.                                                   (3)

     5.2.4     Name ONE significant difference between a *private method* and a *public method*.                                    (2)

     5.2.5     Name ONE significant difference between an *accessor method* and a *mutator method*.                                      (2)

5.3     As one of the activities, the learners have been divided into groups where each group will be given a topic related to programming. The learners in each group will need to formulate questions related to that specific topic. Your group has been given the topic of error handling and debugging.

      5.3.1     Name the THREE common types of errors in programming.          (3)

      5.3.2     Explain the concept *exception handling*.          (2)

      5.3.3     Give TWO reasons why validation of data entered into a program is necessary.          (2)

      5.3.4     Normal test data often does not reveal possible incorrect outputs of a program.

            Name TWO types of test data that will assist in ensuring correct outputs.          (2)

      5.3.5     Name TWO good programming practices that may be followed to make the debugging of a program easier.          (2)

5.4     The IT expo has a variety of stalls to keep the community entertained for the duration of the expo. A database has been designed to store information on the different stalls at the expo. The database contains two tables, namely **tblCategories** and **tblStalls**, which are related. Below are screen shots of the content of the two tables in the database.

**tblCategories**                    **tblStalls**

| CategoryName |
| --- |
| Books & Resources |
| Entertainment |
| Food |
| Hardware |
| Software |

| StallID | StallOwner | StallCategory | Indoors |
| --- | --- | --- | --- |
| 1 | Maxie Kenton | Food | ☑ |
| 2 | Henry Potgieter | Hardware | ☑ |
| 3 | Penny Swartkop | Food | ☐ |
| 4 | Brandon Naidoo | Entertainment | ☐ |
| 5 | Thabisile Nkosi | Food | ☑ |
| 6 | Olivier Moses | Books & Resources | ☑ |

      5.4.1     Name the type of relationship between the **tblCategories** and **tblStalls** tables.          (1)

      5.4.2     Which field in the **tblStalls** table would you suggest as a suitable foreign key?          (1)

5.4.3　The data capturer is attempting to enter a new record into the **tblStalls** table. The data to be captured are as follows:

| Field Name | Content |
|---|---|
| StallOwner | Kensley Jenkins |
| StallCategory | Books |
| Indoors | Yes |

The following error message is displayed after the record has been captured:
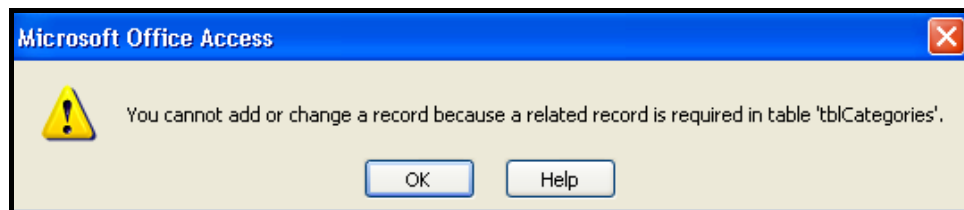


(a)　Explain the reason for this error.　(2)

(b)　There are a number of ways of preventing the capturing of incorrect data in this example. Name TWO ways.　(2)

(c)　Name the term that enforces the input of correct data when using multiple tables with relationships.　(1)

5.4.4　All categories of stalls are not represented at the expo. For example, there are no stalls representing the software category. The expo director wants a list of all the stall categories that are represented.

The list should appear as follows:



Indicate whether the following statement is TRUE or FALSE. Write only 'true' or 'false'.

Any ONE of the SQL statements below may be used to display the list given above.

SQL1→　SELECT DISTINCT StallCategory FROM tblStalls

SQL2→　SELECT StallCategory FROM tblStalls GROUP BY StallCategory　(2)

5.4.5　State ONE significant advantage of storing data in a database rather than in a text file.　(1)

5.5     Computer experts emphasise the importance of the planning stages in programming. One way to plan effectively is to write out an algorithm.

      5.5.1     Explain what an *algorithm* is.                                                          (1)

      5.5.2     Explain why an algorithm designed in pseudocode should not be programming language specific.                                      (2)

      5.5.3     A certain university is awarding bursaries to Grade 12 learners to pursue a career in Information Technology.

            The learners must adhere to the following criteria:

            1.   They must be younger than 19 years of age.
            2.   They must have a minimum of 4 distinctions in Grade 12.
            3.   One of the distinctions must be in either Mathematics or Information Technology.

            **NOTE:** A mark of 80 or more is required for a distinction.

            Study the given segment of pseudocode used to test the conditions stated in the criteria.

            IF age < 19 AND mathsMark >= 80 (a) … infoTechMark >= 80 (b) … totalDistinctions (c) … 4

            Write only the correct answer next to the letters (a), (b) and (c) in your ANSWER BOOK to complete the statement above correctly.          (3)

      5.5.4     The expo director is interested in how well the expo was received. The algorithm on the next page was written to count the number of people that rated the expo as either of a high standard or of a low standard.

