basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATION

INFORMATION TECHNOLOGY P2

2015

MARKS: 150

TIME: 3 hours

This question paper consists of 17 pages.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of SIX sections:

        SECTION A: Short questions   (10)
        SECTION B: System Technologies   (25)
        SECTION C: Communications Technologies and Network Technologies (25)
        SECTION D: Data and Information Management   (27)
        SECTION E: Solution Development   (24)
        SECTION F: Integrated Scenario   (39)

2.   Read ALL the questions carefully.

3.   Answer ALL the questions.

4.   Start EACH question on a NEW page.

5.   Number the answers correctly according to the numbering system used in this
         question paper.

6.   The mark allocation generally gives an indication of the number of facts
        required.

7.   Write neatly and legibly.

SECTION A: SHORT QUESTIONS

QUESTION 1: MATCHING ITEMS

Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A–N) next to the question number (1.1–1.10) in the ANSWER BOOK, for example 1.11 T.

COLUMN A		COLUMN B	
1.1	Keylogger	A	a location where wireless network connectivity is provided to the public and paying subscribers
1.2	WiMAX	B	processes and analyses large amounts of data to obtain useful information
1.3	World Wide Web (www)		
		C	spyware that monitors keystrokes to steal personal details and passwords that can be retrieved by a third party
1.4	Firmware		
1.5	A software plug-in	D	web application that gathers different web content from many online sources
1.6	Hotspot		
		E	networking technology that allows high-speed wireless connectivity over a range of 20–50 km
1.7	Registers		
1.8	Machine cycle	F	provides additional functionalities to existing software
1.9	Data mining		
		G	fetches, decodes and executes instructions
1.10	Interpreter		
		H	interlinked and interactive documents stored on computers all over the world which are accessed via the Internet
		I	translates entire source code into object code
		J	securely stores, manages and retrieves large amounts of data
		K	translates and executes each line of source code in succession
		L	allows a USB device to automatically be connected to the PC
		M	temporary storage area inside the CPU
		N	an embedded instruction set

(10 x 1)   (10)

TOTAL SECTION A: 10

SCENARIO

A new shopping mall was recently opened in your area. It was designed to give employees, tenants and the local community access to the latest communication technologies.

SECTION B: SYSTEM TECHNOLOGIES

QUESTION 2

The computer system in the offices of the management staff will be used for general administration and to keep track of the activities in the mall.

2.1   The manager uses a desktop computer in the office. The computer has a preloaded operating system.

      2.1.1   State TWO functions of an operating system.   (2)

      2.1.2   Why should the operating system be updated regularly?   (1)

      2.1.3   When applications contain lots of graphics, the program files are often too large to be stored in the physical RAM.

              Explain the method used by the operating system to free up space in the RAM.   (2)

      2.1.4   The computer has 8 GB of RAM, which was installed correctly and is in working order. The system properties showed the following statement for the RAM specification:

> Installed memory (RAM): 4.00 GB (3.87 GB) usable

              Give a possible reason why there is only 4 GB of RAM available.   (2)

      2.1.5   As part of an upgrade process, the manager requested a notebook computer.

              Suggest TWO reasons why a notebook computer would be more suitable than the desktop computer used presently.   (2)

      2.1.6   The manager also requested a smartwatch.

              Motivate why a smartwatch would be useful for the manager to have in performing his duties.   (1)

2.2   The manager tested a notebook computer with the following specifications in the local computer store:

- Intel® Core i5-4200U 2.6 GHz processor
- 8 GB RAM
- 500 GB SSD
- 15.6" touch screen
- Ethernet, Wi-Fi and Bluetooth connectivity
- Biometric access

2.2.1   What is the main difference between an *Ethernet* and a *Bluetooth connection*?   (1)

2.2.2   What is the size of the secondary storage in the notebook?   (1)

2.2.3   The notebook computer has a SSD.

(a)   Expand the acronym SSD.   (1)

