



basic education

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**NATIONAL
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GRADE 12

INFORMATION TECHNOLOGY P2

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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	(61)
SECTION C: Applications and implications	(20)
SECTION D: Programming and development of software	(48)
SECTION E: Integrated scenario	(41)
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 An approach to information technology in which departments and divisions of a company maintain their own information systems can be referred to as a ... approach.
- A centralised
 - B decentralised
 - C department/division
 - D head office
- (1)
- 1.2 A popular file format that refers to a version of a readable word document that looks exactly like the printed version, but is independent of the word processor that was used to create the document, is known as a ... file.
- A pdf
 - B pdl
 - C exe
 - D wav
- (1)
- 1.3 A file with the extension .dll is ...
- A a dynamic-link library file.
 - B used to implement direct links to LAN servers.
 - C the source code for a database management system.
 - D used to provide communication to peripheral devices.
- (1)
- 1.4 A virtual office is one ...
- A that uses a LAN and intelligent terminals.
 - B where employees never enter a physical office, but rather conduct their business via the Internet.
 - C that implements virtual memory in a LAN using a suite of office software.
 - D that can only be used in a metropolitan area network (MAN).
- (1)
- 1.5 ... are text files containing information about web pages you have visited.
- A Web browsers
 - B Style sheets
 - C Cookies
 - D RSS feeds
- (1)

- 1.6 A ... is a computer attached to a network that has had its security compromised and as a result is remotely controlled for a purpose other than what it was intended for.
- A bot
 - B puppet
 - C Trojan horse
 - D zombie
- (1)
- 1.7 Software that monitors each keystroke a user types on a specific computer's keyboard, is referred to as ...
- A spyware.
 - B adware.
 - C a keylogger.
 - D a popup.
- (1)
- 1.8 ... is a RAID storage technique that splits data, instructions and information across multiple disk drives.
- A Striping
 - B Streaming
 - C Mirroring
 - D Partitioning
- (1)
- 1.9 A public wireless network that provides Internet access to mobile computers and handheld devices is referred to as a(n) ...
- A cybercafé.
 - B kiosk.
 - C hot spot.
 - D ISP.
- (1)
- 1.10 ... is a method of processing where the processor is able to read new instructions from memory before the instruction that is currently being processed has been completed.
- A Caching
 - B Pipelining
 - C Hyperthreading
 - D Swapping
- (1)

TOTAL SECTION A: 10

SCENARIO

The Department of Welfare has embarked on a project to establish youth centres throughout the country. These centres will consist of facilities to support the improvement of computer literacy skills, crisis management, health issues and careers. You have been invited to be part of the planning committee to assist with the information technology part of establishing the youth centres.

SECTION B: HARDWARE AND SOFTWARE**QUESTION 2**

An essential part of the project will be to establish e-laboratories. These laboratories will consist of work stations and other peripheral devices that will be connected in a network.

- 2.1 Each youth centre will require a minimum of ten work stations in order to operate effectively. The following two **quotations** were selected for consideration by the planning committee. Most of the members of this committee are not familiar with computer terminology and require your assistance.

Computer A (R4 599)

Intel Pentium Dual-Core 2.2 GHz
2 Gigabyte DDR2 memory
300 Gigabyte hard drive
DVD writer
USB optical mouse and keyboard
On-board network card
AGP 16x Bus

The following software will be installed on each machine:

- ▶ Windows XP
- ▶ Microsoft Office 2007
- ▶ Free Educational Software

Computer B (R5 999)

Intel Pentium Quad-Core 2.4 GHz (MMX)
4 Gigabyte DDR2 memory
320 Gigabyte hard drive
DVD RW dual layer drive
USB optical mouse and keyboard
On-board network card
PCI-Express Bus
MMX instruction set
Additional graphics card

The following software will be installed on each machine:

- ▶ Windows Vista
- ▶ Microsoft Office 2007
- ▶ Free Educational software
- ▶ Free Gaming software

Answer the following questions based on the given quotations.

- 2.1.1 Which computer would be most suitable for the youth centres?
Give TWO reasons for your choice.

