



basic education

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GRADE 12

INFORMATION TECHNOLOGY P2

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MARKS: 180

TIME: 3 hours

This question paper consists of 18 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE sections subdivided as follows:

SECTION A: Multiple-choice questions	(10)
SECTION B: Hardware and software	(58)
SECTION C: Applications and implications	(20)
SECTION D: Programming and development of software	(47)
SECTION E: Integrated scenario	(45)
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 given 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 Which of the following does NOT break the copyright law?
- A Downloading music from the Internet
 - B Downloading music made available by podcasters from the Internet
 - C Installing a copy of the school's single-user license on your home computer.
 - D Copying information from a web page into your assignment (1)
- 1.2 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. (1)
- 1.3 A digital ... is a secure digital identity that certifies the identity of the holder on the Internet.
- A certificate
 - B password
 - C signature
 - D username (1)
- 1.4 The most popular LAN-communication standard used today is ...
- A TCP/IP.
 - B ADSL.
 - C Token Ring.
 - D Ethernet. (1)
- 1.5 Which one of the following is the ODD ONE OUT?
- A Norton Antivirus
 - B Windows XP
 - C Linux
 - D MS-DOS (1)
- 1.6 People with the same interests who want to chat online will make use of ...
- A a forum.
 - B e-mail.
 - C IRC.
 - D a blog. (1)

- 1.7 ... is high-speed memory used for the temporary storage of data or instructions likely to be needed next by the processor.
- A Virtual memory
 - B Cache memory
 - C Random access memory
 - D Read-only memory
- (1)
- 1.8 Which one of the following statements is NOT associated with green computing?
- A Companies should refill toner cartridges rather than buy new ones.
 - B One of the advantages of using ICT is creating 'paperless' offices.
 - C Energy Star compliant hardware should be used as a rule.
 - D Companies should replace their computers regularly.
- (1)
- 1.9 A ... port is a high-speed port most suited to connecting digital and video cameras to a computer.
- A USB
 - B FireWire
 - C MIDI
 - D SCSI
- (1)
- 1.10 A technique used by intruders to make their network or Internet transmission appear legitimate to a victim is referred to as ...
- A phishing.
 - B spoofing.
 - C spam.
 - D a hoax.
- (1)

TOTAL SECTION A: 10

SCENARIO

A large, very successful computer company called Cosmo Computing has opened a new branch in a metropolitan city. The board of directors are currently conducting interviews with various potential candidates for the position of manager of the new branch.

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

Dube is a young, motivated and dynamic graduate who has three years of working experience in the Information Technology sector. He wants to migrate to the retail sector and is short-listed for the job of manager of the new branch. The panel has a list of questions that Dube will be required to answer at the interview.

- 2.1 A client has recently upgraded the operating system of her computer from Windows XP to Windows Vista. She needs to be advised regarding issues related to hardware and software.
- 2.1.1 The computer's external hard drive that used to work on the old operating system no longer works with the new operating system.
Give a possible reason why this may be so. (2)
- 2.1.2 The client was advised that in addition to the external hard drive, she should also partition the existing internal hard drive.
(a) What does it mean to divide a hard drive into partitions? (2)
(b) Name TWO advantages of partitioning a hard drive. (2)
- 2.1.3 The client observed that the operating system sometimes automatically detects and makes a new hardware or peripheral device ready for use without user intervention. What is the term that describes this concept? (1)
- 2.1.4 You need to assure the client that it is safe to disconnect a device and reconnect another device to the computer while it is on. What is the term that best describes this action? (1)
- 2.1.5 The client also complained that her computer has slowed down considerably since changing the operating system. Name TWO hardware components that might need to be upgraded in order to improve the performance of the computer. (2)
- 2.1.6 Someone advised the client that she should have a heat sink and a fan installed in her computer to prevent overheating. The client feels that having both will increase her expenses and she decides to purchase only one. Explain how each of these items prevents overheating of the processor. (2)

