education

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GRADE 12

INFORMATION TECHNOLOGY P2

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MARKS: 180

TIME: 3 hours

This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of SIX questions divided into the following:

        SECTION A: Multiple-choice questions   (10)
        SECTION B: Hardware and software   (52)
        SECTION C: Applications and implications   (23)
        SECTION D: Programming and software development   (48)
        SECTION E: Integrated scenario   (47)

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 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 – 1.10) in the ANSWER BOOK, for example 1.11 D.

1.1   FTP refers to ...

   A   Free Tele Portal.
   B   a protocol used for transferring files over the Internet.
   C   'File Termination Process'.
   D   a protocol for transferring a file out of the recycle bin.

1.2   A hardware interrupt is ...

   A   how a peripheral gains the CPU's attention when it needs to communicate.
   B   used to shut down printers.
   C   how the memory stops peripherals from working.
   D   what happens when the power fails and the computer stops working.

1.3   Fragmentation occurs when ...

   A   you drop the computer and the hard drive shatters.
   B   hard drives spin too fast and cause the computer to break into pieces.
   C   files are broken up and scattered all over the screen and memory.
   D   files are broken up and scattered all over the hard disk.

1.4   Multi-processing is when ...

   A   the CPU appears to process more than one task at a time.
   B   the CPU appears to run multiple process threads at once.
   C   tasks are divided between multiple computers on a network.
   D   tasks are divided between more than one CPU on the same computer.

1.5   Copyright law is NOT broken when you ...

   A   copy music from your friend's computer to your mp3 player.
   B   borrow a CD from a friend and copy it to your computer.
   C   find and download music from the Internet.
   D   copy your own CD to play on your mp3 player.

1.6   To enable faster performance, a *printer* typically ...

        A   has a built-in buffer (amount of memory) so that it can hold a chunk
                of data at a time and the CPU does not have to pay attention to it
                all the time.
        B   has a spooler (on a ROM chip) so that it can hold a chunk of data
                at a time and the CPU does not have to pay attention to it all the
                time.
        C   will only receive an amount of data which can be printed in a given
                number of clock cycles.
        D   sends printing pages to its own virtual memory.

1.7   Virtual memory techniques are used when the contents of ...

        A   the hard drive are copied to memory to enable faster access to
                data.
        B   memory are swapped to the hard drive to 'free' memory for another
                program.
        C   the hard drive are copied onto a flash disk for transfer to another
                computer.
        D   memory are transferred to cache for faster access to data.

1.8   An example of an OS used on a smartphone is ...

        A   Unix.
        B   Windows XP.
        C   Symbian.
        D   Novell.

1.9   An algorithm is ...

        A   a set of instructions written in a computer language for solving a
                problem.
        B   a sequence of logical steps for solving a problem.
        C   the source code of a computer program that will solve a problem.
        D   a sequence of plans for developing and selling a computer
                program.

1.10   ICT has changed education by ...

        A   creating a job market that requires more skills and therefore better
                education.
        B   raising the expected standard, quality and appearance of 'products'
                (projects, et cetera) that learners must deliver.
        C   forcing a shift in focus from knowledge-based learning to
                information gathering and analysis skills.
        D   all the above-mentioned.

TOTAL SECTION A (10 x 1):   10

The scenario below must be used to answer the questions in SECTION B, C, D and E.

SCENARIO
The Bill & Melinda Gates Foundation has approached the government with a proposal to establish special schools for gifted learners in two major cities in each province in the country. They propose the two schools in each province be connected electronically to each other and to a third group-teaching venue (for example a community hall) in a network. This proposal is aimed at community development. The idea is that the gifted learners will be encouraged to both teach and lead community projects in their province. The schools and the community development centres will need IT infrastructure to be able to communicate with each other and to enhance their productivity. The basic suggested computer configuration is: Core 2 Duo 2.0 GHz CPU 1 GB RAM 250 GB Hard Disk Drive DVD writer

