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# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**SENIOR CERTIFICATE/  
NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**NOVEMBER 2020**

**MARKING GUIDELINES**

**MARKS: 150**

**These marking guidelines consist of 15 pages.**

**SECTION A: SHORT QUESTIONS****QUESTION 1**

1.1	1.1.1	A ✓		(1)
	1.1.2	C ✓		(1)
	1.1.3	D ✓		(1)
	1.1.4	C ✓		(1)
	1.1.5	D ✓		(1)
1.2	1.2.1	E ✓	RAID	(1)
	1.2.2	R / C ✓	Alternate key/ Foreign key	(1)
	1.2.3	P ✓	Biometrics	(1)
	1.2.4	L ✓	SSL	(1)
	1.2.5	A ✓	Digital divide	(1)
	1.2.6	O ✓	Disk defragmentation	(1)
	1.2.7	Q ✓	Drivers	(1)
	1.2.8	M ✓	FTP	(1)
	1.2.9	J ✓	Rollback	(1)
	1.2.10	H ✓	Utility software	(1)

**TOTAL SECTION A: 15**

**SECTION B: SYSTEM TECHNOLOGIES****QUESTION 2**

- 2.1 2.1.1 Any ONE: ✓  
• Faster data access speed/ reading speed  
• Does not need to be defragmented  
• Greater reliability due to the absence of moving parts  
• Uses less power / more energy efficient  
• Smaller in physical size (1)
- 2.1.2 Any ONE: ✓  
More expensive when compared to hard drives  
The inability to recover old data (1)
- 2.2 2.2.1 RAM loses its contents when power is lost ✓/computer is switched off  
Or any other correct explanation (1)
- 2.2.2 Any ONE: ✓  
If the operating system/machine is 64-bit it can use more than 4 GB of RAM.  
OR  
If the operating system/machine is 32 bit, it would not be able to use more than 4 GB of RAM. (1)
- 2.2.3 (a) Solid state drive ✓ (1)
- (b) Any TWO: ✓✓  
• Operating system and program performance / access time will be faster  
• Bulk data can be stored on the cheaper hard disk drive, while programs that require high performance is stored on the more expensive SSD.  
• Does not need to be defragmented  
• Greater reliability due to the absence of moving parts  
• Uses less power / more energy efficient (2)
- 2.3 2.3.1 Any ONE:  
Virtualisation/ Emulator/or examples of virtualisation software (1)
- 2.3.2 Any TWO of the following concepts: ✓✓  
• New features  
• Fixes to problems  
• Updates  
• Adding onto the existing operating system  
• Provides updated security (2)

2.4 2.4.1 A language that is easy for humans to write and understand/ language closely related to the language we use✓, because it relates to the English language. (1)

2.4.2 (a) Difference: An interpreter translates line by line ✓  
The compiler translates the whole program ✓ (2)

(b)

Interpreter	Compiler
An interpreter displays error message(s) line by line	The compiler provides a list of error messages ✓
Does not provide an executable file	Provides an executable file ✓

(2)

(c) Delphi uses a compiler (1)

2.4.3 An API is an interface between the programming language✓ and operating system/ software/ services/ hardware ✓ (2)

2.5 2.5.1 DIMM slots ✓ (1)

2.5.2 SATA connectors/ USB/ Firewire/ Thunderbolt ✓ (1)

2.5.3 Any ONE: ✓

PCI-Express slot OR PCI-e OR AGP OR USB (1)

2.6 The system clock generates pulses✓ that regulates the rate at which data is transferred between components. ✓

### Concepts

Pulses are generated (1 mark)

The rate at which data is transferred (1 mark) (2)

2.7 2.7.1 Machine cycle ✓ (1)

