NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2020

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 DEFINITIONS

1.1 Modular design ✓
1.2 Phishing ✓
1.3 Video on demand (VoD) ✓
1.4 UDP ✓
1.5 Botnet/Zombie army ✓
1.6 Tablet/Phablet/accept iPad or similar product names ✓
1.7 Gateway ✓
1.8 Back door ✓
1.9 Wireless mesh ✓
1.10 Social media ✓

[10]

QUESTION 2 MATCHING COLUMNS

2.1 D ✓
2.2 G ✓
2.3 L ✓
2.4 I ✓
2.5 O ✓
2.6 C ✓
2.7 E ✓
2.8 J ✓
2.9 A ✓
2.10 P ✓

[10]

20 marks

SECTION B SYSTEM TECHNOLOGIES

QUESTION 3 THEORY

3.1 C ✓
3.2 D ✓
3.3 A ✓
3.4 D ✓
3.5 B ✓
3.6 C ✓
3.7 B ✓
3.8 A ✓
3.9 A ✓
3.10 C ✓

[10]

QUESTION 4 APPLICATION

4.1 RAM is a form of volatile primary storage. ✓ (1)

ROM is non-volatile, primary storage. ✓ (1)

4.2 RAM will contain data and applications ✓ that are currently being used by the device. (1)

ROM will contain the operating system ✓ and other software the device needs in order to operate. Accept: certain applications that are standard on the device might also be stored here. (1)

4.3 4.3.1 RAM ✓ (1)

4.3.2 The user can easily add to/remove ✓ what is stored on the SD Card. Accept: ROM chips would require additional software ✓ to change the contents.
Accept TWO correct reasons. (2)

4.3.3 Example 1: Photos
Example 2: Documents
Accept any TWO correct answers. ✓✓ (2)

4.4 4.4.1 Pixel – picture element – a small area of illumination on a display device, ✓ the smallest unit of a display. (1)

4.4.2 The video/graphics card, the screen itself, density of pixels.
Any ONE correct factor. ✓ (1)

4.4.3 (a)

R1 ← horizontal resolution
R2 ← vertical resolution ✓✓
S ← size of screen
Step1 ← $R1^2 + R2^2$ calculation ✓ squares of values ✓
Step2 ← $\sqrt{Step1}$ ✓
PPI ← Step2 / S ✓

Accept alternative solutions that are correct, for example:

- Allow values for R1, R2 and S to be input rather than just assigned: provided the correct values are entered to the correct variables – assign the marks accordingly.
- Calculation steps could be combined: provided the steps are correct and all correct values have been used – allocate the marks. (6)

(b) $\frac{\sqrt{(C \checkmark + G \checkmark)}}{F \checkmark\checkmark}$ (4)

4.5 4.5.1 No/Yes ✓ (1)

4.5.2 Justification must match answer in Question 4.5.1: If no justification, then no mark for Question 5.4.1

No: The device is not being used primarily for photography; the work the delivery agent is doing doesn't involve taking high resolution photos. ✓✓ 1 mark for each reason

Yes: Delivery agents might want to use the phone to take photos of what they are delivering for reference, e.g. the address of the item so they can see it while they are driving; take photos if they should be involved in an accident. ✓✓ 1 mark for each reason (2)

4.6 The delivery agents are probably going to be working fairly long hours, will be away from charging points, don't want to have to stop delivering (and therefore not earn money) to recharge their devices, apps become resource hungry when used continuously, device will be on all the time to check notifications. Accept TWO correct options, but must be related to the scenario. ✓✓ (2)

4.7

Characteristic	Android	iOS
Open Source	✓	
Proprietary		✓
Free with device	✓	✓

(4)

4.8 Different operating system, different processor (different instruction set), apps are sold in different online stores. Accept any ONE correct answer. ✓ (1)

4.9 4.9.1 A computing storage model where data is stored on servers generally accessed via the Internet. ✓ (1)

4.9.2
- connection to the Internet
- mobile data or Wi-Fi access
- free or paid-for service providing storage
- registered with Gmail/O365/Mobile Me service

Accept any THREE correct answers. ✓✓✓ (3)

[35]

45 marks

SECTION C INTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 5 THEORY

5.1 5.1.1 Switch ✓ (1)

5.1.2 They both connect network nodes into a network, ✓ OR used in a star topology. ✓ (1)

5.1.3 A hub broadcasts to all nodes, and switch transmits to a single node, switch is point to point.
Fewer (no) collisions in point to point transfer.
A switch can learn and store MAC addresses of nodes, uses a table, uses ARP.
Data is transmitted as a pure electrical signal (bits) in a hub, but as frames or frames and packets on a switch.
Hubs operate at layer 1, switches on layer 2 or 3 (for candidates who understand OSI).
Accept any TWO correct options. ✓✓ (2)

5.2 5.2.1 Any node can print to the network printer. ✓ (1)

