



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2013

**INFORMATION TECHNOLOGY: PAPER I**

**MARKING GUIDELINES**

Time: 3 hours

180 marks

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**These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.**

**The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.**

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**QUESTION 1****2 MARKS EACH**

- 1.1 **Cloud computing** – Cloud computing is an Internet service that provides applications and data storage on-line. (2)
- 1.2 **RFID** – Radio Frequency Identification. A small electronic circuit embedded in labels, material, etc. for purposes of tracking and stock control. When brought near a sensor the RFID unit broadcasts its unique ID number on low power radio. (2)
- 1.3 **System Software** – Programs that control and manage the system resources/hardware. System software contains a number of utilities for the operating system and device drivers. (2)
- 1.4 **Virtualisation** – Creation of a virtual system such as an operating system server or storage device. (2)
- 1.5 **Firmware** – Usually refers to control programs that are typically found in **embedded systems** such as **consumer appliances**, digital watches and cameras, etc. Quite often firmware is relatively fixed and is **stored** on **ROM** chips. (2)
- 1.6 **VPN (Virtual private network)** – Allows secure login from a remote location to a small private network. (2)
- 1.7 **Digital signature** – A mathematical scheme for proving the authenticity of a digital message or documents. (2)
- 1.8 **RSI – Repetitive Strain Injury** – It is an injury of the body caused by repetitive tasks, or sustained or awkward positions. (2)
- 1.9 **UML – Unified Modelling Language** is a set of design methods and tools used for designing and engineering object-oriented software. These tools include class diagrams, use case diagrams and interaction diagrams. (2)
- 1.10 **Android** – Is an open source operating system designed primarily for touch screen mobile devices, such as smartphones and tablet computers. (2)
- [20]**

**QUESTION 2**

2.1 North bridge and South bridge (2)

2.2 Examine Device A.

2.2.1 1.4 GHz (1)

2.2.2 **ANY TWO explained (2 × = 4 marks)**

**Wi-Fi 802.11 b/g/n** – it is the newest wireless that have a bandwidth of about 300 Mbps; 802.11g have a bandwidth of 54 Mbps.

**Bluetooth** – it is a wireless radio technology, aimed at new, principally low-power and low-latency, applications for wireless devices within a short range (up to 50 metres).

**Infrared** – is electromagnetic radiation with longer wavelengths than those of visible light. This range of wavelengths corresponds to a frequency range of approximately 430 down to 1 THz. (4)

2.2.3 **ANY TWO**

Stylus/Touch screen/Voice input/Bluetooth keyboard (2)

2.2.4 Embedded – The OS is loaded onto the device as a ROM and is part of the machine. You do not install it. Also smaller and more compact than desktop editions. (2)

2.2.5 **ANY TWO** features

Font size/voice recognition/vibration/touch tones (2)

2.3 Refer to Device B.

2.3.1 64 bits CPU has a word size of 64 bits 64 bit architecture provides higher performance than 32 bit architecture by handling twice as many bits of information in the same clock cycle. (2)

2.3.2 **Clock multiplication** – each component detects speed of the system bus and multiplies it by a factor.

**Overlocking** – increasing the speed of the system bus.  
Or increasing the internal speed of the CPU. (2)

2.3.3 The GPU (graphic processing unit) has its own processor and RAM and therefore its own Graphic clock rate, which affects speed. Bus speed usually refers to the speed of the FSB (Front Side Bus) which connects the CPU to the northbridge. (2)

2.3.4 Address bus (1)

2.3.5 Access time – The time it takes before the drive can actually transfer data. **OR** Seek time + latency

2.3.6 Due to fewer moving parts nothing spins/no fans. (1)

2.3.7 Electrical, not mechanical. Faster. Doesn't break easily/robust. (2)  
Not necessary to defragment. **ANY TWO**

- 2.4 **Any TWO.** ❶ The more graphics, ❷ The processor is 64 bit operating system.  
❸ Convertible as a laptop. USB port. (2)
- 2.5 **Any TWO.** ❶ Use less power, ❷ Cheaper units lower specs, ❸ Less software to install. More portable. Smaller. Camera. Hard drive has no moving parts. (2)
- 2.6 Examine Device C.
- 2.6.1 Device C has a wireless USB receiver and Device A does not have a USB port. (2)
- 2.6.2 Plug and Play  
When a new device is added, the computer system automatically configures the drives (pre-loaded on the OS). (3)
- 2.6.3 Flash memory (1)
- 2.6.4 **ANY TWO**  
Detect vibrations/movements.  
Convert vibrations to machine code.  
Control data communication between wireless device and computer.  
Or any other correct answer. (2)
- [37]