(b)   State TWO advantages of a SSD.   (2)

2.2.4   Suggest ONE type of biometric input which would allow a user to access the notebook computer.   (1)

2.3   Study the screenshot of the Windows Task Manager below and answer the questions that follow.
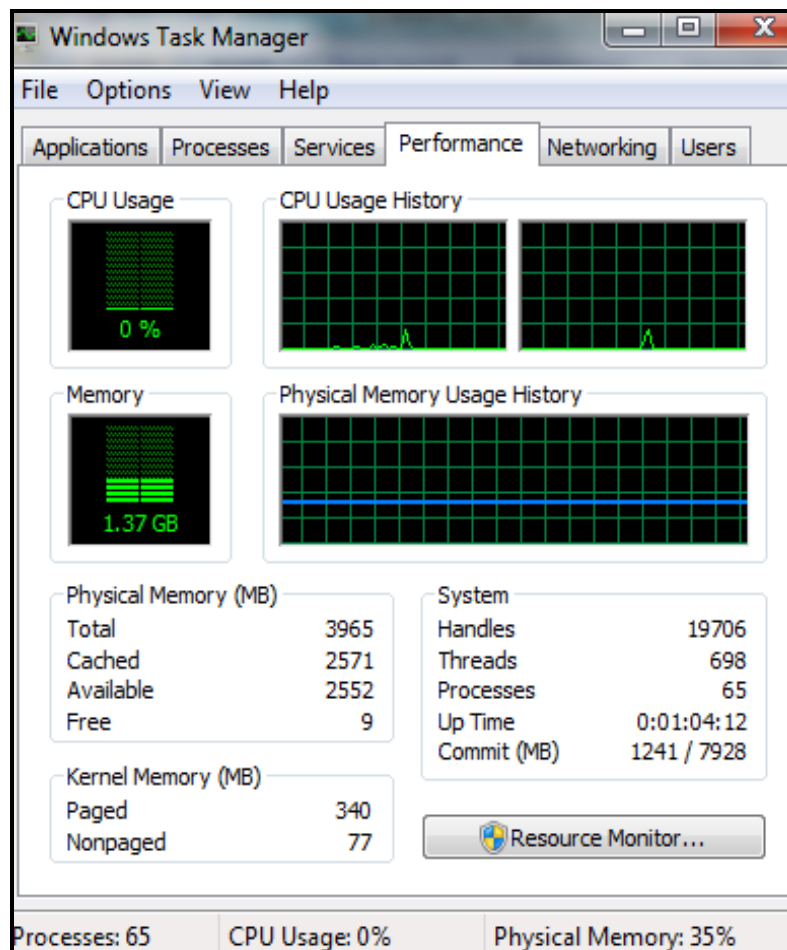
2.3.1   (a)   Use the information in the screenshot to motivate why it can be assumed that this system uses multithreading.   (1)

(b)   Briefly explain the term *multithreading*.   (2)

2.3.2   The task manager shows that 2 571 MB of the physical memory of the system is cached.

Explain the purpose of caching.   (2)

2.3.3   Briefly explain how a CPU can apply multithreading.   (1)

2.4   The manager enquires about making backups of his data.

2.4.1   It was suggested that he use an external hard drive to back up his personal data.

Name ONE type of port that will allow the external hard drive to connect to the notebook computer.   (1)

2.4.2   RAID technology is recommended as a protection method against hard drive failure.

Briefly explain how RAID technology works.   (2)

