



# basic education

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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**EXEMPLAR 2014**

**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 16 pages.**

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of SIX sections:

SECTION A:	Multiple-choice questions	(10)
SECTION B:	System Technologies	(25)
SECTION C:	Communications Technologies and Network Technologies	(28)
SECTION D:	Data and Information Management	(23)
SECTION E:	Solution Development	(24)
SECTION F:	Integrated Scenario	(40)

2. Read ALL the questions carefully.
3. Answer ALL the questions.
4. The mark allocation generally gives an indication of the number of facts/reasons required.
5. Number the answers correctly according to the numbering system used in this question paper.
6. 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.

- 1.1 ... is NOT an example of primary memory.
- A SRAM
  - B DRAM
  - C DDR
  - D SSD
- (1)
- 1.2 A technique used to intercept data without permission as it travels between devices through communication media is called ...
- A routing.
  - B keylogging.
  - C packet sniffing.
  - D phishing.
- (1)
- 1.3 Multitasking is a technique ...
- A used in 64-bit processors.
  - B that needs more than one processor or multi-core processor.
  - C that allows different programs to be opened simultaneously by sharing processing time.
  - D that allows one processor to act as two virtual processors that can be used separately by the operating system.
- (1)
- 1.4 A protocol that is commonly used to transfer files via peer-to-peer networks over the Internet:
- A FTP
  - B SMTP
  - C BitTorrent
  - D HTTP
- (1)
- 1.5 Database management software incorporates a feature known as record locking. The purpose of this feature is to ...
- A ensure that no user can make changes to the table structure of the database without the correct permissions.
  - B ensure that only the administrator can access all data and that ordinary users can only access data for which they have pre-defined rights.
  - C prevent simultaneous access to data in the database, which could result in inconsistent changes to the data.
  - D allow each record to have a primary key, thereby allowing the record to be locked.
- (1)

- 1.6 The maximum rate at which data can be transmitted over an electronic communication medium is known as ...
- A bandwidth.
  - B frequency.
  - C megabits.
  - D attenuation.
- (1)
- 1.7 A ... can be used to show the logical flow of events to solve a problem.
- A trace table
  - B flowchart
  - C relationship diagram
  - D use case diagram
- (1)
- 1.8 Which ONE of the following is NOT a reason for using a network?
- A Fast, efficient communication
  - B Dissipation of data
  - C Sharing of hardware resources
  - D Playing online games
- (1)
- 1.9 Which ONE of the following statements related to object-oriented programming is TRUE?
- A A class must have more than one constructor.
  - B An object is an instantiation of a class.
  - C A method must always return a value.
  - D A class must always include accessor methods and mutator methods for each of its attributes.
- (1)
- 1.10 Which ONE of the following advantages is NOT offered by a UPS?
- A It allows the computer to be used universally from any type of power supply.
  - B When the power fails, it allows the system to be shut down normally in order to prevent damage from an irregular shutdown.
  - C It protects the computer against power fluctuations in an electrical storm.
  - D It smooths power dips and spikes in the electrical supply that may damage the computer.
- (1)

**TOTAL SECTION A: 10**

**SECTION B: SYSTEM TECHNOLOGIES****QUESTION 2**

- 2.1 One of the most important components in a computer is the motherboard.
- 2.1.1 State TWO functions of a motherboard. (2)
- 2.1.2 What is the term used to describe a communication channel on a motherboard? (1)
- 2.1.3 Modern motherboards contain on-board components such as a network controller or graphics card. What is meant by *on-board*? (1)
- 2.1.4 What is the purpose of the chipset on the motherboard? (1)
- 2.2 ROM chips are found on motherboards which store firmware.
- 2.2.1 What is *firmware*? (1)
- 2.2.2 Firmware updates are occasionally released for motherboards. Why is this necessary? (1)
- 2.3 Virtualisation is becoming more common as a result of more powerful computer hardware.
- 2.3.1 Explain the concept of *virtualisation* in a computer system environment. (2)
- 2.3.2 State TWO advantages of using virtualisation on your computer system. (2)
- 2.4 Pipeline technology is a modern technique to increase the efficiency of a processor.
- 2.4.1 Describe how an instruction pipeline in a CPU increases the efficiency of the CPU. (2)
- 2.4.2 What powerful processing technique is made possible by creating another 'virtual' instruction pipeline on the same CPU? (1)
- 2.5 Software as a Service (SaaS) is when software and its associated data are hosted in the cloud which can then be accessed by users via a web browser.
- 2.5.1 State ONE advantage of SaaS. (1)
- 2.5.2 Give ONE example of SaaS. (1)