(2)

- 2.1.2 (a) What is the function of a PCI bus? (2)
- (b) Explain how the PCI-Express bus is an improvement on the normal PCI bus. (2)
- 2.1.3 Computer A includes an AGP bus. What is the advantage of AGP over the PCI bus? (2)
- 2.1.4 (a) DDR2 is an improved version of *DRAM* while *MRAM* is a newer type of RAM. Differentiate between DRAM and MRAM in terms of the method that is used to store data. (2)
- (b) The committee is confused about all the different types of memory and does not understand what virtual memory is in particular. Briefly explain what *virtual memory* is. (2)
- (c) Explain the following concepts related to virtual memory:
- (i) Paging (2)
- (ii) Thrashing (2)
- 2.1.5 (a) Electronic communication between the computer and other devices (internal and external) can either be serial or parallel. Explain the difference between *serial* and *parallel communication*. (2)
- (b) Devices can communicate with the CPU by means of IRQs. Explain what *IRQs* are. (2)
- 2.1.6 Differentiate between a *dual-core* and a *quad-core processor* regarding their physical design. (2)
- 2.1.7 Both the computers in the advertisement are equipped with a USB optical mouse. What does *USB* stand for? (1)
- 2.1.8 An instruction set is a specific group of instructions that a particular CPU can recognise and execute. Computer B has an MMX instruction set.
- (a) What distinguishes the MMX instruction set from a standard instruction set? (2)
- (b) The committee wants to know if there are any other alternative types of instruction sets. You make them aware of the RISC and CISC types. Explain how a RISC instruction set is different from a CISC instruction set. (2)

- 2.1.9 In the quotation for Computer B it is indicated that Windows Vista is installed.
Give TWO reasons why the centres must have the original disk/install files of the operating system. (2)
- 2.1.10 One of the functions of an operating system is to control and maintain the operations of a computer.
(a) State TWO other functions of the operating system. (2)
(b) You suggest that the centres consider using open-source software.
(i) Give TWO advantages of open-source software. (2)
(ii) Give TWO disadvantages of open-source software. (2)
- 2.2 The committee is concerned about the network that needs to be installed at each centre since it could be costly and difficult to maintain.
- 2.2.1 Apart from sharing hardware, such as the printer, list THREE other advantages of having a network in each centre. (3)
- 2.2.2 The committee members complain that having a single printer at each of the centres may cause printing jobs to be lost due to congestion in communication channels to the printer. Address their concern by explaining the following concepts.
(a) Buffer (2)
(b) Spooler (3)
- 2.2.3 The committee wants to know what hardware, apart from cables, will be required to set up the network. Motivate why EACH of the following items are required by briefly explaining the function of each item in a network:
(a) Network interface cards (3)
(b) Switch or hub (2)
- 2.2.4 Fibre-optic cables are mentioned by one of the committee members as an option to connect the computers in each centre. Explain why UTP cables, rather than fibre-optic cables, will be better suited to this application. (2)

- 2.2.5 You suggest that the network to be used should be a client-server network.
- (a) Name an alternative type of network to a client-server network. (1)
 - (b) Give TWO reasons why a client-server network would be better suited for a centre than the other type of network that you named in QUESTION 2.2.5.(a). (2)
- 2.2.6 Support personnel should be appointed to assist with the maintenance of the network. Explain how the problem of maintenance can be solved by the following support personnel:
- (a) Network administrator (2)
 - (b) Network technician (2)
- 2.3 The committee is investigating the possibility of connecting all the youth centres in the country into a wide-area network (WAN).
- 2.3.1 You are recommending the use of routers to set up the WAN. Motivate your recommendation by naming TWO advantages of routers. (2)
- 2.3.2 Cables or wireless communication channels can be used in a WAN. Name TWO advantages of using wireless media for this WAN. (2)
- TOTAL SECTION B: 61**

SECTION C: APPLICATIONS AND IMPLICATIONS**QUESTION 3: e-COMMUNICATION**

A pilot youth centre is set up with ten computers linked into a client-server network. Your task is to convince the committee to allow the centre to access the Internet.

