



education

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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 SIX questions.
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 most appropriate answer and write only the letter (A – D) next to the question number (1.1 – 1.10) in the ANSWER BOOK.

1.1 SPOOLing ...

- A refers to simultaneous peripheral operation on-line.
- B refers to an automatic backup procedure.
- C is a type of file used to store documents for printing.
- D is used to buffer input from a word processor. (1)

1.2 A cookie is a ...

- A binary file that allows a program to run.
- B database file that stores information about a computer.
- C text file that stores information relating to a web site.
- D HTML file that contains internet settings. (1)

1.3 A device driver ...

- A is NOT required in plug and play.
- B is optional in hot swapping.
- C has to be used by every device attached to a personal computer.
- D is not needed for older technologies. (1)

1.4 A USB 2.0 port ...

- A has a slower access time than a PS2 port.
- B can daisy chain up to 127 devices.
- C does NOT support older USB devices.
- D refers to Universal Support Bus. (1)

1.5 GIGO ...

- A refers to a situation where there is too much data for a program to handle properly.
- B is an acronym for Gigabyte of Graphic Output.
- C refers to incorrect information obtained from incorrect input.
- D is an acronym for a Google's latest freeware program. (1)

- 1.6 A foreign key in a database table is ...
- A a field which identifies a link to a graphic object.
 - B an index to a Yes/No field.
 - C an alternative field that can be used as a primary key.
 - D a copy of a primary key which exists in another table. (1)
- 1.7 Consider the following list of hardware items:
- (i) UPS
 - (ii) AGP
 - (iii) 250 W power supply
 - (iv) Heat sinks on certain motherboard components
- Which items may be essential to provide continuous reliable operation of a computer system?
- A All FOUR items
 - B Items (i), (iii) and (iv)
 - C Item (i)
 - D Items (ii) and (iii) (1)
- 1.8 Which ONE of the following statements is FALSE?
- A Formatting a value to be displayed according to a certain format will physically alter the stored value.
 - B Overflow occurs when a number such as an integer falls outside the representable range of the computer.
 - C Truncation errors cause a loss of accuracy when representing decimal (real) numbers.
 - D A decimal (real) number can be subject to overflow. (1)
- 1.9 Which ONE of the following statements is TRUE?
- A A class may NOT have more than ONE constructor.
 - B A mutator method provides the facility to change a class variable.
 - C A class is an instantiation of an object.
 - D An accessor method provides the facility to change a class variable. (1)
- 1.10 A north bridge is ...
- A one chip which provides a chipset dedicated to components which work closely with peripherals.
 - B a buffer between the CPU and the hard disk.
 - C a new type of motherboard.
 - D one chip which provides a chipset dedicated to components which work closely with the CPU. (1)

TOTAL SECTION A: 10

SCENARIO

The internet has the potential for uses in education, commerce, recreation as well as a variety of other specialised fields such as the medical field. Although there are many positive and many negative aspects to the internet we cannot imagine our world without this vast source of global information at our fingertips.

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

- 2.1 The first cache store used in computers was a small high-speed memory device situated between the CPU and RAM.
- 2.1.1 Explain how conventional cache memory works. (3)
- 2.1.2 Name TWO differences between L1 and L2 cache. (2)
- 2.2

Most users are using their computers for multiple purposes at the same time – for example today many users are using the internet (downloading) while they are writing reports or doing other work. Computer hardware has improved gradually to facilitate this kind of usage. This has been accomplished by introducing new technology in hardware and by improved CPU design.
- 2.2.1 What is the difference between multi-threading and multi-processing? Explain AND give an example of each. (4)
- 2.2.2 (a) Name ONE recent technological hardware innovation (not related to the CPU) which has improved the efficiency and speed of computer systems. (1)
- (b) Explain how it has improved performance. (2)
- 2.2.3 Explain why pipelining improves the processing speed of a computer system. (2)
- 2.3

LANs which provide access to the internet are becoming commonplace. At any given time there can be huge amounts of data moving through the servers supporting these LANs. The speed and capacity of backing storage is always a problem. RAID is now a commonly used solution.
- 2.3.1 What does the acronym *RAID* stand for? (1)
- 2.3.2 Name and briefly discuss TWO pre-dominant storage techniques used by RAID. (4)