- 2.1.7 The client is undecided about whether to purchase a 17" LCD flat-screen monitor or a CRT-monitor. Give THREE reasons why LCD monitors are preferable to the older CRT-monitors. (3)
- 2.2 Schools are one of the biggest clients of Cosmo Computing. The company sets up computer laboratories and networks and offers a maintenance program thereafter. A teacher approaches the company about setting up a network at his school.
- 2.2.1 (a) Explain to the teacher the advantages of having a network. (3)
- (b) The school is considering a client-server network. Give TWO reasons why a client-server network may NOT be such a good choice for the school environment. (2)
- (c) One of the teacher's major concerns is security on the network. Learners should not be able to get unauthorised access to computers on the network. Explain to the teacher the duties of the network administrator regarding security. (2)
- 2.2.2 The school requires the computers in the computer laboratory to be linked in a network. The company recommends that the computers be connected using a star topology.
- (a) Give the teacher a simple diagrammatical representation of a star topology. (3)
- (b) What type of cable will be used to link the computers in the computer laboratory? Give TWO reasons for your choice. (3)
- (c) Name TWO functions of a switch in a network. (2)
- (d) The teacher would like to have a wireless network instead of one using cables. He wants WiFi to be installed.
- (i) Explain the term *WiFi*. (2)
- (ii) Give TWO reasons why WiFi is NOT suitable for a school computer laboratory. (2)
- (iii) If the teacher insists on WiFi technology, name TWO devices that the school will have to purchase to facilitate WiFi technology. (2)

- 2.3 Cosmo Computing's manager needs to conduct workshops with his staff whenever there is an upgrade/update in any hardware or software.
- 2.3.1 Explain to the staff the difference between DRAM and DDR2 RAM. (2)
- 2.3.2 Briefly explain each of the following terms:
- (a) Pipelining (3)
 - (b) Superscalar (1)
 - (c) Hyperthreading (2)
 - (d) RAID (2)
 - (e) Clock multiplication (2)
- 2.3.3 Devices such as smart phones, PDAs and other hand-held devices use embedded operating systems. Name an open-source multitasking operating system used in smart phones. (1)
- 2.3.4 Give a practical example to explain the purpose of each of the following:
- (a) File compression utility software (2)
 - (b) File conversion utility software (2)
- 2.3.5 Explain how a 32-bit operating system differs from a 64-bit operating system. (2)
- 2.4 The national Department of Transport is also a client of Cosmo Computing. They have employees all over the country and have decided to use video conferencing to reduce costs.
- 2.4.1 The Department will require a web cam for video conferencing.
- (a) Describe the function of a web cam. (1)
 - (b) Give an example of software that will make use of a web cam. (1)
- 2.4.2 Name ONE other hardware device that will be required to conduct video conferences. (Do NOT use web cams, CPUs, keyboards, mouses or monitors in your answer.) (1)

TOTAL SECTION B: 58

SECTION C: APPLICATIONS AND IMPLICATIONS**QUESTION 3: e-COMMUNICATION**

The Internet department in the new branch is always the busiest. The reason is that most clients are not familiar with simple terminology and often need assistance. Dube has to assist with the requests of a vehicle sales consultant visiting the Internet department.

- 3.1 The sales consultant would like to create podcasts and publish them so that they can be downloaded by clients.
- 3.1.1 Explain to the consultant the term *podcasting*. (2)
- 3.1.2 Explain how podcasting will benefit the company. (2)
- 3.2 The sales consultant is confused with the terms IM and e-mail. Give TWO clear differences between *IM* and *e-mail* in table format. (4)
- 3.3 The sales consultant would like an alternative website with a .mobi domain.
- 3.3.1 What does the domain 'mobi' represent? (1)
- 3.3.2 Name ONE significant advantage of a mobi website. (1)
- [10]**

QUESTION 4: SOCIAL AND ETHICAL ISSUES

Cosmo Computing is concerned about their social responsibility to local communities. They would like to improve the computer literacy of the surrounding community. They also have old computers that are no longer being used that they would like to donate to a local school.

- 4.1 Name ONE type of software package that could be taught to novice computer users in the local community in order to make them more employable. Justify your answer. (2)
- 4.2 Name TWO ways in which the school can use the old computers for educational purposes. (2)
- 4.3 You inform the company that it is not socially responsible to donate very old computers to schools. Identify TWO potential problems of donating old computers to a school. (2)
- 4.4 The company decides to rather give the school a fully equipped new computer laboratory. Name TWO job positions that will be required in order to make this project a success. (2)

- 4.5 The company considers e-mailing all their clients about the project mentioned in QUESTION 4.4 inviting them to donate money to the project. Would you regard these e-mails as spam? Justify your answer.

