



NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2021

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

QUESTION 1

- 1.1 The ability of a variable or object to take on multiple forms.
- 1.2 The use of human characteristics as a form of identification.
- 1.3 Injury to a part of the human body as a result of continuous movement in one orientation.
- 1.4 The speed ratio between the FSB and CPU. Allocate one mark for "clock ratio".
- 1.5 The ability to remove a component without powering the device down.

QUESTION 2

- 2.1 E
- 2.2 J
- 2.3 F
- 2.4 C
- 2.5 I
- 2.6 M
- 2.7 B
- 2.8 D
- 2.9 H
- 2.10 A

SECTION B

QUESTION 3

- 3.1 3.1.1 A piece of software which assists a device to interface with the operating system.
- 3.1.2 New drivers often contain patches for weaknesses or other vulnerabilities in devices as well as adding new features. The new features, or even tweaks to improve the way in which the device operates can result in improved performance.
- 3.2 3.2.1 It results in the processor working at a higher/faster rate and therefore being able to process more data in unit time.
- 3.2.2 Focussing on the GPU will assist gaming by refreshing the graphics faster, resulting in better images/graphics transition. This is important in gaming.
- 3.3 3.3.1 Hardware cannot be changed on a laptop as the components are soldered onto the motherboard, not removeable/replaceable like on a desktop. He has on-board graphics, it might violate his guarantee. ANY TWO.
- 3.3.2 By increasing the RAM on the graphics card if this is possible, or by increasing the system RAM which the graphics card will use. OR overclock CPU.
- 3.4 3.4.1 Because files get scattered over the disk surface over time as other files are deleted/moved.
- 3.4.2 The game will load quicker initially, data that is being written away to the HDD during the game will write faster, less use of virtual memory
Any two correct factors.
- 3.5 If the laptop is dirty, it could result in air vents being blocked up, which will make the laptop run hotter and demand more cooling which can be detrimental to performance. It could drain your battery since overheating, keys could get stuck. ANY ONE.
- 3.6 3.6.1 An application which is loaded in memory (RAM) but is not currently being used. Accept: process is waiting/suspended.
- 3.6.2 A music application (e.g. iTunes), anti-virus program. Accept any valid answer.
- 3.6.3 The time required for the execution of one simple processor operation/machine instruction, OR the time required for the fetching and execution of one simple machine instruction. Accept Fetch/Execute/Decode/Store.

- 3.7 3.7.1 Operating System, applications. Accept other correct answers.
- 3.7.2 Users usually forget to do updates; to ensure that the most up to date versions and patches are installed; reduce the risk of the system being attacked via a vulnerability. Any ONE valid option.
- 3.7.3 The downloading and processing of updates all have an effect on the system performance; when gaming you want the full resources of the machine available to you.
- 3.8 3.8.1 (a) Option 2: option 1 is too slow (clock speed) option 3 – games might not support 6 cores – wasting resources.
- (b) Option 3: option 2 too expensive, far too large, option 1 insufficient for gaming.
- (c) Option 3: get the biggest you can to store lots of games and other programs, (to be used for his studies) alternative Option 2 if non-gaming files stored offline. Option 1, not big enough.
- 3.8.2

Reason for cooling	As CPUs work, they generate heat. for reason
Consequence of not cooling	This heat needs to be removed to allow the CPU to work as efficiently as possible, and to prevent failure. for consequence
Technique 1	Heat sink ; fan
Technique 2	Water cooling ; nitro *One mark for each correct technique. Accept correct options.

SECTION C

QUESTION 4

- 4.1 4.1.1 Star
- 4.1.2 (a) A switch is a device which connects nodes together in a network.
- (b) **Switch traffic filtering** reduces the traffic load carried by the set of Ethernet cables connected to the switch, thereby making more efficient use of the network bandwidth.
- 4.2 4.2.1 A port on a laptop/desktop where an ethernet (LAN) cable can be connected. Must mention that it is a cabled connection.
- 4.2.2 Via a wireless network, Bluetooth
- 4.2.3 If they chose Bluetooth then No. The all-in-one router does not have Bluetooth.
If they chose Wireless then Yes. The all-in-one router will be able to provide the wireless link.
- 4.3 4.3.1 Mbps Accept bps, Gbps
- 4.3.2 Poorly configured network/poor cable connections; multiple collisions. Slow switches, wifi is shared.
ANY TWO.
- 4.3.3 Data will be dropped/lost, will need to re-send, generally slow down performance of game; collisions on network: will need network packets to be re-transmitted between clients, will slow down performance. Per correct effect.
- 4.4 4.4.1 IP address is a string of numbers which uniquely identifies a node on a network.
- 4.4.2 So that data can be sent to the correct node on a network, if they are not unique then the network won't know where to send the data to.
- 4.4.3 An IP address is specific to a node on a particular network, but the MAC address is fixed to the node and is used on any network the device connects to. MAC address is associated with a device, an IP address is associated with a LAN.
- 4.5 4.5.1 The upload and download speeds are different.
- 4.5.2 Yes. It should be fine as most of the data transfer will be downloaded, however, if there are a lot of clients they could saturate the upload portion.

