# INFORMATION TECHNOLOGY

# GRADE 12

# PAPER 2 (THEORY)

# TRIAL EXAM

# 2013

**MARKS: 180 TIME: 3 HOURS**

**INSTRUCTIONS:**

1. ANSWER ALL QUESTIONS.
2. START EACH QUESTION ON A NEW PAGE.
3. WRITE NEATLY AND LEGIBLY.

**This exam paper consists of 16 pages**

**QUESTION ONE: MULTIPLE CHOICE QUESTIONS**

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 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

1.2 Fragmentation occurs when…

A you partition your hard drive

B the hard drive spins too fast and causes the computer to break into pieces

C files are broken up and scattered all over the screen and memory

D the file system cannot allocate enough contiguous space to store a file

* 1. Which one of the following is **NOT** an example of system of system software:

A Unix

B Windows Vista

C Office 2007

D DirectX

1.4 Which of the following refers to an encryption technology used to authenticate the identity of the sender of an e-mail message?

A Digital certificate

B Digital divide

C Digital signature

D Digital handshake

1.5 Android is the operation system used on a …

A LAN server

B Desktop computer

C Netbook

D Smartphone

* 1. Which of the following is **NOT** associated with green computing?

A Using Energy Star compliant hardware

B The ‘Paperless office’

C Using refillable toner cartridges

D Replacing computer equipment on a four-yearly basis

1.7 Which of the following would least likely affect a computer’s performance or

speed?

A Increasing the number of applications running

B Increasing the amount of RAM installed.

C Using a high quality graphics card with lots of memory

D Installing a DVD drive

1.8 Software that monitors each keystroke a user types on a specific computer's

keyboard is referred to as …

A Spyware

B Adware

C A key-logger

D A popup

1.9 … 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 Hyper-threading

D Swapping

1.10 Open-source software is...

A Free ONLY if you are a registered company

B Software for which the source code is freely available

C Free for a trial period

D Software that cannot be affected by a virus **[10]**

**SCENARIO**

When an international event like the Comrades Marathon takes place in Durban, large numbers of people attend the event.

The 2013 Comrades Marathon has taken place on the 2nd June 2103. The cut-off of 18 000 runners was reached long before the entry closing date of 30 November 2012. This ultra-marathon draws runners from all over South Africa as well as many international athletes. These athletes have to organise transport and accommodation for this “the ultimate ultra-marathon” event. Various communication technologies are used by athletes to stay in contact with family and friends.

The results centre makes use of computers that are networked to electronically capture the results and track each runner along the route. Afterwards each runner receives a message congratulating them and also confirming their finishing time on their cell phone.