- 3.1 The committee is concerned about some issues relating to the Internet.
- 3.1.1 Apart from using e-mail, indicate TWO other ways that the youth can communicate over the Internet. (2)
- 3.1.2 Apart from communicating, state TWO other useful activities that the Internet provides that people can make effective use of to improve their lives. (2)
- 3.1.3 The youth need to be informed about social networking websites on the Internet.
- (a) State ONE advantage of participating in activities on social networking websites. (1)
- (b) State TWO disadvantages of social networking websites. (2)
- 3.2 Give advice on how one can ensure that information found on the Internet is reliable. (2)
- [9]**

QUESTION 4: SOCIAL AND ETHICAL ISSUES

The members of the committee insist on a workshop to educate the youth about legal issues surrounding the use of the Internet. As the IT person on the team, you are responsible to formulate relevant information to present at the workshop.

- 4.1 Explain the term *computer ethics*. (2)
- 4.2 Define each of the following concepts:
- 4.2.1 Copyright (1)
- 4.2.2 Plagiarism (1)
- 4.3 Computer crime using the Internet is on the increase. Explain the following types of computer crime:
- 4.3.1 Identity theft (1)
- 4.3.2 Phishing (1)

- 4.4 The pilot centre has created a website to promote its activities and to encourage more public participation.
- 4.4.1 State ONE way that the centre can earn revenue from the website. (1)
- 4.4.2 Do you think it is wise to have a blog on the website where the public can enter comments? Motivate your answer. (2)
- 4.5 The youth centre must promote the concept of 'green computing'. Name TWO good habits that computer users must practise to ensure that this concept is encouraged. (2)
- [11]**
- TOTAL SECTION C: 20**

SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT**QUESTION 5: ALGORITHMS AND PLANNING**

The youth centre has a collection of resources with information and advice on careers. They want to have a database of these resources so that young people can easily get access to the information.

- 5.1 A comma-separated file called **resources.csv** has been created which contains a list of all the resources. In a comma-separated file the fields are separated by means of commas. A sample of the contents of the file is as follows:

```
ResourceID,Title,ResourceType,Publisher,Contact
1,Engineering Careers,Book,Max McMillan,011 456 3212
2,Choosing a Degree,Website,SA University Council,033 456 3452
3,Becoming a Medical Practitioner,Book,WHO,021 678 1244
4,Learning a Trade,Website,Artisans SA, 013 553 1123
5,Becoming a Teacher,Website,Education4All,012 948 4432
```

- 5.1.1 How many different fields does each entry in the file have? (1)
- 5.1.2 What is the purpose of the first line in the file? (2)
- 5.1.3 Name TWO types of application software that can use .csv files for inputting data. Do NOT give proprietary/brand names of the software. (2)
- 5.1.4 Besides a comma, give ONE other character that can be utilised to separate the fields in a .csv file. Justify your choice of character. (1)
- 5.2 You are required to develop software to process the .csv file (referred to in QUESTION 5.1) and to store the resulting data. You develop a simple high-level algorithm that can be used to process the file:
1. Enter the file name from the keyboard
 2. Open the file for input
 3. Read each line of data from the file
 4. Extract each piece of data from the line
 5. Store the data that has been extracted
 6. Close the file
- 5.2.1 In line 1 of the given algorithm the user has to enter the name of the file. Give a hint on how to make sure that the user enters the file name in the correct format. (1)
- 5.2.2 Assume that the user has entered the **correct** filename. Give ONE possible error that may still occur when line 2 of the algorithm is executed, that is when trying to open the file. (1)

- 5.2.3 Assume that the user has entered the **wrong** filename. Indicate any TWO appropriate actions that your software should perform in order to handle this error. (2)
- 5.2.4 To read the data from the file one line at a time you need to use a loop. You have to choose between a counting (for) loop or a conditional (while) loop. Explain why you would rather choose a conditional loop. (2)
- 5.2.5 When extracting the contact number from each entry in the file, which data type would you use for the variable to store the contact number? Explain your choice. (2)
- 5.2.6 Give TWO reasons why the final step (closing the file) is considered important. (2)
- 5.3 One of the requirements when writing programming code is that it should be easy for other programmers to maintain. Two techniques that can be used to write easily maintainable code are object-oriented programming and good programming conventions.
- 5.3.1 Give TWO advantages of using object-oriented programming when there are multiple developers involved in coding a piece of software. (2)
- 5.3.2 Object-oriented programming makes use of encapsulation. Give a definition of *encapsulation*. (2)
- 5.3.3 Indicate whether the following statements about object-oriented programming are TRUE or FALSE:
- (a) You can have only one object for each class that you write. (1)
 - (b) Methods in a class can have the same name as long as their parameters are different. (1)
 - (c) It is not possible to have an array as an attribute in a class. (1)