5.2.2 (a) IPv4 ✓ (1)

(b) Similarity: Both form part of the internet protocol; both connectionless, both use packet switching, ✓
Difference: IPv4 – numeric, IPv6 – alphanumeric,
IPv4 = 32 bit,
IPv6 = 128 bit ✓ (2)

(c) IPv4 addresses running out, insufficient because of only using 32 bits, limited number, IPv6 offers more options. ✓✓ Accept any TWO correct answers, 1 mark each (2)

5.2.3 Connect to server and share, connect via Bluetooth if available on the printer, connect via Wi-Fi AP if printer has Wi-Fi. ✓ The printer will still be connected to a network device, and therefore will be accessible to all devices across the network. ✓ (2)

5.3 5.3.1 To allow devices to connect wirelessly to a network. ✓ (1)

5.3.2 Yes ✓ (1)

5.3.3 It needs an IP address so that traffic can be routed ✓ to the device correctly, so that it is identifiable ✓ to the network, using the same protocol. (2)

5.4 Backup physically takes data from one device ✓ and stores it onto another. ✓ RAID replicates ✓ data from one area to another. ✓ Both protect data, RAID cannot operate remotely, backup can. RAID can fail, you still need a backup. (4)

[20]

QUESTION 6 APPLICATION

6.1 6.1.1 To ensure only Pizza World customers use the Wi-Fi, to limit the number of people using the Wi-Fi at any one time. Accept any TWO valid answers. ✓✓ (2)

6.1.2 (a) Secured means that data transmissions to and from the AP are encrypted. ✓ (1)

(b) WEP, WPA, WPA2 ✓ (1)

(c) Yes: ✓ Malware could be injected/planted onto their device while they are doing their banking. ✓

No: ✓ WPA/WPA2 provides strong enough encryption. ✓ (2)

(d) No ✓ (1)

(e) Public network – users must take responsibility, users should never do banking on such a network, Pizza World is not acting as an ISP, malware could already exist on the customer's device, It is not their responsibility, it is a public network and users shouldn't expect that level of security on such a network, it is a free service.
Accept any TWO valid answers. ✓✓ (2)

(f) Pizza World could display a non-liability notice in the store, wording on the username/password sheet they are given, "splash page" when logging into the Wi-Fi explaining t's & c's, link to an AUP, block all HTTPS traffic.
Any TWO correct answers. ✓✓ (2)

6.2 6.2.1 (a) and (b) Phone calls, SMS, MMS, data networking, caller ID. Accept valid answers for (a), must have valid alternatives for options for part (b). Three options shown here:

A	B
Phone calls ✓	Skype calling (can call any number with subscription), ✓ WhatsApp voice calling (or similar) if contact is using the service.
SMS ✓	Message via WhatsApp, ✓ iMessage or similar.
Internet connections via cellular data ✓	Use public Wi-Fi for any Internet connections. ✓

(6)

6.2.2 (a) GPS is a system of satellite-based navigation providing location and time information. ✓ (1)

(b) Mapping software, accept Google Maps, Apple Maps. ✓ (1)

6.3 6.3.1 Location based services (LBS) ✓ (1)

6.3.2 Complement: Business which offer complimentary services, e.g. drinks, transport, food other than pizzas, newsagents. ✓ (1)

Compete: Any other pizza business, businesses which are open at different hours to Pizza World. ✓ (1)

[22]

42 marks

SECTION D SOCIAL IMPLICATIONS

QUESTION 7

7.1 To ensure users are not subjected to bad content, to avoid any legal liability. Accept any TWO valid options. ✓✓ (2)

7.2 Violent content, pornography, racist content, hate speech. Accept any TWO valid options. ✓✓ (2)

7.3 A user can easily disable this option (toggle switch), relies on what Google decides is undesirable content. ✓ (1)

7.4 To avoid being sued ✓ by an employee if they are negatively affected by the content they view all day.
To not have to pay for any medical bills ✓ of employees who need therapy.
Do not accept AUP. (2)

7.5 No ✓ – this does not seem right; I am being asked to sign a form that passes all liability away from the company, but they cannot even provide a proper service to assist me. ✓
Yes ✓ – I would not want non-professionals providing a diagnosis. ✓ (2)

7.6

Efficiency	Effectiveness
A smart algorithm, or AI system, would be more efficient, would work quicker, can work 24/7, doesn't need to worry about people being affected. ✓✓ 1 mark per factor which suggests better efficiency	May not always be as effective: the algorithm might be tricked by certain images or content, users will learn how to bypass it, will need to have manual checks, need to be updated, algorithm will only detect what it is trained to, might have false positives. ✓✓ 1 mark per factor that suggests lower effectiveness.