(2)
[10]

TOTAL SECTION C: 20

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

Cosmo Computing has a division that does repairs and gives technical support to clients. The company requires software which will allow them to keep track of their clients' support requests as well as details of the technicians who deal with these requests. They have hired a software developer but would also like your input.

5.1 The software developer has created two tables **tblClients** and **tblJobs**:

tblClients

CustomerID	Name	Surname	ContactNumber
1	John	Smith	0821475869
2	Phumzile	Mbata	0714567895
3	Delia	Juniper	0847541225
4	Reyahd	Khan	0724578892

tblJobs

JobID	CustomerID	DateOfJob	Description	Technician	Rating	FullTime
1	1	2010/10/06	Data recovery	Lionel Torvalds	9	<input checked="" type="checkbox"/>
2	1	2010/11/10	Software upgrade	Gill Bates	5	<input type="checkbox"/>
3	2	2010/05/10	Re-install operating system	Gill Bates	5	<input type="checkbox"/>
4	4	2010/12/07	Set up Internet	Lionel Torvalds	9	<input checked="" type="checkbox"/>
5	2	2010/01/07	Set up Internet	Gill Bates	5	<input type="checkbox"/>
6	3	2010/09/29	Remove virus	Lionel Torvalds	9	<input type="checkbox"/>
7	3	2010/04/10	Re-install operating system	Steve Hobbs	8	<input checked="" type="checkbox"/>

- 5.1.1 What is the purpose of the primary key in a database table? (1)
- 5.1.2 Identify the primary key in the table **tblClients**. (1)
- 5.1.3 The **CustomerID** field from **tblClient** is repeated in **tblJobs**. What is the purpose of also having the **CustomerID** field in the table **tblJobs**? (2)
- 5.1.4 The field-type for the **ContactNumber** field in the **tblClients** table has been specified as 'Text'. Explain how the data will be affected if the data type for this field is rather specified as a 'Number'. (2)

5.2 You suggest that the table **tblJobs** should be normalised and therefore be replaced by two separate tables (**tblTechnicians** and **tblJobsOnly**) as indicated below.

tblTechnicians

TechnicianID	Name	Rating	FullTime
1	Lionel Torvalds	9	<input checked="" type="checkbox"/>
2	Gill Bates	5	<input type="checkbox"/>
3	Steve Hobbs	8	<input checked="" type="checkbox"/>

tblJobsOnly

JobID	CustomerID	DateOfJob	Description	TechnicianID
1	1	2010/06/10	Data recovery	(a)
2	1	2010/11/10	Software upgrade	(b)
3	2	2010/05/10	Re-install operating system	(c)
4	4	2010/12/07	Set up Internet	(d)
5	2	2010/01/07	Set up Internet	(e)
6	3	2010/09/29	Remove virus	(f)
7	3	2010/04/10	Re-install operating system	(g)

5.2.1 Name TWO advantages of normalising tables in general. (2)

5.2.2 In the suggested **tblJobsOnly** table the **TechnicianID** field is a foreign key. The **TechnicianID** field in each record contains the characters (a) to (g) at the moment but should contain values indicating the correct **TechnicianID** for each record. Use the **original tblJobs** table (on the previous page) and the **new tblTechnicians** table (above) to determine the correct **TechnicianID** for each record. Write down the letters (a) to (g) as well as the correct value for the **TechnicianID** field for each record. (3)

5.3 The company decides that they want to award performance bonuses to part-time technicians using the following criteria:

- **An amount of R300,00 for all part-time technicians with a rating of 7 or higher.**

The developer has provided the following **incorrect algorithm** as part of the solution to select the technicians who qualify for this bonus:

Algorithm

```

Line 1      IF RATING >= 7 OR FULLTIME = NO THEN
Line 2      BONUS ← 300
    
```

5.3.1 Use the table below to test the suggested **algorithm**. Write down the letters (a) to (e) and your answers to correctly complete the table. The first two columns contain the given values for the variables RATING and FULLTIME for three different technicians.

