higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE (VOCATIONAL)

## COMPUTER HARDWARE AND SOFTWARE
## NQF LEVEL 3

## 18 February 2025

**This marking guideline consists of 15 pages.**

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## SECTION A

### QUESTION 1

1.1 True✓
1.2 False✓
1.3 False✓
1.4 True✓
1.5 False✓
1.6 False✓
1.7 False✓
1.8 False✓
1.9 False✓
1.10 True ✓

(10 × 1) **[10]**

### QUESTION 2

2.1 D✓
2.2 A✓
2.3 A✓
2.4 C✓
2.5 D✓
2.6 C✓
2.7 D✓
2.8 B✓
2.9 B✓
2.10 D ✓

(10 × 1) **[10]**

### QUESTION 3

3.1 A✓
3.2 F✓
3.3 H✓
3.4 E✓
3.5 C✓
3.6 G✓
3.7 B✓
3.8 D✓
3.9 J✓
3.10 I✓

(10 × 1) **[10]**

**TOTAL SECTION A: 30**

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## SECTION B

## QUESTION 4

4.1 4.1.1 **Communication**: Notify users in advance about the software installation, including its purpose, benefits and potential impact on their workflow. This helps manage expectations and reduce surprises.✓

4.1.2 **Scheduled downtime**: Choose a time for installation when user activity is typically low, such as evenings, weekends or during breaks. Avoid peak hours to minimise disruptions.✓

4.1.3 **Compatibility checks**: Ensure that the software is compatible with the user's system and existing software. Compatibility issues can lead to installation failures or performance problems.✓

4.1.4 **Data backup**: Advise users to back up their important data before installation, especially for major upgrades. This prevents data loss in case of unforeseen issues.✓

4.1.5 **Progressive deployment**: If applicable, consider a phased deployment where the software is initially installed for a smaller group of users. This allows you to identify and address any issues before rolling out to a larger audience.✓

(5 × 1) (5)

4.2 4.2.1 **Quantum computing**

- Quantum computing is fundamentally different from classic computing. It uses qubits, which can exist in multiple states at the same time (superposition) and be entangled, enabling it to process information in ways impossible for classic computers.✓
- Quantum computing is in its early stages and is primarily aimed at solving complex problems in fields like cryptography, optimisation and materials science.✓
- Quantum computers require specialised hardware and are used for specific tasks that classic computers struggle with.✓

(Any 2 × 1) (2)

4.2.2 **Edge computing**

- Edge computing moves data processing closer to the data source, such as IoT devices or sensors. It does not fundamentally change the way computing works but changes where it happens.✓
- Edge computing is focused on reducing latency and improving real-time data processing. It is commonly used in applications that require immediate responses, like autonomous vehicles, industrial automation and IoT devices.✓
- Edge computing often involves distributed hardware configurations, such as edge servers, IoT devices or sensors. It complements, rather than replaces, traditional desktop and mobile computing.✓ (Any 2 × 1) (2)

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4.3

- **Reduced infrastructure costs**: P2P networks do not rely on centralised servers or data centres, which can be expensive to set up and maintain. Instead, the network nodes (peers) share resources and distribute the workload. This eliminates the need for costly server hardware and associated infrastructure.✓
- **Scalability and flexibility**: P2P networks can easily scale by adding more peers to the network. This scalability is cost-effective because it does not require significant upfront investments in additional server capacity as the network grows.✓
- **Redundancy and reliability**: P2P networks often exhibit high redundancy, as files or data are distributed across multiple peers. This redundancy enhances network reliability without the need for expensive backup systems.✓
- **Distributed computing**: P2P networks can harness the computing power of individual peers for tasks like data processing or distributed computing projects. This can be more cost-effective than investing in high-end servers for similar tasks.✓
- **Lower bandwidth costs**: In some P2P networks, peers share the burden of data transmission, reducing the bandwidth requirements for each individual peer. This can lead to cost savings on internet or network bandwidth.✓
- **Reduced maintenance costs**: P2P networks often require less ongoing maintenance and support compared to client/server networks with centralised servers. Peers can self-organise and manage their resources, reducing the need for IT staff and support.✓
- **Improved efficiency**: P2P networks can make more efficient use of available resources, for example, in a P2P file-sharing network files are distributed across peers, reducing the need for large, centralised storage systems.✓
- **Peer contribution**: In some P2P networks, participants contribute their resources (e.g., bandwidth, storage or computing power) voluntarily. This 'crowdsourcing' approach can lead to significant cost savings as the burden is shared among participants.✓
- **Reduced downtime:** P2P networks can be more fault-tolerant because they do not rely on a single point of failure like a central server. This can lead to reduced downtime and associated costs in case of hardware failures.
- **Savings on licensing costs:** In some P2P applications, the use of open-source or freely available software can reduce licensing costs, as opposed to proprietary server-based solutions. (Any 4 × 1) (4)

