



NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – MARCH 2019

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 A method which performs actions but does not return an answer/value.
- 1.2 A function of an operating system which allows a user to perform more than one computer task at a time.
- 1.3 The act of creating a virtual rather than real or physical version of something, including computer hardware, storage devices or network resources.
- 1.4 A combination of two or more fields in a table which can be used to uniquely identify a record.
- 1.5 A hardware or software component which provides a mechanism to control another piece of hardware or software **OR** an application where the input and output is passed to a separate class.

QUESTION 2

- 2.1 H
- 2.2 R
- 2.3 A
- 2.4 L
- 2.5 C
- 2.6 I
- 2.7 E
- 2.8 K
- 2.9 M
- 2.10 D

SECTION B SYSTEM TECHNOLOGIES

QUESTION 3

3.1 3.1.1 Primary

3.1.2 DDR SDRAM allows for two sets of data to be written per clock cycle
OR Data transferred twice per clock tick.

3.1.3 DDR4 RAM allows for higher transfer speeds and increased bandwidth. The motherboard in figure two will most likely be used for high-performance gaming which will need the faster RAM. Motherboard only supports DDR4.

Accept any TWO correct answers.

3.1.4 (a) Figure 1 : 4 GB/8 GB
(Minimum requirements for Windows 10 are 1 GB for 32 bit and 2 GB for 64 bit.)

(b) 4 GB: This would be adequate for a general, basic system built around this motherboard; daily use by a small-scale user.
8 GB: This would be for a slightly more intensive user; basic business machine that will be using multiple applications.
Accept valid answers which show that the candidate understands how much RAM will probably be needed for each motherboard given its probable use. (Second mark is for the justification/reason.)

3.1.5 (a) More than 8 GB

(b) 8 GB+: This motherboard is aimed at a gaming user. There will obviously be much higher memory requirements/demands, so 8 GB would be the minimum.
Accept valid answers which show that the candidate understands how much RAM will probably be needed for each motherboard given its probable use. (Second mark is for the justification/reason.)

3.2 3.2.1 Select motherboard; give justifiable reason. Possible example: Motherboard in Figure 2 will probably benefit most from an additional graphics card as it is aimed at gaming use, better to have an external card for this with lots of RAM, allow CPU to get on with other tasks. ONE valid option.

3.2.2 Since there is no RAM on the graphics card, system RAM has to be used.

3.3 3.3.1 The configuration of hardware components to operate at a faster speed than it was designed to run by the manufacturer.

3.3.2 Increased heat because the component will be working at a higher frequency. Decrease in lifespan of component if it is not adequately cooled.

3.3.3 Refresh rate might be too slow, increase the rate to make the image more stable/less jerky; game requires higher spec graphics card – allows the computer to display the visuals better.

One mark for why the user would overclock; one mark for the reason.

3.4 3.4.1 Faster

3.4.2 Because L1 and L2 caches will be incorporated into the CPU.

3.4.3 Web cache, disk cache, GPU cache, database cache.

Accept any TWO correct answers.

3.4.4 A buffer is used to temporarily hold data being moved from one area to another; a cache is used to store frequently used instructions/data.

3.5 3.5.1 The chipset has to manage the movement of data between the processor (CPU), memory (RAM) and peripheral devices.

3.5.2 Because they use different CPUs; chipsets are designed to work with a specific family of processors.

3.6 3.6.1 SSD will allow for fast boot-up; data drive doesn't need to have as fast access; better to have a split between data types being stored – makes backups easier as you merely have to back up the data drive (OS doesn't need to be backed up).

Accept any TWO correct answers.

3.6.2 (a) A data storage technology which combines multiple physical drives into one logical drive as a form of data redundancy; also accept to improve performance.

(b) Two additional drives.

(c) RAID level 0 uses disk mirroring so there would need to be an additional drive for each existing drive so that each can be mirrored.

SECTION C INTERNET AND COMMUNICATION TECHNOLOGIES

QUESTION 4

- 4.1 4.1.1 Advantages: Easy to install, can add nodes quickly, if one node fails, the rest are OK.

Disadvantages: Need a switch to connect everything (expensive); lots of cable required.

- 4.1.2 Bus

- 4.1.3 A switch knows which node the data needs to be sent to. A hub broadcasts all packets to all nodes on the network. Therefore, a switched network is more efficient as there are fewer data transmissions taking place.

- 4.2 4.2.1 UTP/STP/Coax.

