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# basic education

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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**NOVEMBER 2022**

**MARKING GUIDELINES**

**MARKS: 150**

**These marking guidelines consist of 14 pages.**

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

- |     |        |                               |     |
|-----|--------|-------------------------------|-----|
| 1.1 | 1.1.1  | C ✓                           | (1) |
|     | 1.1.2  | B ✓                           | (1) |
|     | 1.1.3  | C ✓                           | (1) |
|     | 1.1.4  | A ✓                           | (1) |
|     | 1.1.5  | C/D ✓                         | (1) |
| 1.2 | 1.2.1  | H ✓ (Transaction)             | (1) |
|     | 1.2.2  | K ✓ (Array)                   | (1) |
|     | 1.2.3  | J ✓ (Backdoor)                | (1) |
|     | 1.2.4  | I/R ✓ (JavaScript/Python)     | (1) |
|     | 1.2.5  | A ✓ (Copyright)               | (1) |
|     | 1.2.6  | O ✓ (Synchronising)           | (1) |
|     | 1.2.7  | E ✓ (Driver)                  | (1) |
|     | 1.2.8  | B ✓ (User Rights)             | (1) |
|     | 1.2.9  | D ✓ (Artificial Intelligence) | (1) |
|     | 1.2.10 | C ✓ (Scalability)             | (1) |

**TOTAL SECTION A: 15**

## SECTION B: SYSTEM TECHNOLOGIES

## QUESTION 2

- |     |       |   |     |
|-----|-------|---|-----|
| 2.1 | 2.1.1 | (a) DIMM ✓-slots  | (1) |
|     |       | (b) Bytes / MB / GB ✓   | (1) |
|     | 2.1.2 | Any TWO GPU hardware specifications: ✓✓   |     |
|     |       | <ul style="list-style-type: none"> <li>• Speed/number of cores/type of processor</li> <li>• Speed/size/type of RAM</li> <li>• Slot type of the GPU</li> </ul>   | (2) |
|     | 2.1.3 | (a) ZIF ✓-socket  | (1) |
|     |       | (b) Reasons for point-to-point connection:  |     |
|     |       | <ul style="list-style-type: none"> <li>• CPU need to transfer large amounts of data/higher workload to and from RAM ✓</li> <li>• Point-to-point connection is dedicated ✓ for single component OR bus is shared amongst many components</li> </ul>                          | (2) |
| 2.2 | 2.2.1 | Software that manages/controls ✓ all the activities of a computer system.   | (1) |
|     | 2.2.2 | Any TWO functions of an operating system: ✓✓  |     |
|     |       | <ul style="list-style-type: none"> <li>• Provides a user interface</li> <li>• Manages processes and tasks</li> <li>• Manages memory</li> <li>• Manages input and output/peripherals/hardware and software</li> <li>• Manages storage</li> <li>• Manages security</li> </ul> | (2) |
| 2.3 | 2.3.1 | Virtual memory ✓  | (1) |
|     | 2.3.2 | How virtual memory works:<br>When more applications are opened the system runs out of available RAM. ✓<br>Processes not actively being used are moved to virtual memory (special storage) ✓ to open up space in RAM for other applications.                                 | (2) |
| 2.4 | 2.4.1 | A software bug is an error ✓ in software.   | (1) |
|     | 2.4.2 | Any ONE example of how the software bug could be revealed: ✓  |     |
|     |       | <ul style="list-style-type: none"> <li>• Incorrect/inaccurate calculated values</li> <li>• System crash/run-time error</li> <li>• System malfunction</li> </ul>   | (1) |

- 2.5 *Any ONE way to prevent unauthorised access to software: ✓*
- Use passwords/access control
  - Install anti-malware/anti-spyware
  - Setup a Firewall
  - Physically restricting access (locking up, etc.) (1)
- 2.6 2.6.1 *Any TWO limitations related to mobile devices compared to PC: ✓✓*
- Small Screen
  - Small keyboard
  - Limited processing power
  - Limited storage
  - Limited mobile OS
  - Mobile devices are not expandable/upgradeable (2)
- 2.6.2 Convergence ✓ (1)
- 2.7 2.7.1 They both convert programs into machine code. ✓ (1)
- 2.7.2 *Any TWO reasons why a compiler would be a better choice than an interpreter: ✓✓*
- A compiler compiles the whole program at once, whilst the interpreter does it one line at a time.
  - A compiler provides a list of errors whilst the interpreter stops at the first error.
  - A compiled program does not need the compiler to execute, whilst the interpreter is needed to run (creates an executable file). (2)
- 2.8 2.8.1 *Any ONE reason to clean up/arrange items on a desktop computer: ✓*
- Easy to locate programs
  - Better organisation
  - Avoid clutter
  - Increase storage space/remove unnecessary files (1)
- 2.8.2 For the operating system to select the correct application ✓ to open the file with. ✓
- Also accept:  
For the operating system to identify the type of file (1)  
to be able to view the file. (1) (2)

