Instructional Framework

Technology Devices Maintenance

15.1202.00

This Instructional Framework identifies, explains, and expands the content of the standards/measurement criteria, and, as well, guides the development of multiple-choice items for the Technical Skills Assessment. This document corresponds with the Technical Standards endorsed on July 13, 2020.

Domain 1: Device Hardware Installation and Maintenance **Instructional Time: 30-35%**	
STANDARD 6.0 INSTALL, CONFIGURE, UPGRADE, AND MAINTAIN TECHNOLOGY	

6.1 Identify the purpose and characteristics of common system components (i.e., storage devices, power supply, removable media, expansion cards, memory, etc.)	• Computer Components
	  ○ CPU
	  ○ Motherboard
	  ○ PSU
	  ○ Hard drive
	  ○ Optical drive
	  ○ RAM
	  ○ Heat sink
	  ○ Cooling fan
	  ○ Expansion cards

6.2 Identify the purpose and characteristics of mobile device components (i.e., power supply, removable media, screens, batteries, speakers, ports, etc.)	• Mobile Device Components
	  ○ Display/screen
	  ○ Battery
	  ○ ARM
	  ○ Memory/storage
	  ○ Cameras
	  ○ Sensors
	  ○ Modems
	  ○ Speakers
	  ○ Power Supply
	  ○ Microphone

6.3 Demonstrate basic procedures for adding and removing common system components and recognizing associated cable connections	• Cable connections
	• Cable management
	• Male/female connections
	  ○ Serial
	  ○ Parallel

	• Power Supply Connections

6.4 Distinguish the names, purposes, and performance characteristics of common peripheral ports	• Video Ports
	  ○ VGA, DVI, HDMI, etc.
	• Network Ports
	  ○ RJ45
	• Serial/parallel ports
	• Audio ports

6.5 Demonstrate proper procedures for installing and configuring common peripheral devices	• Plug and Play (PnP) • Provided optical drive (CD/DVD)
6.6 Identify issues that must be considered when upgrading technology components [i.e., safety (electrical), data integrity, compatibility, user privacy, etc.]	• Safety • Data integrity • Compatibility • User privacy • Cost analysis • RAM • Graphics • Hard drive • Optical drive

6.7 Follow procedures for preventive maintenance of computers and peripherals (i.e., physical cleaning, defragmenting drives, data backup, security updates, etc.)	• Cleaning hardware
	• Latest drivers for hardware
	• Latest antivirus protection
	• Software utilities
	  ○ Defrag
	  ○ Scandisk
	  ○ Backup
	  ○ Data remnants
	• Deleting unused programs
	• Rebooting

6.8 Determine the cost-benefit of replacement or repair of hardware/software	• Direct
	  ○ Hardware and software invoices
	  ○ Purchase orders
	  ○ Three-year period
	  ○ Labor cost
	  ○ Website
	  ○ Helpdesk
	  ○ Network cost
	• Indirect

	○ Productivity lost to end user ○ Productivity loss • Revenue loss
STANDARD 7.0 ASSESS MOTHERBOARDS, PROCESSORS, AND MEMORY	
7.1 Identify CPU chip types, manufacturers, and associated sockets	• Types ○ Single core ○ Dual core ○ Quad core • Manufacturers ○ Intel ○ Advanced Micro Devices (AMD) • Sockets ○ Ball-grid array (BGA) ○ Pin-grid array (PGA) ○ Land grid array (LGA)
7.2 Distinguish differences between surface mount technology (SMT) and socketed components	• Surface Mount Technology ○ Definition ○ Advantages ○ Disadvantages • Socketed components ○ Definition ○ Advantages ○ Disadvantages
7.3 Identify operational characteristics of RAM (e.g., speed, type, and size)	• Type ○ DRAM ▪ ADRAM ▪ FPM DRAM ▪ EDO DRAM ▪ BEDO DRAM ▪ SDRAM ▪ SDR SDRAM ▪ DDR SDRAM ▪ DDR2 SDRAM ▪ DDR3 SDRAM ▪ DDR4 SDRAM ▪ DDR5 SDRAM ○ SRAM ○ ROM

7.4 Identify the responsibility of the various components of the motherboard (i.e., integrated ports, expansion slots, chipsets, battery, etc.)	• CPU
	• Northbridge
	  ○ PCIe Controller
	  ○ AGP Controller
	  ○ Memory Controller
	• Southbridge
	  ○ ATA Interface
	  ○ Serial ATA
	  ○ Floppy Controller
	  ○ Onboard Audio
	  ○ PCI Expansion Bus
	  ○ Onboard USB/Serial/Parallel
	  ○ Onboard LAN
	• Chipset
	• Motherboard connectors

7.5 Identify basic compatibility guidelines of the motherboard, processors, and memory	• Packaging/labels
	• Components compatibility
	• Order of selection for assembly
	  ○ CPU
	  ○ Motherboard
	  ○ RAM
	  ○ Case
	• Types
	  ○ ATX
	  ○ Micro ATX
	  ○ ITX
	  ○ Mini ITX
	• Motherboard manual

7.6 Explain the role of BIOS and CMOS in computer technology	• BIOS/UEFI
	  ○ Input
	  ○ Output
	• CMOS
	• CMOS battery
	• Firmware
	• Security

