NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2022

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.

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SECTION A SHORT QUESTIONS

QUESTION 1 DEFINITIONS

1.1 Hotspot ✓
1.2 Plug-in/Extension /Add Ons ✓
1.3 Router ✓
1.4 Static/Web 1.0 ✓
1.5 Biometrics ✓
1.6 Virus/Malware✓
1.7 IMAP✓
1.8 Bridge ✓
1.9 Check sum/Parity ✓
1.10 RFID tag ✓

[10]

10 marks

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SECTION B SYSTEM TECHNOLOGIES

QUESTION 2 THEORY

2.1 F ✓
2.2 A ✓
2.3 N ✓
2.4 H ✓
2.5 P ✓
2.6 C ✓
2.7 L ✓
2.8 B ✓
2.9 D ✓
2.10 I ✓

[10]

QUESTION 3 APPLICATION

3.1 3.1.1 Faster ✓ (1)

3.1.2 Printer/mouse/Bluetooth adapter/Accept any TWO correct devices ✓✓ (2)

3.2 3.2.1 Microsoft ✓ (1)

3.2.2 Linux/MAC OS (not current version) ✓ (1)

3.2.3

Name	**Windows Server 2016**	**Linux**	**Mac OS**	
License model	Proprietary	Open source	Proprietary	✓
Free or paid?	Paid	Free	Paid	✓
Can the code be altered?	No	Yes	No	✓
Can you distribute copies?	No	Yes	No	✓

One mark per correct factor for both OS's
Second column must relate to OS chosen – example here is for Linux.

(4)

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3.3 3.3.1

RAID 1	**RAID 5**
✓ Uses mirroring	☐ Uses mirroring
☐ Uses striping	✓ Uses striping
☐ Uses mirroring and striping	☐ Uses mirroring and striping
Minimum number of drives needed: ☐ 1 ✓ 2 ☐ 3	Minimum number of drives needed: ☐ 1 ☐ 2 ✓ 3
☐ Uses parity	✓ Uses parity

(5)

3.3.2 (a) Data stored in a RAID array can be lost/corrupted if the RAID controller fails ✓ or if multiple disks fail. ✓ (2)

(b) Backup. ✓ (1)

3.4 3.4.1 2^{64} (1)

3.4.2 Number of address bus bits / processor / memory sockets / operating system restrictions / Any TWO correct factors ✓✓ (2)

3.4.3 (a) Virtual memory ✓ (1)

(b) Hard drive ✓ (1)

3.5 3.5.1 Data/instructions ✓ that the CPU might need to reuse/need next. ✓ (2)

3.5.2 Control unit. ✓ (1)

3.5.3 ANY CORRECT TWO

- Gives the CPU quicker access to the instructions it needs ✓
- Reduces CPU latency ✓
- Increases the speed of RAM–CPU data transfers ✓
- Reduces the number of instructions sent back to RAM ☐
- Reduces the number of CPU cores needed ☐

(2)

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3.6 3.6.1 A device that has a battery allowing a computer to operate without a mains supply. ✓ (1)

3.6.2 The battery in a UPS does not generally last for very long. ✓ A server will need to keep running as long as possible to keep the business running. ✓ Any ONE correct fact. (1)

3.6.3 A redundant power supply. ✓ Accept any correct PC HARDWARE solution. Do not accept generator. (1)

[30]

40 marks

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SECTION C INTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 4 THEORY

4.1 B ✓
4.2 D ✓
4.3 D ✓
4.4 B ✓
4.5 A ✓
4.6 B ✓
4.7 C ✓
4.8 A ✓
4.9 D ✓
4.10 C ✓

[10]