**TOTAL SECTION B: 25**

**SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES****QUESTION 3**

- 3.1      3.1.1      (a) UTP/Ethernet cables ✓  
Also accept: Fibre (1)
- (b) *Any ONE:* ✓  
  - Radio waves
  - Wi-Fi
  - Microwaves
(1)
- 3.1.2      *Any TWO advantages of installing a wireless network:* ✓✓  
  - Mobility
  - No cables used
  - Cost saving
  - Easy to setup/connect
(2)
- 3.1.3      *Any ONE function when no internet access on a network:* ✓  
  - Transfer files/Communication between computers
  - Sharing of files/applications/software resources
  - Share hardware/mention a specific hardware device
(1)
- 3.2      3.2.1      *Any TWO reasons why peer-to-peer is less suitable:* ✓✓  
  - Less secure in terms of managing access to resources
  - Difficult to manage a large number of computers
  - Does not provide centralised storage/services
  - More prone to spread of malware
(2)
- 3.2.2      BitTorrent ✓ (1)
- 3.2.3      *Any ONE role of server:* ✓  
  - A server provides resources (software, storage, etc.)
  - Serves as a log-on controller
  - Manages security settings on network
(1)
- 3.2.4      When a switch fails, all the computers connected to the switch will not be able to access the network ✓ (single point of failure). (1)
- 3.3      3.3.1      (a) HTTP is the protocol that defines how web pages, and their content are transferred across the Web. ✓ (1)
- (b) HTTPS provides for secure/encrypted transfer of web content. ✓ (1)

3.3.2 *Encoding of data:*  
To change the format of data ✓ for transmission over different mediums. ✓ (2)

3.4 3.4.1 A website is a collection of related webpages. ✓ (1)

3.4.2 (a) To ensure high ranking in search results/increase the amount of traffic on a website ✓ by changing the design of webpages. (1)

(b) Adding specific keywords/phrases ✓ that relates to the way in which search engines does content search. (1)

3.5 CSS separates the formatting of the HTML and gathers all of it in one place, in a .css file. ✓ When you want to make a change in the formatting of your website, you only change the CSS file and all the web pages get updated. ✓

Concepts:

- Formatting is placed in a single .css file/style sheet
- Formatting is applied to all web page (2)

3.6 3.6.1 *Any TWO Hotspot risks:* ✓✓  

- Network might not be secured/encrypted
- Exposure to hacking
- Possible risk of malware spread
- Shoulder surfing
- Signal/hotspot spoofing (2)

3.6.2 A VPN creates an encrypted connection ✓ to a private network over a public network/Internet ✓ to gain access with the same security as a direct local connection. ✓

Concepts:

- Communication is encrypted
- Connecting to a private network over a public network/internet
- Same security as a local connection/secure connection (3)

3.7 3.7.1 The company will have information on the website that stays the same over time/no need to be regularly updated. ✓ (1)

3.7.2 *Any TWO advantages for the users of dynamic web pages:* ✓✓  

- They can receive relevant/customised versions of webpages
- Webpage will allow interaction with users
- Content is more likely to be up to date
- Users can now also be contributors of content (2)

- 3.7.3 (a) A set of data that describes and gives additional information on other data. ✓ (1)
- (b) A search will take place using the metadata of the relevant content on the internet and will relate it to the user's contextual information ✓ to present a search result uniquely suited to the user. ✓

Concepts:

- The metadata is matched to users' search request/query
- Providing the user with tailored/suitable results (2)

**TOTAL SECTION C: 30**

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

- 4.1      4.1.1      *Any ONE example of invisible data captured: ✓*
- Purchasing habits/preferences
  - Shopping hour preferences
  - Gender/family composition
  - Whether the person has pets
- OR any other valid example (1)
- 4.1.2      *Any ONE reason why a company wants to capture invisible data: ✓*
- To predict/plan other products to stock
  - Anticipate the needs of the clients
  - Target marketing
- OR any other valid example (1)
- 4.1.3      *Any TWO mechanisms of invisible data capturing: ✓✓*
- Forms - completing forms
  - E-toll - passing through E-toll gates
  - Cell phone logging
  - Online activities – Web searches, online purchases, etc.
  - GPS navigation - Using Google Maps, etc.
  - Security camera footage – Biometrics, etc.
  - Background voice capturing by devices
  - Access control system – Entering a premises/site
  - Smart devices/IoT
  - RFID
- (2)
- 4.2      4.2.1      *Any TWO ways of ensuring the validity of captured data: ✓✓*
- Format check
  - Data type check
  - Range check
  - Presence check
  - Check digit
  - Uniqueness check
- (2)

