higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE (VOCATIONAL)

## COMPUTER HARDWARE AND SOFTWARE
## NQF LEVEL 3

## 2 December 2024

**This marking guideline consists of 12 pages.**

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## SECTION A

### QUESTION 1

1.1 F✓
1.2 B✓
1.3 A✓
1.4 H✓
1.5 J✓
1.6 D✓
1.7 C✓
1.8 I✓
1.9 G✓
1.10 E✓

(10 × 1) **[10]**

### QUESTION 2

2.1 False✓
2.2 True✓
2.3 True✓
2.4 False✓
2.5 True✓
2.6 True✓
2.7 False✓
2.8 False✓
2.9 False✓
2.10 False✓

(10 × 1) **[10]**

### QUESTION 3

3.1 A✓
3.2 C✓
3.3 C✓
3.4 D✓
3.5 C✓
3.6 A✓
3.7 C✓
3.8 A✓
3.9 A✓
3.10 A✓

(10 × 1) **[10]**

**TOTAL SECTION A: 30**

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## SECTION B

## QUESTION 4

4.1 4.1.1 Web installation: Web installations download and install software directly from the internet.✓

**OR**

Users access a web page, and the installer is downloaded and run in the browser.✓

4.1.2 Upgrade installation: This type of installation allows the user to keep certain files and preferences.✓

**OR**

The operating system is upgraded to the newer version.✓

4.1.3 Over the air installation: Commonly used for mobile devices and embedded systems.✓

**OR**

OTA installations allow software updates to be delivered and installed remotely over a wireless network.✓

4.1.4 Offline installation: Offline installations involve downloading the full installer file onto the local system before installation.✓

4.1.5 Repair installation: Used to fix any problems with current OS.✓

**OR**

It has utility tools that allow technicians to scan the hard drive for errors.✓

(5 × 1) (5)

4.2 Client-server configuration
A client/server configuration is based on a powerful central computer that provides services to computers connected to it, known as clients. Client/server configurations require specialised hardware and software resources.✓✓

Peer-to-peer configuration
In a peer-to-peer configuration there is no centralisation of services, all computers are equal. There is a huge interdependence amongst all devices connected. This configuration is less complex compared to client/server configuration.✓✓ (4)

4.3
- Centralised architecture✓
- Dedicated roles✓
- Resource sharing✓
- Client requests✓
- Server-client communication✓
- Scalability✓
- Security✓
- Centralised management and administration✓ (Any 4 × 1) (4)

4.4 Input/output (I/O) devices are essential components used with computers to enable communication between the computer and the external world.✓ These devices facilitate the input of data or commands into the computer and the output of processed information or results to users.✓ (2)

**[15]**

**QUESTION 5**

5.1 Central processing unit (CPU) cooling fan✓
Computer fans are widely used along with heat sink fans to reduce the temperature by actively exhausting hot air.✓✓ (3)

5.2
- Mechanical printers, such as daisy wheel printers.✓
- Dot matrix printers.✓
- Inkjet printers.✓
- Laser printers.✓
- Large format printers.✓ (5)

5.3 5.3.1
- Step 1: Prepare the tools.✓
- Step 2: Screw in the standoffs.✓
- Step 3: Install the I/O shield.✓
- Step 4: Install the motherboard.✓
- Step 5: The power cables.✓ (Any 2 × 1) (2)

5.3.2
- Step 1: Install your new motherboard (if necessary).✓
- Step 2: Ground yourself and remove the new processor from its protective bag.✓
- Step 3: Locate the CPU socket on the motherboard and lift the metal arm next to it.✓
- Step 4: Insert the CPU into the socket, aligning the notches or arrows on the CPU and the socket.✓
- Step 5: Lower the metal arm to lock the CPU in place.✓

(Any 2 × 1) (2)

5.3.3
- Step 1: Shut down the computer and unplug it completely.✓
- Step 2: Open the desktop cover.✓
- Step 3: Locate the correct slot on the computer for a wireless card.✓
- Step 4: Insert the adapter card.✓
- Step 5: Close the case and run any software that came with your adapter card.✓ (Any 2 × 1) (2)

**[14]**

## QUESTION 6

6.1
- Define test objectives and criteria:✓ Clearly define the objectives of the testing process. Determine what one wants to achieve through testing and establish key success indicators.✓
- Develop a comprehensive testing plan:✓ Develop a comprehensive testing plan that covers all aspects of the hardware and software to be tested or being tested.✓
- Test environments and data:✓ Create testing environments that mimic real-world scenarios as closely as possible. Use realistic data and configurations that simulate actual usage.✓
- Documentation and reporting:✓ Thoroughly document the testing process, including test cases, procedures, results, and any other issues discovered. Proper documentation ensures that issues are addressed, and it provides a historical record for future references.✓ (4)