- 2.6 Some USB devices can be plugged into a computer for the first time and used immediately without the need for user intervention.
- 2.6.1 What is this feature called? (1)
- 2.6.2 What makes this feature possible? (2)
- 2.7 Mobile computing devices such as smartphones and tablets have become very popular because of their portability, but they also have their limitations.
- 2.7.1 State TWO limitations of these mobile devices versus traditional computers such as laptops and desktops. (2)
- 2.7.2 For the following two scenarios, indicate which device you would recommend to be used: a mobile device or a conventional computer.
- In each case, give a reason for your choice.
- (a) A factory worker is checking stock in a warehouse. (2)
- (b) A financial manager is working out budgets in a spreadsheet. (2)

**TOTAL SECTION B: 25**

**SECTION C: COMMUNICATION TECHNOLOGIES AND NETWORK TECHNOLOGIES****QUESTION 3**


- 3.1 The star topology is a popular choice for business networks.
- 3.1.1 State TWO benefits of making use of a computer network. (2)
  - 3.1.2 Give TWO reasons why the star topology is a popular choice. (2)
  - 3.1.3 Name ONE other topology besides the star topology. (1)
- 3.2 ADSL routers are a popular way for home and small business users to connect to the Internet.
- 3.2.1 A user cannot connect to the Internet with only the ADSL router. Name ONE other requirement. (1)
  - 3.2.2 State TWO advantages of using a fixed line connection such as ADSL instead of a mobile connection. (2)
- 3.3 Using mobile technology to connect is becoming the most common way of accessing networks and the Internet.
- 3.3.1 Explain what the biggest problem is that is experienced when many users share a Wi-Fi connection in a LAN. (2)
  - 3.3.2 Which technology, similar to Wi-Fi, is used to commercially supply high-speed wireless Internet access in metropolitan areas? (1)
  - 3.3.3 Discuss how the availability of mobile Internet impacts on society's social interaction. (2)
- 3.4 Name the protocol that is used for each of the following:
- 3.4.1 E-mail (1)
  - 3.4.2 Web browsing (1)
- 3.5 Explain how GPS technology/tracking is changing the way in which social networking is being done, as well as the way in which we interact with our environment and the people around us. (3)
- 3.6 A VPN allows employees of an organisation to connect securely to the internal network through the Internet.
- 3.6.1 Give TWO reasons why an employee may need to connect to the internal network while physically not at the place of work. (2)
  - 3.6.2 Name ONE other method of obtaining remote access to the network, besides using a VPN. (1)


- 3.7 VoIP is an inexpensive option compared to traditional telephone communication.
- 3.7.1 Write out the acronym *VoIP*. (1)
- 3.7.2 Why is VoIP more cost-effective than traditional telephone communication? (1)
- 3.8 Secure websites make use of SSL encryption to protect information transfer/communication.
- 3.8.1 State TWO ways in which a user can tell if a website is secure. (2)
- 3.8.2 Explain how the public key and private key are used to securely transmit the session key from the user's browser to the secure website. (3)
- TOTAL SECTION C: 28**



**SECTION D: DATA AND INFORMATION MANAGEMENT****QUESTION 4**

- 4.1 Data validation is used to help ensure the correctness of data in a database.
- 4.1.1 Describe the difference between *data validity* and *data integrity*. (2)
- 4.1.2 Give an example of a data validation rule. (1)
- 4.2 Data mining has become more popular in organisations because of the decreasing cost of computing hardware.
- 4.2.1 State TWO ways in which data mining can benefit an organisation or a business. (2)
- 4.2.2 State ONE way in which the hardware of a computer server used for data mining will differ from the hardware of a print server. (1)
- 4.3 The tables below are used for a school shop program. Study the tables and answer the questions that follow.