- 4.2.2 A unique value, a primary key, will be allocated to each customer. ✓  
OR  
Any correct example of a unique field related to the customer. (1)
- 4.3 4.3.1 (a) Data redundancy ✓ (1)  
(b) An update anomaly occurs when a record cannot be changed at a single entry ✓ but has to be changed at multiple entries. ✓ (2)
- 4.3.2 (a) One-to-One ✓ (1)  
(b) One-to-Many ✓ (1)
- 4.4 4.4.1 Composite/Compound ✓ (1)
- 4.4.2 CollectionNumber ✓ OR any other suitable new field  
Also accept: Autonumber field (1)
- 4.4.3 Short Text ✓ (1)
- 4.4.4 The data contained in the field of a foreign key must already exist as an entry in the table where the field is the primary key. ✓  
OR  
No record in the secondary/many table may refer/link to a record in the primary/one table that does not exist. (1)
- 4.4.5 (a) True ✓ (1)  
(b) False ✓ (1)  
(c) False ✓ (1)  
(d) False ✓ (1)

**TOTAL SECTION D: 20**

**SECTION D: SOLUTION DEVELOPMENT****QUESTION 5**

- 5.1      5.1.1      *Any ONE reason for the use of modular programming: ✓*
- Avoids repetition of code
  - Methods can be called and used easily in more than one class
  - Enhances readability
  - Easier to debug
  - Collaboration between programmers
- (1)
- 5.1.2      *Any ONE difference between a procedure and a function: ✓*
- Procedure does not necessarily return a value, whilst a function must return a value.
  - A function has a data type associated with the function name, that acts as a variable for the return value, whilst a procedure does not have that.
  - A procedure is an independent call, whilst a function must form part of another statement.
- (1)
- 5.2.      5.2.1      Valid ✓
- (1)
- 5.2.2      Valid ✓
- (1)
- 5.3      5.3.1      Defensive programming uses code to avoid/handle errors ✓ that will prevent the normal execution of a program. ✓
- (2)
- 5.3.2      (a)      *Any ONE possible reason for an overflow error: ✓*
- When a value to be stored in a variable is outside the range of the data type/ or is too large
  - Endless loop
- (1)
- (b)      *Any ONE of the following to prevent a runtime error: ✓*
- Data validation
  - Exception handling techniques
  - Any example of defensive programming e.g. testing for division by zero
- (1)
- 5.4      5.4.1      Instantiate/Create/Initialise an object ✓
- (1)
- 5.4.2      getCompanyName ✓
- (1)
- 5.4.3      (a)      CompanyNum ✓
- (1)
- (b)      The company number uniquely identifies the company ✓ and should not be changed.
- (1)

ALSO ACCEPT - CompanyName in (a) with correct motivation in (b)

- 5.4.4 (a) Some of the attributes are declared public/attributes should be private. ✓

OR

Indicating specific examples (+ ContactNumber  
+ NumberOfEmployees) (1)

- (b) Declaring an attribute public it is directly accessible from outside the class ✓ which could have unintended/unforeseen effects. ✓ (2)

- 5.5 5.5.1 Number of repetitions are not known in advance. ✓ (1)

- 5.5.2 `iNumber := RandomRange(1,11) ✓;`  
`While (iNumber = 5) ✓ OR (iNumber = 8) ✓ do`  
`iNumber := RandomRange(1,11) ✓;` (4)

**TOTAL SECTION D: 20**

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

- 6.1      6.1.1      Electronic waste refers to electronic devices or items related to electronics that are obsolete/no longer needed. ✓ (1)
- 6.1.2      Contains toxic/harmful materials ✓ (1)
- 6.1.3      *Any TWO ways to reduce electronic waste:* ✓✓ (2)
- Keep old devices/replace only if necessary
  - Extend the life of your electronics. Buy a case, keep your device clean, and avoid overcharging the battery.
  - Donate/sell used electronics
  - Recycle electronics and batteries
  - Refill toner cartridges
- 6.1.4      The drive must be formatted/cleared/factory reset (or any way to permanently destroy access to data) ✓ so any personal information cannot be accessed/retrieved by others. (1)
- 6.2.1      (a) With POP your emails are downloaded to your device ✓ and deleted from the server (unless you change the default settings). (2)
- With IMAP, emails 'reside' on the server ✓, and you can easily read and interact with emails from multiple devices. (2)
- 6.2.1      (b) *Any ONE negative effect of spam:* ✓ (1)
- Spam clogs the Internet/generates unnecessary traffic (impacts speed)
  - It impacts employee productivity/employees must sift through 'junk mail' to find what they really want
  - Spam could contain malware that infects devices
- 6.2.1      (c) *Any TWO possible ways how to identify fake news:* ✓✓ (2)
- Consider the source of the news
  - Check the references of the author
  - Apply common sense (recognise unrealistic news)
- Cross-referencing the content with:
- Reputable news sites
  - The citations and references given
  - Fact-checking websites
  - Experts in the field