6.2
- Selecting the implementation team✓
- Defining scope and avoiding scope creep✓
- Creating a detailed implementation plan✓
- Testing and user acceptance✓ (4)

6.3
- Check compatibility and system requirements✓
- Enable necessary features✓
- Free up disk space✓
- Create backups and recovery plans✓ (4)

**[12]**

## QUESTION 7

7.1
- Mouse✓
- Keyboard✓
- Webcam✓
- Microphone
- Monitor✓
- Speakers✓
- Printer✓
- USB flash drive✓ (Any 5 × 1) (5)

7.2 Mouse
- Adjust the sensitivity (DPI) to control cursor movement speed.✓
- Customise button assignments for specific functions (e.g., assign macros or launch applications).✓
- Change the LED lighting colour and effects (if the mouse has RGB lighting).✓

Keyboard
- Remap keys: Assign different functions to specific keys.✓
- Customise RGB lighting patterns and colours.✓
- Set up macros for repetitive tasks or gaming shortcuts.✓

Webcam
- Adjust video resolution and frame rate for streaming or recording.✓
- Fine-tune focus and exposure settings.✓
- Enable or disable features like auto-tracking or background removal.✓

Monitor
- Configure brightness, contrast, and colour settings.✓
- Set up multiple display modes (e.g., extended desktop or duplicate screen).✓
- Adjust the refresh rate for smoother visuals.✓

Speakers
- Customise audio equalisation (bass, treble, etc.).✓
- Set volume levels for different applications.✓
- Choose between surround sound or stereo mode.✓

Printer
- Adjust print quality (draft, normal, high).✓
- Configure paper type (plain, photo, glossy).✓
- Set up duplex printing (double-sided).✓

USB flash drive
- Encrypt the drive for data security.✓
- Create partitions for organising files.✓
- Customise the drive label for easy identification.✓ (Any 5 × 1) (5)

7.3
- Functionality test: Check whether the peripheral is working as expected. For example, if it's a printer, does it print correctly? If it's a keyboard, do all the keys register accurately?✓
- Compatibility test: Ensure that the peripheral is compatible with the system it's connected to. This includes checking whether the correct drivers are installed and whether the device is recognised by the operating system.✓
- Performance test: Evaluate the performance of the peripheral. For instance, if it's a hard drive, check its read/write speeds. If it's a monitor, assess its resolution, refresh rate, and colour accuracy.✓
- Stress test: Push the peripheral to its limits to see how it performs under heavy load. This could involve printing hundreds of pages continuously for a printer, or running high-resolution, fast-paced visuals for a monitor.✓ (4)

**[14]**

## QUESTION 8

8.1

- Requirement fulfilment**:** The system should fulfil all the specified requirements. This includes functional requirements (what the system should do) and non-functional requirements (performance, security, usability, etc.).✓✓
- Test case success: All the test cases should pass. A test case is a set of conditions or variables under which a tester determines whether a system under test satisfies requirements and functions correctly.✓✓
- No critical bugs: There should be no critical bugs that impact the system's functionality, performance, security, or user experience. Minor bugs that do not significantly impact the user can usually be addressed in future updates.✓✓
- Performance metrics: The system should meet all defined performance metrics. This could include things like load time, response time, resource usage, and throughput.✓✓
- Security compliance: The system should pass all security tests and comply with all relevant security standards and regulations.✓✓
- User acceptance: The system should meet the satisfaction of end-users in terms of functionality, usability, and reliability during the user acceptance testing (UAT) phase.✓✓
- Regression testing: After modifications, the system should pass all regression tests to ensure that previously developed and tested software still perform correctly.✓✓
- Data integrity: The system should maintain data integrity, with no loss or corruption of data during normal operation and in error conditions.✓✓

(Any 5 × 2) (10)

8.2 8.2.1

- Data privacy and security compliance: This includes adhering to regulations such as the General Data Protection Regulation (GDPR) in Europe, the Health Insurance Portability and Accountability Act (HIPAA) in the U.S. for healthcare data, and the Payment Card Industry Data Security Standard (PCI DSS) for credit card data.✓
- Software licensing compliance: This involves ensuring that all software used in the system is properly licensed, and that the use of the software complies with the terms of its license agreement.✓
- Accessibility compliance: This includes meeting standards such as the web content accessibility guidelines (WCAG) for web-based systems to ensure that the system is accessible to users with disabilities.✓ (3)