### QUESTION 3

- 3.1 Any THREE  
Thin client is normally a low end computer terminal that provides GUI to the end user. Relies on a server for all other functionality.  
Peer-to-peer requires that each peer has sufficient of its own resources to make them available to peers, such as processing power, disk storage and or network bandwidth. (3)
- 3.2 3.2.1 Proprietary – Windows Server 2003, 2008, 2010, 2011 MAC OS  
Open source – Linux, Ubuntu, etc. (2)
- 3.2.2 Open source – not much product support – need to understand the software and use forums, etc.  
Proprietary – Expense of licencing; Also need special training, more vulnerable to virus attacks. (2)

- 3.3 3.3.1 Ethernet (1)
- 3.3.2 UTP – it has an RJ45 connection, Ethernet standard, cheap industry standard (one good reason). (2)
- 3.3.3 Speed of data transmission that the network card can deal with. (2)
- 3.3.4 Star – easiest to trouble shoot, easy to extend. (3)
- 3.3.5 TCP/IP is the communication protocol for the Internet  
DNS – Domain Name Server – matches IP numbers with Domain/host names  
DHCP – A server that issues automatic IP numbers to the clients on an IP network. (2 × 3 = 6)
- 3.4 3.4.1 Microwave – in line of sight (radio waves do not need the line-of-sight) (2)
- 3.4.2 Third generation standard cell network. Fast (High speed-broadband) cell network. Combines HSDPA and HSUPA (2)
- 3.4.3 Wireless – it will be cheaper – 3G very expensive (2)
- 3.4.4 (a) Switch – Connecting device for network. Cuts down on traffic by establishing connections only where the data must be sent. (Not broadcasting) (2)
- (b) Proxy server – Powerful/server used for clients to use the Internet by storing recently accessed web pages. (2)
- (c) Router – device to connect different network architectures with path selection. (2)
- (d) Scanner – is a device that optically scans images, printed text, handwriting, or an object and converts it to a digital image. (2)

**[35]**

**QUESTION 4**

- 4.1 System software – manage and control, e.g. Windows 7  
Application software – specific task, e.g. MS Word (2)
- 4.2 4.2.1 No (1)
- 4.2.2 A licence agreement only gives you the right to use the software. (1)
- 4.3 4.3.1 A **firewall** is hardware or software that monitors and detects all traffic coming into and going out of a network. (2)
- 4.3.2 Software that detects AND REMOVES malware (viruses) from your computer. (2)
- 4.3.3 **RAID** – No marks for writing it out. Protect against hard disk failure. More than one HDD is used either to mirror or stripe the data so that if one disk fails the data is not lost and can be rebuilt (usually without any server time loss). (2)
- 4.4 4.4.1 Any two (2)
- Hand geometry systems
  - Voice verification systems
  - Iris recognition systems
  - Facial recognition systems
- 4.4.2 Yes – protect person's identity (3)  
**OR** No – help with security; correct person's ID + 2 reasons.  
This answer must be marked according to the learner's reasoning.
- 4.5 4.5.1 Real-time: It must be able to process data as it comes in, typically without buffering delays. Processing time requirements are measured in tenths of seconds or shorter real-time application requests. (2)
- 4.5.2 Virtual memory – An extension of RAM using the hard drive. The operating system has to constantly **swap** information back and forth between RAM and the hard disk. Data is divided into pages. (4)
- 4.6 4.6.1 Multitasking – Ability to execute more than one task at the same time. Multithreading – The ability of an operating system to execute different parts of a program, called threads, simultaneously. (4)
- 4.6.2 Yes + 2 reasons (3)  
If only one application running, each thread can run on a separate processor. Operating system produces many threads.
- 4.7
- When device is inserted, an interrupt is generated CPU set to run PNP routine by the operating system. (2)

**[30]**

**QUESTION 5**

- 5.1 Two arguments (2) Two justifications which include an explanation. (2)  
Possible arguments and justification. **Any Two**
- Fastest, simplest way to **stay close** to everything you care about. Which is an improvement on sending letter – previously had to read newspaper.
  - Real-time **information** that **connects** you to the latest stories/opinions/news.
  - **Follow** all conversations – previous technology – each conversation is separate such as a telephone call.
  - You do not even have to tweet, but can still access people's voices/opinions/information about topics you are interested in. Previously all information was in separate websites or any comparison. (4)
- 5.2 5.2.1 #rhinoWatch anything with # in front relating to rhino. (1)
- 5.2.2 Yes – help to know the position of rhinos for tracking poachers (valid reason)  
**OR** No – Possible reason: Not **advertising positions** of rhinos to poachers. (2)
- 5.3 **One mark for explaining what it is and one mark for listing the difference.**
- 5.3.1 A Web log – like diary entries of a single person (maybe small group) telling of happenings and news developments. (2)
- 5.3.2 A wiki is a collaborative webpage or online encyclopaedia created by many people and is referenced. (2)
- 5.3.3 A discussion group on Internet that has a certain topic. Many people post many comments and messages in threads which are not referenced. (2)
- 5.4 Wiki – provides a structure to create formal documents. (2)
- [15]**