Accept any TWO correct answers.

- 4.2.2 No. Most laptops do not have modular design – cannot replace individual components on the motherboard.

- 4.2.3 Does your laptop have a wireless network card?
Do you have a wireless router at home?
Do you have an external wireless card you could use on your laptop?

Accept any TWO correct options.

- 4.3 4.3.1 **Remote control:** can use this as it is easier than explaining to the customer exactly what to do.
File uploads: can upload software to be installed on the customer's PC.
Execute commands: can run programs to help fix the PC, e.g. defrag, antivirus software.

Accept any TWO explanations which are correct for the action chose.

- 4.3.2 Operating system updates; install drivers for a piece of hardware, software install, add/remove a peripheral device, configure anything, clear browser cache ... (Any THREE) + valid explanation of what each is for/needs to be done.

- 4.3.3 Data transmitted between the two devices will be encrypted; Digital certificate https.

Any ONE correct option.

- 4.3.4 (a) She can talk over the phone with a technician at DataWize and exchange the password that way rather than doing so by email ; maintain a conversation with the technician all the time the remote session takes place. Use a video call to establish the link with DataWize so she can see she is dealing with someone from their office. Accept any valid reason.
- (b) If possible, follow what the technician is doing (provided the customer is capable of knowing what to look out for); password protect personal folders; remove anything sensitive from the PC first (place on a USB drive).

(One mark each: accept valid options.)

- (c) Phishing; baiting; tailgaiting; dumpster diving.

Accept any two correct answers.

- 4.3.5 (a) A VPN is a network which (usually) makes use of a public service network to connect remote users to a company's private internal network.
- (b) The purpose of a VPN is to allow remote users (usually employees) to access resources on a network which they would normally have access to if they were in the office.
- (c) No – it would be too complex to set up for every customer as there is a lot of configuration which needs to take place before the connection can be made; also not necessary for customers to access anything on the DataWize network.

- 4.4 4.4.1 A UPS is a device consisting of a battery pack and some electronic circuitry which monitors the incoming power supply and switches to supplying the device connected to it with power from the battery, for a limited period of time.

- 4.4.2 They might not be able to carry on selling goods if their sales system is damaged, they won't know how much stock they have on hand if data is corrupted; stolen information could be used by competitors; if entire database is destroyed they will have no customer records, no supplier records.

Accept any THREE correct answers.

- 4.4.3 (a) 4 ; 7 ; 5 ; 3 ; 6 ; 2 ; 1 for first two, for next two, for last three.

- (b) First and second: The server and the switch are highest priorities: the server stores all data on the network and if this fails there could be data not recorded/saved. The switch is important because this controls all data being transmitted across the network.

Sixth and seventh: Admin printer is not essential during the two minute gap – printing can wait till the generator is supplying power. Laptops have a battery which will last the two minutes, so they do not need a UPS.

Accept alternatives for six – could choose sales printer, if customers are prepared to wait for their invoice? Would admin printer be higher priority? Sales PC must be higher priority so that sales can be processed.

Mark part (b) first to be sure that the justifications for the first two and last two are valid. If there are different options to the memo and they are justified, accept them, then go back to part (a) and allocate marks accordingly.

- 4.4.4 Controller failure; overheating; power surge; mechanical failure (head crash).
- 4.4.5 Backup procedures – ensure that all data is backed up regularly so that anything which is lost by a failure can be restored.

Accept RAID **only** if a level which supports multiple drive failures is used (N+ 2 redundancies, at least level 6).

SECTION D SOCIAL IMPLICATIONS

QUESTION 5

5.1 5.1.1 Malware is a generic term used to refer to a variety of harmful or intrusive software aimed at disrupting the normal usage of any computer system.

- 5.1.2 (a) Possible examples:
- Worm: not all designed to be disruptive, can encrypt/delete files on target system.
 - Trojan Horse: misleads the user as to its true intent, can act as a backdoor, often attack/collect personal information.
 - Spyware: aim is to gather information without a user's knowledge, can track user activity, can be set to "phone home" and report usage.
- Accept any ONE valid characteristic of the chosen form.

- (b)
- Worm: self-replicating, relies on security failures or holes, act without the knowledge of the user, doesn't require user to have done anything.
 - Trojan Horse: most often spread via social engineering (also accept drive-by download), relies on the user acting on a message/attachment, not spread by attaching to system files), can spread over a network.
 - Spyware: installs without the knowledge of the user, doesn't self-replicate, often uses security holes in software such as web browsers.
- Accept any TWO correct factors from the form chosen.

