



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2015

INFORMATION TECHNOLOGY: PAPER I

MARKING GUIDELINES

Time: 3 hours

180 marks

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.

SECTION A SHORT QUESTIONS

QUESTION 1 Multiple Choice

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
D	A	A	A	C	C	B	B	D	D

[10]

QUESTION 2 Matching Columns

2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10
G	B	L	I	E	M	A	K	D	J

[10]

20 marks

SECTION B SYSTEM TECHNOLOGIES**QUESTION 3**

- 3.1 Secondary memory (storage) is used for holding **all programs and data**, **irrespective** of whether they are currently being used or not – therefore a lot of space needed.
Primary memory (RAM) is used for holding only those programs and **data currently** being used while computer is switched on – therefore much less space needed. (2)
- 3.2 DVD drive is not 'forwards compatible'. OR No Bluray drive
A DVD player cannot play blu-ray movies. (1)
- 3.3 *VGA* and *HDMI* are graphics ports (to connect to a monitor or data projector).
Display multimedia – video output, sound & images (1)
- 3.4 Any TWO of:
• screen size 15.6" (not a standard desktop computer monitor size)
• Bluetooth (standard with many portables, not with desktop computers)
• Touchpad (input device associated with portable computers)
• Wireless LAN (2)
- 3.5 3.5.1 The Intel i5 supports dynamic overclocking of the CPU (Turbo Boost) to enhance performance, OR the clock multiplication factor can be changed.
OR the CPU can be overclocked to increase the speed.
Manufactured / Default speed (2)
- 3.5.2 (Any TWO):
More cores / Two logical cores / Virtual processors
Hyper-threading
Larger cache (2)
- 3.5.3 Each task can be on a separate set of registers in the CPU.
Two sets of registers (2)
- 3.6 Because processing and storage of cloud-based **software** takes place on **Internet servers**, not on your local computer. So you do not need to worry about things like CPU speed and hard drive space needed to run and store the program.
All hardware & infrastructure are outsourced. (2)
- 3.7 3.7.1 WiFi enabled computers can print to the printer without a cabled connection. Print anywhere (1)
- 3.7.2 Laser printer
Accept industrial or large volume printer. (1)
- 3.8 The equipment used to screen checked baggage might have **magnetic fields** which could **damage/erase** data on your mechanical hard drive. (2)

[18]

QUESTION 4

- 4.1 4.1.1 Interpreters – Software that translates programming instructions into machine **code one line at a time**. Does not generate executable files. Compilers – Software that translates programming instructions written in a high level language into **separate compiled files**. (2)
- 4.1.2 Interpreters – BASIC, Python, Java Virtual machine, Scratch, Java Script
Compilers – C, C++, Delphi, Java (2)
- 4.2 4.2.1 Files are compressed on the same disk.
OR Static / old / unused files are usually moved to a secondary system (other computer/hard drive dedicated for this purpose) or to optical media, thereby freeing up space on the server. (2)
- 4.2.2 A virtual server divides a single server into many servers. Each with its own possible operating system. No, a virtual server will not save space unless the virtual server is on a different machine.
Accept yes, if reason moved off site to the cloud. (3)
- 4.3 4.3.1 (Any ONE explained OR TWO practical reasons named)
Disallow games being run – wastes company time
Recording/copying information, i.e. spying/theft.
Loss of valuable company data (2)
- 4.3.2 SaaS
Accept Office 365 / Google docs / Google slide (1)
- 4.3.3 Yes / No
Motivation - Data stored in the cloud belongs to the company that owns the cloud service. Unless encrypted it is not secure. (2)
- 4.3.4 No, too big, waste space/depending on the size of video
Yes, use as backup OR up-to-date version OR always available (2)
- 4.3.5 (Any TWO)
- Accessible from anywhere on any device with Internet access
 - Easy to share files with others
 - Backups are managed by the hosting company (i.e. you don't need to do this)
 - No need for hardware or software to manage storage.
 - Up to date version of latest software (2)