- 2.4 Data stored on the servers must be protected from loss or damage arising from hardware failure, theft of equipment or user carelessness. To facilitate this protection backup procedures are used.
- 2.4.1 When designing a backup procedure briefly state:
- (a) What hardware should be used?
 - (b) What media type should be used for this hardware (in QUESTION 2.4.1 (a)) and where should it be kept?
 - (c) What software should be used?
 - (d) How often the procedure should be executed? (4)
- 2.4.2 Some companies offer a backup solution whereby they will provide equipment and visit your site to perform backups for you. Suggest TWO advantages of this solution. (2)
- 2.5 From time to time one can experience unexpected problems with a computer connected to the internet. These can range from trivial to catastrophic.
- 2.5.1 Describe TWO negative and unwanted effects that can be experienced with a personal computer connected to the internet. State, in each case, what the cause of the negative effect could be. (4)
- 2.5.2 The increased use of the internet means that many more files are written to and deleted from the hard drive.
- (a) Explain ONE common problem which causes slowness in a personal computer if there have been many file additions and deletions over a period of time. (2)
 - (b) Suggest a remedy for the problem in QUESTION 2.5.2 (a). (1)
- 2.6 One internet solution that has emerged in recent years is on-line software. For example, an application package such as a word processor and the storage of processed files are provided on the internet.
- 2.6.1 Discuss THREE advantages of using a word processor on-line. (3)
- 2.6.2 Discuss TWO disadvantages of using a word processor on-line. (2)

2.7

A local business upgraded their computers and donated their old computers as well as their printers to a school. The school decided to create a small research centre at the school by setting up a LAN that is connected to the internet.

- 2.7.1 There are no drivers available to set up the printers. Suggest TWO ways to solve this problem. (2)
- 2.7.2 The LAN will be used to play network games over weekends.
- (a) Name at least TWO specific needs of these users regarding the hardware specifications of the computers. (2)
- (b) Since there will be internet access they would be able to play games on-line. What kind of internet connection will be suitable for this application? Give ONE reason for your choice. (2)
- 2.7.3 Learners doing research in the computer room can save information that they have downloaded on their cellphone without a physical connection.
- (a) What is the recent communication standard available on PDA's or cellphones to accomplish this? (1)
- (b) Name TWO limitations of a wireless communication standard. (2)
- 2.7.4 Some of the learners use smart phones to connect to the internet. Some of these phones use an open-source multitasking operating system.
- (a) Do you need to install the operating system on your smart phone before you can use the phone? Explain. (2)
- (b) Use an example to explain what *multitasking* is. (2)
- (c) Would you recommend the use of open-source software? Substantiate your answer by stating TWO advantages and TWO disadvantages of open-source software. (4)

- 2.7.5 Traveling costs are increasing and roads are becoming very congested. The principal gave permission to configure the LAN so that teachers can make video calls instead of attending meetings.
- (a) Name a suitable network protocol that will be required to facilitate video calls. (1)
- (b) Choose the suitable software that will be required to make video calls from the following list:
- Outlook Express; Skype; FTP; Internet Explorer; VoIP
- (1)

TOTAL SECTION B: 56

SECTION C: APPLICATIONS AND IMPLICATIONS

QUESTION 3: e-COMMUNICATION

- 3.1 A number of categories of internet-based criminals have emerged in recent years.
- 3.1.1 What is a *hacker* and what is his/her objective? (2)
- 3.1.2 Using an example, explain what the purpose of *phishing* is. (2)
- 3.1.3 Using an example, explain what *identity theft* is. (2)
- 3.2 One way of providing security on certain websites is to use digital signatures.
- 3.2.1 In what type of site will the use of digital signatures be effective? (1)
- 3.2.2 What security do digital signatures provide AND to whom? (2)
- [9]**

QUESTION 4: SOCIAL AND ETHICAL ISSUES

- 4.1 Society has access to global information through the internet. Do you think the internet can be used to assist governments to handle the HIV/Aids issue? Substantiate your answer. (2)
- 4.2

The IT teacher at a certain school makes use of internet technology in the classroom by requiring learners to do electronic research in class on given topics.
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- 4.2.1 During their electronic research sessions it became obvious that the information retrieved on a topic can differ quite dramatically from one website to another. Give TWO hints on how a learner can ensure that the information on a website is trustworthy. (2)
- 4.2.2 The teacher requires the learners to do the research and compile a brief report within one hour of finishing. Most of the learners could not complete this task in the allotted time because of information overload. Give TWO hints to learners on how to avoid information overload. (2)
- 4.2.3 Making use of electronic research should still be encouraged in schools even though there are problems to overcome. Name TWO benefits to substantiate this argument. (2)
- 4.3 Internet technology is being used extensively in the medical field. The shortage of medical doctors in certain areas has been addressed by making use of telemedicine. Explain what *telemedicine* is. (2)

[10]**TOTAL SECTION C: 19**

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

Mothusi has managed to obtain licenses from the large Hollywood studios to sell downloadable copies of movies online in South Africa. As part of his planning and setup he needs to create a database to contain information on the people ordering movies on the internet.