TOTAL SECTION B: 25

         Please turn over

SECTION C:　COMMUNICATIONS TECHNOLOGIES AND NETWORK TECHNOLOGIES

QUESTION 3

The computers in the administration offices in the mall are networked in a local area network (LAN), as shown in the diagram below.
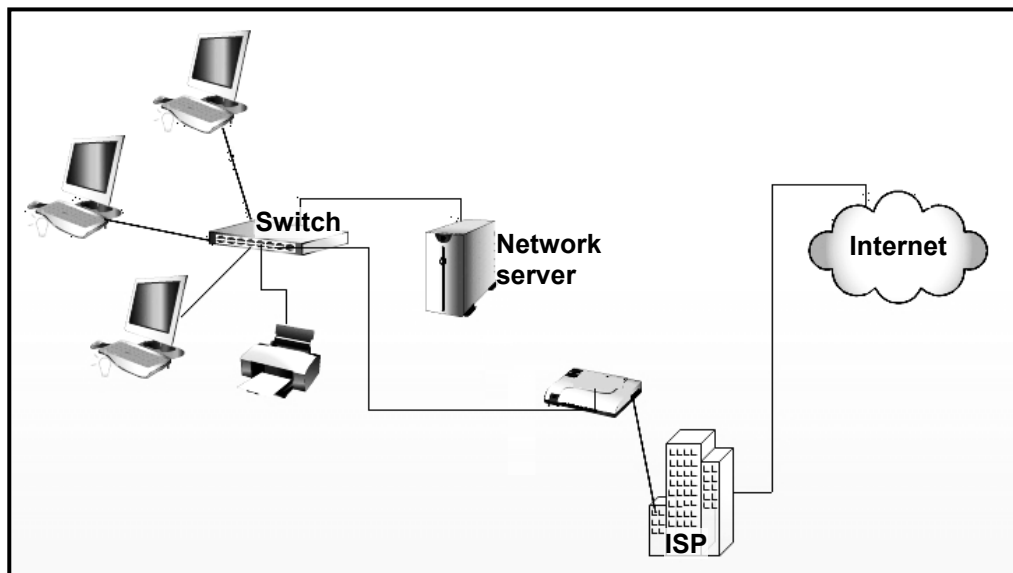
3.1　　3.1.1　State TWO advantages of using a wired LAN.　　　　　　　　　(2)

　　　　3.1.2　Unshielded twisted pair (UTP) cables have been used for the network.

　　　　　　　State TWO disadvantages of using UTP cables.　　　　　　　(2)

　　　　3.1.3　(a)　Name the network topology used in the LAN diagram above.　(1)

　　　　　　　(b)　State TWO advantages of using the topology mentioned in QUESTION 3.1.3(a).　　　　　　　　　　　　　　　　(2)

　　　　3.1.4　What is the function of a network server?　　　　　　　　　(1)

3.2　　Data travels along communication channels to the NIC (network interface controller).

　　　　3.2.1　What is the function of the NIC?　　　　　　　　　　　　(1)

　　　　3.2.2　Explain the role of a switch in a network.　　　　　　　　　(1)

3.3   The office computers are connected to the Internet using a broadband connection.

      3.3.1   Which device connects this network to the Internet? (1)

      3.3.2   Motivate why a broadband connection is a good choice for Internet access in the office. (2)

3.4   One of the responsibilities of the mall's network administrator is to do regular backups.

      3.4.1   Name TWO other duties of the network administrator. (2)

      3.4.2   An online backup service is being considered as a solution for backing up data.

            Explain the term *online backup service*. (2)

      3.4.3   State TWO advantages of using an online backup service. (2)

      3.4.4   Online storage services make use of encryption.

            Briefly explain what encryption entails. (2)

3.5   Permission must be granted to users to be able to access the network.

      3.5.1   All users are provided with a password to access the network.

            The passwords for all the users are generated using the initials of the user and his/her employee number, for example BT345.

            Critically comment on the generated passwords in terms of the requirements for strong passwords. (2)

      3.5.2   Differentiate between the rights granted to *standard users* and those generally granted to *administrators* on a network. (2)

TOTAL SECTION C: 25

SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

The management of the mall will make use of a database to store details of the tenants and their stores.