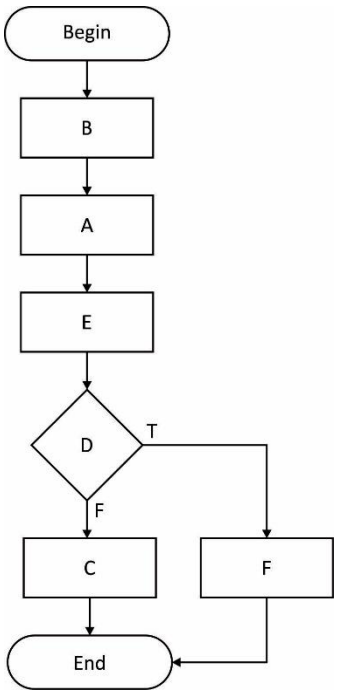
QUESTION 5 APPLICATION

5.1 5.1.1 Protocol: to identify the type of traffic that is in the packet, ✓ e.g. mail, web traffic (1)

Packet number: to know where the particular packet is located in the overall data transmission ✓ (1)

5.1.2 Source ✓ and destination ✓ MAC address. Do not accept IP addresses. (2)

5.1.3 (a) To check for errors in transmission. ✓ (1)
(b) CRC – Cyclic redundancy check ✓ (1)
(c) 0 ✓ (1)
(d)



Mark allocation:
First three boxes correct (B, A, E) ✓✓
Decision (D) ✓
True and False correct (C) and (F) ✓✓ (5)

5.2 5.2.1

Factor	Thin Client	Fat Client	
Contains a hard drive	No	Yes	✓
Contains a network card	Yes	Yes	✓
Where are applications stored and run?	On the server ✓	On the client ✓	

(4)

5.2.2 Item: RAM. Justification: For every client that connects to the server, an instance of the OS/applications being run exist in memory on the server, therefore the amount of RAM will need to be much bigger than it currently is. (16 GB insufficient)

Item: Hard drive. Justification: The server will need to store a copy of the OS to be used by thin clients, as well as applications that they are going to use. The current drive might not be big enough for this as well as the current needs of the server.

Item: CPU. Justification: Because there will be many more tasks for the CPU to undertake, a single CPU might not be sufficient, even though it has eight cores.

Accept any TWO correct items with corresponding justification.

Mark allocation: ✓✓ for both components, ✓✓✓✓ for their justifications. If justification does not match the item, no mark for the item. (6)

5.2.3 Data is stored online usually via a cloud platform. ✓ (1)

5.3 5.3.1 In the user's browser/user's local computer. ✓ (1)

5.3.2 Properties viewed, dates of bookings made, date/time website viewed. ✓✓ Accept any TWO correct options. (2)

[26]

36 marks

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SECTION D SOCIAL IMPLICATIONS

QUESTION 6

6.1 Where many devices used in day-to-day life are connected to the Internet ✓ via some form of built-in processing device. (1)

6.2 Failed security measure: weak password/encryption not setup on device
Consequence: Devices were easily hacked, data intercepted. Sensitive data obtained, device controlled remotely.
Mark allocation: ✓ failed security measure, ✓ for consequence (2)

6.3

Device	Advantage	Disadvantage
Heating	Turn on heating remotely to warm the house ahead of coming home. ✓	If energy system is hacked, heating can be wasted leading to increased costs. ✓
Security cameras	Can receive security alerts when you are away from home. ✓	If the Internet connection is down you won't be able to disable the security system if you want to let someone into the house. ✓

Accept correct options: remember only use an item once; no opposites. (4)

6.4 Complex passwords: Complex passwords are more difficult to crack; reducing chance of access. ✓ (1)

Different VLANs: VLAN can be hidden/make VLAN inaccessible to guests ✓ (1)

6.5 6.5.1 Devices that are connected to the Internet generate data all the time, contributing to the pile of Big Data. ✓ (1)

6.5.2 Yes. ✓ Big Data is generated from many other sources, including transactions, mobile phone usage, etc. ✓

NB: if reason does not match the Yes then do not allocated mark. (2)

6.6 Deep Web contains websites that are not indexed via normal search engines, ✓ Dark Web contains websites supporting illegal activities. ✓ (2)

14 marks

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SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 7

