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GRADE 12

INFORMATION TECHNOLOGY P2

MARKING GUIDELINES

NOVEMBER 2023

MARKS: 150

Approved:

These marking guidelines consist of 19 pages.

SECTION A: SHORT QUESTIONS**QUESTION 1**

1.1	1.1.1	H ✓	Green computing	(1)
	1.1.2	I ✓	IoT	(1)
	1.1.3	J ✓	Volatile	(1)
	1.1.4	C ✓	Ergonomics	(1)
	1.1.5	D ✓	Wiki	(1)
	1.1.6	L ✓	Augmented reality	(1)
	1.1.7	P ✓	Query	(1)
	1.1.8	M ✓	jpeg	(1)
	1.1.9	G ✓	URL	(1)
	1.1.10	O ✓	BitTorrent	(1)
1.2	1.2.1	A ✓	Botnet	(1)
	1.2.2	D ✓	Cache	(1)
	1.2.3	C ✓	Open-Source Software	(1)
	1.2.4	C ✓	Broadband	(1)
	1.2.5	C ✓	7	(1)
1.3	1.3.1	Plug-in / Extension / Add-on ✓		(1)
	1.3.2	Relational database ✓		(1)
	1.3.3	Ransomware ✓		(1)
	1.3.4	Copyright ✓		(1)
	1.3.5	Scalability ✓		(1)

TOTAL SECTION A: 20

SECTION B: SYSTEMS TECHNOLOGIES**QUESTION 2**

2.1 2.1.1 *Any TWO characteristics of a motherboard: ✓✓*

- Type of ZIF socket
 - Type of CPU supported / Bus speed
 - Type of chipset
 - Types of slots
 - Number of slots
 - Available ports
 - Number of DIMM/RAM slots
 - Extra features: Wi-Fi/Bluetooth built-in
 - Number of SATA ports
 - Form Factor/physical size
 - On board features like NIC
- (2)

2.1.2 GPU / Graphics card / Video card ✓ (1)

2.1.3 *Any TWO examples of flash storage: ✓✓*

- Flash drive
 - SSD / M.2
 - Memory card / SD card
- (2)

2.2 2.2.1 It is a server hosted/based on the internet (online) ✓ that does not exist as a physical entity / only exists in software. ✓ (2)

2.2.2 *Any TWO justifications of using cloud virtual servers: ✓✓*

- Accessibility/ubiquity – The server could be accessed at any location/any time using an internet connection
 - Scalability – The server specifications could be adapted to suit the changing needs of the university
 - The server does not use local resources
 - The service provider takes responsibility for maintenance and software upgrading
 - Outsourcing of skilled processes
 - Improved server reliability/availability
 - Lower total operational cost / Affordability
- (2)

2.2.3 *Any TWO advantages for using SaaS: ✓✓*

- Don't need to install software on the computers / easy setup.
- Do not need to update software on the computers.
- No need for high-end computers as you only need to run the applications from the web browser.
- SaaS company responsible for storing data and backups.
- Work from multiple devices/locations.
- Takes up less local resources.
- Collaboration features
- Scalability / Ability to upgrade SaaS model according to their needs

NOTE: Do NOT accept renting/cost. (2)

2.2.4 *Motivation for using site license:*

A site license allows all the employees of the institution to use the same license ✓ which is cheaper than buying individual licenses. ✓

Any TWO of the following concepts:

- Replaces the need for individual licenses / All users use the same license
- Leading to cost saving
- Leading to less administration (2)

2.3 2.3.1 A backup strategy ensures that regular copies of data are made ✓ that will prevent data loss ✓ and ensure quick recovery/restoring of data ✓ to prevent downtime.

