NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2012

INFORMATION TECHNOLOGY: PAPER I

Time: 3 hours 180 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 10 pages. Please check that your question paper is complete.
2. Read the questions carefully and make sure that you answer all parts of each question.
3. Answer ALL questions – there are no options in this paper.
4. Show all working where applicable.
5. Non-programmable calculators may be used.
6. Number your answers exactly as the sub-questions are numbered.
7. Start each answer to each question on a **new page**.
8. Please leave a **line open** between sub-questions.
9. It is in your own interest to write legibly and to present your work neatly.

SCENARIO

You as an IT student have been employed by an IT company that is responsible for the communications and data storage for the Toll gates. The IT company is joined by an Engineering company who will be involved in producing new roads in South Africa.

QUESTION 1

Compare the term in Column A with the correct description in Column B in the table below. Only write down the correct letter next to the number in your Answer Book, e.g. 1.1 C.

Column A		Column B	
1.1	Fat Client	A	A naturally occurring phenomena when the electromagnetic field of one device disrupts, impedes or degrades the electromagnetic field of another device by coming into proximity with it.
1.2	CMOS	B	A small electronic circuit embedded in labels, material, etc. for purposes of tracking and stock control.
1.3	IrDA	C	A program that translates source code into object code so that the object code is executed.
1.4	Gateway	D	A location where wireless network connectivity is provided for public and paying subscribers. Typically found in airports, hotels, coffee shops, etc.
1.5	Keyloggers	E	A memory chip that stores the data that the BIOS needs for configuring the computer at start-up.
1.6	RSI	F	The practice of designing equipment and furniture so that it does not place undue strain on the human body.
1.7	RFID	G	An incremental improvement in wireless networking technology that allows high speed wireless connectivity over ranges of 20 – 30 km. Uses the 802.16 wireless standard.
1.8	EMI	H	A node on a network that provides access to another network by performing functions such as protocol translations.
1.9	Wi-Max	I	Spyware that monitors a user's keystrokes to steal personal details and passwords that can be retrieved by a third-party.
1.10	Interpreter	J	A physical specification communication protocol standard for the short-range exchange of data over infrared light, for uses such as personal area networks (PANs).
		K	A computer with full CPU, memory, storage and local software. The network is only used for communication and accessing shared resources.
		L	An injury of the musculoskeletal and nervous systems that may be caused by repetitive tasks and forceful exertions.
		M	Analyses and executes each line of source code in succession.

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QUESTION 2

Briefly describe each of the following **terms** to be understandable by the non IT users of both companies. Expansion of the acronyms is not required.

2.1 ISP

2.2 Firmware

2.3 Pharming

2.4 E-commerce

2.5 Overclocking

2.6 Inheritance

2.7 Worm virus

2.8 Topology

2.9 Buffer

2.10 UML

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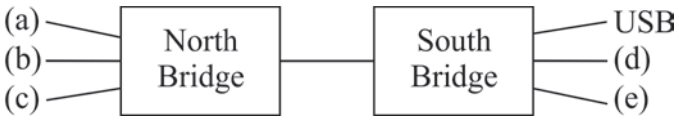
QUESTION 3

Employees of the engineering company often ask the IT company for advice when they want to purchase new computer equipment for their projects. The employees vary from users with little computer knowledge to the fairly experienced users. Assist them by answering the questions below.

3.1 The motherboard consists of the Northbridge and the Southbridge.

3.1.1 What is the main difference between these two bridges? (2)

3.1.2 List which components connect to the Northbridge and Southbridge by filling in names for parts labelled (a) to (e).