8.2.2

- Electrical safety compliance: IT systems often involve the use of electrical equipment, which must comply with electrical safety standards to prevent electrical shock, fires, and other hazards.✓
- Ergonomic compliance: If the IT system involves hardware that will be used by people (like a computer workstation), it should comply with ergonomic standards to prevent repetitive strain injuries and other health issues.✓

- Radiation compliance: Certain IT equipment, like monitors and networking equipment, emit small amounts of radiation. Compliance with radiation safety standards is necessary to ensure this radiation stays within safe limits.✓
- Chemical safety compliance: IT systems can involve the use of chemicals in things like printer toners and batteries. These chemicals must be handled and disposed of in accordance with safety regulations to prevent exposure.✓ (Any 2 × 1) (2)

**[15]**

**QUESTION 9**

9.1 Static electricity build-up, also known as static charge, occurs when there is an imbalance of electric charges within or on the surface of a material. Here are five possible causes:

- Friction: This is the most common cause of static electricity. It occurs when two objects are rubbed together, causing a transfer of electrons from one object to the other. For example, when one rub a balloon against one's hair, electrons are transferred from your hair to the balloon, causing a static charge.✓✓
- Contact and separation**:** When two objects come into contact and then separate, electrons can be transferred from one object to the other. This is known as contact electrification or triboelectric effect. An example is walking on a carpet with rubber-soled shoes and then touching a metal doorknob.✓✓
- Induction: Static electricity can also be generated through induction. This happens when a charged object is brought near a neutral object, causing the neutral object to redistribute its charges. If the neutral object is then separated from the charged object, it can retain a net static charge.✓✓
- Conduction: This occurs when a charged object comes into contact with a neutral object. The electrons will move from the charged object to the neutral object until both objects have the same charge.✓✓
- Polarisation: This happens when an electric field distorts the positions of the positive and negative charges in a neutral object. This distortion can cause regions of the object to have a higher concentration of positive or negative charges, leading to a static charge.✓✓ (10)

9.2 EPA in the IT context usually refers to an electrostatic protected area. An EPA is a workspace where electrostatic discharge (ESD) sensitive electronic components are handled and stored. Here's how IT technicians can create an EPA for their clients:

- ESD-safe work surface: Use an ESD-safe mat on the work surface. This mat is designed to limit the discharge of static electricity.✓
- ESD-safe flooring: Consider installing ESD-safe flooring. Like the ESD-safe work surface, this type of flooring is designed to prevent the build-up of static electricity.✓
- Anti-static wrist strap: Wear an anti-static wrist strap when working on sensitive electronic components. This device safely grounds the technician, preventing static electricity from building up on their body.✓

- ESD-safe tools: Use ESD-safe tools. Many common tools used in computer repair, such as screwdrivers and pliers, come in ESD-safe versions.✓
- ESD bags: Store sensitive components in ESD bags. These bags are designed to protect electronic components from electrostatic discharge.✓
- Humidity Control: Maintain a controlled level of humidity in the area. Low humidity levels can contribute to the build-up of static electricity.✓
- ESD training: Ensure that anyone who is going to be working in the EPA understands the risks of ESD and knows how to minimise those risks.✓

(Any 3 × 1) (3)
**[13]**

**QUESTION 10**

10.1
- Identify the issue: Understand the problem that the user is facing with the computer. This could be related to hardware or software.✓✓
- Gather information: Ask the user about any error messages they've seen, what they were doing when the problem occurred, and if they've made any recent changes to the system.✓✓
- Reproduce the issue: If possible, try to reproduce the issue. This can help one to understand exactly what went wrong.✓✓
- Research the issue: Use the information gathered to research the issue. This could involve looking up error codes, consulting technical forums, or using one's own knowledge and experience.✓✓
- Implement a solution: Once one has identified a potential solution, implement it. This could involve anything from guiding the user through steps to fix the issue, to performing a repair yourself.✓✓
- Test the solution: Verify that the solution has resolved the issue. This could involve having the user confirm that the problem is resolved or testing the system yourself.✓✓
- Document the issue and resolution: Record the issue and how it was resolved. This can be useful for future reference, and for reporting purposes.✓✓
- Report the issue and resolution: Report the issue and its resolution to the relevant parties. This could be a supervisor, a team, or a database of known issues and solutions.✓✓ (Any 6 × 2) (12)

10.2 10.2.1
- On-site and remote IT support✓
- Network setup and maintenance✓
- Data backup and recovery services✓
- Software installation and updates✓
- Cybersecurity solutions✓
- Training for employees on IT best practices✓ (Any ONE)

