NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2024

INFORMATION TECHNOLOGY: PAPER II

MARKING GUIDELINES

Time: 3 hours 150 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 DEFINITIONS

1.1 Overclocking

1.2 Modular design

1.3 Virtual memory

1.4 Bus Anything with bus

1.5 System Clock NOT CMOS

1.6 SSL/TLS Certificate – Accept Digital Certificate

1.7 IRQ/Interrupt

1.8 Cache Allow SRAM

1.9 Method overloading

1.10 Unified Extensible Firmware Interface (UEFI)

SECTION B SYSTEM TECHNOLOGIES

QUESTION 2 THEORY

2.1 I

2.2 L

2.3 M

2.4 H

2.5 K

2.6 J

2.7 B

2.8 A

2.9 D

2.10 F

QUESTION 3 APPLICATION

3.1 Mouse / keyboard / printer.

Accept any correct device which will connect to a USB port.

3.2 3.2.1 4 GB

3.2.2 Open-ended depending on the justification, but entry-level laptops are standard with 8 GB.

Award one mark for yes or no if the justification is related to the scenario and the student has correctly identified RAM as being the primary memory. Facts that could influence the decision could be cost, not power users, etc. – we are looking for an understanding that different users would have different requirements.

3.3

Operating system name	Suitable Justification	Cost implications
Linux	3.3.1 Yes, it has 2 cores and 2 threads. Linux is known for its compatibility with a wide range of hardware, including Intel processors.	3.3.2 None – opensource/ free.
Windows 11	3.3.3 Yes/No – can run it as minimum requirements are met BUT it's going to have performance issues.	3.3.4 Pay for license (propriety software).

3.4

Technique: Multitasking	**Example:** Focus is on different tasks/programs at the same time. Running multiple browsers at the same time. Running Word and Excel at the same time. Running a browser and a music program at the same time.
Technique: Multithreading	**Example:** Playing a video and downloading it at the same time. Browser accepting input from the user and is fetching data at the same time. Allow identification of modern CPUS having multiple cores. Multiple tabs operating in a browser at the same time. Accept any valid example. Focus is on different parts of the SAME program/task happening at the same time.

Make sure candidates are not simply repeating the same information in a different wording for both examples – the answers need to be different from each other.

3.5

Component 1:	GPU – specialised processor designed to accelerate computer graphics and image processing.
Component 2:	VRAM – it temporarily stores data for the GPU to access, which makes for better performance. Don't allow cooling fan

3.6 Do not allow external devices. 1 mark for device and 2 marks for justification – must relate to scenario.

SSD – they are much faster, more reliable, much quieter and use less power compared to HDD.

Laptop is going to be used for business, so HDD is not really suitable but allow it depending on reasons; for example, there are many instances where a business laptop will quite happily run with a modern low-power laptop HDD. A good reason for choosing the HDD might be given from the scenario that they want to reduce start-up costs.

HYBRID – accept as the intent is adding some of the speed of SSDs to the cost-effective storage capacity of traditional HDDs. The purpose of the SSD in a hybrid drive is to act as a cache for the data stored on the HDD.

3.7 **ADVANTAGES**

- The backup would be remote which can be safer.
- The process of backing up and recovering data is simplified since those now reside on the cloud and not on a physical device.
- The cloud can accommodate and store much more data compared to a personal computer.
- Saves businesses the need to upgrade their computer hardware, further reducing the overall IT cost.

Do not allow reliable and do not allow one-word answers such as faster, efficient.

DISADVANTAGES

- Security and privacy of the data can be compromised.
- Downtime due to outages or bad connections.
- Ownership issues.

SECTION C INTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 4 THEORY

Question	4.1	4.2	4.3	4.4	4.5
Answer	B	D	D	C	B

4.6 4.6.1 UDP.

4.6.2 This is because UDP allows for faster transmission of data by sending smaller packets of data without waiting for an acknowledgement of receipt. Do not accept secure.

4.6.3 Some quality is sometimes lost. Packets can be lost, which might lead to lagging.

4.7 MAC for first row IP for second row

QUESTION 5 APPLICATION

5.1 5.1.1 A wireless router, combines the networking functions of a wireless access point and a router. A wireless router allows for wireless devices to connect to a network and the Internet (must include Internet for second mark).