5.1 He has been given a database table design that looks as follows:

MoviesTb : Table			
	Field Name	Data Type	Description
	Title	Text	The title of the movie
	Director	Text	The name of the director
	Year	Date/Time	The year the movie was released
	Length	Number	Running time of the movie
	Producer1	Text	Name of producer
	Producer2	Text	Name of producer
	Producer3	Text	Name of producer
	Actor1	Text	Name of male star
	Actor2	Text	Name of male star
	Actor3	Text	Name of male star
	Actress1	Text	Name of female star
	Actress2	Text	Name of female star
	Actress3	Text	Name of female star
	Genre	Text	The type of movie (Action, Romance, Drama, Sci-Fi, ect)
	Age Restriction	Text	Age restriction of the movie
	Price	Currency	The cost of the movie
	Rating	Number	Rating of the movie out of 10
	ID	AutoNumber	An automatically generated field

FIGURE 5.1

- 5.1.1 (a) What is the primary key of the table? (1)
- (b) What is the purpose of a primary key? (1)
- (c) Motivate the choice of this field (and its data type) as a primary key by comparing it to TWO of the other fields from the given table in FIGURE 5.1 that you would instinctively want to use as primary keys. (2)

- 5.1.2 Mothusi has asked you to examine the database design to make sure it is as effective and efficient as possible. This means that you have to normalise the database.
- (a) Explain to Mothusi what *normalisation* is by giving him a rule for normalising the database to 1NF (1st Normal Form). (1)
- (b) Give him a rule for normalising the database to 2NF (2nd Normal Form). (1)
- (c) Show Mothusi how the table design will change by bringing it into 2NF. Take the single table (FIGURE 5.1) and split it into three tables. All the original fields given in the table (FIGURE 5.1) must appear in your new design. You are allowed to add extra field(s) to accommodate the normalisation process.
- Show the following as part of your design:
- The fields that make up the new tables. This must include all the fields from the original table as well as any extra field(s) that you will need to achieve 2NF.
 - Primary keys (PK)
 - Foreign key(s) (FK) (9)
- 5.1.3 You suggest to Mothusi that the design should include data validation:
- (a) Briefly explain to Mothusi what the purpose of data validation is. (2)
- (b) Write out the data validation that you would set for the following fields in the given table:
- (i) Rating (2)
- (ii) Price (the cheapest movie is R45) (1)
- 5.1.4 Getting data into the database and making sure that it is accurate is only the first step in making a database work. The real power of a database lies in how you get information out of it. To do this you need to know how to query the database. The best way to do this is to use SQL.
- (a) What does the acronym *SQL* stand for? (1)
- (b) Write out the SQL statements to get the following data from the table:
- All the films directed by Steven Spielberg sorted by title. (5)

5.2 Users who log onto a website to order movies need to create a profile which includes a user name and a password. You explain to Mothusi that he will need some programming done to make sure that users' passwords are sufficiently strong. If a password is not strong enough then the user must re-enter a new one.

The criteria for a sufficiently strong password are as follows:

- Minimum of 9 characters
- Must include a number
- May not include the user name

Write down an algorithm for testing if a password is strong or not.

NOTE: Use pseudocode and NOT programming code.

(11)

5.3 The website that is being used is a success and Mothusi has expanded his business to sell mp3 music and e-books as well as movies. He has decided the program that records the sales from the web-site should now be re-written to use OOP programming techniques. **ItemClass** is a class that records sales and looks as follows:

Fields	Methods
<ul style="list-style-type: none"> • itemCode • costPrice • title • fileName 	<ul style="list-style-type: none"> • setPrice (price) • setTitle (title) • update • getFileName • toString • getSalesPrice

5.3.1 Which of the methods is used to output information about the entire object?

(1)

5.3.2 How would you change the update method to make it receive values to put into the fields?

(2)

5.3.3 What (data) type of method would getFileName be?

(1)

5.3.4 Three other classes will be derived from this superclass, namely MovieClass, BookClass and MusicClass. The process of one class being derived from another is called *inheritance*.