Any THREE of the following concepts:

- Creating copies of data
- Regular creation of back-ups/copies
- To prevent data loss
- Data can be quickly recovered/restored (3)

2.3.2 *Any TWO disadvantages of using cloud storage: ✓✓*

- Internet access required to access storage
- Bandwidth issues – You need a large amount of bandwidth to back up large chunks of data
- Full data recovery could take some time
- Data costs associated with storing data off-site
- Security exposure
- Data may be lost if company/service closes down (2)

2.4 Power user ✓ (1)

2.5 2.5.1 *Any TWO properties associated with a computer worm: ✓✓*

- Ability to replicate itself from one computer to another
- Creates back-doors for other threats to gain access to a computer system
- Uses weak areas in an application/operating system to spread
- Transfers over a network to other devices
- Emails itself to all the contacts in an email address book
- Uses a lot of system resources (slows down machine)
- Causes strain on network bandwidth
- Causes loss of data

(2)

2.5.2 Firewalls monitor and manage access to a network from other networks, ✓ while an anti-virus identifies/blocks/removes malware. ✓

Concepts:

- Firewall monitors network traffic, but does not always prevent the spread of malware
- Anti-virus identifies/removes malware

(2)

2.6 *Any ONE motivation why defragmenting is not needed on an SSD: ✓✓*

SSD has no moving parts. (2)

OR

SSD is a type of electronic storage. (2)

OR

Groups/position of stored data doesn't influence access speed. (2)

(2)

TOTAL SECTION B: 25

SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES**QUESTION 3**3.1 3.1.1 *Any ONE explanation of a network: ✓✓*

A network is a group of interconnected devices (1) that can communicate with each other. (1)

Concepts:

- Multiple devices that are connected
- Via a communication medium (2)

3.1.2 *Why the school would benefit from investing in communication and network technologies:*

Providing TWO reasons: ✓✓

- Improved productivity
- Improved communication speed
- Improved reliability
- Increasing the capacity
- Supports more devices
- Supports modern online services
- Improved collaboration

Also ACCEPT any ONE reason with an explanation. (2)

3.1.3 *Any TWO components of a LAN:*

2 x name of component ✓✓

2 x motivation ✓✓

- Network Interface Card (NIC) (1) – This is a hardware component that connects a device to the network. (1)
- Switch (1) – This is a networking device that connects multiple devices together in a local area network. (1)
- Router/Modem (1) – To provide connection to the internet. (1)
- Cabling/Communication medium (1) – To carry signals / connect devices/nodes (1)
- Wireless Access Points (1) – To provide wireless access to a network. (1)

(4)

3.1.4 (a) *Any ONE problem/disadvantage of layout described:*

Failure of one device/switch ✓ can make other parts of the network inaccessible. ✓

OR

Multiple switches are connected in series (1) if any one of the switches fail, it can disrupt other parts of the network. (1)

OR

Single cable between network segments (1) can lead to congestion in the cables / loss of network management efficiency. (1)

OR

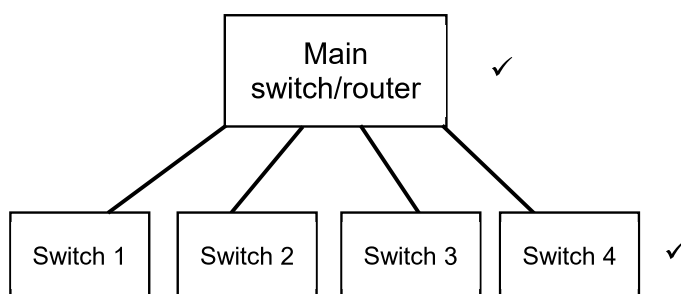
Signal travels through multiple switches (1) it can slow down communication. (1)

Concepts:

- Switches are connected in series / Single cable between network segments / Signal travels through multiple switches / A problem in one device influences other parts of the network
- Can lead to congestion / slower communication / network segments failing

(2)

(b)

**Concepts:**

- Centralised switch (1)
- Secondary switches individually connected (1)

(2)

3.2 3.2.1 *Any ONE wireless technology: ✓*

- WiFi/Access points
- Range extenders
- WiMax
- Satellite
- Mesh technology

(1)

3.2.2 *How to extend the wireless capability of the school's network:*

Using additional access points, ✓ which can be placed strategically / spread across the school grounds. ✓

OR

WiMAX (1) has a larger range. (1)

Also accept other technically correct answers. (2)

3.2.3 *Any ONE way the network could be extended to the hostel: ✓ Motivation ✓*

- WiMAX/WiFi – Hostel will be in range of WiMax/WiFi technology.
- Fiber cable – Low attenuation makes data transfer over long distances possible.
- UTP with switches – Signal needs to be repeatedly strengthened to cover the distance.
- VPN – Use existing resources to securely connect to the school's network over the internet. (2)