(5)

3.1.3 It looks like the motherboard is covered in 'paths' or 'embedded wires'.

(a) What are these 'paths' or 'embedded wires' called? (1)

(b) What is their purpose? (1)

3.1.4 An employee needs his PC's RAM upgraded. Explain TWO differences between RAM and ROM. (2)

3.1.5 The accountant of the company bought an external hard drive to back-up all his work. Explain what is meant by the device is 'hot pluggable' (also known as hot swopping). (2)

3.2 The CPU is the 'brain' of a computer and operates in a four step cycle.

3.2.1 Name THREE of the main parts of the CPU. (3)

3.2.2 List FOUR stages of the machine cycle. (4)

3.2.3 Which TWO stages of the machine cycle are not always necessary? Motivate your answer. (4)

3.2.4 Consider the differences between 32-bit and 64-bit CPUs.

(a) Name ONE component of the CPU that will be affected by this. Justify your answer. (2)

(b) Name ONE part of the motherboard that will need to be improved for a 64-bit CPU. Justify your answer. (2)

(c) Can you run a 32-bit operating system on a 64-bit processor? Motivate your answer. (2)

3.3 The IT company designed a CBT (Computer Based Training) course for the employees to enhance their existing computer skills and to learn new skills.

3.3.1 State ONE advantage of using CBT software. (1)

3.3.2 State ONE disadvantage of using CBT software. (1)

3.4 To enhance communication between the two companies, video conferencing meetings are scheduled. What additional hardware device would both companies need for the video conferencing meetings to take place? (1)

3.5 The IT company set up a secure network for their projects since the data must be protected at all times.

3.5.1 Give THREE ways how they can secure their data from unauthorised access from within the company and from the Internet. (3)

3.5.2 The company is concerned about hardware failure. An argument developed whether to use RAID or backup to prevent this disaster. Explain why both RAID and backup are required to secure stored data. (2)

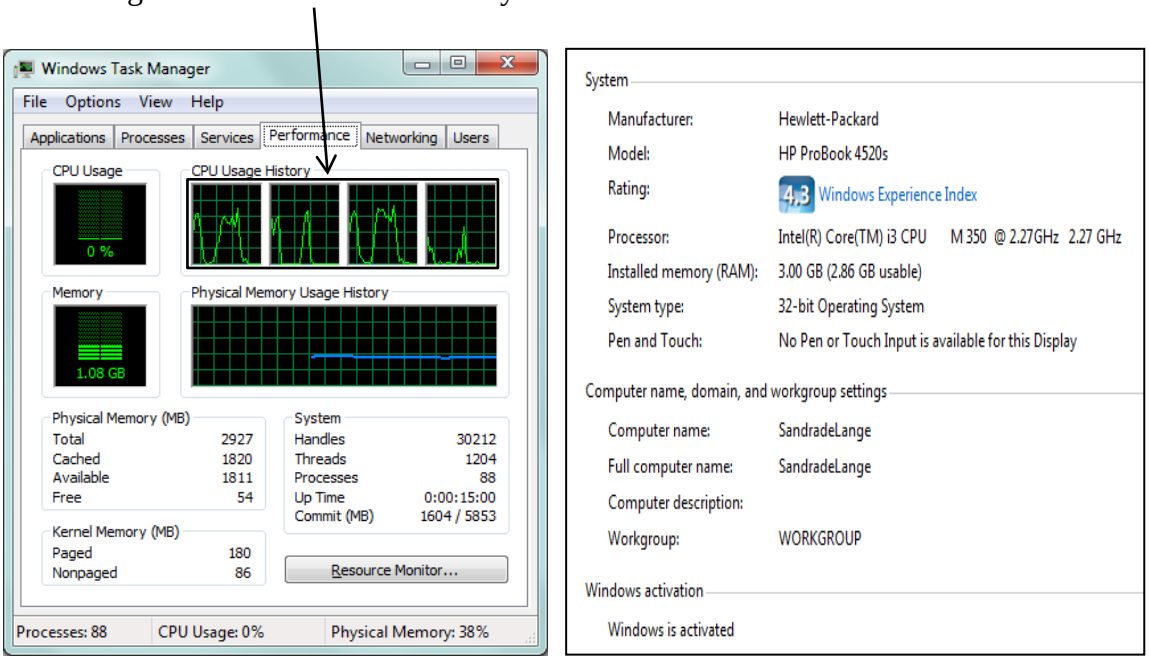
3.6 Each employee has the use of a smartphone with embedded operating systems installed.