- 4.4 4.4.1 (Process listed THREE in correct sequence)
OS detects and queries new device / Allocating driver
Checks table if previously installed
Allocates IRQ or IO range/buffer / Automatic configuration (3)
- 4.4.2 Multitasking – if the presentation cannot record and a separate application
is used.
OR multithreading – if the presentation software can also record (2)
- 4.5 4.5.1 Pixels (1)
- 4.5.2 Any TWO of:
- Cheaper than normal phone calls, or travelling to a venue
 - Can also **see** the other participants – convey non-verbal clues/body language
 - Can view same documents/exchange files while in conference
 - Accept eco-friendly, but only with an explanation (2)
- 4.5.3 Open source operating system (2)
- 4.6 4.6.1 OCR (Optical Character Recognition)
Accept scanner (1)
- 4.6.2 Save in PDF-format.
Accept rtf- format or txt-format (1)
- [30]

48 marks

SECTION C INTERNET & COMMUNICATION TECHNOLOGIES**QUESTION 5**

- 5.1 5.1.1 Any TWO of:
- Users can access their files from any computer on the network.
 - Backups can be performed centrally (users do not have to worry about this).
 - Easier for administrator to manage home folders (add, remove files, etc.)
 - Master copies of files are stored centrally – no need to distribute to other computers, etc.
 - Better security
- (2)
- 5.1.2 Any TWO of:
- Speed and performance of the CPU(s)
 - Size of the memory
 - Amount of storage space
 - Type of OS
- (2)
- 5.1.3 (a) (Any ONE advantage of):
- Very fast (faster than UTP)
 - Can run greater lengths of cable / Attenuation
 - Not susceptible to EMI/Surges/lightening
 - No crosstalk
 - No eavesdropping
- (1)
- (b) (Any ONE disadvantage of):
- Difficult to install
 - Expensive to install
 - Fragile – breaks more easily than UTP
 - Can't bent it / Cannot be repaired, must be replaced
- (1)
- 5.2 5.2.1 Tries to monitor and track the way you use your computer then sends this info to third parties, without your consent or knowledge OR records key strokes and sends to a third party.
- Any ONE of:
- Keep your anti-virus software's definitions up to date (anti-virus software often includes anti-spyware software).
 - Be careful when installing software from the Internet (and from other dubious sources).
 - Do not click on links in pop-ups.
 - Do not open programs or attachments unless you know what you are doing.
 - Keep informed –stay abreast of media reports and warnings, etc.
- (3)

- 5.2.2 (a) Firewall allows you to control which programs can access the Internet, thereby protecting the computer from unauthorised access – type of 'gatekeeper' between your PC and the Internet, monitoring traffic in both directions. Content filtering. (2)
- (b) Proxy server – Client requests a website, Proxy checks cache, Proxy denies the request based on policy. OR Proxy **caches websites**. (1)
- 5.3 5.3.1 (Any ONE of – must relate to **data**):
- Can use touch or pen-sensitive monitor to interact directly with screen – can be faster than a keyboard.
 - Can interpret handwriting (course notes) and convert this into typed text.
 - Easier to take photos / Easier to record voice / videos (1)
- 5.3.2 An intranet is an organisation's **private** network – info stored on intranet is only available to the organisation's employees. (1)
- 5.3.3 (Any TWO of):
- Specify that the device should 'sleep' or 'hibernate' when it has not been used for a specified period of time.
 - Set brightness of screen to reduce power consumption
 - Choose a balance between power consumption and performance
 - Disable USB ports/Underclock CPUs
 - Block Flash Ads and close unnecessary processes
 - Disable wireless/Bluetooth
 - Disable/uninstall apps that send (unnecessary) notifications, etc. (2)
- 5.4 5.4.1 (Any TWO)
- Multiple tables, e.g. phone, maps, music on one device.
 Less to carry around
 Less power
 Easier to charge
 Easier to backup
 Cheaper to buy than many devices (2)
- 5.4.2 You don't have to 'log on' to retrieve your email – smartphone receives email automatically, and notifies you that a message has arrived. OR Emails always up to date on the device. (1)
- 5.4.3 (Any ONE of):
- Making image sizes smaller
 - Avoiding Flash/multimedia effects that require greater resources
 - Not using pop-ups, etc.
 - Responsive web design / Limit data & less information (1)