2.7.2 Point-to-point connection ✓ (1)

**TOTAL SECTION B: 25**

## SECTION C: COMMUNICATIONS AND NETWORK TECHNOLOGIES

### QUESTION 3

- |     |  |   |     |
|-----|--|---|-----|
| 3.1 | 3.1.1  | (a) Bandwidth is the total amount of data that can be sent and received/transferred in a network in a given period of time. ✓   | (1) |
|     |  | (b) Mega bits per second ✓  | (1) |
|     | 3.1.2  | Any TWO: ✓✓<br><br>Low/No signal degradation over a distance/ (Lower attenuation)<br>Mostly not affected by electro-magnetic interferences (EMI).<br>Immune to eavesdropping/more secure<br>Immune to crosstalk   | (2) |
|     | 3.1.3  | Any TWO: ✓✓<br><br>UTP is less prone to Interference<br>UTP is not as slow when shared between multiple users<br>UTP is not as influenced by objects like walls and trees<br>UTP has better security<br><br>Alternative:<br>Answers can be provided from the perspective of Wifi. | (2) |
|     | 3.1.4  | A cable that connects different network segments or LANs together. ✓<br><b>OR</b><br>A backbone is part of a computer network that interconnects various pieces of a network providing a path of information exchange.  | (1) |
|     | 3.1.5  | Any ONE: ✓<br><br>A NIC facilitates/provides communication/connection between a computer and a network medium.<br><b>OR</b><br>Functions to encode and decode messages between computer and network   | (1) |
| 3.2 | Any ONE: ✓<br><br>The ability to choose what the user wants to watch<br>A service which allows users to watch video content on demand (per request – users do not need to watch scheduled content) OR<br>Any other suitable description. |   | (1) |

- 3.3      3.3.1      Any ONE: ✓
- Decrease the likelihood of illicit/harmful downloads on the network through BitTorrent clients.
  - So that the network's bandwidth is not dominated by traffic from BitTorrent downloads. (1)
- 3.3.2      No downloading of copyrighted material. ✓ (1)
- 3.4      Blogs can be published by anyone. ✓  
Information is not verified. ✓ (2)
- 3.5      A static webpage displays the exact same information every time it is viewed ✓ while the information displayed by a dynamic webpage may differ ✓ based on the user/ time/environment/ more interactive. (2)
- 3.6      Any ONE: ✓
- The document has not been changed.
  - The signature can verify the signer/sender of an electronic document. (1)
- 3.7      3.7.1      Web browser ✓  
Also accept a correct example such as Internet explorer/Mozilla Firefox (1)
- 3.7.2      Any TWO: ✓✓
- Styles can be defined only once/in a single file that are referenced and used by HTML files.
  - If a change is made in the CSS file, all HTML files that reference the styles defined in the CSS file will be updated.
  - Styles are centralised and changes scale well without having to change formatting/styling settings in multiple places across HTML files.
- Concepts:**  
Centralised design in a single file/only once  
All web pages can access the design from the CSS files (2)
- 3.7.3      Combines JavaScript with a browser command to allow the browser to download data ✓ without refreshing the entire webpage. ✓  
**OR**  
Allows parts of a webpage to be updated (1 mark) without updating the entire webpage. (1 mark) (2)

- |     |       |  |     |
|-----|-------|--|-----|
| 3.8 | 3.8.1 | A group of computers ✓ controlled by a hacker/computer criminal/<br>malicious software ✓ and that work together to be used in an illegal<br>manner   | (2) |
|     | 3.8.2 | Using a large number of computers ✓ to overload servers/service<br>with a large number of requests ✓ making it inaccessible. ✓   | (3) |
|     | 3.8.3 | It is the computer used/controlled by a computer criminal/<br>malware ✓ in a DDoS attack or other criminal activity.   | (1) |
| 3.9 | 3.9.1 | A type of malware that records keystrokes ✓ and sends it off to a<br>third party.  | (1) |
|     | 3.9.2 | Any TWO: ✓✓<br><ul style="list-style-type: none"> <li>• Installing/using anti-malware/ anti-virus software.</li> <li>• Using a firewall.</li> <li>• Keeping all your software up to date.</li> <li>• Following a good password policy.</li> <li>• Do not open unknown emails and attachments.</li> <li>• Only use secure websites.</li> <li>• Be updated with the new trends.</li> <li>• Be guarded when sharing personal details.</li> <li>• Do not install/add/open suspicious files.</li> </ul> | (2) |

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**TOTAL SECTION C: 30**

## SECTION D: DATA AND INFORMATION MANAGEMENT

### QUESTION 4

- |     |   |  |                 |
|-----|---|--|-----------------|
| 4.1 | 4.1.1   | Data in field of primary key must be unique (no duplicates). ✓<br>Cannot be null/empty. ✓      | (2)             |
|     | 4.1.2   | (a) ImporterID ✓ tblApplications/ tblImporters ✓<br><br>(b) One to Many ✓                      | (2)<br><br>(1)  |
|     | 4.1.3   | Entity Relationship Diagram ✓<br><br><i>Also accept ER diagram / ERD/ Relationship diagram</i> | <br><br>(1)     |
| 4.2 | Any ONE ✓<br>Boolean<br>Yes/No<br>True/False                                    |  | <br><br><br>(1) |
| 4.3 | The number of days it takes to process the request can be calculated/derived. ✓ |  | (1)             |