10.2.2
- Remote IT support✓
- Computer setup and troubleshooting✓
- Software installation and updates✓
- Virus and malware removal✓
- Data backup and recovery services✓ (Any ONE)

10.2.3
- On-site and remote IT support✓
- Network setup and maintenance✓
- Classroom technology setup and support (e.g., smart boards, projectors)✓
- Software licensing and updates for educational tools✓
- Cybersecurity solutions✓
- Training for staff and students on IT best practices✓ (Any ONE)

10.2.4
- Enterprise-level IT support✓
- Network architecture design and maintenance✓
- Data centre management✓
- Software licensing and updates✓
- Cybersecurity solutions✓
- IT consulting services✓ (Any ONE)

10.2.5
- On-site and remote IT support✓
- Network setup and maintenance✓
- Support for medical technology and software✓
- Compliance assistance with healthcare regulations (e.g., HIPAA)✓
- Data backup and recovery services✓
- Cybersecurity solutions✓ (Any ONE)

(5 × 1) (5)

10.3
- Small business owner – Data backup and recovery services✓
- Individual client – Remote IT support✓
- Educational institution – Classroom technology setup and support (e.g., smart boards, projectors) ✓
- Corporate IT division – Software licensing and updates✓
- Healthcare facility – Compliance assistance with healthcare regulations (e.g., HIPAA), and support for medical technology and software✓ (5)

**[22]**

## QUESTION 11

11.1 11.1.1 Cost-benefit analysis: This involves comparing the cost of repair with the cost of purchasing a new computer. If the repair costs are significantly lower than the cost of a new computer, it might be worth repairing. However, if the repair costs approach or exceed the cost of a new computer, it might be more economical to replace the computer.✓✓

11.1.2 Availability of repair parts: The availability of parts is crucial for the repair process. If parts are readily available, it will be easier and quicker to repair the computer. However, if parts are scarce or obsolete (which often happens with older models), it might be difficult or impossible to repair the computer.✓✓

11.1.3 Technical expertise: The complexity of the repair is another important factor. Some issues can be fixed easily with basic technical knowledge, while others require advanced expertise. If the repair requires professional skills and you don't have the necessary expertise, you might need to consider hiring a professional, which adds to the cost.✓✓

11.1.4 Warranty and support: If your computer is still under warranty, it's usually advisable to have it repaired by the manufacturer or an authorised service centre. Doing the repair yourself or using an unauthorised service centre might void the warranty. Additionally, some manufacturers offer support that could help resolve the issue without needing a repair.✓✓

(4 × 2) (8)

11.2 There are several reasons why computer technicians should avoid using second-hand components when repairing a client's computer:

- Reliability: Second-hand components may not be as reliable as new ones. They could have been used extensively and may be close to the end of their lifespan. This could lead to frequent breakdowns and the need for additional repairs.✓
- Compatibility: Second-hand parts may not be fully compatible with the client's system. Even if they fit physically, there could be issues with software, drivers, or system requirements.✓
- Performance: Used components may not deliver the same level of performance as new ones. Over time, components can degrade and become less efficient.✓
- Warranty: Second-hand components usually don't come with a warranty, or if they do, it's typically much shorter than the warranty for new parts. If the component fails, the client could be left with a broken computer and no recourse.✓
- Client satisfaction: Using second-hand parts could lead to client dissatisfaction. If clients find out that used parts were used in their repair, they might feel that the service they received was subpar.✓
- Data security: If the second-hand component is a storage device, there could be a risk of data breach or malware infection from the previous owner's data.✓

(Any 4 × 1) (4)

11.3 If a software program is installed on a computer that does not meet its minimum requirements, several challenges could arise:

- Performance issues: The software may run slowly or may not run at all. This is because the computer's hardware (like the processor, RAM, or graphics card) may not be powerful enough to handle the software's demands.✓
- Software crashes: The software may frequently crash or freeze. This is often due to insufficient memory (RAM) or disk space.✓
- System instability: The entire system may become unstable. Running software that demands more resources than the system can provide may cause other applications or even the operating system to crash.✓
- Incompatibility issues: There may be compatibility issues with the operating system or other installed software. Some software requires specific versions of operating systems or other software to function correctly.✓
- Limited functionality: Some features of the software may not work as intended. For example, high-end graphics features may not work on a system with a low-end graphics card.✓
- Increased wear and tear: The hardware components may experience increased wear and tear as they are pushed beyond their capabilities.✓

(Any 3 × 1) (3)
**[15]**

**TOTAL SECTION B: 120**
**GRAND TOTAL: 150**

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