4.4

- **Data transfer**: Cables and connectors enable the transmission of digital and analog data between different hardware components within a computer system. This includes the transfer of information between the CPU, memory, storage devices and peripherals such as monitors, keyboards and mice.✓
- **Power distribution**: Power cables and connectors deliver electrical power from a power source, such as a wall outlet or a power supply unit (PSU), to the various components of a computer system, ensuring they receive the necessary power to function. ✓
- **Connectivity**: Cables and connectors establish connections between the computer and external devices, such as printers, scanners, external hard drives and networking equipment. This allows for data exchange, printing, and other interactions with external hardware.✓
- **Signal transmission**: Specialised cables and connectors are used for transmitting audio and video signals from a computer to display devices, speakers and headphones. Examples include HDMI, DisplayPort, USB audio connectors and headphone jacks.✓(Any 2 × 1) (2)

**[15]**

**QUESTION 5**

5.1 5.1.1 **Tower\Case**

- **Form factor:**✓ The form factor of the case determines the size and shape of the motherboard it can accommodate. Common form factors include ATX, Micro-ATX, Mini-ITX and E-ATX. Make sure the case matches the motherboard size you plan to use. ✓
- **Dimensions:**✓ Tower cases come in various sizes, including mini-tower, mid-tower and full-tower. Check the dimensions to ensure the case fits in the intended space and has enough room for your components.✓
- **Exterior design:**✓ Look for a design that suits your aesthetics, whether it is a sleek and minimalist look or a more elaborate and gaming-oriented design.
- **Expansion slots:**✓ Check the number of expansion slots the case offers for graphics cards, sound cards and other add-on cards.✓
- **Drive bays:**✓ Consider the number and type of drive bays the case provides, including 2.5-inch and 3.5-inch bays for hard drives and SSDs.✓
- **Cooling options:**✓ Look for features like pre-installed fans, fan mounts and radiator support for water-cooling solutions. Good airflow is crucial for cooling the components effectively.✓

(Any 3 × 1) (3)

5.1.2 **Memory\RAM modules**

- **Capacity**: RAM is available in various capacities, typically measured in gigabytes (GB) or terabytes (TB). Common capacities for consumer PCs range from 4 GB to 32 GB or more. The capacity needed depends on the specific use for the case, such as gaming, content creation or general office tasks.✓
- **Type**: There are different types of RAM, with DDR (double data rate) SDRAM being the most common for consumer systems. Current DDR standards include DDR4 and DDR5, with the latter being the latest at the time of my knowledge cutoff in 2022. DDR5 offers higher bandwidth and better performance compared to DDR4.✓
- **Speed (frequency)**: RAM speed is measured in megahertz (MHz) and determines how quickly data can be read from and written to the memory modules, for example, you might see RAM rated at 2400 MHz, 3200 MHz, or higher. Higher MHz values generally indicate faster performance, but the impact on real-world tasks can vary.✓
- **CAS latency (CL):** CAS latency or CL, is a measure of how many clock cycles it takes for the RAM to respond to a request. Lower CAS latency values indicate faster response times. When comparing RAM modules, consider the combination of speed and CAS latency for a better understanding of performance.✓
- **Voltage**: RAM modules can operate at different voltage levels. Lower voltage modules are often more energy-efficient and generate less heat. Check your motherboard's compatibility with the RAM voltage, as some motherboards have specific requirements.✓
- **Form factor**: RAM modules come in different form factors, such as DIMM (Dual In-Line Memory Module) and SO-DIMM (Small Outline DIMM). Ensure you choose the correct form factor for your motherboard or laptop.✓ (Any 3 × 1) (3)