- 4.4    4.4.1    Any ONE: ✓
- A version of a piece of software that is made available for testing. Typically tested by a limited number of users.
  - Version before its general release.
  - A trial version of the software. (1)
- 4.4.2    Any ONE: ✓
- Validation rule/ Range check/ Format check
  - Limit input with a component OR an example listbox/combobox (1)
- 4.5    4.5.1    TWO Marks:
- Test for correct range (0 or 1)
- OR
- ONE Mark each:
- Ensure/test for acceptable data
- Test for correct data type (Number) (2)
- 4.5.2    Data verification:
- Checking the correctness ✓ of data against the source/ human perspective. (1)
- 4.6    Any TWO: ✓✓
- Controlled access to building by means of NFC / RFID.
  - Using biometric security to control access to a building.
  - Placing servers/storage devices in lockable room / cabinet.
  - Hiring security personnel to enforce access control to data.
  - Using a cloud server/ off site server (2)

- 4.7    4.7.1    Data independence refers to the separation between software ✓that uses the database application and the actual data structure✓ managed by the DBMS server. (2)
- 4.7.2    Logical independence✓ (1)
- 4.7.3    Any TWO✓✓
- The user software/application cannot alter the structure or format of the data
  - Multiple applications can interface the same data because the physical structure is not a factor
  - DBMS software handles the actual data management. (2)
- TOTAL SECTION D:    20**

]

**SECTION E: SOLUTION DEVELOPMENT****QUESTION 5**

- 5.1 5.1.1 A syntax error occurs when the rules of the programming language (or an example of a programming language error) are violated ✓ OR an error that prevents the program from running.

A runtime error occurs when the program is executed/run and a problem is encountered (or an example of a runtime error). ✓

(2)

- 5.1.2 Any TWO sensible guidelines: ✓✓

- Explain the error in understandable terms to the user.
- Provide an indication of whether the error is due to a problem with the software or hardware.
- Explain how to solve the problem.
- Give an indication whether it has been a program error or an error due to something that the user did.

(2)

- 5.2 The array list needs to be sorted ✓ before binary search can be done.

(1)

- 5.3 5.3.1 Any ONE ✓

- Variable S is not given an initial value (not initialised).
- Variable S needs to be initialised before the loop is executed.

(1)

- 5.3.2 Any TWO ✓✓

- Indentation to provide a readable structure
- Descriptive variable name to assist in understanding the purpose of the code
- Add a comment(s) to explain the purpose of the program
- Including blank lines between code segments

(2)

5.4

Block Nr	f1	f2	i	i < 3?	fn	Output
1	2					
2		3				
3			1			
4				Yes ✓		
5					5 ✓	
6	3 ✓					
7		5 ✓				
8			2 ✓			
4				Yes ✓		
5					8 ✓	
6	5 ✓					
7		8 ✓				
8			3 ✓			
4				No ✓		
9						8 ✓

12/2  
=(6)

- 5.5 Inc(i) ✓ OR Inc(i,1) (1)
- 5.6 5.6.1 + indicates public ✓members/methods/attributes  
- indicates private ✓members/ methods/attributes  
Also accept Public and Private if provided in that order without symbols. (2)
- 5.6.2 Any TWO: ✓✓
- setLocation()'s parameter doesn't specify a data type.
  - getCapacity() method should return an integer data type.
  - setEventDate()'s parameter should be a String data type OR fEventDate should be a Date data type.
- Note:**  
Also accept the name of the incorrect method without an explanation. (2)
- 5.6.3 toString ✓ (1)

**TOTAL SECTION E: 20**

**SECTION F: INTEGRATED SCENARIO****QUESTION 6**

6.1 6.1.1 Any TWO: ✓✓

Cache memory is physically closer to/on the CPU.

Cache memory stores frequently/recently/likely to be used instructions.

Type of memory used for cache memory is faster than RAM.