7.1

Threat	Cause	Solution
Corrupted data	Hard drive failure ✓	RAID ✓
		Backups
		Audit trails
Invalid data	Poor interface ✓	Design the interface to allow for
		accurate data input, no confusion ✓
		Exception handling

Accept valid causes and related solutions. Solution must match the cause. (4)

7.2

Feature	Database	Data Warehouse	Both
Records data	☐	☐	✓
Uses multiple data sources	☐	☐	✓
Contains historical data	☐	✓	☐

Accept Database/Data Warehouse or Both

One mark per correct concept. Up to –2 to prevent candidate just ticking boxes randomly – birdshot approach! (3)

7.3

	Mining	Warehousing
Extracting useful data from large data sets	✓	☐
Stores unstructured data	☐	✓
Pattern recognition	✓	☐

(3)

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7.4.1

Property
Fields: – ownerName : string – address : string – beds : integer
Methods: + Constructor (oN : string, a : string, b : integer) + getOwnerName() : string + setBeds (b : integer) + toString : string

Booking
Fields: – renterName : string – bookingDate : [ ] string – propertyBooked : [ ] Property
Methods: + Constructor (rN : string, bD : [ ] string, pB : [ ] Property) + getName() : string + toString() : string

Mark Allocation:

Property Class: ✓ for private fields; ✓ for all fields listed and named, ✓ for Constructor with ✓ correct parameters, ✓ for accessor and mutator, ✓ for toString() with correct type

Booking Class: ✓ for all private fields with correct name and type, ✓ for all methods public, ✓ for Constructor with correct parameters, ✓ for accessor method returning string not array. (10)

7.4.2 toString() method is used to concatenate all fields of an individual object into a string. ✓ (1)

Mutator method is used to change the value of a field of an object that has been set to private. ✓ (1)

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7.4.3 (a) A method that will break the booking dates down into two different strings, one for the start date and one for the end date. ✓

This will allow easier manipulation of dates as you won't have to break down the single string every time you want to work with a booking. ✓

OR

A method to calculate the number of days for a booking. ✓ This will be useful as the value is not stored anywhere (good programming practice) and it is likely that this will be important for charging, etc. ✓ (2)

(b) Private (1)

(c) Date (1)

7.4.4 This is not method overloading as the two methods are in different classes. ✓ (1)

7.5

L	D	B	I'	D OR B	I' AND (D OR B)	RESULT True/False
0	0	0	1	0	0	False
0	0	1	1	1	1	True
0	1	0	1	1	1	True
0	1	1	1	1	1	True
1	0	0	0	0	0	False
1	0	1	0	1	0	False
1	1	0	0	1	0	False
1	1	1	0	1	0	False

Mark Allocation:

Column i': ✓ (inverse of i)
Column d or b: ✓ for 1,1,1 patterns, ✓ for 2 × 0
Column i' AND (d OR b): ✓ for 1,1,1 pattern, ✓ for 0,0,0,0 pattern
✓ for 1 × 0 in last row

Column RESULT: ✓ for True, ✓ for False (8)

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7.6 7.6.1 The Boolean variable allows for the algorithm to end ✓ when the correct value has been found. ✓ (2)

7.6.2 False. (1)

7.6.3 If the array is empty, then the value of –1 will be returned that can be used to detect an error; OR: if the search element is not found a value of –1 will be returned that can be used to determine that the value wasn't present. ✓✓ (2)

7.6.4

Line	**inName**	**i**	**flag**	**size**	**pos**	**i<size && flag=false?**	**inName = bArr[i].getName()?**
	"Agnes"						
1		0					
2			F				
3				4			
4					–1		
5						T	
6							F
9			T				
10		1					
5						F	
Return value of pos:					–1		

Mark allocation: ✓✓✓ for correct initial values against correct line numbers
✓ for correct values of i
✓ for correct values of flag
✓✓✓ for correct True/False values in test columns
✓ for correct return value
✓ for all correct line numbers from first line 5 downwards. (6,9,10,5)

(10)

50 marks

Total: 150 marks

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