5.2 5.2.1 The main functions of network interface cards include:

- Network Connectivity✓
- Data Link Layer Functions
- Ethernet or other Network Protocol Support✓
- MAC Address Assignment✓
- Data Transmission and Reception✓
- Buffering and Data Storage✓
- Hardware Offloading✓
- Jumbo Frames Support✓
- Quality of Service (QoS) ✓
- Network Management✓ (Any 4 × 1) (4)

5.2.2 **NIC form factors**

- **PCI NICs**: Network cards that connect to a computer's PCI or PCIe slots on the motherboard.✓
- **USB NICs**: These are portable NICs that connect via USB ports, often used for laptops or desktops lacking built-in Ethernet ports.✓
- **PCMCIA/CardBus NICs**: Older types of network cards designed for laptops, which used PCMCIA or CardBus slots.✓✓ (4)

**[14]**

**QUESTION 6**

6.1

- **Define test objectives and criteria**:✓ Clearly define the objectives of the testing process. Determine what you want 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 × 2) (8)

6.2

- Peripheral devices, often referred to simply as 'peripherals', are hardware components that connect to and interact with a computer or other digital device but are not part of the core central processing unit (CPU) or main memory.✓✓
- Peripheral devices refer to components/devices that extend the functionality of a computer or provide additional input, output or storage capabilities.✓✓

(Any 1 × 2) (2)

6.3 6.3.1

1. **Human interaction:** Manual test scripts involve human testers who interact with the software by following predefined steps and test cases.✓
2. **Exploratory testing:** Testers have the flexibility to explore the software, adapt to changes and make on-the-fly decisions during testing. This approach is especially useful for usability and user experience testing.✓
3. **Prone to human error:** Manual testing is more prone to human errors, as testers might make mistakes when following test steps or recording results.✓
4. **Best for UI and usability testing:** Manual testing is often used for user interface (UI) testing, usability testing and ad-hoc testing to evaluate the software from a user's perspective.✓
5. **Time-consuming:** Manual testing can be time-consuming, especially for repetitive and regression testing, as testers must execute each test case manually.✓ (Any 1 × 1) (1)

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6.3.2
- **Automation tools:** Computer-based test scripts involve automated test scripts created using testing tools and frameworks. These scripts run tests without human intervention.✓
- **Repeatability:** Automated tests are highly repeatable and can execute the same test cases with precision every time, reducing the risk of human error.✓
- **Efficiency:** Automated testing is more efficient for repetitive tasks and large test suites. It can quickly run regression tests and provide rapid feedback on code changes.
- **Limited to predefined steps:** Automated test scripts are limited to predefined test steps and cannot adapt to unexpected changes or issues that are not accounted for in the script.✓
- **Best for regression and functional testing:** Automated testing is well suited for regression testing, functional testing, and performance testing, where the repetitive and systematic execution of test cases is required. (Any 1 × 1) (1)

**[12]**

**QUESTION 7**

7.1 7.1.1 **Database software**
- Microsoft Access:✓
- MySQL✓ (Any ONE)

7.1.2 **Graphics and multimedia software**
- Adobe Photoshop✓
- Adobe Premiere Pro✓
- Core-draw✓ (Any ONE)

7.1.3 **Web browsers**
- Google Chrome✓
- Mozilla Firefox✓
- Microsoft Edge ✓
- Apple Safari✓
- Opera Mini✓
- Brave✓ (Any ONE)