3.6.1 Give TWO examples of embedded operating systems for smartphones. (2)

3.6.2 Name THREE functions of an operating system in computers that are also found on smartphones. (3)

3.7 One of the ways we can improve the processing speed of the CPU is by making use of a process called pipelining. Explain the pipelining process in detail. (4)

3.8 How is it possible that a dual-core processor can have four processors shown in the task manager as seen below? Motivate your answer.



(3)
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QUESTION 4

Consider the specifications of a laptop given in the following advert and answer the questions that follow.

With a solid state hard drive and 2nd Gen Intel® Core™ i7, you can save your computer projects so much faster and more securely.

- 2nd generation Intel® Core™ i7-2640M processor 2.80 GHz with Turbo Boost 2.0 up to 3.50 GHz
- Genuine Windows® 7 Home Premium, 64-Bit
- Elemental Silver Aluminum 15.6" WLED Display with Webcam
- 8GB Dual Channel DDR3 SDRAM at 1 333MHz
- 256GB Solid State hard drive
- 8X Slot Load CD/DVD Burner (Dual Layer DVD+/-R Drive)
- NVIDIA® GeForce® GT 525M 2 GB graphics with Optimus
- 1 Year Basic Support

[Adapted from: <http://www.intel.com>]

4.1 The above laptop has an 'Intel® HM6' chipset.

4.1.1 The speed of the processor is 2.80 GHz while the speed of the RAM is 1 333 MHz. Explain why these components have different speeds. (2)

4.1.2 Differentiate between the chipset and the processor. (2)

4.1.3 Are chipsets specific to processor manufacturers? Motivate your answer. (2)

4.2 The advert refers to a solid state hard drive. Explain THREE ways that solid state hard drives can be distinguished from traditional magnetic disks such as HDDs. (3)

4.3 What is the difference between DRAM and SDRAM? (2)

4.4 Why should the graphics card have its own 2 GB of RAM since the laptop already has 8 GB RAM? Motivate your answer. (3)

4.5 The secretary who frequently updates the website and edits images using Photoshop wants to buy this laptop. Do you think the secretary will utilise the features of the laptop? Justify your answer by stating TWO reasons. (4)

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QUESTION 5

The IT and engineering companies need to communicate successfully and effectively. Today even the smallest computers and devices can communicate directly with one another. Communication can take place around the globe via the Internet.

5.1 In order to connect to the Internet the company needs a router. Name THREE functions of a router. (3)

5.2 Name FOUR advantages of a network. (4)

5.3 Certain staff members will have more access/security rights on the company's network than others, e.g. secretaries need to create, save documents and send emails. Accountants need to access spreadsheet software for profit, loss, and to run the payroll package.

5.3.1 Whose responsibility would it be to assign access to network resources? (1)

5.3.2 Name TWO network resources which, besides the Internet, would be subject to security restrictions. (2)

5.3.3 Would you allow every member to get the same Internet access? Motivate. (2)

5.4 Unbounded or wireless media are becoming more common.

5.4.1 Name and describe THREE different wireless methods used by a modern smartphone for transferring data. (6)

5.4.2 Give TWO ways how employees can access the company's data from outside the company using the Internet. (2)

5.4.3 The company has created a new Research and Development department and needs to create a network to enable the members of this department to communicate. Do you think that it would be better to connect these new computers wirelessly or with cables? Motivate your answer by giving THREE reasons. (3)

5.4.4 What is the difference between an IP and a MAC address? (2)

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QUESTION 6

The two companies create a forum to improve the communication between their employees. There are so many wonderful forums and websites to view and join that it becomes very difficult for you to keep track of all the information. RSS helps you with this problem.