- 5.1.3 (a) (i) TRUE
(ii) FALSE

- (b) Rootkit software usually loads very early in the booting process before most portions of the operating system have even loaded; difficult to be able to run any removal software if the OS is not fully loaded.

5.2 5.2.1 No.

- 5.2.2 (a) It is illegal to distribute MP3s via the Internet if the original copyright holder has not given permission or isn't recompensed in some way.
- (b) From a website on which they have been placed by the copyright holder; via a service such as iTunes; purchasing individual tracks from an online music store.
- (c) Ripped from a CD; copied from a friend.

5.2.3 Accept choice of candidate.

Justification options:

- Proprietary: coder has full control over who uses the software, will earn money from selling copies, can control upgrades, and might have to have an additional system to deploy licenses.
- Open-source: more difficult to control/earn money from, makes his product available to more people who might be interested in paying for future options; don't need any complex system to control licensing.
- Freeware: easy choice, no admin involved, won't earn any money from it, will make the product popular.

Accept TWO valid points for the chosen option.

SECTION E DATA AND INFORMATION MANAGEMENT AND SOLUTION DEVELOPMENT

QUESTION 6

6.1 6.1.1 A database-management system is a software application that interacts with end-users, other applications, and the database itself to capture and analyse data.

6.1.2 **Security:** Ensures that data stored in the database is only available to users who have been allocated access.

Integrity: Ensures that the stored data is not corrupted in any way and is available to users when needed, is accurate and consistent in every way.

6.2 6.2.1 (a) A primary key is a field which is unique for every record and can be used to identify an individual record.

(b) No – there is potential for multiple stock items to have the same name, e.g.: different RAM modules could be called "DDR3 DIMM".

6.2.2 (a) Database normalisation is the process of organising the attributes and relations of a relational database to reduce data redundancy and improve data integrity.

(b) tblStock (Item_ID; Item_Name; Stock_Level; Cost_Price Cat_ID)
tblCategory (Cat_ID; Category)

Mark allocation:

for two correct table names used as supplied

for the two primary keys indicated

for foreign key in tblStock

for additional fields in tblStock

for additional field in tblCategory

6.2.3 (a) Because there could be more than one stock item sold on the same date. Example in database: Item_ID's 2 & 6 both have Last_Sale value of 4 December – this leads to data duplication; possibility of update anomaly **OR** they might want to be able to record the sale of each item.

(b) tblSales (Sale_ID; Last_Sale; Stock_ID)

QUESTION 7

7.1	Stock Properties - String name - String category - double costPrice - int stockLevel Methods + Constructor (String n, String c, double c, int s) + getName() : String + getCostPrice() : double + getStockLevel() : int + setStockevel() + toString() : String
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Mark allocation:

- one mark for name of class
- one mark to show all properties as private
- one mark for all properties correctly named with appropriate types
- one mark for costPrice shown as double
- one mark for all methods shown as public
- two marks for constructor with correct number of parameters
- one mark for all three getters and one setter
- two marks for toString() method shown and correctly typed

7.2 7.2.1 They are needed because the properties are set as private and therefore cannot be accessed from outside the Stock class.

7.3 7.3.1 Parameter

7.3.2 To be used as a subscript to refer to/identify an individual element in the array.

7.3.3 The name field of one element in stockArr at position pos is compared to the value of the parameter name and if they are equal (i.e. the same stock item) then the stockLevel field of the same array element is reduced by 1. This method would be useful when a sale is made to update the number of items in stock.

7.4 7.4.1 outFile <- "duplicates.txt"
 size <- size of stockArr
 loop <- 0 to size
 begin
 if stockArr[loop].getName = stockArr[loop+1].getName
 begin
 outFile <- stockArr[loop].getName +
 stockArr[loop].getStockLevel +
 stockArr[loop+1].getName +
 stockArr[loop+1].getStockLevel
 end if
 end loop
 write outFile to disk and close outFile

Mark allocation:
initialise variables
set up correct loop
for correct if statement to test name field of two elements
concatenate all values to be output to file
output to file and close file

- 7.4.2 Perform a check when the data was being read in from the text file against what had already been put into the array (loop through the existing items) – flag duplicates.
Have a method which could read through the file to check for duplicates before any data is entered into the array.

Accept any valid technique.

Total: 180 marks