7.1.4 **Video conferencing software**
- Zoom✓
- Microsoft Teams✓
- Skype✓
- Google Meet✓
- Cisco Webex✓
- BlueJeans✓ (Any ONE)

7.1.5 I**nstant messaging applications**

- WhatsApp✓
- Facebook Messenger✓
- Telegram✓
- Slack✓
- Skype✓

(Any ONE) (5 × 1) (5)

7.2

- 16 bit✓
- 32 bit✓
- 64 bit✓
- 128 bit✓

(Any 3 × 1) (3)

7.3

- **Image resolution**: You can adjust the scanning resolution to control the image quality.✓
- **Colour mode:** Scanners typically offer options for colour, grayscale or black and white (binary) scanning.✓
- **Image enhancement:** Many scanners provide image enhancement features like contrast adjustment, brightness control and image cleanup to improve the quality of scanned documents for OCR.✓
- **Scanning speed:** You can adjust the scanning speed based on your requirements.✓
- **File format:** Choose the file format for the scanned images. Common formats include JPEG, TIFF and PDF.
- **Document feeding options**: If you have multipage documents, scanners may offer various document-feeding options, such as duplex scanning (scanning both sides of the page), sheet size detection and automatic document feeders.✓
- **OCR settings:** Some scanners come with built-in OCR software or can be integrated with third-party OCR applications. ✓
- **Barcode detection:** Some scanners have the capability to recognise and decode barcodes, which can be valuable for document indexing or organisation.✓
- **Integration with document management systems:** Scanners can be configured to integrate with document management systems or workflow software to streamline the OCR and document processing process. ✓
- **Batch processing**: Some scanners support batch processing, allowing you to scan and process multiple documents in a single operation.

(Any 6 × 1) (6)
**[14]**

**QUESTION 8**

8.1

- **Class A fires (ordinary combustibles):**✓ Class A fires involve ordinary combustible materials such as wood, paper, cardboard and plastics. In a computer operation setting, these materials may include paper documentation, cardboard boxes and some types of plastic used in equipment or wiring insulation.✓
- **Class B fires (flammable liquids and gases):**✓ Class B fires are fueled by flammable liquids and gases such as gasoline, oil, solvents and propane. While these materials may not be commonly found directly within computer operations, they could be present in maintenance or storage areas.✓
- **Class C fires (electrical equipment):**✓ Class C fires involve electrical equipment, including computers, servers, wiring and other electrical components. These fires are energised by electrical fires.✓
- **Class D fires (combustible metals):**✓ Class D fires involve combustible metals, such as magnesium, titanium and aluminum. While not common in typical computer operations, certain industrial or specialised settings may use equipment and materials containing combustible metals.✓
- **Class K fires (cooking oils and fats):**✓ Class K fires involve cooking oils and fats, often found in commercial kitchens. These types of fires are not typically associated with standard computer operations.✓ (5 × 2) (10)

8.2

- **Placement:** Place the printer on a stable, flat surface that can support its weight. Ensure adequate ventilation to prevent overheating.✓
- **Power supply:** Connect the printer to a surge protector or a dedicated electrical outlet to protect it from power surges.✓
- **Ink and toner cartridges:** When replacing ink or toner cartridges, follow the manufacturer's instructions. Avoid touching the print head or imaging drum to prevent damage.✓
- **Paper handling:** Use the appropriate type and size of paper recommended by the printer's specifications. Improper paper can cause jams or other issues.✓
- **Paper loading:** Load paper trays and feeders carefully, aligning the paper correctly. Make sure the guides are snug against the paper.
- **Regular cleaning:** Clean the printer regularly to remove dust and debris that can affect print quality. Use a soft, lint-free cloth and a manufacturer-recommended cleaning solution.
- **Scheduled maintenance:** Follow any recommended maintenance schedules in the user manual. This may include replacing consumables, cleaning internal components and performing calibration.
- **Firmware and driver updates:** Keep the printer's firmware and driver software up to date to ensure compatibility with your computer and to access the latest features and bug fixes. ✓
- **Network security:** If your printer is connected to a network, implement security measures to protect it from unauthorised access and cyber threats.
- **Power management:** Enable power-saving features when the printer is not in use to reduce energy consumption.✓ (Any 5 × 1) (5)