3.3 3.3.1 (a) Voice over Internet Protocol ✓ (1)

(b) *Any TWO of the following differences of VoIP vs traditional calls: ✓✓*

- No dedicated connection/calls made over the internet
- Lower cost
- Allows for video calls
- Needs preinstalled software applications
- Can make call to any computing device connected to the internet
- Call cost not dependant on distances (2)

3.3.2 *Any TWO technical challenges to implement VoIP:*

2 x challenges identified ✓✓

2 x correctly described ✓✓

- Stable internet connection (1) – To ensure that the call does not disconnect (1)
- Sufficient bandwidth (1) – Low connection speed can influence the quality of the call (1)
- Software (1) – Must be the same version / compatible (1)
- Data cost (1) – High data cost when making video calls (1) (4)

- 3.4 An intranet is an organisation's private network / Internet-like environment ✓
consisting of web pages.
Course notes, schedules, news, announcements etc. could be posted to the
intranet providing access to these resources/communication. ✓ (2)
- 3.5 3.5.1 *Any TWO reasons why a RDC be used:* ✓✓
- Software is easily configured on host and target computer compared to setting up a VPN
 - Allows users same control on the remote device as if sitting in front of the device
 - Changes are made to files directly on the remote computer
 - Software is included in your operating system (2)
- 3.5.2 *Any ONE advantage of RDC:* ✓
- Provides access to viewing from any location / at any time
 - Low maintenance cost
 - Convenient/saves time/cost saving
- Any ONE disadvantage of RDC:* ✓
- Can be hacked
 - Setup cost is expensive
 - Dependant on internet access/data cost
 - Video material can take a long time to transfer (2)

TOTAL SECTION C: 30

SECTION D: DATA AND INFORMATION MANAGEMENT**QUESTION 4**

4.1 4.1.1 A primary key is a field in a table that uniquely identifies each record in that table. ✓ (1)

4.1.2 Cannot have a null value. ✓ (1)

4.1.3 (a) *Any ONE design error with explanation:* ✓✓

Data is duplicated in the Teacher field. (1) If the teacher is replaced the data needs to be corrected everywhere. (1)

OR

Table is not normalised (1) the table contains redundant data / Teacher field is linked to register class / Teacher field is dependent on another field that is not part of primary key. (1)

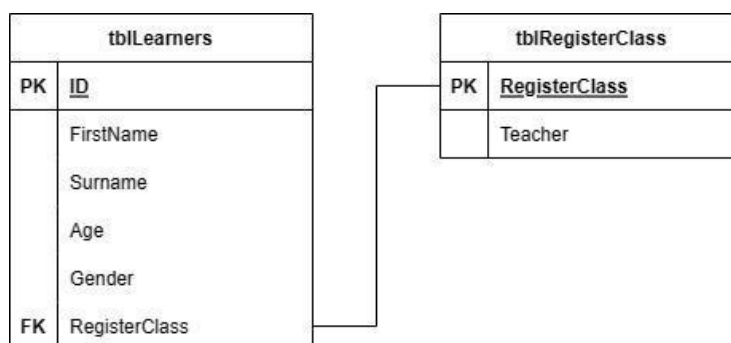
OR

Any TWO examples of design errors: (2)

- Data redundancy/repeated data/not normalised
- A field is dependent on another field that is not the primary key/description of anomaly

(2)

(b) Create a separate table ✓ and move the RegisterClass and Teacher fields to that table. ✓ Use the RegisterClass field as the foreign key in the tblLearners table ✓ and the primary key in the new table. ✓

**Concepts:**

- Splitting the data into two tables
- RegisterClass/teachers must be placed in a separate table
- Tables must be linked
- Indication of linking on the RegisterClass

Note: Concepts can be described or illustrated using a table diagram.