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| --- | --- | --- | --- |
| **SECTION B: HARDWARE AND SOFTWARE** | | | |
| **QUESTION TWO: HARDWARE AND SOFTWARE** | | | |
|  | The manager of the Results Centre complained that the computers they used were very slow and should be replaced or upgraded. Study the specifications of the old computers below and then answer the questions that follow: |  |  |
|  | |  | | --- | | Intel Celeron 1.66Ghz G440 CPU  Description: http://www.pcint.co.za/images/pcint%20pic%209.jpg2GB DDR3 RAM  120GB HDD  Professional Chassis + 350W PSU  24x DVD Writer +/-  Onboard Sound & VGA + LAN  18.5" LCD Wide Monitor  Keyboard + Optical Mouse  Windows XP | |  |  |
|  |  |  |  |
| 2.1. | The operating system needs to be upgraded from Windows XP to  Windows 7. |  |  |
|  | (a) List **THREE** functions of the operating system. | (3) |  |
|  | (b) What is the minimum amount of memory required for the new operating system? | (1) |  |
| 2.2 | The computers in the centre are going to be used to store huge amounts of pictures and videos as well as all the details of the 18 000 runners. This information needs to be protected. RAID is one of the technologies that can be used to solve this problem. |  |  |
| 2.2.1 | What does the acronym RAID stand for? | (1) |  |
| 2.2.2 | Briefly explain the concept of RAID. | (3) |  |
| 2.2.3 | What level of RAID would be the best option in this scenario?  Motivate your answer by describing how it works. | (3) |  |
| 2.3 | Several other factors will influence the general performance of the computers.  Briefly explain how each of the following technologies can improve the performance of the processor: |  |  |
|  | (a) Multi-core processing | (2) |  |
|  | (b) Pipeline processing | (4) |  |
|  | (c) RISC | (2) |  |
| 2.4 | The computer monitors in the centre were upgraded the previous year from 17” CRT monitors to 21" LCD flat-screen monitors.  Give **THREE** reasons why this upgrade was advantageous. | (3) |  |
| 2.5 | Laptops will be added to the centre this year. Below are the specifications of the laptops management intends buying: |  |  |
|  | * Dual Core Processor 1.73 GHz * 1MB L2 Cache 533 MHz FSB * 1024 MB DDR2-667 DIMMs (2x512) * DVD/RW Multi Drive optical drive * 200 GB SATA Hard drive * 13.3” WXGA TFL LCD display * 10/100 Ethernet LAN * 56K Modem * 802.11b/g * Integrated camera * Bluetooth * Vista Business |  |  |
|  |  |  |  |
| 2.5.1 | Name **TWO** hardware components included with the laptop computer that will allow it to connect to the internet. | (2) |  |
| 2.5.2 | Reference is made to the Front Side Bus (FSB) in the specifications. |  |  |
|  | (a) What is the function of the FSB? | (2) |  |
|  | (b) What is the difference between the FSB and the external bus? | (2) |  |
| 2.5.3 | The computers in the result centre are networked with cables. The laptops are going to be added to the network using **wireless technology**. |  |  |
|  | (a) State **TWO** advantages of this approach. | (2) |  |
|  | (b) Given the wireless technologies Bluetooth and Wi-Fi, which ***ONE*** would you use to set up the network and what would the other be used for? | (2) |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2.6 | Fibre optic cables have been used for the network in the centre. |  | |  |
| 2.6.1 | Justify the choice of fibre optic cables by listing **TWO** advantages of these cables. | (2) | |  |
| 2.6.2 | Give **TWO** reasons why the organisers have decided to network the computers. | (2) | |  |
| 2.6.3 | What is a network topology? | (2) | |  |
| 2.6.4 | What type of topology do you think they are using in this scenario? | (1) | |  |
| 2.7 | After the operating system was upgraded, the external hard drives with all the details of the runners did not work anymore. |  | |  |
| 2.7.1 | Provide an explanation as to why this is happening. | (2) | |  |
| 2.7.2 | The manager says that a USB-port is hot-swappable and supports plug and play. Explain what each of these terms means. | (4) | |  |
|  |  | **[45]** | |  |
|  |  |  | |  |
| **SECTION C: APPLICATIONS AND IMPLICATIONS** | | | | |
| **QUESTION THREE: e-COMMUNICATIONS** | | | | |
| The Comrades Marathon Association (CMA) provides and makes use of various communications facilities such as Skype, IM, e-mail and an official website to communicate and allow runners to contact family and friends. | | | | |
| 3.1 | Due to the fact that some of the members and runners are from other towns and countries, they use Skype to contact loved ones at home. | |  |  |
| 3.1.1 | What type of software is Skype? | | (2) |  |
| 3.1.2 | Skype allows for video-calling. Explain video-calling. | | (2) |  |
| 3.1.3 | Which communication protocol is used when video-calling? | | (1) |  |
| 3.2 | Give **THREE** clear differences between IM (instant messaging) and e-mail. | | (3) |  |
| 3.3 | The CMA would like an alternative website with a .mobi domain. | |  |  |
| 3.3.1 | What does the domain .mobi represent? | | (2) |  |
| 3.3.2 | Name **ONE** significant advantage of a .mobi website. | | (1) |  |
| 3.4 | A number of categories of internet-based criminals have emerged in recent years. | |  |  |
| 3.4.1 | What is a *hacker* and what is his/her objective | | (2) |  |
| 3.4.2 | Using an example, explain the purpose of *phishing*. | | (2) |  |

**[15]**

**QUESTION FOUR: SOCIAL AND ETHICALISSUES**

During the race event, many television viewers will be watching the live broadcast of the comrades. Behind the scenes newsrooms and television stations make use of computers to manage the live feeds that come in from the race.

4.1 The media office for the event have installed biometric devices to control

access to the live feed rooms during this event:

4.1.1 What are biometric devices and briefly describe how they function? (2)

4.1.2 Give **TWO** examples of biometric devices that could be used (2)

4.2 The journalists covering this event will spend many hours using the computer. One of the health risks that they could face is CVS.

4.2.1 What is CVS ? (1)

4.2.2 State **TWO** ways in which we could alleviate CVS (2)

4.2.1 Mention **TWO** other health risks they could face (2)

4.3 These days, many people can also be kept abreast about the developments on the race via social networks, such as ***facebook*** and ***twitter.***

4.3.1 What is a social network? (1)

4.3.2 Apart from the obvious advantages of social networks, there are also

threats and disadvantages.

State and discuss any **TWO** disadvantages of social networks. (2)

4.4 Mr Pule, one of the journalists involved in the coverage of this event, is a strong environmentalist and believes in the principles of green computing.