**[15]**

## QUESTION 9

9.1 9.1.1 **Internet connectivity issues**

- Restart the modem and router. ✓
- Check network cables for loose connections.
- Run the Windows network troubleshooter (or equivalent on other operating systems).✓
- Reset the network settings if necessary.✓
- Contact the internet service provider if the issue persists.✓

(Any TWO)

9.1.2 **Hardware failure (e.g. hard drive failure)**

- Back up the data immediately if you suspect hardware failure.✓
- Use diagnostic tools to check the health of the hard drive or other hardware components.✓
- Replace or repair the faulty hardware component as needed.✓

(Any TWO)

9.1.3 **Peripheral issues (e.g. printer not printing)**

- Check connections and cables for proper attachment.✓
- Update drivers for the peripheral device.✓
- Clear print queues or other peripheral-related issues.✓
- Consult the device's user manual or manufacturer's website for troubleshooting guidance.✓ (Any TWO)

9.1.4 **Slow performance**

- Close unnecessary background applications.✓
- Free up disk space by deleting unneeded files.✓
- Run a malware scan to check for viruses or malware.✓
- Upgrade your hardware (e.g., add more RAM or upgrade your hard drive to an SSD).✓
- Consider reinstalling the operating system if the computer is severely slowed down.✓ (Any TWO)

9.1.5 **Operating system corruption**

- Use system restore or recovery options to roll back to a previous state.✓
- Reinstall or repair the operating system.✓
- Consult support resources for your specific OS for guidance.✓

(Any TWO)
(5 × 2) (10)

9.2
- **Identify the problem:** Understand the issue you are facing. Is it a hardware or software problem? What exactly is happening and when does it occur?✓
- **Reproduce the problem**: If possible, try to reproduce the problem. This can help you understand under what conditions the problem is occurring.✓
- **Check for simple solutions:** Sometimes the issue can be resolved by simple solutions such as restarting the device, checking the power supply or ensuring all cables are properly connected.✓
- **Isolate the problem:** Try to narrow down the cause of the problem. If it is a software issue, check if it occurs with other software too. If it is a hardware issue, try using different hardware.✓
- **Research the problem:** Use resources such as the internet, user manuals or help forums to find possible solutions or workarounds for the problem. ✓
- **Implement a solution**: Once you have found a potential solution, implement it and see if it resolves the problem. If not, it may be necessary to seek professional help.✓ (Any 3 × 1) (3)

**[13]**

**QUESTION 10**

10.1 10.1.1
- **Use a protective case:** For chrome books, netbooks, Ultrabook, tablets and laptops, consider using protective cases or sleeves to shield the device from physical damage.✓
- **Screen protectors:** Apply a screen protector to protect the display from scratches and minor impacts.✓
- **Avoid liquid exposure:** Keep your devices away from liquids, including water, coffee and other beverages. Consider using spill-resistant accessories if necessary.✓
- **Protect against dust:** Dust can accumulate inside devices, leading to overheating and performance issues. Keep devices clean and store them in a dust-free environment.✓
- **Proper storage:** Store devices in a cool, dry place, away from direct sunlight, extreme temperatures and humidity.✓
- **Keep away from magnets:** Magnets can interfere with the functionality of devices. Avoid placing devices near strong magnetic fields.✓
- **Charge with care:** Use the original charger and cable or high-quality alternatives. Avoid using cheap, unbranded chargers. Unplug chargers when not in use to prevent overcharging.✓
- **Use surge protectors:** Plug the devices into surge protectors to safeguard against power surges and voltage fluctuations.✓

(Any 5 × 1) (5)