NOTE: Do NOT redraw the table.

VALUE OF RATING	VALUE OF FULLTIME	RESULT OF RATING >= 7?	RESULT OF FULLTIME = NO?	RESULT OF RATING >= 7 OR FULLTIME = NO?	VALUE OF BONUS
3	NO	FALSE	TRUE	(a)	
6	YES	(b)	(c)	(d)	
9	NO	TRUE	TRUE	(e)	

(5)

5.3.2 The results in the table reflect that the algorithm is incorrect and does not match the requirements of the initial criteria. Rewrite only Line 1 of the algorithm in order to produce the correct results.

(1)

5.4 Cosmo Computing has stored the number of jobs they completed each month in an array called **JOBSTATS**. Each position represents the number of jobs completed in each month of the year. Position 0 refers to the number of jobs completed in January and position 11 refers to the number of jobs completed in December. A visual representation of the array is given below.

JOBSTATS

	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Value	64	57	43	36	69	86	94	72	83	59	67	75

For example: 43 jobs were completed in March (position 2). The company wants to calculate the average number of completed jobs for the last 6 months of the year. The software developer has compiled the following algorithm:

```

LINE
1      TOTAL_JOBS ← 0
2      COUNTER ← 6
3      AVERAGE_JOBS ← 0
4      LOOP UNTIL COUNTER > 12
5          TEMP ← JOBSTATS[COUNTER]
6          TOTAL_JOBS ← TOTAL_JOBS + TEMP
7          COUNTER ← COUNTER + 1
8      END LOOP
9      AVERAGE_JOBS ← TOTAL_JOBS / COUNTER
10     DISPLAY AVERAGE_JOBS
    
```

- 5.4.1 Suggest a suitable data type for the variable COUNTER. (1)
- 5.4.2 When the program is executed, a run-time error occurs.
- (a) The run-time error indicates that line 5 of the given algorithm caused the error. Rewrite line 4 of the algorithm in order to correct the error. (2)
 - (b) Explain what a *run-time error* is in general. (1)
- 5.4.3 Assume that the error in line 4 has been corrected. When the program is executed, an incorrect value for the variable AVERAGE_JOBS is displayed.
- (a) What type of programming error is generally associated with incorrect output? (1)
 - (b) Explain why the algorithm displays an incorrect output for AVERAGE_JOBS. (2)
 - (c) Rewrite a **single line** from the algorithm above which will fix the error. Indicate the line number of the statement that you are rewriting in your answer. (2)

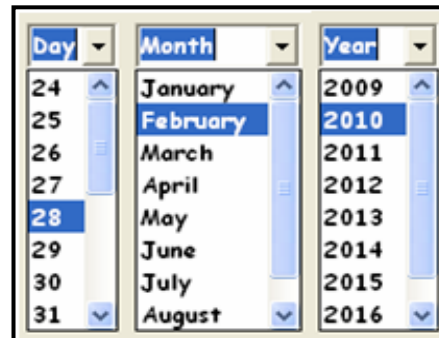
5.5 The clients register on the website of Cosmo Computing and get free advice on computer problems. The software developer compiled the following four possible interfaces for capturing the date of birth of the client:

Website A (Radio Buttons)

<p>Day</p> <p><input type="radio"/> 1 <input type="radio"/> 9 <input type="radio"/> 17 <input type="radio"/> 25</p> <p><input type="radio"/> 2 <input type="radio"/> 10 <input type="radio"/> 18 <input type="radio"/> 26</p> <p><input type="radio"/> 3 <input type="radio"/> 11 <input type="radio"/> 19 <input type="radio"/> 27</p> <p><input type="radio"/> 4 <input type="radio"/> 12 <input type="radio"/> 20 <input checked="" type="radio"/> 28</p> <p><input type="radio"/> 5 <input type="radio"/> 13 <input type="radio"/> 21 <input type="radio"/> 29</p> <p><input type="radio"/> 6 <input type="radio"/> 14 <input type="radio"/> 22 <input type="radio"/> 30</p> <p><input type="radio"/> 7 <input type="radio"/> 15 <input type="radio"/> 23 <input type="radio"/> 31</p> <p><input type="radio"/> 8 <input type="radio"/> 16 <input type="radio"/> 24</p>	<p>Month</p> <p><input type="radio"/> January <input type="radio"/> July</p> <p><input checked="" type="radio"/> February <input type="radio"/> August</p> <p><input type="radio"/> March <input type="radio"/> September</p> <p><input type="radio"/> April <input type="radio"/> October</p> <p><input type="radio"/> May <input type="radio"/> November</p> <p><input type="radio"/> June <input type="radio"/> December</p> <p>Year</p> <p><input type="radio"/> 2009 <input type="radio"/> 2012 <input type="radio"/> 2015</p> <p><input checked="" type="radio"/> 2010 <input type="radio"/> 2013 <input type="radio"/> 2016</p> <p><input type="radio"/> 2011 <input type="radio"/> 2014 <input type="radio"/> 2017</p>
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Website B (Text Box)