- 5.5 Remote desktop connection (Connect + Control)
- Software is configured on **host** and target computer and user can **log on to remote computer** using the host.
- VPN (Any)
- Users log on to the **network via a remote location** with the same security and privacy as logging on to a LAN.
- OR
- The LAN is 'extended' to the remote location using the Internet. (4)
- 5.6 5.6.1 Permissions can be used to **control** the type of access users have to files or folders on the network (e.g. **read only, read and write, edit, view**, etc.). Permissions can be granted to a single user or to groups of users. (2)
- 5.6.2 Public key encryption uses **mathematical algorithms** to create two separate keys for the encryption/decryption process. One key is private (secret) and the other is public. The public key is used to **encrypt** the plain text and the private key is used to **decrypt** the text. You cannot decrypt the message using the key that was used to encrypt it. (3)
- 5.7 5.7.1 With BitTorrent, the whole file is not downloaded from one single server but rather collaboratively by other BitTorrent clients. Split up, use multiple seeds/many computers (2)
- 5.7.2 No + reason (Do not accept “yes”)
BitTorrent itself is merely a file sharing method and is not illegal to use as such. You just need to be careful to avoid using BitTorrent to download material that has copyright restrictions. (2)
- 5.8 5.8.1 User requests a Web page from the server → the script in the page is interpreted by the server creating/changing the content of the page → the final page is sent to the user. (2)
- 5.8.2 To increase the number of visitors OR to the page by getting a higher rank in the search results. (2)

37 marks

SECTION D SOCIAL IMPLICATIONS**QUESTION 6****6.1.1 ANY FOUR**

- Always create a separate email account for your online activity.
- Get a post office box, rather than using your home address, to register for the site. (Do this for all sites where an address is required.)
- List your cell phone number, not your home number, if the site requires one.
- Change your cell phone billing address so it goes to your post office box. That way, if some nut has access to a backward phone book (one with phone numbers in numerical order and their corresponding addresses) he can't look up your address.
- When chatting or emailing, never give more than a first name.
- Install a privacy checker on your computer. This lets you set privacy standards and be alerted when an unsecure site doesn't meet them. These checkers are often free and can be downloaded online.
- Secure password / change password frequently (4)

6.1.2 Any THREE

- Do not see the person face to face
- Easy to type without consequences
- Anonymous
- Not considered aggressive/not violent (3)

6.2 6.2.1 Microblog is a **social media** site (e.g. Twitter) to which a user makes **short, frequent posts**. Brief messages about personal activities/short text updates of **140 characters** OR less. It may include hashtags. (2)

6.2.2 The purpose of a hashtag in a tweet is to **categorise** tweets by **keywords**. The symbol # is before a relevant keyword or phrase in the tweet. It helps with 'search'.
Link / relate / associate content together. (2)

6.2.3 (Mark according to candidates' arguments - must give TWO convincing arguments) (**2 marks for each correct argument**)
Possible answers:

- Yes, human rights/laws in countries/culture and religion differences should be respected. OR / AND
- No, argue freedom of speech/Twitter is social media for everybody to use. (4)

6.3 6.3.1 Distributed processing (Use more than 1 processor to perform the processing of an individual task) (e.g. the processing of a database task, using a client and server via a network) Accept an example of grid computing. (1)

6.3.2 Botnets, spyware to harvest information /Spam (1)

6.4 Software applications can use the geographical position of a device.
GPS location / Cell location (2)

19 marks

SECTION E DATA AND INFORMATION MANAGEMENT & SOLUTION DEVELOPMENT

QUESTION 7

- 7.1 7.1.1 Databases are ideal when you have a large amount of related data to store and quickly need to be able to add to, update, query, and create reports about the data. Structured / Queries / Scalable (2)
- 7.1.2 Data integrity (1)
- 7.1.3 Data validation (1)
- 7.2 **Database Analyst** – focuses on the meaning and usage of the data, decides on the proper placements of fields, and defines the relationships among data. (2)
- 7.3 7.3.1 Record (1)
- 7.3.2 Query Accept filtering (1)
- 7.3.3 One-to-Many (1)
- 7.3.4 **(Any ONE correct explanation)**
Links the information in the tblStaff table to the tblAccess table.
Create a **foreign key** to link tables. (2)
- 7.3.5 **(Any ONE)**
The number of entries into the school premises is unknown.
The AccessNo should not be physically captured.
There will be no possibilities of duplicate numbers.
Create a sequence of numbers.
Unique identifier (1)
- 7.3.6 It will create a new field, called 'SecretCode' – taking the 1st letter of the staff member's name and the 1st letter of their surname, add '-', and generate a 2-digit random number.