(4)

7.7 Ensure secure access to the update process, only allow limited people access to do updates to app, secure incoming connections to the server where the app works from. ✓ Second mark: must relate to the scenario. ✓ (2)

[15]

15 marks

SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 8

8.1 8.1.1 All the OnTime fields ✓ would have been set to Yes ✓ by the first query. (2)

8.1.2 No – will just invert the position. ✓ (1)

8.1.3 Restore a backup of the database, ✓ use an audit trail to see which records were changed and reverse these manually. ✓ Accept any other correct options (2)

8.1.4 Method 1: Write a better query using more than one field to decide which to change. ✓ (1)

Method 2: Write a query to remove the current yes-related records to a new table, change them, change the other fields, then merge back into the table. ✓ (1)

8.2 8.2.1

UPDATE	
DELETE	
INSERT	✓

(1)

8.2.2 Because there is a primary key violation ✓ – the field AgentName is a key field and it does not have a value, therefore the record cannot be added. ✓ (2)

8.3 8.3.1 It will provide the manager with a list of delivery agents who deliver pizzas from his outlet on time. ✓ Will help him know which agents are more reliable than others. ✓ Accept any other correct options. (2)

8.3.2

Agent	OnTime ✓
Hermione	4 ✓
Fazul	1 ✓
Thabo	2 ✓

(4)

8.3.3 (a) HAVING allows a condition ✓ to be placed on the output of a query that has made use of a GROUP BY ✓ – WHERE clause cannot be used. (2)

(b) Fazul's ✓ record will be removed from the result set. ✓ (2)

8.4 8.4.1 Redundant data is the same piece of data held or saved in two different ✓ places. (1)

8.4.2 Field 1: CustName ✓ Field 2: PizzaType✓ (2)
Accept: AgentName, AgentPhone

8.5 Orders (<u>OrderID</u>, CustName, PizzaType, <u>AgentName</u>, AgentPhone, OnTime)
Mark allocation: ✓ for relation name, ✓ for all fields correctly named, ✓ for two keys underlined. (3)

8.6 8.6.1

Field	Dependent on
CustName PizzaType ✓	OrderID
AgentPhone ✓	AgentName

Accept any one correct field for each key. (2)

8.6.2 Orders (<u>OrderID</u>, CustName, PizzaType)
Agents (<u>AgentName</u>, AgentPhone,)
AgentOrders(<u>OrderID</u>, <u>AgentName, OnTime</u>)
Mark Allocation: ✓✓ 2 new relations with applicable names, ✓✓ for all fields correct in each relation, ✓✓ for keys correct. (6)

[34]

QUESTION 9

9.1

ORDER ✓
Fields - orderNumber : integer - customerName : string - pizzaOrder : array [10] Pizza - deliveryAgent : Agent ✓ for all private(-) ✓ for orderNumber and customerNumber correct and typed ✓ for pizzaOrder shown correctly as array of Pizza objects ✓ for deliveryAgent shown as type agent
Methods + Constructor (oN:integer, cN:string, pO:[] pizza, dA:agent) + getOrderNumber() : integer + getDeliveryAgent() : Agent + setPizzaOrder (pO : [] Pizza) + setDeliveryAgent (dA : Agent) + toString() : string ✓ for all methods public (+) ✓ for constructor with ✓ all parameters of constructor correct names and types ✓ for accessor methods correct ✓ for mutator methods with correct parameters ✓ for correct name and type for toString()

(10)

9.2 Char allows a greater set of values to allow for LGBTQI values, ✓ default value for a Boolean is FALSE, so all agents will be male by default. ✓ Accept any other valid answers. (2)

9.3 9.3.1

Array Index	**[0]**	**[1]**	**[2]**	**[3]**	**[4]**		
agentName	Hermione	Fazul	Jimmy	Thabo	Jia-Haui		
agentGender	F	M	T	M	M		
Line	**name**	**i**	**pos**	**flag**	**i < size AND flag = false ?**	**name = (agentName [i]) ?**	**Output**
	Jimmy	0	0	false			
1					T		
2						F	
4		1					
5			1				
1					T		
2						F	
4		2					
5			2				
1					T		
2						T	
3				true			
4		3					
5			3				
1					F		
6							Jimmy M

Marking allocation:
✓ for all correct values of i;
✓ for all correct values of pos;
NB: allow 1 mark if the candidate's values for i and pos are incorrect but show a pattern/follow logically
✓ for flag shown as TRUE at line 3
✓ for three values of TRUE (i < size) and for two values of FALSE (name = nameArr[i])
✓ for FALSE (i < size) (against line 1)
✓ for TRUE value (name = nameArr[i]) (against line 2)
✓✓ for two correct return values. Allow 1 mark if the wrong name is returned, but corresponding gender is correct; vice versa. (8)

9.3.2 (a) Line 5 ✓ (1)

(b) Move Line 5 to be inside the IF statement or decrement pos by 1 after the while loop. ✓✓ (2)

(c) An array of objects. ✓ (1)
[24]

58 marks

Total: 180 marks