SECTION B: HARDWARE AND SOFTWARE

QUESTION 2: HARDWARE AND SOFTWARE

A task team has been put together to design the IT infrastructure. You are a consultant on the task team. The following issues have been raised and need to be resolved:

2.1   Each of the schools will standardise on the same computer configuration and the same type of local area network (LAN). This means that the equipment has to be chosen very carefully. **Learners will be encouraged to use the computers for the standard tasks of word processing, e-mail, Internet browsing, et cetera. They will also be encouraged to program, edit graphics and movies, use accounting software, design objects using CAD tools, design and implement interactive web sites and work with large databases.**

2.1.1   A member of the task team suggests that the RAM of the suggested computer configuration is insufficient.

What is the maximum amount of memory that computers like these can typically access?   (1)

2.1.2   Name TWO tasks from the list above (QUESTION 2.1) that would typically make use of this large amount of memory.   (2)

2.1.3   Consider the applications (QUESTION 2.1) that the learners will be expected to use. Why is it necessary to have a reasonably large hard drive? (2)

2.1.4   No mention is made of the monitors to be used. Give TWO reasons why you recommend they invest in LCD monitors as opposed to CRT monitors. (2)

2.1.5   Someone on the task team has suggested that the CPUs should rather be Quad Core.

    (a)   What is the difference between a Quad Core design and the suggested Core 2 Duo CPU, apart from the amount of cache memory? (2)

    (b)   (i)   Explain what the learners would have to be doing to gain any performance advantage from the Quad Core CPU. Give an example as part of your answer. (2)

        (ii)   Briefly explain how the Core 2 Duo CPU will handle the activity you have described in Question 2.1.5 (b) (i). (2)

    (c)   The Core 2 Duo CPU has 4 MB of cache whilst the Quad Core CPU has 8 MB of cache. One of the task team members does not understand the purpose of cache.

        (i)   Briefly explain how cache memory differs from normal RAM in terms of the electrical components it is made of. (2)

        (ii)   Briefly explain why the CPU needs cache memory. (2)

        (iii)   Describe how cache memory works. (4)

2.2   One member of the task team insists that all the computers must have four USB ports and at least one Firewire 800 port.

2.2.1   (a)   Why are there fewer Firewire ports than USB ports? (2)

    (b)   What peripheral/application would typically make use of the Firewire port? (1)

    (c)   Both USB and Firewire are 'hot plugable'. Explain what *hot plugable* refers to. (2)

    (d)   How can a shortage of USB ports in a computer be solved? (1)

2.2.2 One of the members of the task team says: "At least all the computers will be 'Plug 'n Play' – so we won't need all those drivers."

    (a) What is a *driver*? (2)

    (b) Is it correct to say that 'Plug 'n Play' means that you don't need driver software? Justify your answer. (2)

    (c) Users often complain that devices such as printers plugged into the computer do not want to work even though drivers have been installed. Give TWO troubleshooting suggestions on how to resolve this type of problem. (2)

2.3 The performance of the hard drives will be important to the users.

2.3.1 One of the factors that will influence the performance of the hard drive is the disk controller. Which ONE of the two controllers available today will you recommend for high performance (EIDE/SATA)? (1)

2.3.2 Disk caching is an important feature of a hard disk that will improve performance. What is *disk caching*? (2)

2.3.3 Name any other feature of a hard drive that will influence the performance of the hard drive. (1)

2.4 It has been agreed that the computers all need to be networked. The task team cannot agree on the media to be used.

2.4.1 (a) Name the standard commonly used for connecting computers in unbounded media networks. (1)

    (b) Describe TWO disadvantages of a wireless LAN. (2)

2.4.2 (a) What bounded medium is the standard commonly used in most networks? (Be very specific.) (1)

    (b) What bounded medium is most often used as the high-speed 'backbone' of a network? (1)

2.4.3 Networks all have a 'topology' that describes how the computers are connected. Name the topology that is most commonly used in current networks. (1)

2.5   One of the task team members is an enthusiastic supporter of Open Source Software (OSS). He is really keen that the schools use and promote OSS.