Explain TWO advantages of inheritance by referring to the **ItemClass** example above.

(2)

5.3.5 Besides inheritance, OOP also allows programmers to use a technique called polymorphism. Briefly explain what *polymorphism* means.

(2)

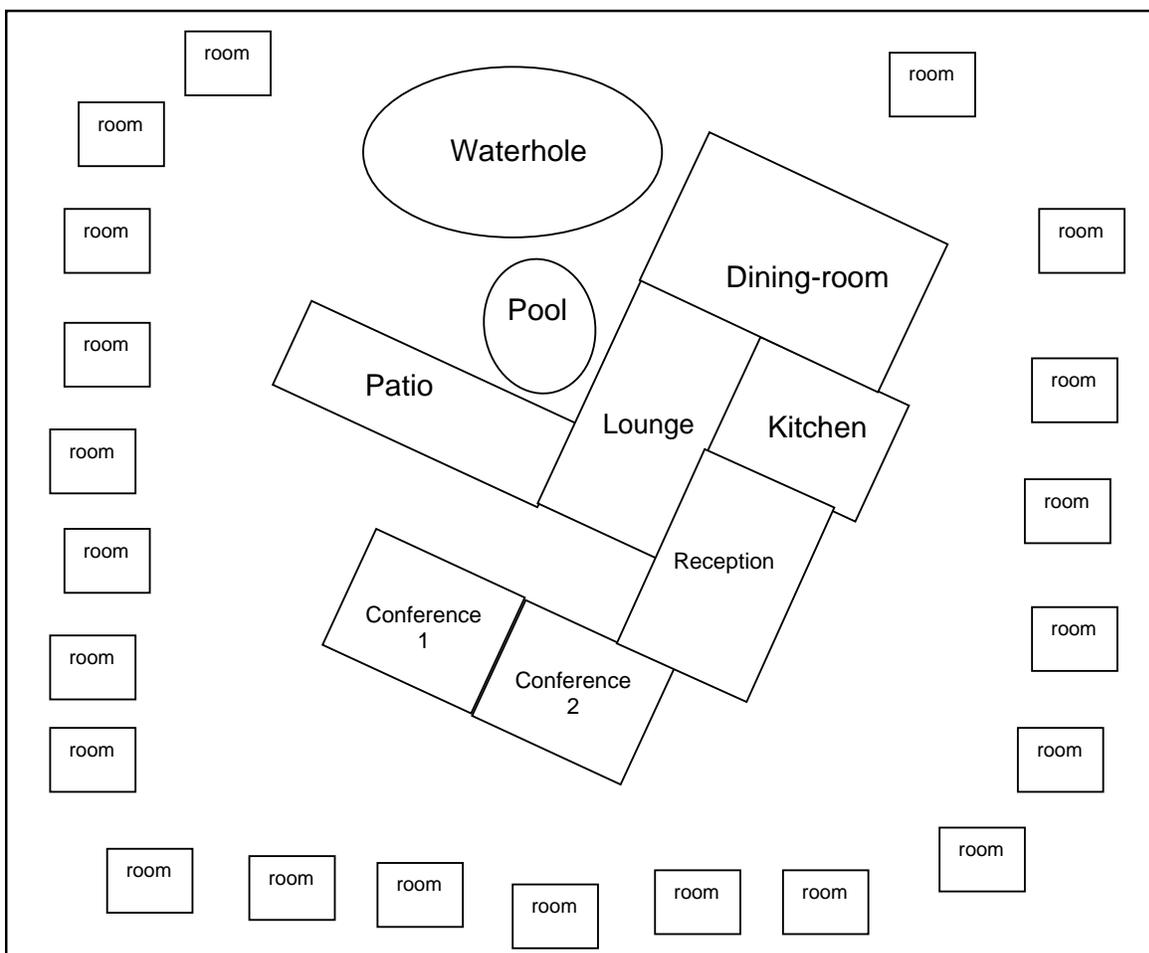
TOTAL SECTION D: 45

SECTION E: INTEGRATED SCENARIO

QUESTION 6

The Ba Tau BEE consortium has attracted foreign investment and has bought land next to the Pilanesberg National Park. They plan to construct a five-star game lodge with a difference; they plan to use ICT to manage the wildlife and the environment and to keep their guests happy and comfortable.

The lodge will consist of a central complex including a reception office, lounge, conference venue, curio shop, swimming-pool and dining area. There will be 21 individual two-sleeper units for the guests within a 100 m radius of the central complex (see the diagram below).