5.1.2 Eavesdropping – signals can be intercepted by outsiders.
Attenuation – signal strength degrades as it travels over a distance.
Crosstalk – when signals from one line interfere with signals from another.
Electro-Magnetic Interference (EMI) – Nearby signals from other sources, such as machinery or fluorescent lights, can corrupt the signals travelling through a copper cable.
Allow data is open to interception. Do not allow slower transmission speeds or any form of cost implications.

1 mark for term and 1 mark for correct description. Level 1 question so allocate marks for term even if description is incorrect. Do not allow wear and tear.

5.1.3 Useful for mobile devices, in places where cabling might be a challenge, easy to connect and set up. Allow saving of money but must state the saving comes from not having to purchase cables.

5.2 5.2.1 Peer-to-peer

5.2.2 Does not use a single server to share files. All computers can upload or download torrents/files, i.e. can seed. Cost

5.3 5.3.1 A firewall is designed to prevent unwanted access to private data on a network, to filter packets on a network, provides protection from external attacks.

Absolutely no anti-virus discussion.

5.3.2
- Back up the data regularly.
- Install and regularly update anti-virus software.
- Store the data on a reliable medium.
- Update your patches.
- Install SSL certificates to stay ahead of threats.
- Upgrade Firewalls with Access Control Lists (ACL), Proxy and routers.
- Multi-factor authentication.
- Allow VPN with justification as it is a level 3 question.
- Allow Secure passwords.

5.4

	Difference	Example
Cloud Computing	5.4.1 Any service or resource that resides in the cloud. It involves processing power, software, and other resources delivered remotely over the internet not just storage.	5.4.2 Google Workspace, Microsoft 365
Cloud Storage	Specifically concerns the storage of files or data in remote servers accessible via an internet connection not services, etc.	**Google Drive** **Microsoft OneDrive** **iDrive** and **Backblaze**

5.4.3 Bandwidth is the set limit of data that flows across a wired or wireless medium. Accept: the maximum amount of data transmitted in a given amount of time. Speed is the measure of how much time it takes a file/data to transfer from a server to your device and vice versa.

5.4.4 VOIP – allows businesses to make and receive calls using the internet, which is cost-effective. Apps like Skype and WhatsApp use VoIP technology to enable free voice and video calls over the internet.

(Must give a benefit for the business AND how it could be used)

VPN – encrypts all data, providing secure transactions when customers make online bookings or payments. Provides a secure tunnel to access private resources on the network. Avoid ISP Throttling: Some Internet Service Providers (ISPs) may limit bandwidth during peak times. A VPN can help avoid this throttling, ensuring smooth internet access.

(Must give a benefit for the business AND how it could be used)

5.5 5.5.1 Spoofing/ email spoofing. Phishing / Smishing/ Identity theft /Social engineering

5.5.2 Is any malware that misleads users of its true malicious intent by disguising itself as a standard program.

5.5.3 Is a cyberattack intended to redirect a website's traffic to another.

5.5.4 Ransomware: This type of malware uses encryption to disable a target's access to its data until a ransom is paid.

Fileless Malware: It makes changes to files that are native to the operating system.
Spyware: It collects user activity data without their knowledge.
Adware: This type of malware serves unwanted advertisements.
Worms: They spread through a network by replicating themselves.
Rootkits: Rootkits give hackers remote control of a victim's device.

Keyloggers: They monitor users' keystrokes.
Bots/Botnets: Bots launch a broad flood of attacks.
Mobile Malware: This type of malware infects mobile devices.
Wiper: Wiper malware erases user data beyond recoverability.

Any relevant malware or activity with correct definition.

5.5.5 See above – definition must be correct to allocate the mark. Any relevant malware or activity with correct definition.

SECTION D SOCIAL IMPLICATIONS

QUESTION 6

6.1 Email address, full name, cell number, Date of birth
Any valid personal data relevant to opening an online account.

6.2

Risk	Description
Identity theft:	When personal information is shared online, it could potentially be accessed by cybercriminals. They could use this information to impersonate the individual, opening fraudulent accounts in their name or even committing crimes.
Phishing and scams:	Personal information can be used by scammers to craft convincing phishing emails or messages. These communications may trick individuals into revealing sensitive information like passwords or credit card numbers.
Data breaches:	Even when information is shared with trusted entities, there's always a risk of data breaches. If the organization's security measures are compromised, personal data could be exposed and used maliciously.