Enter a Date

Website C (Single Drop Down List)**Website D (Multiple Drop Down Lists)**

- 5.5.1 Which ONE of the websites (A to D) provides an input component that makes it almost impossible for a user to select/enter an invalid date? (1)
- 5.5.2 The correct test data should be used to test whether program code delivers the correct output in all cases. Give a suitable example of a date as input in each of the following instances where the date will qualify as the following:
- (a) Normal test data (1)
 - (b) Erroneous test data (1)
 - (c) Extreme test data (1)
- 5.5.3 Using dates as examples, explain the difference between *invalid* and *incorrect* data. (2)
- 5.5.4 Study the input interface in Website B on the previous page. Name ONE way that the programmer can ensure that the user is guided to enter the date using the correct format. (1)
- 5.5.5 Other than allowing users to select incorrect dates, name ONE disadvantage of the interface in Website C on the previous page. (1)
- 5.5.6 An error message should be provided when an invalid date is entered. Give THREE general guidelines for compiling good error messages. (3)

5.6 The manager admits that he does not know much about OOP. You have compiled the following class diagram representing a **Technician** object to explain certain OOP concepts.

Study the class diagram. NOTE: The '-' sign indicates a private declaration and the '+' sign indicates a public declaration.

Technician	
Fields	Methods
- fTechnicianID:String	+ constructor()
- fName:String	+ constructor(ID, name)
- fRating:int	+ getID():String
- fFullTime:boolean	+ getRating():int
	+ getFullTime():boolean
	+ setRating(rating)
	+ toString()

5.6.1 Explain the difference between *public* and *private declarations* in terms of OOP. (2)

5.6.2 There are two constructor methods in the class diagram above, viz.

- (a) +constructor()
- (b) +constructor(ID, name)

Give the generic name for EACH type of constructor given above. (2)

5.6.3 Write down ONE example of each of the following methods from the given **Technician** class diagram:

- (a) Accessor method (1)
- (b) Mutator method (1)

5.6.4 Explain the purpose of a '*toString*' method in a class. (2)

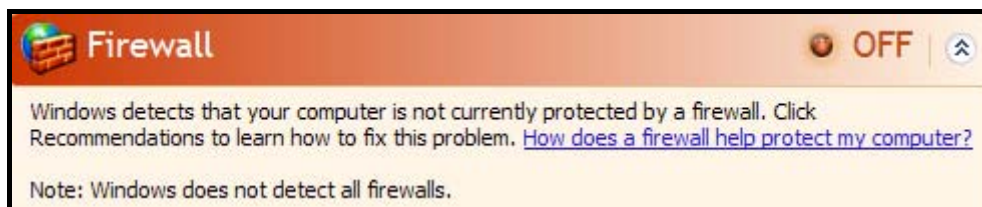
5.6.5 The programmer needs to write a method to return the name of a technician. Write a statement for the Methods-column of the class diagram that will indicate this return method. (2)