(4)

4.2 *Validation vs verification: ✓✓*

- Validation ensures that data is acceptable/valid. (1)
- Verification is ensuring the correctness of data. (1)

Why validation does not remove the need for verification: ✓✓

If data is valid, it only implies that the data is in the correct format/data type/range/presence/check digit, (1) and not necessarily factually correct. (1)

OR

Verification requires that the information be checked against the source (1), that validation does not do. (1) (4)

4.3 4.3.1 SQL/Structured query language code ✓ (1)

4.3.2 *Identify and explain a scenario where a server-database would be required:*

Where a lot of personnel need to access the same database. ✓
A server-based database will allow many users to use the database at once, ✓ from many different locations. ✓

Concepts:

- Scenario correctly identified with many users/many locations
- Simultaneous use of database / providing access to many users
- Access possible from different locations/over a network (3)

4.4 4.4.1 *Any TWO of the following about an audit trail: ✓✓*

- Tracks WHAT changes are made
- Tracks WHEN changes were made
- Tracks WHO made changes (2)

4.4.2 *Any ONE method ✓ with an explanation enhancing the security of the school database: ✓*

- Access control: Setting permissions and access levels for users, passwords, biometric access control, multifactor authentication, physical locking of server room.
- Encryption: By encrypting sensitive data such as learner records, the school can prevent unauthorised access to this information.
- Regular backups: Regular backups are essential for protecting data from loss due to hardware failure, data corruption, or other disasters.
- Firewall: Using a firewall to monitor all incoming and outgoing transmissions/traffic and block unwanted communication/requests. (2)



SECTION E: SOLUTION DEVELOPMENT**QUESTION 5**

- 5.1 5.1.1 (a) *Any ONE indicating initialising: ✓*
- Line 1 (iCount := 0)
 - Line 4 (sLine := '')
- (1)
- (b) *Any ONE indicating looping: ✓*
- Line 2 (for iRow := 1 to 3 do)
 - Line 5 (for iCol := 1 to 5 do)
- (1)
- 5.1.2 15 ✓
- (1)
- 5.1.3 ***** ✓
- Only one line ✓
- (2)
- 5.1.4 iCol := 1; ✓
 while iCol <= 5 do ✓
 begin
 inc(iCol); ✓
 ...
 end;
- OR
- iCol := 0; (1)
 repeat
 inc(iCol); (1)
 ...
 until iCol = 5 (1)
- OR
- Any other correct solution
- Concepts:**
- Initialise counter (1)
 - Conditional loop with correct condition (1)
 - Increment loop controller (1)
- (3)

5.2

name	counter	Is counter <= 5?	Is arrNames [counter] = name?	Display
Lebo				
	0			
		True		
	1			
			False	
		True		
	2			
			False	
		True		
	3			
			True	
				Found
	✓	✓	✓	✓

Concepts:

- Correct **counter** column (1)
- Correct **Is counter < 5** column (1)
- Correct **Is arrNames [counter] = name** column (1)
- Correct **Display** – Any phrase indicating "Found" (1)

(4)

5.3

Input sWord (Given)

Initialise sOutput

Loop ✓ K from length of sWord downto 1 ✓

sOutput ← sOutput + sWord[K] ✓✓

OR

Input sWord (Given)

Initialise sOutput

Loop (1) K from 1 to length of sWord (1)

sOutput ← sWord[K] + sOutput (2)

OR

Any other correct solution

Concepts:

- Loop (1) for length (1)
- Correct adding of characters using correct indexing (2)

(4)

SECTION F: INTEGRATED SCENARIO**QUESTION 6**

- 6.1 6.1.1 The use of an image/two-dimensional block code to store information/URL. ✓
It can be captured/scanned using a digital camera/smartphone. ✓ (2)
- 6.1.2 *Any ONE way information is automatically entered: ✓*
- Autocomplete/Autofill done by the browser
 - Information stored in cookie from previous visits to site
 - Device/App feature from registered/stored information (1)
- 6.2 6.2.1 (a) A computer's OS utilises more than one processor or processing core ✓ to simultaneously execute multiple tasks/threads/processes. ✓ (2)
- (b) The process of ensuring that each process/task/thread gets enough CPU time ✓ and access to memory, storage and other hardware ✓ to be able to work without interference by other processes.
- Concepts:**
- Allocation/sharing of processing time
 - Allocation of resources/memory/storage (2)
- 6.2.2 When a website is visited for the first time, the browser downloads all the necessary content from the server to cache on local storage. ✓
When the user visits the website again, the browser loads the content from cache. ✓
- Concepts:**
- Web content from previous visits is stored
 - Content obtained from the cache/local storage when visited again (2)