1 mark for risk and 1 mark for description. Level 2 question, so terminology for risks must be correct and not a general 'Data Sol'. Give the mark for the description if correct.

6.3 Processing of information is limited, which means that personal information must be obtained in a lawful and fair manner. The person processing data must ensure that the proper security safeguards and measures to safeguard against loss, damage, destruction, and unauthorized or unlawful access or processing of information have been put in place.

6.4 6.4.1 If the comments are offensive or violate the community guidelines, they can be reported **OR** deleted. Most social media platforms, including Instagram, have options for reporting inappropriate content. The customer could respond to the negative comments in a polite and professional manner.

6.4.2 (a) AI

(b) AI can analyse user behaviour, including posts, likes, and shares, to detect patterns and preferences. These patterns are then used to display personalised advertisements to the user. This process is known as targeted advertising or personalised advertising.

SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 7

7.1 **Databases**: A database would be a good choice for storing long-term data. For example, you could have a table for customers, another for employees, another for services offered, and so on. SQL databases like MySQL or SQLite, or NoSQL databases like MongoDB could be used.

JSON Files: JSON (JavaScript Object Notation) files are a good choice when you want to store structured data in a human-readable format. They can be especially useful if you're working with JavaScript, but many other languages have libraries that can parse and generate JSON data.

Text Files: Text files can be used to store simple data. For example, you might have a text file that logs all transactions for a particular day. However, they're not as easy to query as databases or JSON files.

Level three question so justification MUST be related to scenario and solid justification – no marks allocated for simply stating a data structure. NO arrays!

7.2 **Example MUST be related to scenario!**

Check	**Description**	**Example**
Presence	7.2.1 The data must exist.	7.2.2 All data for the client must exist such as name, contact details, hair style, etc.
Type	7.2.3 The data must be of an appropriate type.	7.2.4 Photos of the client and hairstyle will be taken so needs to be a graphic file type.
Format	7.2.5 The data requires the data to be in a specific format, i.e. date.	7.2.6 Date of client's appointment must be entered in the correct format.

7.3 7.3.1 Logical

7.3.2 Choose a data type that can store larger values, i.e. more number of bits allow real/float over int.

7.4 7.4.1 One hexadecimal digit can represent four bits of binary data. This means it takes fewer digits to represent a given value in hexadecimal than in binary.

7.4.2 Word size in a CPU refers to the number of bits that the CPU can process at one time. CPU with a larger word size can process more data at once, leading to better performance.

QUESTION 8

8.1

Stock
Properties – itemLabel: string – costPrice: real – stockLevel integer
Methods + Constructor (iL : string, cP : real, sL : integer) + setItemLabel( ) : string + getStockLevel(l : integer) + toString( ) : string

Mark allocation:

- 1 mark for name of class.
- 1 mark to show all properties as private.
- 1 mark for all itemlabel: string AND stockLevel integer
- 1 mark for costPrice shown as real.
- 1 mark for all methods shown as public.
- 1 mark for Constructor with correct number of parameters and of correct type.
- 1 getter and one setter.
- 1 mark for toString() method shown and correctly typed.

8.2 8.2.1 Code reuse: Inherited methods and fields can be reused across subclasses.

8.2.2

Composition	
Relationship	"has-a" relationship between classes.
Usage	involves creating an instance of another class as a field within your class.

8.2.3

Decomposition:	Breaks the problem down into smaller parts that are solvable – meeting the goals and sub-goals in the process.
Abstraction:	Makes use of abstraction tools and structures to reduce complexity of the problem focus on the underlying structure and relationships, rather than getting bogged down by too many details.

8.3 8.3.1

Line #	orderQuantity	orderCost	i	sArr[i].getStockLevel() <=50?	Display
1	0				
2		0.00			
3			0		
4				T	
5	20				
6		424.00			
7					Place an order for 20 units of Shampoo
8					This order will cost 424.00
3			1		
4				F	
9					Stock of Conditioner is sufficient
3			2		
4				T	
5	40				
6		400.00			
7					Place an order for 40 units of Braids
8					This order will cost 400.00

8.3.2 if sArr[i].getStockLevel() < 50

8.3.3

W	C	H	W.C	W.H	(W.C) + (W.H)
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	1	0	1
1	1	1	1	1	1

8.3.4 F(W,C,H) = W.C'.H + W.C.H' + W.C.H

Total: 150 marks