4.1   The table **tblStores** below contains data about the stores.

tblStores				
Store No.	**Store name**	**Store manager**	**Manager telephone number**	**Rent**
A1	A2Clothing	Ms B Smith	0601245223	R12 500
A2	A2Clothing	Ms B Smith	0601245223	R14 000
A4	Easy Foods	Mr P Mahlangu	0714256988	R10 700
C7	Fast Foods	Mr B Jutha	0744458970	R6 000
A3	Comfy shoes	Mr A Mabuza	0835642541	R7 800
A5	Quick Reads	Miss L Moodley	0835457544	R9 000

4.1.1   Give an example of an anomaly that could occur as a result of a poorly designed database table.   (1)

4.1.2   Use the above database table to explain how you would use normalisation to remove the redundant data.   (3)

4.2   Study the database tables below and answer the questions that follow.

The table **tblEmployees** below contains details about employees. **EmpID** represents a unique employee number. **DepID** represents a unique code for each department.

tblEmployees					
EmpID (PK)	**DepID (FK)**	**Surname**	**Name**	**Tel no.**	**Salary**
A023	T1	Tshabala	George	0251236542	R2 000
B124	S4	Naidoo	Jeethan	0415245215	R1 500

The table **tblDepartments** below contains contact details of the managers of the various departments.

tblDepartments		
DepID (PK)	**ManagerName**	**ExtensionNum**
T1	P Corn	452
S4	J Zwane	456
S5	NK Pillay	448
T6	T Botha	493

4.2.1 Write SQL statements for each of the following requests:

(a) Display the extension numbers and manager names of each department in numerical order according to the extension number. (3)

(b) T1 employees will receive a salary increase of 8,5%.

Display the names and surnames of these employees and their new salaries.

The new salary must be displayed in a field called **NewSalary**. (5)

(c) Display a list of employees (names and surnames) who earn more than R3 000 and whose manager is J Zwane. (6)

4.2.2 The employee with EmpID = B124 has moved to department T2. The following incorrect SQL statement was written to effect the change of the record:

SELECT * FROM tblEmployees SET DepID = 'T2'

Write the correct SQL statement. (2)

4.3 Some stores at the mall use a distributed database system.

4.3.1 What is a *distributed database system*? (2)

4.3.2 State TWO reasons why it is suitable for the stores to use a distributed database system. (2)

4.4 An audit trail is used when the database contains sensitive information.

4.4.1 What is the purpose of an audit trail? (2)

4.4.2 Name ONE disadvantage of using an audit trail. (1)

TOTAL SECTION D: 27

SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

The marketing team for the mall is hosting a competition for schools in the community to promote the activities at the mall. Sample questions have been given to the schools so that the learners can prepare for the competition.

5.1   A program was written to register learners for the competition.

The class diagram for the object class **Entrant** indicates the following attributes:

Entrant
-Name:String
-Surname:String
-TelNumber:String
-IdentityNo:String
.....
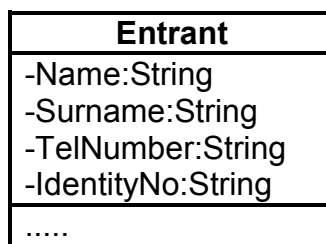
5.1.1   Give a reason for using private declaration for the attributes.   (1)

5.1.2   The attributes **TelNumber** and **IdentityNo** need to be validated.

(a)   State TWO ways in which the data for the two attributes could be validated.   (2)

(b)   Valid data does not necessarily mean that the data is correct.

Motivate this statement with reference to QUESTION 5.1.2(a).   (1)

5.2   Problem-solving questions will include flow charts and pseudocode.

    5.2.1   The flow chart shown below is designed to determine the largest factor of an integer (other than the number itself).

        Study the flow chart to answer the question that follows.