tblParents	
Key	FieldName
	ParentID
	FirstName
	Surname
	DateOfBirth

tblOrders	
Key	FieldName
	OrderID
	OrderDate
	Product
	Cost
	ParentID

- 4.3.1 The *ParentID* and *OrderID* fields are primary keys.
- What is the purpose of a primary key? (2)
- 4.3.2 Name the foreign-key field that exists in one of the tables. State in which table the key exists. (1)
- 4.3.3 Explain how you could retrieve the orders for a specific parent using the **tblParents** and **tblOrders** tables. Do NOT write any code; only explain how you can achieve this. (2)

## 4.3.4 Write SQL code for the questions below.

- (a) Name the function that can be used in an SQL statement to determine the smallest *Cost* value in the **tblOrders** table. (1)
- (b) Write an SQL statement to show the content of the *FirstName* and *Surname* fields from the **tblParents** table. (3)
- (c) Write an SQL statement to determine the total number of orders. (3)
- (d) Write an SQL statement to add a record for a parent in the **tblParents** table using only the following information:  
  
    FirstName: John  
    Surname: Smith  
    DateOfBirth: 20/10/1975 (5)

**TOTAL SECTION D: 23**

**SECTION E: SOLUTION DEVELOPMENT****QUESTION 5**

- 5.1 The clarity of the graphical user interface (GUI) of a program is essential to ensure that the user can interface efficiently with the program.
- 5.1.1 Briefly describe TWO ways in which you can ensure that your design meets the requirements for an unambiguous, comprehensive GUI. (2)
- 5.1.2 Error messages form an important part of software.
- State TWO properties of good error messages. (2)
- 5.1.3 Software testing is essential to ensure a quality final product.
- Name TWO categories of test data that should be used in order to test software thoroughly. (2)
- 5.2 Object-oriented programming (OOP) is an important software development paradigm.
- 5.2.1 Briefly describe ONE major advantage of using OOP in programming. (1)
- 5.2.2 Within the context of OOP, briefly describe the concept of *encapsulation*. (2)
- 5.3 The algorithm below is used to calculate two to the power of four ( $2^4$ ).

Line	
1	Base $\leftarrow$ 2
2	Power $\leftarrow$ 4
3	Product $\leftarrow$ Base
4	Counter $\leftarrow$ 1
5	While Counter < Power
6	Product = Product * Base
7	Counter = Counter + 1
8	Display Product

Create a trace table in your ANSWER BOOK to display the values of the **Product** and **Counter** variables through each step of the algorithm. (3)

- 5.4 A software developer has created a **Vote** class to be used in a TV game show programme.

The class diagram below will be used to store information of an audience member's vote. Study the class diagram and answer the questions that follow.

VOTE	
<ul style="list-style-type: none"> <li>– IDNumber</li> <li>– Name</li> <li>– CandidateVotedFor</li> <li>– TimeOfVote</li> </ul>	Private attributes
<ul style="list-style-type: none"> <li>+ Constructor(IDNumber)</li> <li>+ getIDNumber():string</li> <li>+ getName():string</li> <li>+ setCandidateVotedFor(Candidate)</li> <li>+ setTimeOfVote(Time)</li> <li>+ toString():string</li> </ul>	Public methods

- 5.4.1 What is the general term used for the **Time** value that is between brackets after the **setTimeOfVote** method name? (1)
- 5.4.2 What is the purpose of the **toString** method? (2)
- 5.4.3 What is the constructor method provided in the class used for? (2)
- 5.4.4 Explain why the attributes are declared as private. (2)

- 5.5 An algorithm has been designed to calculate weekly wages of workers based on their worker code and the number of hours worked.

The worker code consists of four characters that are determined as follows:

- 1<sup>st</sup> character: Either P for a permanent worker or T for a temporary worker
- 2<sup>nd</sup> character: The number of years that the worker has worked
- 3<sup>rd</sup> character: The first name initial of the worker
- 4<sup>th</sup> character: The surname initial of the worker

The wage is calculated as follows:

- A permanent worker receives R40 per hour, while a temporary worker receives R30 per hour.
- In addition, 2% is added to the total wage for each year that the worker has worked.