2.5.1   Name the operating system most commonly associated with OSS.   (1)

2.5.2   OSS is a way of distributing software. Compare OSS with ONE of the other distribution models available (Shrink-wrapped/Shareware/Freeware). Address the following aspects:

(a) Cost   (1)

(b) How people obtain the software   (1)

(c) Support   (1)

(d) How the software is upgraded   (1)

2.5.3   OSS (like most other operating systems) is both a multi-threaded and a multi-tasking operating system. Briefly describe the difference between these two concepts.   (4)

TOTAL SECTION B: 52

SECTION C: APPLICATIONS AND IMPLICATIONS

QUESTION 3: e-COMMUNICATION

3.1   The task team sees e-communication as one of the most exciting and far-reaching features of using and promoting IT in schools and the community.

3.1.1   Name THREE forms of e-communication that are unique to the IT world (in other words that can only happen on computers/PDAs/Smartphones).   (3)

3.1.2   (a) What is the main advantage of e-communication?   (1)

(b) Name TWO disadvantages of e-communication with reference to the human aspect of communication.   (2)

3.2   The Internet has become the first place most learners go when researching a topic. The problem is that anyone can publish anything on the Internet. Briefly describe TWO strategies that you can follow to make sure that the information you find is valid and accurate.   (2)

3.3   Select and briefly describe any TWO of the following problems associated with the world of e-communication: Spyware/Spam/Phishing.   (4)

3.4   Name TWO safety features of an Internet site that will ensure that a secure credit card payment can be made.   (2)

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QUESTION 4: SOCIAL AND ETHICAL ISSUES

4.1   "With great power comes great responsibility."
       IT and e-communications put great power in the hands of most computer users. The task team believes that computer ethics should be strongly emphasised in the schools and the community.

       4.1.1   Define *computer ethics.*   (2)

       4.1.2   Learners were requested to post some of their school projects on the web. Give TWO examples of unethical practices regarding the use of these projects.   (2)

4.2   Identity theft is different from fraud such as credit card theft.

       4.2.1   Use an example to explain what identity theft is.   (2)

       4.2.2   Why are tools such as social networking sites (for example Facebook) and IM (Instant Messaging) often associated with identity theft?   (1)

4.3   It is often said that in the developing countries, like South Africa, the digital divide is increasing. Explain what is meant by the term *digital divide*.   (2)

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TOTAL SECTION C: 23

SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT

QUESTION 5: ALGORITHMS AND PLANNING

The task team must deal with aspects of sourcing equipment and obtaining quotes to set up the IT infrastructure. They also need to look at the order in which they need to get the work done to ensure the greatest possible efficiency.

The first task is to create a database to hold the quotes that will be submitted for supplying equipment. One of the task team members has set up the database shown below. For each item a minimum of three quotes is required.

	Field Name	Data Type	Description
🔑	CompanyCode	Text	The first 5 letters of the company name followed by a sequence number
	CompanyName	Text	The name of the company
	CompAddress	Text	The address of the company
	CompEmail	Text	The email address of the company
	ContactPersonID	Text	ID number of the contact person
	ContactPersonName	Text	The name of the contact person
	ContactPersonEmail	Text	The email address of the contact person
	ContactPersonPhone	Text	The telephone number of the contact person
	ItemCategory	Text	The category (Hardware/Software/Network)
	ItemDescription	Text	Description of the item
	ItemQuantity	Text	For how many items the quote is
	ItemCost	Text	Cost of one item
	QuoteNo	Text	Unique number for each quote

Quotes : Table

FIGURE 5.1

5.1   Explain the purpose of a primary key in a database table.   (2)

5.2   There are several problems with the design of this database. The steps below are part of the process of solving the design problems.