6.1 What is a forum? (2)

6.2 Explain how RSS can help you keep track of all the information on forums, websites and blogs. (3)

6.3 BBM (Black Berry Messenger) and WhatsApp are popular chat services that allow users to send messages at very low cost. This can be seen as a virtual community with interpersonal e-communications.

These chat services tend to create smaller communities in today's modern life.

6.3.1 (a) Give TWO examples where these chat services can enhance social interaction. (2)

(b) Give ONE example where these chat services can isolate people socially. (1)

6.3.2 Discuss TWO advantages of e-communication. (2)

6.3.3 Explain TWO ways that social networking has contributed to identity theft. (4)

6.3.4 Give TWO examples of popular social networking sites. (2)

6.4 Each year the graphic designers from the IT company and the engineers gather at the *Greener Gadget* conference to obtain ideas on how their companies can motivate their employees to use 'Green Computing'. One such idea is becoming a paperless company.

What steps can the company implement towards becoming a paperless company?

NOTE: You must give a minimum of FOUR facts to obtain full marks for this question. (4)

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QUESTION 7

7.1 Normalisation organises a database into one of several normal forms to remove ambiguous relationships between data and minimise data redundancy. If a database is not normalised, the database table has large number of fields/columns due to the repeating of data/groups and hence wastes disk space.

7.1.1 What is data redundancy? (2)

7.1.2 Give an example of repeating groups. (2)

7.1.3 What is the difference between a primary and a foreign key? (2)

7.1.4 Name TWO requirements for a table to be in 1NF (First Normal Form). (2)

7.2 An IT company has money vendors that supply products for the company to sell. Each vendor has a name and a unique number. The company assigns a unique number to each product and stores the product name. When a customer orders items, the company gives each order a unique order number and records the date. Note that a customer can order many items which will all be recorded on a single order with the same order number.

Use the table below to answer Questions 7.2 and 7.3.

tblOrder

Order Nr	Order Date	Product Nr	Product Name	Qty Ordered	Vendor Nr	Vendor Name
1001	2011/05/08	605	2 Gb USB Flash Drive	10	321	Cruzer
1002	2011/06/10	751	4 Gb SDRAM	4	166	RAM Electronics
1003	2011/06/11	321	1 Tb external HD	3	450	Seagate
1004	2012/01/05	405	15" LCD Screens	6	321	Acer
1001	2011/05/08	203	4 Gb USB Flash Drive	10	110	Trancend
1004	2012/01/05	405	15" LCD Screens	6	450	HP
1005	2012/01/25	605	2 Gb USB Flash Drive	8	321	Cruzer

Figure 1

The data in the tblOrder can be sorted by the Product Name by either using a SQL statement or by creating an array of Order objects, where each item in the table is read into the array, the array is sorted and then displayed.

7.2.1 Write down the SQL statement to sort the Orders by the Product Name. (3)

7.2.2 Give the class design as a table of the Order object (include all the fields and the constructor, accessor and mutator methods). Provide complete parameter lists where necessary. A class design consists of 3 sections, namely the class name, a list of the fields and a list of method headers. (7)

7.2.3 Which is the better solution to sort the table: the SQL statement or sorting the array of order objects? Motivate your answer. (3)

7.2.4 With reference to the class above, explain the concepts of information hiding and encapsulation. (2)

7.3 The tblOrder can also be written in the following format:

tblOrder (Order Nr, Order Date, Product Nr, Product name, Qty Ordered, Vendor Nr, Vendor Name) where Order Nr, Product Nr and Vendor Nr are the primary keys.

7.3.1 The purpose of normalising a database is to prevent anomalies. Name TWO anomalies and give an example of each, using the table in Figure 1. (4)

7.3.2 Draw a data dependency diagram of the above table. (6)

7.3.3 Write the tblOrder in Third Normal Form (3NF). Write the solution in the format as seen above, i.e. name of table followed by the fieldnames in brackets. Underline any primary keys. (4)

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Total: 180 marks