Line	
1	Wage $\leftarrow$ 0
2	WorkerCode $\leftarrow$ "P5SM"
3	HoursWorked $\leftarrow$ input the number of hours worked
4	If WorkerCode First Character = P
5	Missing code
6	Missing code
7	Missing code
8	For LoopCount = 0 To WorkerCode Second Character
9	Wage = Wage * 2/100
10	Display Wage

- 5.5.1 Complete the missing parts in the IF statement, so that it will correctly calculate the basic wage for each type of worker. (3)
- 5.5.2 There is a logical error in the remainder of the algorithm. State the line number where the error occurs and rewrite the statement correctly. (2)

**TOTAL SECTION E: 24**

**SECTION F: INTEGRATED SCENARIO****QUESTION 6**

A debating competition is run to determine the best school debating team in South Africa. Provincial centres have run competitions to determine the best teams in each province. These centres are all networked so that information from each centre can be managed. The general public can also view the results for the competition online. There is a variety of social media that is used to promote the competition.

6.1 A server with the following specifications was purchased for the competition:

Intel Xeon 3.8 GHz Processor  
2 GB DDR3 Memory  
2 x 300 GB HDD  
RAID Controller

6.1.1 From the supplied list of specifications, identify the component that will have the most limiting effect on the performance of the system AND briefly explain why it would be limiting. (2)

6.1.2 The server will make use of a RAID configuration. RAID 1 or RAID 5 is being considered.

(a) Explain the difference between *RAID 1* and *RAID 5* in terms of the way it handles the data. (2)

(b) Which RAID configuration would you recommend? (1)

(c) Give a reason for your answer to QUESTION 6.1.2(b). (1)

6.1.3 The hard drive of the server is partitioned.

(a) Explain what is meant when a hard drive is *partitioned*. (2)

(b) State ONE advantage of a partitioned hard drive. (1)

6.1.4 The server's processor makes use of caching to speed up its efficiency.

(a) Explain how caching increases the processing speed of the processor. (2)

(b) Caching is also used to improve the speed of Internet browsing. Explain how this is achieved. (2)

6.2 The network for the competition is currently a peer-to-peer network. It has been decided that the network should be changed to a client-server network.

State TWO benefits of changing to a client-server network. (2)

- 6.3 The organisers are receiving a large amount of spam e-mail and have also discovered malware on their computers.
- 6.3.1 What is *spam e-mail*? (1)
- 6.3.2 Suggest TWO ways in which the organisers can prevent spam e-mail. (2)
- 6.3.3 The malware on an organiser's computer has been described as spyware. What is *spyware*? (2)
- 6.3.4 State TWO ways in which the computers could have been infected by malware. (2)
- 6.4 The organisers are considering using Google Hangout for online discussions about contenders of the competition. Google Hangout provides a virtual room where video conferencing can be used and where any type of media can be shared.
- 6.4.1 State ONE advantage of using Google Hangout for online discussions. (1)
- 6.4.2 Some organisers will use 3G to connect to Google Hangout. Explain why this is not a good idea. (2)
- 6.5 The competition's social media manager has said there is a troll posting messages on the official Facebook page of the competition.
- 6.5.1 What is meant by a *troll*? (1)
- 6.5.2 Recommend TWO ways in which the social media manager can maintain a good profile of the competition online through social media. (2)
- 6.6 The competition organisers have a Bring Your Own Device (BYOD) policy for staff so that they do not need to provide a computer or device for every staff member in order to save money.
- 6.6.1 How can this policy affect data security? (2)
- 6.6.2 Recommend TWO ways in which the BYOD policy can be made to work effectively. (2)
- 6.7 It was discovered that an SQL injection was used to obtain user details from the database of the competition through the website.
- 6.7.1 What is an *SQL injection*? (1)
- 6.7.2 Explain how the website and database can be protected from an SQL injection. (2)

6.8 The organisers of the competition have encouraged participants through the website to do in-depth research of the topics, using the Internet.

6.8.1 What is the most common problem when any person starts looking for information on the Internet? (Not validity) (1)

6.8.2 State TWO practical ways in which the participants can check the validity of the information that they find on the web. (2)

6.8.3 Briefly discuss a negative influence that the exposure to global political and social viewpoints may have on the participants and the product that they deliver. (2)

**TOTAL SECTION F: 40**  
**GRAND TOTAL: 150**