        All variables used in the flow chart are of the integer data type, which means that all division operations will result in truncated answers.
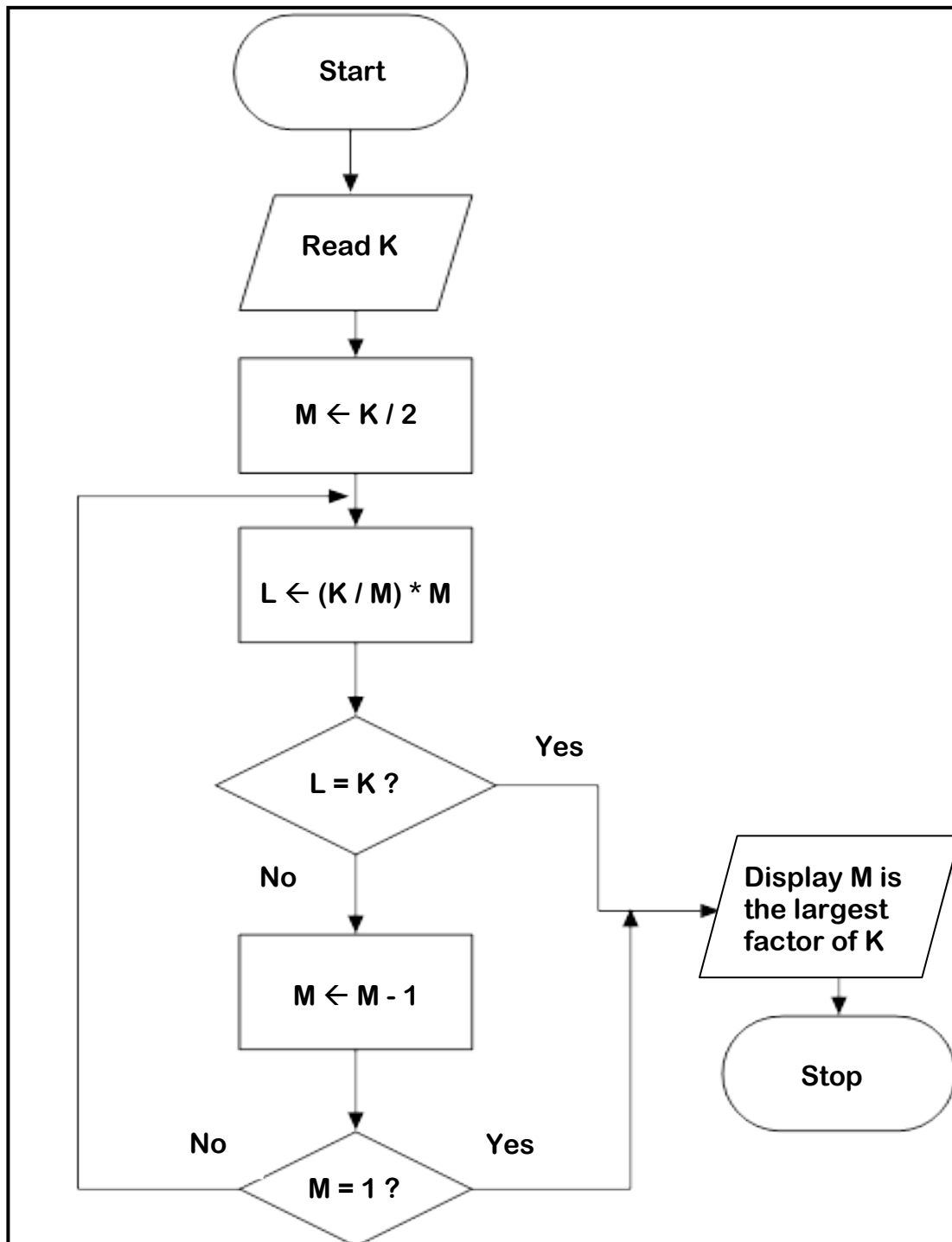
Use the headings given below to draw a trace table. Complete the trace table to show the results when the steps contained in the given algorithm are processed.