- 4.6 UPS: No – a UPS cannot block traffic, it merely allows for equipment to carry on working when the power drops.
Anti-virus: Yes – anti-virus software will assist by scanning incoming files to see if they contain any malicious code.
RAID: No – RAID is a storage technology and does not assist with filtering data coming in or out of a network.
Firewall: Yes – a firewall will inspect all incoming and outgoing packets and can detect many different types of attacks.
- 4.7 4.7.1 Secure Socket Layer.
- 4.7.2 Public Key, private key. Both are needed as the public key is known by both clients in a data transaction and is used to encrypt the data. A private key is needed to decrypt the data and is only known to the receiving client.
- 4.7.3 A digital certificate.
- 4.7.4 A certificate authority.
- 4.7.5 A larger key will enhance the level of security on the website. Websites that transfer more confidential data might want to use a higher number of bits to encrypt the data, making it more secure.
- 4.7.6 Look for an alert, such as a padlock, on their web browser; ensure that the URL is an https URL and not just http. Any correct option.
- 4.7.7 A news website; a website giving information about appliances:
Accept correct answers.
These sites are not transferring confidential data, so they don't need to encrypt the data.
- 4.8 Twitter: Will be able to send out small bits of information about what **The Clan** are currently up to/busy with, what games they are playing, people will be able to follow them, keep up to date and share their information.
Facebook: Could use this to post videos, live video feeds of gaming evenings, send out invitations to events, get feedback from others about what they are doing.
Blog: This would give them a record of what they are doing for others to read, contribute to and make suggestions.
- 4.9 Is the information up to date? Who wrote the information – an authority or just anyone? Is the site affiliated to a reputable organisation? Is the content shown objectively?

SECTION D

QUESTION 5

- 5.1 5.1.1 No. They want to get the application running and working and don't think about potential problems.
- 5.1.2 For tagging, for authentication, for checking identity. Any two correct options. Accept options which might be unscrupulous.
- 5.1.3 (a) AUP
- (b) If Yes: employee signed the policy and Facebook can prosecute. OR No: Facebook was negligent in not protecting the data.
- 5.1.4 A way of gaining access to a piece of software (application) which bypasses the normal security measures.
- 5.1.5 In the event of an accident; in the event of an attack/theft, voice recognition, impaired people. Accept correct answers.
- 5.1.6 If their battery is suddenly draining quicker than normal, data usage is higher than normal, any indicator lights showing use of a component are visible. Accept correct answers.
- 5.2 5.2.1 Hacker: Someone who gains access to a system/network to prove that there is a vulnerability, but does not steal information/data. The hacker will view passwords, etc.
Cracker: Someone who gains illegal access to a system/network in order to steal data/information. The cracker will change passwords or make use of them for criminal purpose.
- 5.2.2 By sending a malicious file to a person's phone, which they then download and install/open which then triggers code which can access areas/devices that shouldn't normally be available/accessible. Accept correct options, including social engineering techniques.

SECTION E

QUESTION 6

- 6.1 6.1.1 In order to be able to identify individual records in a table uniquely.
- 6.1.2 Because names are not always unique, a name alone is not a suitable primary key as it will not guarantee uniqueness.
- 6.1.3 (a) Candidate
(b) Composite
- 6.2 6.2.1 Provinces and people are unrelated objects.
- 6.2.2 Update: There are two people with the same surname – it could be tricky to differentiate between them.
Insert: If you don't know which province a person lives in you can't add them to the database.
Delete: With two people having the same name, you could delete the wrong person; deleting a person where they are the only person registered in a province will delete all references to that province.
- 6.2.3 To remove any indirect relationship between values in the same table which will result in a functional dependency OR to prevent anomalies OR prevent data redundancy between non key fields.
- 6.3 6.3.1 Sylvester Cain has a fine for not voting but is not yet 18 years old in 2019.
Joyce Ruby (from the NC) is not a citizen but has voted previously.
Eve Robbins voted previously but would not have been old enough to vote 10 years ago.
Sonja McCain voted previously but would not have been old enough to vote 10 years ago.
Dale Minerva has a fine for not voting previously, but he didn't as he would not have been old enough to vote 10 years ago.
3 for 3 correct errors detected.
- 6.3.2 By making use of range checks, logic check, use of components.
Explanation of what the check would do.
- 6.3.3 Inspect audit logs to see when changes were made for any correct option. OR compare parallel data sets.

QUESTION 7

7.1

Voter
-voterName : string -voterID : string -outcome : boolean
+constructor(vn:string, vid:string, hv:boolean) +getVoterName() : string +getVoterID() : string +getOutcome() : int +setOutcome(hv:boolean) : void +toString() : string

Mark allocation:
for class name
for all fields private
for all fields named correctly and of correct type
for constructor
for correct fields and types on constructor
for all methods as public
for all correct accessor and mutator methods, typed
for toString for correct type for toString

7.2

```

age ← 0
name ← read from file
ID ← read from file
voted ← read from file
for all values correctly assigned

if ID.characters at 0 = '0'
    age ← 2019 – convert to int ("20" + ID.characters 0 and 1)
else age ← 2019 – convert to int ("19" + ID.characters 0 and 1)
end if

if age <18 AND voted = Yes
    display name + " was not eligible to vote and did vote – FRAUD!"
end if

if age >=18 and voted = No
    display name + " was eligible to vote and did not vote – fine this person! "
end if
    
```

7.3

7.3.1 Void. The method is merely making a change to the data item and not sending any value back to where it was called from.

7.3.2 From a parameter.

- 7.3.3 (a) In the constructor method.
(b) To prevent a method outside the class changing its value.
- 7.3.4 For a programmer to see the data when debugging.
To display the values of the ENTIRE array.

Total: 180 marks