- 5.3.4 The algorithm given below searches an array (called *c*) of ten strings for all occurrences of the word *Career* and displays the word each time it is found.

```

LINE
1      a ← 0
2      b ← "Career"
3      LOOP WHILE a < 10
4      IF c[a] EQUALS b
5      DISPLAY c[a]
6      END IF
7      a ← a + 1
8      END LOOP

```

The algorithm given is difficult to read because it does not follow good coding conventions. Rewrite the entire algorithm and apply good coding techniques so that it is easier to read and understand. (4)

- 5.3.5 Give TWO reasons why programmers might make use of comments in their code. (2)

- 5.4 The youth centre wants to reward young people who use the centre's facilities often, with free air-time. Any person who has visited the centre 20 times or more in a year or any Grade 12 learner who has visited the centre more than five times will get free airtime. Study the following algorithm to determine whether a person receives the free air-time or not:

```

LINE
1      IF grade = 12 AND visits > 5 OR visits >= 20
2      DISPLAY "You get free air-time"
3      ELSE
4      DISPLAY "No free air-time"
5      END IF

```

- 5.4.1 Assume that the value of 12 has been assigned to the variable named *grade* and the value of 7 has been assigned to the variable named *visits*. For each of the following statements state whether the conditions will evaluate to a result of TRUE or FALSE:

- (a) *grade* = 12 AND *visits* > 5 (1)
- (b) *visits* >= 20 (1)
- (c) *grade* = 12 AND *visits* > 5 OR *visits* >= 20 (2)

5.4.2 The algorithm given in QUESTION 5.4 can also be written as follows:

```

LINE
1      IF _____
2          DISPLAY "No free air-time"
3      ELSE
4          DISPLAY "You get free air-time"
5      END IF
    
```

Write down the Boolean expression that should appear in the underlined part in LINE 1 of the algorithm above so that it produces the same result as the given algorithm in the introduction of QUESTION 5.4. (2)

5.5 A number of career counsellors work at the youth centre. When learners register at the centre they are assigned to a particular career counsellor. A counsellor can counsel any number of learners. Some counsellors are available fulltime, others weekends only and others by appointment only. A database has been designed to store information on learners and their counsellors. Below are screenshots of certain aspects of the database.

FIGURE A – DATA

LearnerID	LearnerName	CounsellorID	CounsellorName	Speciality	Availability
1	Geoff Gedeye	1	John Kelland	Engineering	Fulltime
2	Tao Ponde	1	John Kelland	Engineering	Fulltime
3	Sarah Zollner	1	John Kelland	Engineering	Fulltime
4	Kwezi Botso	2	Thandi Mgoepe	Business	Weekends
5	Penelope Niemand	2	Thandi Mgoepe	Business	Weekends
6	Isak Mendez	3	Henrietta Prinsloo	Social Sciences	By Appointment
7	Luthando Zungu	3	Henrietta Prinsloo	Social Sciences	By Appointment
8	Patience Mabata	3	Henrietta Prinsloo	Social Sciences	By Appointment
9	Mgashe Sogoni	4	Reginald Baldaroo	Law	Weekends
10	Athenkosi Labuya	4	Reginald Baldaroo	Law	Weekends

FIGURE B – PROPERTIES OF THE **Availability** FIELD

General	Lookup
Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	Yes
Indexed	No
Unicode Compression	Yes
IME Mode	No Control
IME Sentence Mode	None
Smart Tags	