4.4.1 Briefly define green computing? (2)

4.4.2 State **TWO** ways we can encourage green computing at school (2)

4.5 An event of this magnitude that uses the latest technologies can produced

quite a lot of e-waste:

4.5.1 Define the term e-waste (2)

4.5.2 Name TWO ways in which the CMA can prevent or minimise e-waste. (2)

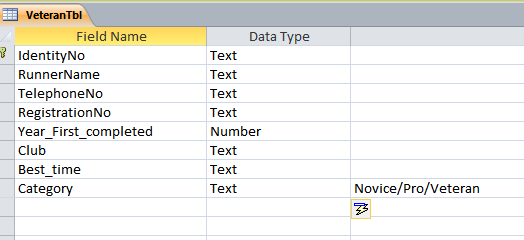
**[20]**

|  |
| --- |
| **SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT** |
| **QUESTION FIVE: ALGORITHMS AND PLANNING** |

The organisers of the Comrades Marathon wish to create a software program to control the registration process of runners for the marathon.

5.1 As part of the software, a database of runner’s details needs to be created. The aim of the database is to keep track of a runners’ performance over the years.

The following database structure has been proposed:



5.1.1 Suggest an alternative field that could be used as a primary key field .

Give a reason for your answer. (2)

5.1.2 One of the above fields in the database has been assigned an incorrect

data type. Identify the field and suggest a more appropriate data type. (2)

5.1.3 Both the *I****dentityNo*** and ***TelephoneNo*** fields are declared as text fields.

Why this is the case? (2)

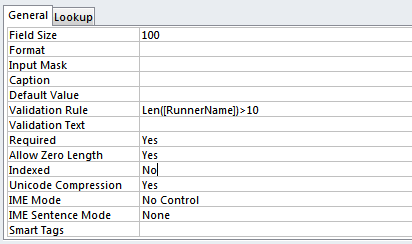
5.1.4 State any **TWO** features of a database that could be used to minimise data

capture errors. (2)

5.1.5 What feature / component would you suggest be used to capture the data

for the ***category*** field ? (1)

5.1.6 The general properties of the ***RunnerName*** field are shown below:



5.1.6.1 Explain what it means to specify a field size of 100 for this field (1)

5.1.2.2 Comment on the suitability of the validation rule for this field. (1)

5.1.2.3 What is the purpose of the ***Required***property (1)

5.2 In order to eliminate redundancy and increase accuracy of the data, the

database should be normalised, otherwise anomalies could occur.

5.2.1 Explain what is meant by the underlined phrase. (2)

5.2.2 State **THREE** types of anomalies that could occur in a database (3)

5.2.3 State any **TWO** steps that need to be followed to bring a table into 1NF (2)

5.3 Software should be free of errors. Therefore, debugging is an essential part

of the development of software.

* + 1. State **TWO** methods of debugging a program. (2)
    2. Classify **EACH** of the following errors as either a syntax error or a logical:
       1. The data type of a variable has not been declared.
       2. The time that an individual has spent on the road has been calculated using data from a data file, but the calculation is incorrect.

5.3.2.3 The data has been sorted according to the time the runners have crossed

the finish-line . The unsorted list is displayed instead of the sorted list.

(3)

5.4 The novice software developer has created an algorithm to determine the

average and the quickest finishing time for a particular runner.

1. **Begin**
2. **numRaces🡨 input from user**
3. **sum🡨 0**
4. **repeat (numRaces) times**
5. **begin loop**
6. **time 🡨 input from user**
7. **sum🡨……**
8. **if (time > quick) then**
9. **quick 🡨 time**
10. **end loop**
11. **average🡨…..**
12. **display average**
13. **display quick**
14. **End**

5.4.1 Complete line 7 of the algorithm (2)

5.4.2 Complete line 11 of the algorithm (2)

5.4.3 You notice that the variable ***quick*** has not been initialised.

1. Explain to the programmer why it is necessary to initialise this variable (2)
2. State the actual initialisation for the variable ***quick*** and the line number where it should be inserted. (2)
   * 1. Identify the line number and discuss the logical error in the algorithm. (2)

5.5 Object- Oriented programming and its principles will be applied in the design

of the software. Indicate whether the following statements are **TRUE** or **FALSE**:

5.5.1 Private data fields can be used outside the class in which it is declared.

5.5.2 Mutator methods must have parameters.

5.5.3 An accessor method is known as a get method.

5.5.4 A variable declared in a method cannot be accessed from another

method.