10.1.2
- **Regular updates:** Keep the device's operating system, drivers, and software up to date. Updates often include bug fixes, security patches and performance enhancements.✓
- **Uninstall unnecessary software:** Remove unused or redundant software and apps to free up storage space and reduce background processes.✓
- **Manage start-up programs:** Disable unnecessary start-up programs to reduce boot times and system resource usage.✓
- **Close background apps:** Regularly close or disable apps running in the background, as they can consume system resources and slow down the device.✓
- **Organise and clean storage:** Regularly clean up and organise files on the device. Remove temporary files, caches and old, unused files to free up storage space.✓
- **Upgrade hardware:** Consider upgrading hardware components, such as adding more RAM or upgrading to a solid-state drive (SSD) to improve device performance.✓ (Any 5 × 1) (5)

10.2
- Process of elimination✓
- Component isolation✓
- Trial and error✓
- Divide and conquer✓
- Ask for expert advice✓
- Use diagnostic tools✓
- Parallel testing✓ (Any 4 × 1) (4)

10.3
- **Compatibility checks**:✓ Before implementing any replacement modules or software, it is crucial to check their compatibility with the existing system. This includes hardware specifications, operating system and other software applications.✓
- **Vendor reputation**:✓ Always choose modules and software from reputable vendors. They are more likely to adhere to industry standards and best practices.✓
- **Version control**:✓ Keep track of the versions of all software and modules. This can help in troubleshooting and ensures that you are using the most secure and stable versions.✓
- **Testing**:✓ Conduct thorough testing before fully implementing new modules or software. This can help identify any potential issues or conflicts early on.✓
- **Backup and recovery**:✓ Always have a backup of your system before making changes. In case something goes wrong, you will be able to restore the system to its previous state. ✓
- **Security**:✓ Ensure that the new modules or software do not introduce any security vulnerabilities. This includes checking for any known issues and keeping the software up-to-date with patches and updates. ✓
- **Documentation**:✓ Maintain detailed documentation of all changes made. This can help in future troubleshooting and provide a record of your system's evolution.✓
- **Training**:✓ Ensure that all users are properly trained on how to use the new modules or software. This can help prevent user error and improves efficiency.✓ (Any 4 × 2) (8)

**[22]**

## QUESTION 11

11.1
- Verify warranty and support.✓
- Backup data.✓
- Prepare the workspace.✓
- Adhere to anti-static precautions.✓
- Power off the computer and disconnect from power sources.✓
- Label and disconnect cables.✓
- Remove existing hard drive.✓
- Install the new hard drive.✓ (8)

11.2 **Professional competence**
- Stay current with industry trends, technology and best practices.✓
- Only undertake tasks that you are qualified and trained to perform.✓

**Integrity and honesty**
- Be truthful and honest in all professional dealings.
- Do not engage in deceptive or fraudulent practices.✓

**Respect for client needs**
- Understand and prioritise the client's needs and requirements.
- Communicate effectively and transparently with the client throughout the project.✓

**Timeliness and reliability**
- Meet deadlines and commitments made to clients.
- Notify clients promptly of any delays or issues that may affect project time lines.✓

**Ethical use of technology**
- Use technology and information systems in a responsible and ethical manner.
- Respect intellectual property rights and licensing agreements.✓

**Quality of work**
- Strive for excellence and deliver high-quality work.
- Test and validate solutions to ensure they meet client expectations and requirements.✓

**Client education**
- Provide clients with information and guidance to make informed decisions about technology solutions.
- Promote digital literacy and educate clients on the safe and responsible use of technology.✓

**Environmental and social responsibility**
- Consider the environmental impact of technology solutions and promote sustainability when possible.✓ (Any 5 × 1) (5)

11.3
- Inform the user about the response time that he/she can expect.✓
- If you commit to any time frame, make sure you meet it.✓
- Assign priority to reported problems.✓
- If there are any changes to the agreed time line, inform the user accordingly.✓ (Any 2 × 1) (2)

**[15]**

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

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