**QUESTION 6**

6.1 To uniquely identify a record. Prevents duplicate records with the same primary key. (2)

6.2 6.2.1 ItemQuantity – Number/Integer  
ItemCost – Currency/real/double/decimal number (4)

6.2.2 Too much information which may be repeated has to be inputted for each quote. For example: any of the company details must be entered for every quote  
(OR any other example that refers to the given data) (2)

6.2.3 Delete anomaly, Insert anomaly, Update anomaly (Or correct descriptions) (3)

6.2.4

Company	Items	Quote
CompanyCode (PK)	ItemCode (PK)	QuoteNo(PK)
CompanyName	ItemDescription	CompanyCode (FK)
CompAddress		Item Code (FK)
CompEmail		Item Quantity
		Item cost

NOTE: 3 tables

Primary keys indicated

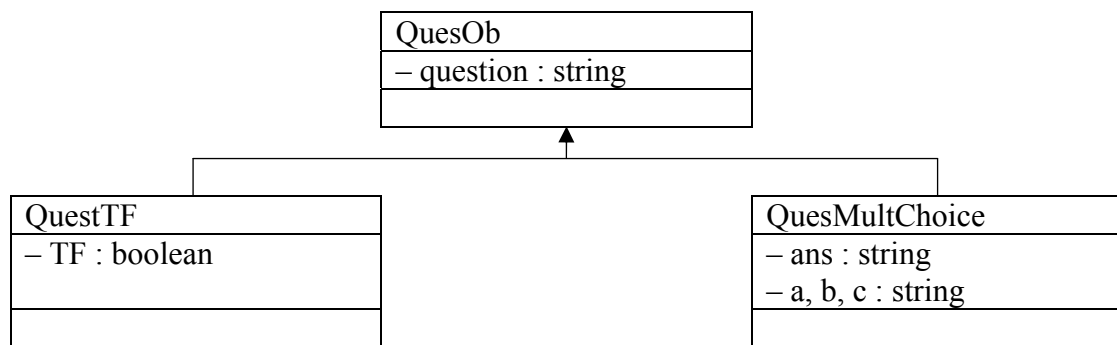
Items and Quote must have CompanyCode field to link to company table (9)

6.3 6.3.1 Validation rule (1)

6.3.2 ItemQuantity > = 100 and ItemQuantity <= 5000 (2)  
**[23]**

**QUESTION 7**

7.1



(3)

7.2 Code re-usability. Child class comfortably extends all behaviour from its parent class.



- 7.3 Subclasses of class can define their own unique behaviour yet share some of the same functionality of the parent class thereby having the ability to take on more than one form. (2)
- 7.4 7.4.1 A parameter declared in the method header. It receives its value from the argument. (2)
- 7.4.2 Used in a call to a method, with the actual value. Is copied to the formal parameter. (2)
- 7.5 Validation of (20) digit number:
  - 7.5.1 **Java:** int[]arr = new int[20] **OR**  
**Delphi:** arr = array[1..20] of integer; or string (2)
  - 7.5.2 Any acceptable method that uses the above data structure.

Possible Method 1:	Possible Method 2:
Method validate number Begin Loop count = 1 to 20 Read(arr[count]) Endloop Sum = 0 Loop count = 1 to 19 Sum = Sum + arr[count] Endloop If arr[20] = Sum mod 20 Then output("The number is valid") Else output("The number is invalid") EndIf End	Input numstr Total ← 0 For i ← 1 to length(numstr) – 1 Begin total ← total + val(numstr[i]) end Remainder ← total mod 20 If val(numstr[20] = Remainder Then output valid Else output invalid

Alternative solution: (using val)

- Val is a procedure that converts a string to a numeric value. (Delphi)
  - String value of (number) (Java)
  - Or
  - Integer.toString(number)
  - Or
  - ""+number;
- }
- JAVA  
Array of integers

Algorithm mark allocation (any correct method).

- Input 20-digit number, using loop
- Initialize sum or total
- Add to array, using loop
- Check for valid number
- Output result (7)

Note: Use above guidelines when marking individual solutions (any correct method).

[20]

**Total: 180 marks**