NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2023

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 Data bus/Address bus/Control bus/Front-side bus

1.2 UEFI

1.3 IoT (Internet of Things)

1.4 Cyberbullying Accept: Malware/Hacking

1.5 JSON files

SECTION B SYSTEM TECHNOLOGIES

QUESTION 2 THEORY

2.1 E
2.2 M
2.3 H
2.4 K
2.5 J
2.6 D
2.7 C
2.8 G
2.9 N
2.10 A

QUESTION 3 APPLICATION

3.1 3.1.1

Component 1	Component 2
CPU GPU	RAM BIOS/UEFI

Accept any TWO valid hardware components that are on the motherboard.

3.1.2 Example possible solution:

	Component 1	Component 2
Name	RAM	CPU
Specification	>8 GB	At least 4 cores/ 64 bits/i7/hyperthreaded
Justification	Server needs to run many different programs at the same time and manage networking, so needs more RAM.	Server OS is larger than desktop OS and server will also need to have many other applications running, and might also have mail/web services running, processing many requests from different users.

Accept any two correct components that are relevant in a server context.
Mark allocation: for each component; for each specification; for each justification. NB: To get all three marks for each component, the justification and specification must be in line with the use of the component in a server environment.

3.2 3.2.1

Manufacturer 1	Manufacturer 2
Intel	AMD

Accept other valid names e.g.: Apple (M1/M2 processors)

3.2.2 NO
The CPU manufacturers mentioned in Question 3.2.1 have identical instruction sets in their CPUs; so they will work with any OS that is designed to run on their CPU.

3.2.3 (a) So that a separate GPU doesn't have to be bought, reduces costs to the user, reduces complexity of system configuration. Any valid reason.

(b)

Type 1	Type 2
3D graphics modelling	Extreme/high end gaming

Accept correct alternatives. Do not accept just 'gaming'.

(c) NO
The normal running of a server is not graphics-intensive, so an onboard GPU will be sufficient. There is no indication of the user doing demanding graphics work. If the justification is missing or does not tie to the choice, no mark for the tick box.

3.2.4 (a) The use of two or more physical or logical processing units in a single computer system.

(b) When tasks are being executed, different tasks can be allocated to different processors rather than tasks waiting for a single processor to have processing capacity available.

(c) Operating system needs to be able to allocate tasks to different cores.

3.2.5 (a) YES: The maximum number of threads is usually double the number of cores when SMT is enabled (hyperthreading)

(b) L1 cache is USUALLY smaller than L2 cache
L1 cache is faster than L2 cache
L1 cache is closer to the processor than L2 cache
Accept any TWO correct facts

(c) Shared (most likely)
The large size of especially the L1 cache suggests it is most probably shared given that there are 9 cores.

Accept either dedicated or shared provided the justification ties with the choice. If the justification is missing or not valid, no mark for the tick box.

SECTION C INTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 4 THEORY

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

QUESTION 5 APPLICATION

5.1 5.1.1 4 000 000 bps

5.1.2 (a) Reason: Most use in a domestic situation is based on downloads, very little upload takes place normally.
Upload example: Sending email, requesting website, uploading to cloud. Accept any ONE correct answer.
Download example: Listening to music, streaming a movie, receiving email. Accept any ONE correct answer.
Accept: Less expensive, reason why it is suitable for domestic (asynchronous)

(b) Run speed test software that will test the upload and download speeds.

(c) The relatively small number of current users and the use of the connection means that a lower upload speed won't be a problem.

(d) Negotiate a different package with ISP.

5.1.3 (a) DNS or Domain Name Service.

(b) If it is hosted by a different ISP OR The ISP moves the location of their servers to another provider.

(c) NO
DNS will update and correct the link between IP and URL. This may take some time though.

5.1.4 (a) DHCP or Dynamic Host Configuration Protocol.

(b)

	Device	Reason
Static	Printer	The IP has to be constant as it is configured in printer drivers. If it changes, users won't be able to print
Dynamic	Laptop	IP address doesn't matter, as long as it has a unique address. Switch will update each time the device connects

Accept alternatives that are correct

5.1.5 (a) YES (most likely)
There will be greater traffic in and out of the connection with customers using the website as well as employees connecting from home.
OR: NO – the amount of traffic on a website is small and won't make a difference.

(b) YES The IP address for the website will have to be the same as his router.

(c)

Protocol	Purpose
HTTP/S	This protocol is used to transfer data from webpages and can easily be used to download a document that is linked to a webpage.
FTP	Designed specifically for downloading files and is more efficient than HTTP for file transfer, particularly for larger files.

Accept:
Torrent

(d)

Feature 1	Allows for user-generated content Allows for user interaction
Feature 2	Rich web applications More dynamic content

Accept alternatives that are correct, mark per factor

5.2

Factor	Switch	Router
Connects nodes on a star network	✓	
Uses the MAC address embedded in a frame	✓	
Uses MAC address and IP address embedded in a frame		✓
Boosts the signal received	✓	✓
Determines the best path for packets to follow		✓

For 'Boost the signal received' both must be ticked to allocate the mark.

SECTION D SOCIAL IMPLICATIONS

QUESTION 6

6.1 Reason 1: Airline has changed prices; cheaper tickets may have sold out.
Reason 2: Website kept cookies that tracked usage and noticed that user had looked for prices before and changed the price.
Accept: Demand has increased, fuel price increase

6.2 6.2.1 A piece of software that creates a protected connection over a public network that can give anonymity when browsing. Accepted encrypted

6.2.2 The VPN is quite probably routing the traffic through the US and location settings are picking this up and using a different currency.