K	M	L	L = K?	M = 1?	Output

Use the value of 15 as the input to complete the trace table for the given flow chart. (5)

5.2.2 Write pseudocode to provide a solution to the following problem:

The user must enter a word. The letters 'e' and 'E' in the word must be replaced with an asterisk (*). The original word and the modified word must be displayed.

For example:

Input: Event
Output: The original word is Event.
              The modified word is *v*nt.   (6)

5.2.3 All learners will be seated in a hall which has 20 rows of chairs with 30 seats per row. A two-dimensional array called **SEATING** has been created to store the names of the learners who have booked seats.

Write an algorithm to determine which row has the most booked seats.

NOTE: Assume that each row has a different number of booked seats. (9)

TOTAL SECTION E: 24

SECTION F: INTEGRATED SCENARIO

QUESTION 6

Internet access is freely available in the mall and will be managed by the mall's IT department.

6.1   The network at the mall has been expanded to include Wi-Fi access to the network.

6.1.1   Name the medium used to transfer data in a Wi-Fi network.   (1)

6.1.2   Wireless access points have been installed at various places in the mall.

What is the function of the Wi-Fi access point?   (1)

6.1.3   Give TWO reasons why multiple access points will be needed.   (2)

6.2   The public will use their mobile devices to access the Internet in the mall.

6.2.1   What does it mean to say that mobile devices are designed with an *'always on'* functionality?   (2)

6.2.2   Suggest TWO ways to improve the battery life of a mobile device.   (2)

6.2.3   Identify the mobile operating system represented by the image below:

(1)

6.2.4   Which cellular technology could also be used to access the Internet?   (1)

6.3   The lease agreement for the tenants includes an acceptable use policy (AUP) for the use of the network and Internet.

6.3.1   Motivate why the lease agreement includes an AUP.   (2)

6.3.2   Suggest TWO aspects related to the use of the computer network that should appear in the AUP.   (2)

6.3.3 The lease agreement encourages tenants to pay their rent using online banking.

State TWO ways the tenant will know that the bank website is a secure website. (2)

6.4 An Intranet has been set up for the mall to facilitate communication between management and tenants.

What is an *Intranet*? (2)

6.5 Many stores in the mall use RFID tags on their merchandise in order to capture data.

6.5.1 State TWO advantages of using RFID tags in data capturing. (2)

6.5.2 RFID is one form of 'invisible' data capturing.

Give another example of invisible data capturing that could take place in the mall. (1)

6.6 The mall's website has been developed and the mall also has a presence on the social media sites.

6.6.1 Give ONE example of how the website could be used to successfully promote the mall. (1)

6.6.2 The website has been designed with dynamic pages.

What is the difference between a *static* and a *dynamic website*? (2)

6.6.3 The management will use the website to publish the latest activities and promotions at the mall.

What technology can be used to provide customers with only the changed/updated content on the mall's website? (1)

6.6.4 Social media sites encourage people to share personal information.

(a) Suggest TWO precautions that need to be considered before sharing personal information on a social media site. (2)

(b) Briefly explain how location-based computing could assist a customer in the mall. (2)

6.6.5 What should be included on the mall's website to certify that the mall is the valid owner of the specific website? (1)

6.7 One of the managers suggested the possibility of using a web-based office suite such as Google Docs.

6.7.1 State TWO advantages of using cloud applications. (2)

6.7.2 State ONE disadvantage of using cloud applications. (1)

6.8 The management at the mall is in favour of green computing.

Suggest TWO ways in which the tenants can apply green computing. (2)

6.9 A computer in the store of one of the tenants has been infected by malware.

6.9.1 What is *malware*? (1)

6.9.2 State TWO symptoms that may indicate that a computer has been infected by a virus. (2)

6.10 Some users need access to files and folders on their office computers when they work from home.

Suggest ONE secure network connection that could be used. (1)

TOTAL SECTION F: 39
GRAND TOTAL: 150