5.5.1 Give TWO advantages of storing data in a database as opposed to text files. (2)

- 5.5.2 Why should the **CounsellorID** field not be used as a primary key? (1)
- 5.5.3 The **Availability** field has been specified as a text field with properties as indicated in FIGURE B.
- (a) Which property in FIGURE B will you need to change in order to ensure that the user can only type in the text **Fulltime, Weekends** or **By Appointment**? (2)
- (b) Give ONE other solution to avoiding the possibility of entering incorrect information in the **Availability** field. (1)
- 5.5.4 Explain what the value 255 in the field size property in FIGURE B specifically means. (1)
- 5.5.5 In order to reduce data redundancy one usually normalises database tables. Normalise the table shown in FIGURE A by splitting it into two related tables and do the following:
- (a) Write down the TWO table names and the fields that will appear in each table. (2)
- (b) Indicate the primary keys in each table by underlining the field in the answer to QUESTION 5.5.5(a) that you will choose as the primary key. (2)
- (c) A foreign key is required to create a relationship between the tables.
- (i) Give the field name that will be used as the foreign key. (1)
- (ii) In which one of the two tables will the field that you have identified in QUESTION 5.5.5(c) (i) be the foreign key? (1)

TOTAL SECTION D: 48

SECTION E: INTEGRATED SCENARIO**QUESTION 6**

The youth centre has created its own website. The website of the youth centre contains resources for selecting a career, informative videos for download and articles related to HIV/Aids, relationships and other topics related to young people.

- 6.1 The youth centre has hosted their website on one of their own servers at the centre. This ensures that they are in control of the server hosting their site at all times.
- 6.1.1 What specialised software is required on the server thereby allowing it to host a website? (1)
- 6.1.2 Which protocol (give the full name) will be used to transmit the website data when another computer on the Internet requests information from the website on the youth centre's server? (2)
- 6.1.3 Explain why the youth centre would still require an account with an ISP even though it is hosting its own website. (1)
- 6.1.4 The youth centre currently has a 3GB cap on their ADSL account. One of the advantages of DSL is that it transmits at fast speeds on existing standard copper wiring. What is the specific advantage of ADSL which makes it suitable for Internet access? (2)
- 6.1.5 The youth centre is concerned that providing videos on its website will use too much of its bandwidth.
- (a) Explain the meaning of the term *bandwidth*. (2)
- (b) Suggest a solution which will allow the centre to have videos on its website without using its own bandwidth. (2)
- 6.2 The youth centre manager has been told that if he has a URL for the website then he does not need to use the numerical IP address anymore. The manager chooses the URL <http://www.youthlifecentre.org.za>.
- 6.2.1 When he visits the login page on the website, why does the manager see '*https*' at the beginning of the URL instead of '*http*'? (2)
- 6.2.2 The manager needs to know whether he can use the same domain name for both the website and his e-mail address. Explain whether or not he can use the same domain name for both. (2)
- 6.2.3 Explain why the youth centre's website needs both the numerical IP address as well as the URL. (2)

- 6.3 The designers of the website want to use pop-ups on the website.
- 6.3.1 What is a *pop-up*? (1)
- 6.3.2 Most web-browsers block pop-ups by default. Explain why most web browsers do this. (2)
- 6.3.3 Motivate why you recommend that the website contain pop-ups. (2)
- 6.4 The youth centre wants to provide a user portal for young people who use the website. This portal should allow young people to login to the site with a username and password and contribute their own content to a wiki. They will also be able to participate in online discussions on various topics including HIV/Aids and relationships.
- 6.4.1 You insist that the website content includes a privacy policy. What type of information should be made clear to users in a website's privacy policy? (2)
- 6.4.2 What is a *wiki*? (2)
- 6.4.3 Would you recommend using a wiki on the website to build a source of information for teenagers on HIV/Aids and relationships? Justify your answer. (3)
- 6.4.4 The youth centre needs to make a decision on whether to publish a user's full name or just its username when it contributes to an online discussion on the website. State whether you think it should show usernames or full names on the discussion forum. Justify your answer. (2)
- 6.5 The committee members are curious about the way e-mails are sent and received. Explain the concept *packet switching*. (4)
- 6.6 Learners will be encouraged to use the Internet to do research for their projects. They should be aware of the problem of information overloading. Explain how information overloading can have a negative impact on users. (2)
- 6.7 It will be difficult to find sponsors for the youth centre. Some of the committee members want to investigate the possibility of using the centre for e-commerce in order to generate income.
- 6.7.1 Explain what *e-commerce* is. (1)
- 6.7.2 Name TWO advantages of e-commerce for the youth centre. (2)
- 6.7.3 Name TWO of the negative aspects of e-commerce. (2)

TOTAL SECTION E: 41
GRAND TOTAL: 180