6.3 6.3.1 Fake news/false advertising Accept scam.

6.3.2 Name of the company is wrong; says business has been running since 1990 – incorrect; names of cities spelt incorrectly; prices appear very low; no QR code provided. Any three correct items.

6.4

Advantage	Disadvantage
No travel costs to office Can work at flexible times Company reduces costs – smaller premises, fewer pieces of technology needed	No direct interaction with colleagues Distractions from family Have to use own resources including internet/phone Accept loadshedding: Office more likely to have a generator than home

Any TWO correct advantages and disadvantages

6.5 6.5.1 AUP – Acceptable Usage Policy Do not accept: contract, EULA, Ts&Cs, POPIA

6.5.2 More people using one platform, all know the password, all laptops will be configured to access the same space. Any ONE valid reason.

6.5.3 Encrypt hard drive data; keep only current data, delete old data when finished working with it; password protect all files. Any TWO valid ideas. Accept: laptop password, 2FA/MFA, multiple data storage locations, RAID, backups

6.6 6.6.1 Because no one entity can make a change, any changes have to be agreed to by all parts of the network.

6.6.2 Consensus: all parties to the chain have to agree to the change to any part of the blockchain ledger.
Cryptographically secured: Nodes have private keys assigned to transactions, if someone else tries to change a transaction, it will become invalid as the wrong key association will now exist.
Distributed: all processing takes place over many devices, no single point of failure, each node has own copy, no individual node can change on its own.
Add-only: Once data is added, it cannot be changed.
For the three correct explanations.

SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 7

7.1 7.1.1 A field that is used to uniquely identify a record in a table.

7.1.2 As soon as a passenger made a second booking there would be no uniqueness.

7.1.3 NO It does not add to the uniqueness.
YES You need multiple keys for 2NF

7.1.4 (a) The field PassengerID isn't exclusively numeric, so the SUM function cannot be applied to this field, SUM only works with numeric fields. Change SUM to COUNT.

(b) OR Cape Town. Choosing AND will mean that the field has to contain both values rather than one or the other.

7.2 7.2.1

Journey
Fields: - journeyCode : string - origin : string - destination : string - price : real - travelType : character
Methods: + Constructor (jC : string, o : string, d : string, p : real, tT : character) + getTravelType() : character + setTravelType(tTIn : character) + toString : string

Ticket
Fields: - ticketID : integer - customerName : string - departure : Journey - return : Journey
Methods: + Constructor (tI : integer, n : string, d : Journey, r : Journey) + setDeparture (jIn : Journey) + setReturn (jIn : Journey) + toString : string

Mark Allocation:
Fields private, named and typed correctly in both classes:
Methods public in both classes:
Journey: for correct Constructor with correct fields for accessor and mutator, for toString() with correct type
Ticket: for Journey types in constructor for both correct mutator methods

7.2.2 (a) Journey Class OR TicketManager Class

Justification must match the choice of class: Examples: Journey – keeps the method protected within the encapsulation; TicketManager – allows for easier calculation without passing parameters as values are available in the class.

(b) typed/function. Specification says it will return a value.

7.2.3 Encapsulation: YES Fields and methods of each object type are held within defined class; example is either Journey or Ticket class
Polymorphism: NO There is no inheritance relationship between the classes.
Method overriding: YES There are two methods with the same name in two different classes toString() method

7.3 7.3.1

Line	size	pos	searchFor	j	searchFor = tArr [j] ?	Return
	5		644			
1		0				
2				0		
3					False	
2				1		
3					False	
2				2		
3					True	
4		2				
2				3		
3					False	
5						Ismail Moham mad

Mark allocation: for correct initial values of searchFor and pos (line 1)
for correct values of j (0–3)
for 3 × False in correct place
for 1 × True in correct place
for value of pos in line 4
for correct value returned (line 5)

7.3.2 (a) Line 5

(b) pos + 1 is incorrect, it should just be pos.

(c) Add a Boolean value (flag) that will be changed when the value is found, ending the loop.

7.4

D	J	C	D.J	D.C	(D.J) + (D.C)	RESULT
0	0	0	0	0	0	FALSE
0	0	1	0	0	0	FALSE
0	1	0	0	0	0	FALSE
0	1	1	0	0	0	FALSE
1	0	0	0	0	0	FALSE
1	0	1	0	1	1	TRUE
1	1	0	1	0	1	TRUE
1	1	1	1	1	1	TRUE

D'	J'	C'	(D'+J')	(D'+C')	(D'+J') + (D'+C')	RESULT
1	1	1	1	1	1	TRUE
1	1	0	1	1	1	TRUE
1	0	1	1	1	1	TRUE
1	0	0	1	1	1	TRUE
0	1	1	1	1	1	TRUE
0	1	0	1	0	1	TRUE
0	0	1	0	1	1	TRUE
0	0	0	0	0	0	FALSE

Mark Allocation:
Each column
D.J
D.C
(D.J) + (D.C)
Result column: for TRUE × 3 for FALSE × 5

D' + J'
D' + C'
(D'+J') + (D'+C')
Result column: for TRUE × 7 for FALSE × 2

functions produce different results

If candidate's truth tables are wrong and comes out showing the functions produce the same results, allocate the one mark for saying they are the same based on the outcome of the truth table.

Total: 150 marks