TOTAL SECTION D: 47

SECTION E: INTEGRATED SCENARIO**QUESTION 6**

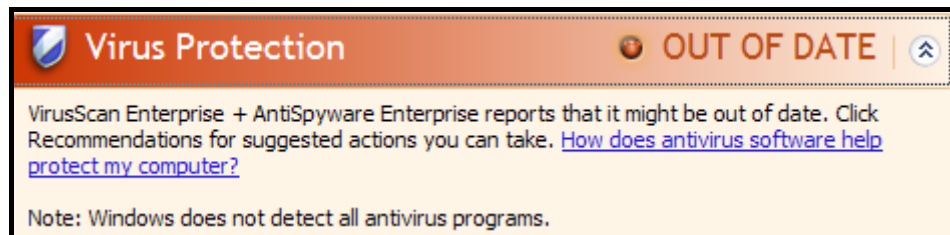
After a successful interview Dube has been appointed as the manager of the new branch of Cosmo Computing. He has to guide other team members so that they can manage this branch successfully as a team and ensure client satisfaction.

- 6.1 It has been suggested that Radio Frequency Identification (RFID) tags are placed on the items in the store to read information directly from the items when purchased or when stocktaking is done. Dube has to investigate this option.
- 6.1.1 Name TWO specific features of RFID. (2)
- 6.1.2 Other than the tags on items in the store name TWO other practical applications of where RFID can be used. (2)
- 6.1.3 Name TWO electronic devices, other than RFID tags, that are widely used to capture data directly from source documents. (2)
- 6.2 WiMax is a possible alternative for clients to connect to the Internet.
- 6.2.1 What medium of transfer does WiMax use? (1)
- 6.2.2 What type of network is a WiMax network – WAN/MAN/LAN? (1)
- 6.2.3 An Internet service provider (ISP) is required for any network connection to the Internet. Name THREE guidelines for choosing an ISP. (3)
- 6.3 One of the clients at the new branch is experiencing security problems on their computer system. Dube investigates the matter. The following information is displayed by a utility program:



- 6.3.1 What is a *utility program*? (3)
- 6.3.2 What kind of protection is offered by a firewall? (2)

6.3.3 The following information has also been displayed:



- (a) What is a *computer virus*? (3)
- (b) Name THREE common symptoms that indicate that a computer system has been infected by a computer virus. (3)

6.4 Clients often lose important data due to laptops being stolen, power failures, etc. Give THREE hints to clients to prevent the loss of data as a result of unforeseen circumstances. (3)

6.5 The performance of their computer is often the most important feature that clients are concerned about.

6.5.1 The CPU can play a significant role in the performance of a computer. It consists of a control unit and an arithmetic logic unit (ALU) as well as an instruction set.

- (a) Name TWO well-known and popular manufacturers of processors used in personal computers. (2)
- (b) Explain what the *instruction set* of a CPU is. (2)
- (c) Most processor chip manufacturers now offer quad-core processors. What is the main characteristic of a quad-core processor? (2)

6.5.2 Communication between components in a computer system should be well managed. The chipset of a modern computer system has a North bridge and South bridge managing the transfer of data.

- (a) Which bridge controls the Front Side Bus (FSB)? (1)
- (b) Briefly explain the function of the Front Side Bus. (1)

6.5.3 Storage devices can play a role in the overall performance of a computer system.

- (a) The performance of storage devices, such as hard disks, can be improved by running the disk defragmenter. What does this software do? (2)

- (b) A hard disk is managed by a disk controller such as SCSI or SATA. Name TWO advantages of using a SCSI disk controller. (2)

6.6 One of the clients works with highly confidential files all the time. The client is concerned about the privacy of information on their computer system. Dube advises the client to make sure that no unauthorised access takes place. He advises him to apply strict identification and authentication verification.

- 6.6.1 One way of applying identification verification is to enter a user name and a password to log into a program. Give TWO hints to users about selecting passwords that will not be easy to decipher. (2)

- 6.6.2 Dube suggests that the client considers installing the device shown below for identification verification:



- (a) What is the term that describes the use of personal characteristics to authenticate the identity of a person? (1)
- (b) Name TWO other personal characteristics that are often used for authentication verification purposes. (2)
- 6.6.3 The client needs to transfer confidential information to clients via the Internet on a daily basis. Dube suggests that he uses the Secure Sockets Layer (SSL) protocol.
- (a) What is a *protocol in a network environment*? (2)
- (b) What technique does the SSL protocol apply to ensure that the data is transferred in a secure way? (1)

TOTAL SECTION E: 45
GRAND TOTAL: 180