- 6.2.2 (a) The file should be uploaded to cloud storage/service ✓ and shared.  
OR  
Any valid example of cloud storage/service that allows this e.g. Google drive, OneDrive, WeTransfer, TeamViewer, etc. / FTP (1)
- (b) *Any ONE risk of sending the attachment via cloud:* ✓  
  - Limited storage available on free versions of services
  - The service might not have good security practices
  - The service might not have good backup policies
  - The service might 'oversell' their services
(1)
- (c) An online storage location for the sharing / downloading / streaming of files. ✓ (1)
- (d) The cloud/files can be accessed from anywhere and at any time. ✓ (1)
- 6.3 6.3.1 (a) It is software that appears to be useful/innocent, that is then installed ✓ and then allows an attacker to remotely control the infected computer. (1)
- (b) *Any TWO ways in which a computer could be infected with Trojan malware:* ✓✓  
  - Open an infected attachment in email
  - Download/installing a Trojan file
  - Download/installing a Trojan file from a malicious site
  - Reacting on spoofed chat messages
  - Opening/Installing a Trojan file from an infected removable storage device
(2)
- 6.3.2 *Any TWO reasons why websites are often hacked:* ✓✓  
  - Steal users' personal information (email addresses, passwords, credit card information) for identity theft
  - Deface the website or place political messages on the website
  - Reroute traffic from the website to a phishing website
(2)
- 6.4 6.4.1 A distributed database is where a database is spread/stored ✓ across servers in separate locations. ✓ (2)
- 6.4.2 Duplication is when every separate site has a copy of the entire/complete database. ✓
- Partitioning is when each site manages/stores only its own data that it works with. ✓ (2)

	6.4.3	When data is duplicated, each site works with its own copy of the data and data sets will start to differ over time. ✓	
		Synchronisation will ensure that changes are replicated ✓ over all data sets to prevent problems.	(2)
6.5	6.5.1	Decision Support System / DSS ✓	(1)
	6.5.2	Human expertise is coded into software ✓ to create a rule-based system that can make decisions based on the input obtained ✓ from a system such as mentioned in Question 6.5.1.	(2)
6.6	6.6.1	Software that is available with access to the source code, ✓ which can be modified and adapted by a user.	(1)
	6.6.2	<i>Any ONE type of file that the disk clean-up program will remove: ✓</i> <ul style="list-style-type: none"> <li>• Temporary/redundant files</li> <li>• Cached webpages</li> </ul>	(1)
	6.6.3	(a) The gap between those who have access to computers and the internet, and those who do not. ✓	(1)
		(b) <i>Any TWO factors that contribute to the digital divide: ✓✓</i> <ul style="list-style-type: none"> <li>• Lack of financial resources to acquire technology</li> <li>• Difference in educational levels</li> <li>• The age gaps</li> <li>• Disabilities</li> <li>• Lack of supporting infrastructure</li> <li>• Fear of ICT</li> </ul>	(2)
6.7	6.7.1	RPA - Used for repetitive, rule-based processes using robotics. ✓	
		Hyper-automation – AI decides on the best strategy ✓ for tasks.	(2)
	6.7.2	<i>Any TWO concepts to be covered in discussion: ✓✓</i> <ul style="list-style-type: none"> <li>• Robots can replace workers</li> <li>• Robots can improve worker productivity</li> <li>• Robots can do task that requires strength and good health</li> <li>• Robots can take over dangerous tasks</li> </ul>	(2)
6.8	6.8.1	Virtual reality replaces reality ✓ with software. Augmented reality enhances reality ✓ by adding onto the real-world experience using software.	
		Also accept examples of each.	(2)
	6.8.2	Mixed reality super-imposes computer-generated objects that users can interact with. ✓	(1)
<b>TOTAL SECTION F:</b>			<b>40</b>
<b>GRAND TOTAL:</b>			<b>150</b>