6.1 The following needs to be considered when planning the use of ICT:

6.1.1 The consortium needs to provide network connectivity to all 21 guest rooms.

(a) Keeping in mind that they must have as little effect on the environment as possible (that is, no poles or trenches), what is the only acceptable medium for them to use to provide network connectivity? (1)

(b) What equipment will they need in the computer room in the central complex to make access to this medium possible? (1)

6.1.2 Most of the guests will be business people who will want access to their e-mail and the internet. The computer room at the lodge will also have to contain the equipment necessary to connect the network to the internet. This equipment includes:

- A router
- A firewall
- A 3G data communication card

(a) What purpose does the router serve? (1)

(b) What would be the effect of removing the router? (1)

(c) Briefly explain how the firewall protects a computer. (2)

(d) What purpose does the 3G card serve? (1)

(e) Is the internet connection set up at the lodge a broadband connection or not? (Explain your answer.) (2)

(f) Besides the hardware, explain what else the consortium would have to do to enable the lodge to connect to the internet? (2)

6.2 Internet use can be frustratingly slow especially if you are accessing an international site that contains lots of graphic images.

A service provider can alleviate this slowness to some extent by running professionally designed caching software. The URLs of sites which are being visited by clients are monitored using the software to screen patterns of usage.

The software will then cache certain sites, predicting that future users will also visit the site.

6.2.1 Explain how caching operates to reduce the delay in accessing the same site on several occasions in a short period of time. (2)

6.2.2 Study the options given below. In each case state whether caching is suitable or not and give a reason.

(a) A site dedicated to the history of the Roman Empire which is being accessed by a number of classes in a high school (2)

(b) Sites providing current traffic updates (2)

6.3 As part of conservation management and to increase efficiency, the lodge will make sure that all guides and trackers are issued with a smartphone PDA. This device will include a GPS which will enable the guides to better track and record the wildlife.

6.3.1 (a) Name TWO characteristics of a smartphone PDA that make it different from a normal cellphone. (2)

(b) Why do you think that the consortium wants to use a smartphone PDA instead of a laptop, specifically in these circumstances where they will be used in the field? Name THREE advantages of this technology over laptop technology. (3)

(c) Name TWO possible operating systems that smartphones can use. (2)

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

(b) Every time a guide sees wildlife he/she is supposed to record the species and the amount spotted. For example, four buffalo. They then use the GPS to record the location accurately.

How will this make tracking and finding game more predictable over time? (2)

6.4

There are two waterholes near the lodge site. Both have viewing platforms and are lit up at night. Both waterholes offer good game viewing opportunities – especially in the dry season. The consortium decides that this is an asset that they can make use of for publicity and so they install high-quality webcams for 24-hour operation at both of the waterholes. They want the feed from these webcams to be available on the internet.

6.4.1 What is a *webcam* AND what does it do? (2)

6.4.2 In order to make the feed available on the internet the consortium will have to create a web presence for themselves. They will need the following:

- Web server software
- A domain name for registration purposes

(a) Give ONE example of web server software. (1)

(b) The domain name service makes navigating the internet easy for humans. Explain how it does this. (2)

(c) An (unacceptable) suggested domain name for the lodge is:

www.bataulodge.edu.nz

(i) Explain what the **.nz** in the name refers to and why this is unacceptable. (2)

(ii) What does the **.edu** in the domain name refer to? (1)

(iii) Give the more acceptable domain name by changing the last two parts of the suggested domain name. (1)

6.4.3 Now that the lodge has a web presence the consortium decides that they want visitors to be able to do direct bookings and payments through the internet. In order to keep these transactions secure they need to use SSL.

(a) Name TWO things to look at to make sure that you are visiting a web site that uses SSL for security. (2)

(b) SSL uses encryption in order to make sure that critical information like your credit card number cannot be intercepted and stolen. Briefly explain the concept of *encryption* and *decryption*. (5)

- 6.4.4 To keep the general public informed of activities the consortium asks the lodge manager and the chief ranger to keep a blog detailing the daily events and activities at the lodge. To keep people interested in the blogs, the consortium insists that the blogs be linked to RSS 'feeds'.
- (a) What is a *blog*? (2)
 - (b) How does a *blog* differ from a *Wiki*? (2)
 - (c) What does the acronym *RSS* stand for? (1)
 - (d) The lodge manager does not understand *RSS* and asks you to explain it to him. (2)
- TOTAL SECTION E: 50**
- GRAND TOTAL: 180**