            Any ticket holders at the expo can enter their ticket numbers and a rating. The number 1 is used for a high-standard rating and the number 0 for a low-standard rating. The algorithm will display the total number of high ratings and low ratings separately. Input is terminated when a value of 0 is entered for the ticket number.

Study the algorithm below.

| Line Number | Description |
|---|---|
| 1 | countHighRatings ← 0 |
| 2 | countLowRatings ← 0 |
| 3 | Input ticket number |
| 4 | While ticket number not equal to 0 |
| 5 |    Start While loop |
| 6 |      Input Rating |
| 7 |      If rating equals 1 |
| 8 |        countHighRatings ← countHighRatings + 1 |
| 9 |      otherwise |
| 10 |        countLowRatings ← countLowRatings + 1 |
| 11 |    End While Loop |
| 12 |  Display countHighRatings |
| 13 |  Display countLowRatings |

(a) Explain why a conditional loop is necessary for this application. (1)

(b) Give a reason why the algorithm given above will be caught in an infinite loop. (2)

(c) A single statement needs to be inserted to ensure a successful output.

   (i) Write out the single statement that is required. (1)

   (ii) Write down the line numbers between which the required statement should be inserted. (1)

**TOTAL SECTION D: 49**

**SECTION E:  INTEGRATED SCENARIO**

**QUESTION 6**

6.1     The following heading appears above one of the stalls:

'Why amateur radio endures in a world of tweets'

The excerpt below appears on a poster.

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Somehow it makes little sense that amateur radio continues to thrive in the age of Twitter, Facebook and iPhones. It attracts 60% more users than thirty years ago.

In an article published in *Wired UK*, David Rowan writes:

*'For a start, there is the thrill in establishing a magical person-to-person long-distance radio conversation that no commodified Internet communication can compete with.'*

There are also radio amateurs who are techno buffs; they want to touch anything that is technologically new. Radio amateurs were amongst the first to use voice over Internet protocol, linking radio, the Internet and computers into a global communications network, called EchoLink.

[Adapted from *EngineerIT*, March 2011]

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6.1.1     Sending an e-mail or a tweet to another person in another country requires the use of different software.

(a)  Name a software application that is required to send an e-mail.     (1)

(b)  State TWO differences between an *e-mail* and a *tweet*, other than the software required.     (2)

6.1.2     An iPhone is classified as a smart phone.

List THREE distinctive features of a mobile phone for it to be classified as a smart phone.     (3)

6.1.3     Facebook and Skype are some of the buzzwords used when discussing social networking.

(a)  Explain the term *social networking*.     (2)

(b)  Briefly explain how the use of Facebook can impact negatively on the social life of a teenager. State TWO facts.     (2)

(c)  What is a *communication protocol*?     (2)

(d)  What type of communication protocol is used by Skype?     (1)

6.2     Linking computers in a global communications network impacts on different sectors of the economy differently.

    6.2.1    State THREE advantages of a global communications network for the education sector. (3)

    6.2.2    List THREE career options that arose as a result of connecting computers in a global network. (3)

    6.2.3    The use of computers for criminal intent is on the increase. The terms below are used to describe people that are a threat to computer systems.

        For each term:

- Explain the term. What is it?
- Give a brief description of how such a person can cause damage to another person.

        (a)  Cyber terrorist (2)

        (b)  Cyber extortionist (2)

        (c)  Script kiddie (2)

        (d)  Wardriver (2)

    6.2.4    The concepts (a) and (b) below are associated with threats to a computer system.

        For each concept, choose TWO security measures from the list below that will protect the computer system against that specific threat. You may use each security measure only ONCE.

> **Possible security measures available:**
>
> - Backup
> - Product activation
> - Encryption
> - Antivirus
> - Biometrics
> - UPS
> - User names and passwords
> - Audit trail
> - Authentication

        (a)  Unauthorised access to confidential information (2)

        (b)  Back doors (2)

    6.2.5    Honeypots help to secure a company's network. Explain how this is accomplished. (2)

6.3     An illegal recording of someone else's work is called piracy.

      6.3.1     Name TWO sectors of the economy on which piracy impacts
            negatively.                                                                              (2)

      6.3.2     Name TWO ways in which an original DVD can be distinguished
            from a pirated copy.                                                                  (2)

      6.3.3     Bootlegging is one of the main categories of piracy.

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

            (b)  Give ONE example of a bootleg.                                     (1)

6.4     The use of the Internet created an information overloaded society. Many of
the websites on the Internet do not supply the users with reliable information.

      6.4.1     Name TWO ways in which we can ensure that the information on a
            certain web page is trustworthy.                                             (2)

      6.4.2     Name TWO ways in which you, as an Internet user, can verify the
            information provided on the web page.                                     (2)

**TOTAL SECTION E:     43**
**GRAND TOTAL:     180**