*Do not accept only faster*

(2)

6.1.2 Any TWO: ✓✓

The CPU speed in GHz - higher speed improves performance

Number of cores - more for better performance

Number of threads - more for better performance

(2)

6.1.3 (a) Virtual memory ✓

(1)

(b) By swapping information not being used ✓ between the hard disk space/virtual memory/additional memory and the RAM. ✓

Two of the following concepts:

- Content not being used,
- Moved from the RAM to storage
- Allocates a segment of hard drive as temporary RAM
- Saved until required again

(2)

6.2 Any TWO: ✓✓

- Not such a wide array of supported software applications available for Linux, (limited compatibility).
- Official support limited.
- No-one held accountable.
- Might include bugs in the source code.
- Many different versions exist, which might be confusing to users.

(2)

6.3 6.3.1 Any TWO: ✓✓

- Scalability
- Ubiquity, Can be accessed anywhere at any time
- Enables collaboration
- No need for maintenance and upgrades of hardware
- No need for software installation and upgrades
- Saves local resources/ storage space

(2)

6.3.2 The distribution/sharing of resources of powerful computers between users ✓

The combining of resources of different computers to create a super powerful service ✓

(2)

- 6.4      6.4.1      Any TWO: ✓✓
- Can access e-mail from anywhere if you have Internet access.
  - No additional costs for email facility.
  - Using your web browser to access e-mail.
  - Scalability
  - Ubiquity, Can be accessed anywhere at any time
  - Outsources maintenance and upgrades of hardware
  - Outsources software installation and upgrades
  - Saves local resources/ storage space (2)
- 6.4.2      (a)      Any TWO: ✓✓
- Browser tracks everything done by the user logged in.  
Builds a detailed profile based on general interests and habits.  
Filters results based on search history.
- Accept any valid aspect that can be linked to the users profile. (2)
- (b)      The search engine uses situational data ✓ (e.g. location) to make search results more relevant. (1)
- (c)      Any ONE: ✓
- The search results will have less hits/more relevant.  
More suppliers can be located. (1)
- 6.4.3      Any TWO: ✓✓
- Mobile devices are more readily available.
  - More streamlined interface.
  - Able to easily receive notifications on user's device.
  - Can use a mobile app on the go (anywhere).
  - Ability to cache data locally on device so that data can be accessed offline.
  - Less data usage.
  - Don't have to memorise long URL's/App is dedicated to a specific website. (2)
- 6.5      Any TWO: ✓✓
- The company runs a small business which does not require the complexity of a distributed database
  - It is more expensive to set up/maintain a distributed database.
  - A distributed database is more complex to set up/maintain.
  - Synchronisation of data is more complex
  - More complex security (2)
- 6.6      6.6.1      Any TWO ✓✓
- To access files and documents on the business computer from anywhere /connect to your business
  - with the same security as in the office/LAN
  - with the same resources/ software as in the office (2)

- 6.6.2 Any ONE: ✓  
• Battery saver  
• Power & sleep  
• Mobile hotspot  
• Airplane mode  
• Location  
• Bluetooth (1)
- 6.6.3 Sharing a cellular internet connection ✓ to connect devices via Wi-Fi/Radio ✓ (2)
- 6.6.4 (a) Multitasking: Operating System shares processing time ✓ between multiple applications/ tasks/ programs ✓ (2)
- (b) Multiprocessing differs from multitasking in the following way:  
More than one CPU core required, ✓  
Different tasks or threads are processed simultaneously. ✓ (2)
- 6.6.5 Allows communication/sharing between electronic devices at a short distance from each other. ✓  
OR a correct and suitable description. (1)

- 6.7 Any TWO: ✓✓
- Call quality is affected by Internet connection speed and traffic.
  - To communicate over VoIP, all parties partaking in communication needs to use the same client software.
  - To make video calls on the Internet can be expensive.
  - Both parties need to have a high speed, stable internet connection. (2)
- 6.8 Any TWO: ✓✓
- IoT can be used to monitor/ control temperatures remotely.
  - IoT can be used to notify management of anomalies in fridge temperature.
  - IoT can be used to keep a log of temperatures, showing the history of the temperature levels which can aid in decision-making.
  - Any other acceptable answer. (2)
- 6.9 6.9.1 Any ONE✓
- Radio/Radio waves  
Electromagnetism/Electromagnetic waves (1)
- 6.9.2 Any TWO✓✓
- More than one tag can be read at a time
  - Tags can be hidden
  - Tags can be read even if they are moving at speed
  - Increased accuracy
  - Speed of capturing
  - Can be read over distances
- In terms of security related issues (scenario in question):  
RFID cannot be easily copied as in the case of barcodes.  
Any other security related examples. (2)
- TOTAL SECTION F: 40**  
**GRAND TOTAL: 150**