5.2.1   All the data types were declared as text. Indicate which fields should NOT be of a text type. Indicate the appropriate data type for EACH of the fields you have identified.   (2)

5.2.2   What is the most obvious weakness of the Quotes table design with regard to capturing data on a quote? You MUST explain your reasoning.   (2)

5.2.3   A poorly designed database can lead to errors whilst doing normal, everyday database maintenance tasks. These errors are often referred to as 'anomalies'. Name THREE of the anomalies that can be caused by a badly designed database.   (3)

5.2.4   The given table actually contains information on three separate groups or categories of data. Split the table into THREE tables to hold these three separate groups of data. You MUST show the following:

(a) The fields that each of the new tables will contain   (3)

(b) The primary key of each table   (3)

(c) The foreign keys and the tables that will contain the foreign keys needed to establish relationships/links between the tables   (3)

5.2.5   Name the process used for making a database as streamlined and efficient as possible (as you did in QUESTION 5.2.4).   (1)

5.3   The phone number in the given table (FIGURE 5.1) should be stored in the following format:

+27 (83) 678 9543

(in other words the country code, the service provider/area code, the number).

What needs to be done to the database design to ensure that users enter data in this format?   (1)

5.4   Part of a good database design is anticipating and preventing errors when entering data.

Consider the data that can be captured about the quote. The task team have decided that they will not accept quotes for less than 100 units or more than 5 000 units.

5.4.1   What is the technique that can be used to ensure that data falls within a predetermined range?   (1)

5.4.2   Write out the rule you would use to ensure that the number of units entered will not be outside the predetermined range. Use the field names from FIGURE 5.1.   (3)

5.4.3   Another field in the given table (FIGURE 5.1) that should have controlled input is *ItemCategory*. Explain what must be done to prevent errors when capturing data for this field.   (2)

5.5   To make a database useful we need to be able to manage the data.

          5.5.1   When managing data using SQL statements, certain key words are
                      used.   Briefly   describe   what   any   THREE   of   the   following
                      keywords/commands do:
                      SELECT/WHERE/DELETE/ORDER BY/INSERT   (3)

          5.5.2   (a)   Write out the SQL statement to delete all records from the
                            supplied Quotes table(FIGURE 5.1).   (2)

                      (b)   Write out the SQL statement to list (from the supplied Quotes
                            table, FIGURE 5.1) the company name and the name of the
                            contact person sorted by the company name.   (3)

5.6   One task team member is very persistent about consistency of data and
          formatting.   He wants the first letter of every word in the text fields to be
          capitalised (for example 'USB Optical Mouse').   Unfortunately, most of the
          database contents have been captured, so it is too late to solve the problem
          by re-designing the database to make sure the users enter the data in the
          correct format.   From first principles, write out algorithms that will manipulate
          a string as follows:

          NOTE: You MUST write your algorithm in pseudocode − do NOT use a
          programming language.

          5.6.1   Remove leading spaces (spaces before the first letter in the string)   (2)

          5.6.2   Remove trailing spaces (spaces at the end of the string)   (3)

          5.6.3   Change the first letter of every word in the string to a capital   (3)

5.7   One of the task team members has suggested that a special program be
          developed to track the learners as they log on and off the network.   We also
          need to keep track of the amount of time they spend on the computer and
          how much time is spent on the Internet.   He has designed an object class to
          do this job.
          Study the class diagram below and then answer the questions that follow.
          The names of the methods indicate what they should do.

FIELDS	METHODS
• LearnerCode • TotalSessions • TotalTime • TotalInternetTime	• changeLearnerCode • toString • getFrequency • addSession(TimeIn, TimeOut) • resetAll • setInternetTime(InternetTime)

5.7.1   What will the toString method be used for?   (2)

5.7.2   Explain the purpose of the following methods in object-oriented programming:

(a) Set methods   (1)

(b) Get methods   (1)

5.7.3   Methods are normally declared as public and fields as private.

(a) Explain why methods are normally declared as public and not as private.   (1)

(b) What is the reason for declaring an instance field as private and not as public?   (1)

TOTAL SECTION D: 48

SECTION E: INTEGRATED SCENARIO

QUESTION 6

6.1 One of the focuses of the project is outreach to and support of the local communities. Staff and learners are expected to participate in this outreach and support. The outreach will focus on IT education, supplying IT facilities to the community and on using IT to help the community with other projects.