6.2.3 *Critical discussion of streaming rather than downloading:*

A critical discussion of at least TWO aspects comparing its implication on both streaming and downloading:

2 x 2 marks ✓✓✓✓

	Streaming	Downloading
Storage	Accessible without the need to store locally.	Requires enough storage space for downloaded material.
Speed of access	Instantly available to start watching.	Needs to be downloaded first to watch.
Internet Dependency	Only available with internet connection.	Can be viewed without internet connection after download.
Ownership/ Copyright	Does not provide permanent ownership.	Users keeps a copy of the file locally.
Cost	Often involves subscription models.	May include one-time purchases or rentals.
Environmental Impact	Consumes more energy because it must be downloaded every time it is viewed.	Consumes less energy because it can be repeatedly viewed after being downloaded once.
Quality of Experience	Quality may fluctuate based on internet speed.	Provides a consistent quality experience.
Security	Content is only retained in a buffer.	Content is locally stored and might include malware.

ALSO ACCEPT other relevant and correct answers.

(4)

- 6.3 6.3.1 *Any TWO features of a Web 1.0 website: ✓✓*
- Static pages that do not change frequently
 - Simple design with limited graphics and multimedia content
 - User is a content consumer and not a content creator
 - Hyperlinks to other webpages for further information
 - Basic HTML and CSS code used for webpage creation
 - No interactive or collaborative features, such as user comments or social media integration
- (2)
- 6.3.2 *Any TWO reasons why websites have evolved from Web 1.0 to Web 2.0: ✓✓*
- To allow users to contribute content
 - To provide an interactive experience
 - To allow for social networking
 - Availability of new web technologies
 - Higher bandwidth availability
 - Internet availability
- (2)
- 6.4 6.4.1 *Any TWO of the following reasons why the data might compromise the quality of input data: ✓✓*
- Because of the different formats used to enter the same information/data not standardised.
 - It will be difficult to group/compare/analyse/sort records with different formats.
 - Difficult to extract core information that can lead to errors
- Concepts:**
- Different formats can lead to (1)
 - Incorrect capturing of data
- OR
- Difficulty in extracting/interpreting the data (1)
- (2)
- 6.4.2 *Any TWO of the following different techniques on how the form could be optimised to prevent this type of input: ✓✓*
- Selection components
 - List box
 - Combo box / Dropdown box
 - Radio group
 - Spin edit
 - Providing examples of required format / default values
 - Input mask
- (2)

6.4.3 (a) ✓

(b) ✓

Alternative 1:



Alternative 2:



(2)

6.5 6.5.1 *Any ONE* reason for using a distributed database: ✓

- Increased performance levels/less traffic on network/less traffic on server/less data transfer
- Can accommodate many users
- Needs to be accessed from many locations
- More stable (reduces redundancy)

(1)

6.5.2 The information is scrambled/made inaccessible ✓ using a secret key/algorithm/set of rules. ✓

(2)

6.5.3 Partitioning ✓ each server only stores the part of the data it works with / Less data to be stored or transferred ✓
 OR
 Duplication (1) every server holds all the data / Data will not be lost if one server crashes (1)

(2)

6.6 6.6.1 *Any TWO valid digital platforms:* ✓✓

- Email
- Social media
- Blogs
- Online newspapers
- Instant messaging
- Website

Also accept any TWO examples of any of the above.

(2)

6.6.2 *Any ONE example of a policy document: ✓*

- Acceptable Usage Policy (AUP)
- Privacy Policy
- POPIA
- EULA (End User License Agreement)

(1)

6.7 *Any TWO potential risks of using ChatGPT: ✓✓*

- People rely on the information generated without any fact-checking
- Copyright issues/Plagiarism
- Over reliance on the technology
- Replacing human skills/employment opportunities
- Removing motivation to learn skills
- Limited accountability
- May generate potentially inappropriate content for children
- May generate malicious code
- May track and store personal information

Also accept other valid examples.

(2)

TOTAL SECTION F: 33
GRAND TOTAL: 150