Example:

SecretCode
▶ AB-32
SC-63
PS-20

Due to the fact that “EntryNo” and not “AccessNo” were used in the question paper, ALL candidates were given THREE marks for this question. (3)

- 7.3.7 The numbers 0 to 9 could be generated OR producing a single digit number. (2)

- 7.4 7.4.1 Update anomaly – school name needs to be updated in more than one place
OR
Insert anomaly – cannot insert a school without a student
OR
Delete anomaly – if we delete a school, we will lose all information about a specific student (2)
- 7.4.2 Removes / eliminate **transitive** dependencies (2)
- 7.4.3 Reorganise the data into two tables, i.e. tblStudents and tblSchools:
tblSchools(**School ID**, SchoolName, Principal) (table and correct fields)
tblStudents(**ID Number**, Surname, Name, School_ID) (table and correct fields)
Primary Key = School_ID (in tblSchools table); ID_Number (in tblStudents table)
Foreign Key = School_ID in tblStudent table
Schoolname can be used in place of School_ID (6)
[27]

QUESTION 8**8.1 Possible Solution:***Balance* ← 10 000 (**Initialise variables**)*YearsPassing* ← 0**DO (loop)***Interest* ← 0.20 * *Balance***(Correct calculations for Simple OR Compound interest)***Balance* ← *Balance* + *Interest**Balance* ← *Balance* – 3000*YearsPassing* ← *YearsPassing* + 1 (**increment**)Loop until *Balance* ≤ 0Output 'The process took '; *YearsPassing*, 'years' (**output**)**End**

(7)

8.2 8.2.1 In a class all fields should be declared as private which are accessed by public methods.

Accept information hiding with an explanation.

(2)

8.2.2 (a) A solution that is short (simple) OR once only OR will not be reused, e.g. finding an average of 5 numbers OR Any correct scenario.

(2)

(b) A large (more complex) solution that needs to be subdivided/reused, e.g. coding a payroll solution OR any correct scenario, e.g. Combining a group of attributes.

(2)

8.2.3 VAT – the value is always 14%.

OR Discount – if the discount is always the same.

OR any other valid answer justifying why a variable cannot change its value.

(2)

8.3 Arrays

8.3.1 (Any TWO)

- Randomly generating data
- Assigning data in the program
- Reading from a text file
- Reading from a database (2)

8.3.2 Algorithm

(a) **visitArr**

6	9	4	1	...
---	---	---	---	-----

- (i) 2 marks for a correctly populated array.
Ran out of data (2)
- (ii) Remove the input number statement above the first loop in line 4
Run loop ONE less (2)

- (b) **NOTE:** Additional statements might be required.
- Line 10 Average = total/5 (correct position)
 - Line 11 Display average
 - Line 12 loop 5 times
 - Line 13 If visitArr[loop] > average
 - Line 14 Display daysArr[loop]
 - Line 15 End loop
- If run out of data used in 8.3.2a), then mark accordingly (4)

8.4 Sort Algorithm on TWO fields:
 IF-statement to compare and sort on Name first, then swap
 IF-statement to compare and sort on Surname second, then swap
Possible Solution OR any other correct solution

Mark allocation:

3 marks comparing on surname & name fields
 1 mark swap (to sort on 'surname' & 'name' field)

Possible solution:

```

Declare variables: int count1 count2
temp :tStudentClass
Begin
    Loop count1 from 1 to the length of the Array – 1
    Begin
        Loop count2 from count1 + 1 to the length of the Array
        Begin
            Check if tStudentArr[count1].getSurname > tStudentArr[count2].getSurname
    
```

OR *(tStudentArr[count1].getSurname = tStudentArr[count2].getSurname
and if tStudentArr[count1].getName > tStudentArr[count2].getName)*
Begin
 temp ← tStudentArr[count1]
 tStudentArr [count1] ← tStudentArr[count2]
 tStudentArr[count2] ← temp
endIf

OR

Loop 1

Loop 2

Begin

Sort 1 ←getSurname[counter1]

+getName[counter1]

Sort 2 ←getSurname[counter2]

+getName[counter2]

IF Sort 1 > Sort 2

Swap

End

(4)

[29]

56 marks

Total: 180 marks