5.5.5 A method that returns a Boolean value can only be called in an 'IF'

statement. (5)

5.6 The following class diagram has been designed to represent an athlete object. Study the class diagram below and answer the questions that follow:

|  |  |
| --- | --- |
| Athlete |  |
| - regNo  - athleteName  - bestTime | Private attributes |
| + Constructor()  + Constructor(regNo)  + Constructor(regNo, athleteName, bestTime)  + getRegNo() : String  + getName() : String  + getTime() : int  + setTime(time)  + setName(name)  + toString() : String | Public Methods |

5.6.1 Identify from the class above the following:

a) an instance variable

b) an accessor method

c) a mutator method (3)

5.6.2 Explain the need for an accessor method in the class. (2)

5.6.3 What is the purpose of the *toString()* method ? (1)

5.6.4 Explain using examples from the above class, the concept of

*overloading* (2)

**[47]**

**SECTION E:** **INTEGRATED SCENARIO**

**QUESTION SIX**

|  |
| --- |
| For Comrades 2014 to be the biggest success ever, old veterans like Bruce Fordyce,  Frith van der Merwe, Sam Tshabalala and a team of employees have embarked on a campaign to get more participants for next year. Their initial idea is to setup a website focusing on:   1. Information about comrades(dates/times/videos/etc) 2. Online Registration forms/guidelines 3. Training programs(exercise/diets/etc)   You and other Information Technology students from various schools have been invited to assist with this campaign, especially the website design /management. |

6.1 The designers of the website want to use pop-ups on the website. Bruce

approached you with the following questions of concern to him.

6.1.1 What is a *pop-up*? (2)

6.1.2 Most web-browsers block pop-ups by default. Explain why most web

browsers do this. (2)

6.1.3 Motivate why you recommend that the website contain pop-ups. (2)

6.2 The committee want to offer online registration for participants as well as an option for them to download the entry form in PDF format.

6.2.1 Explain what a PDF document is and why it is so commonly used. (2)

6.2.2 Would you require special software to access the PDF entry form? (1)

6.3 Bruce Fordyce wants you to help setup his own blog on the official Comrades 2014 website.

6.3.1 What is the difference between a blog and a wiki? (2)

6.3.2 Give **TWO** examples of the type of information Bruce can upload onto his

blog to promote/help in Comrades 2014. (2)

6.3.3 Would you also recommend that a wiki be setup on the website?

Motivate your answer. (2)

6.4 The policy at the office where the committee is based is *“Up-to-date anti-virus*

*Programs should be running on all computers”*

6.4.1 What is a virus? (2)

6.4.2 What is anti-virus software and how is anti-virus software

up-dated? (2)

6.4.3 Does a stand-alone computer need anti-virus software? Justify your answer.

(3)

6.5 Read the following snippet from a BBC News report:

|  |
| --- |
| **BBC News**  Sections  Hacker 'shouts abuse' via baby monitoring camera  14 August 2013 Last updated at 12:41 BST  C:\Users\sheldon\Pictures\_69277925_69277924.jpgA family in Houston in the US apparently had their child's baby monitor camera hacked, after insulting phrases emanated from the unit.  Marc Gilbert heard expletives being directed at his two-year-old daughter Allyson, before he disconnected the camera.  Mr Gilbert said that the invasion felt like "someone broke into our house", but because his daughter is deaf, she was oblivious to the intrusion.  C:\Users\sheldon\Pictures\images(7).jpgCourtesy BBC |

According to various news reports it has been concluded that this hacking took place via the WiFi connection. Computer crimes, hacking, etc has been on the increase.

The committee and other employees of the Comrades 2014 campaign need to be aware of safety and security issues when using the Internet.

Answer the following questions based on the above.

6.5.1 Explain what the following terms mean:

6.5.1.1 Cyber terrorist (2)

6.5.1.2 Ward-driver (2)

6.5.1.3 Script kiddie (2)

6.5.2 Give **TWO** suggestions to the committee on how to take

precautions against hacking and unauthorized access into the website and

other confidential files. (2)

6.5.3 ***Honeypots*** help to secure any company's network and can be useful for this

campaign. Explain how this is accomplished. (2)

6.6 The Committee require technology that they can use for communication that is mobile. The iPhone, Sony Xperia, Samsung Galaxy S4 are some of the

latest smartphones available currently.

State **THREE** features of a Smartphone (*exclude mobility mentioned above*). (3)

6.7 You want to visit other websites for ideas on how to improve the new

Comrades 2014 website.

List **TWO** features of a secure website. (2)

6.8 During the race the runners wear RFID tags on their running shoes.

6.8.1 What does RFID stand for? (2)

6.8.2 Name TWO specific features of RFID. (2)

6.8.3 Give another TWO applications of RFID technology. (2)

**[43]**

**TOTAL = 180**