6.1.1 Each community centre will act as a connection point for the Internet for their community. As such, the community computer room will act like an Internet café and, additionally, the setup will be created to provide a low-cost ISP service to the immediate community (in other words people within 1 km of the community centre).

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

(b) What service is provided by an ISP? (1)

(c) Briefly explain the difference between an *Internet café* and an *ISP service* from a customer's point of view. (2)

(d) (i) Name the medium that community members wanting to make use of the ISP service will have to use to connect to the computers in the community centre.

(ii) Explain your choice. (2)

6.1.2 The task team member from one of the fixed-line operators has offered to provide each of the community centres with an FDDI connection to the Internet. The member from one of the cellphone providers has offered a 3G connection instead.

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

(b) Which technology will provide a broadband connection to the community centre? (1)

(c) Which medium will be the best option to use to get the best Internet performance? Justify your answer. (2)

(d) Each server room in each community centre will need a router. What is the function of a router? (2)

6.1.3   Various projects in the community (for example the local home for AIDS orphans) will be encouraged to create their own blog with support from the learners at the school.

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

(b)   How is a blog different from a web page?   (1)

6.2   A cellphone company has offered to supply subsidised up-to-date, top-of-the-range smart phones to the community provided that the learners provide support and develop additional software for these phones. Two models have been suggested. The one runs OS X for Mobile and the other Windows Mobile.

6.2.1   List TWO functions of a *smart phone* that a normal phone cannot do.   (2)

6.2.2   Will the community be able to use a smart phone to access the ISP service provided at the community centre?   (1)

6.2.3   What is the difference between a *smart phone* and a *conventional PDA*?   (2)

6.2.4   Which type of smart phone would you choose – OS X-based or Windows Mobile-based? Give ONE good reason for your choice.   (2)

6.3   Learners are expected to give the community members courses on using e-communications correctly and effectively (including various concepts of computer ethics).

6.3.1   Which FOUR guidelines should the learners emphasise about netiquette?   (4)

6.3.2   Briefly explain why spam is unethical.   (2)

6.3.3   Briefly explain the guidelines for good password security. Name guidelines in terms of construction of a password (length, characters used, what not to use as a password, bad things to use and frequency of change) as practices to ensure a secure password.   (4)

6.4   Another aim is that each community encourages people to create and market their own local crafts. As an additional sales outlet the learners will develop an online crafts shop for the community allowing people from around the world to view and order the local crafts.

6.4.1   To make this possible, each community will have to register its own unique URL.

(a)   What does *URL* stand for?   (1)

(b)   Suggest an appropriate URL for the Umlazi Community Centre. (Remember to give a complete address with all the parts needed.)   (3)

6.4.2   To enable the site to carry out online transactions it will need to support SSL encryption and decryption.

(a)   What does *SSL* stand for?   (1)

(b)   What is meant by the term *encryption*?   (1)

(c)   SSL uses a special form of encryption called Public Key Encryption. Briefly explain how a secure connection between a server and a browser is established using this method.   (6)

6.5   The task team is aware of the impact that IT is having on the job market and on education, not only in South Africa, but throughout the world. They want to make sure that the learners and the communities are made aware of this. They want you to give some guidelines on this topic.

6.5.1   Briefly describe how IT is both shrinking and expanding the job market.   (2)

6.5.2   Name TWO ways in which IT can streamline the administration and implementation of the education process.   (2)

TOTAL SECTION E: 47

GRAND TOTAL: 180