7.7 Explain how environmental factors including heat, airborne particulates, humidity, vibration, and shocks can affect equipment	• Various environmental factors
	  ○ Vibrations/shocks
	  ○ Humidity

	○ Airborne particles ○ Internal/external temperature • Prevention and resolution
7.8 Explain the relationship of hertz to processor and bus speeds	• MHz ○ Hertz ○ Processor speed ○ Clock cycle • Bus Speed ○ Processor ○ RAM
7.9 Explain the relationship of bits and bytes to common memory and storage capacities	• Bit • Byte (B) • Kilobyte (KB) • Megabyte (MB) • Gigabyte (GB) • Terabyte (TB) • Petabyte (PB) • Exabyte (EB) • Zettabyte (ZB) • Yottabyte (YB)
7.10 Apply basic electronics theories (i.e., Ohm's Law, calculation of wattage, voltage, amperage, resistance, capacitance, etc.)	• Ohm's Law • International Symbols for Current, Power, Resistance
STANDARD 8.0 INSTALL AND MAINTAIN PRINTERS AND SCANNERS	
8.1 Compare and contrast printer technologies including laser, ink dispersion, solid ink, thermal, impact, and dye sublimation	• Laser printing process • Laser printer components ○ EP (electrophotographic) ○ LED (light-emitting diodes) ○ Page vs. line ○ Toner cartridge • Inkjet ○ Ink cartridge ○ Head carriage, belt, stepper motor ○ Paper feed ○ Control, interface, power circuitry • Thermal ○ POS ○ Fax

	• Impact
	  ◦ Daisy wheel
	  ◦ Dot matrix
	• Virtual
	  ◦ File types
	  ▪ PDF
	  ▪ XPS
	  ▪ Image
	  ◦ Cloud
	• 3D
	  ◦ Frame
	  ◦ Printing plate
	  ◦ Extruder
	  ◦ Cooling fan
	  ◦ PCB circuit board
	  ◦ Filamen

8.2 Explore connection options for each printer and scanner technology (i.e., wired vs wireless, server interface, cable types, local infrastructures, etc.)	• Types
	  ◦ Serial
	  ◦ Parallel
	  ◦ USB
	  ◦ Ethernet
	  ◦ Wireless
	  ▪ 802.11
	  ▪ Bluetooth
	  ▪ Infrastructure vs. Ad hoc
	• Software
	  ◦ Page-description language
	  ◦ Drivers

8.3 Determine options to upgrade printers (i.e., memory, hard drives, NICS, FAX, etc.)	• Drivers • Trays • Hard drives • Memory • FAX • NIC

8.4 Troubleshoot common printer problems (i.e., paper jam, connectivity, consumables, power, security protocols, etc.)	• Common printer problems
	  ◦ Streaks/smears
	  ◦ Paper jam
	  ◦ Scrambling on paper
	  ◦ Ghost images

	○ Toner not fused to paper ○ Vertical lines on page ○ No connectivity ○ Error codes ○ No output • Utilize troubleshooting method

Domain 2: Device Software Installation and Maintenance **Instructional Time: 20-25%**	
STANDARD 10.0 COMPARE THE BASICS OF COMMON OPERATING SYSTEMS	
10.1 Differentiate the characteristics of common device operating systems (i.e., Windows, IOS, Android, Linux, MAC, etc.)	• Operating systems ○ Windows ○ IOS ○ Android ○ Linux/Unix ○ MAC
10.2 Distinguish major software features and functions by device (i.e., taskbar, menus, notification bars, gestures, etc.)	• Software features and functions by device ○ Taskbar ○ Menus ○ Notification bars ○ Gestures • Windows Control Panel Utilities ○ Internet Options ▪ Connections ▪ Security ▪ General ▪ Privacy ▪ Programs ▪ Advanced ○ Display/Display Settings ▪ Resolution ▪ Color depth ▪ Refresh rate ○ User accounts ○ Folder options ▪ View hidden files ▪ Hide extensions

	▪ General options ▪ View options o System ▪ Performance (virtual memory) ▪ Remote settings ▪ System protection o Windows firewall o Power options ▪ Hibernate ▪ Power plans ▪ Sleep/suspend ▪ Standby o Credential Manager o Programs and features o HomeGroup o Devices and Printers o Sound o Troubleshooting o Network and Sharing Center o Device Manager
10.3 Navigate major operating system management tools (i.e., file management, administrative tools, command line, REGEDIT, Task Manager, system utilities, etc.)	• Administrative o Computer Management o Device Manager o Local Users and Groups o Local Security Policy o Performance Monitor o Services o System Configuration o Task Scheduler o Component Services o Data Sources o Print Management o Windows Memory Diagnostics o Windows Firewall o Advanced Security o Event Viewer o User Account Management • MSConfig o General o Boot o Services

	◦ Startup ◦ Tools • Task Manager ◦ Applications ◦ Processes ◦ Performance ◦ Networking ◦ Users • Disk Management ◦ Dive status ◦ Mounting ◦ Initializing ◦ Extending partitions ◦ Splitting partitions ◦ Shrink partitions ◦ Assigning/changing drive letters ◦ Adding drives ◦ Adding arrays ◦ Storage spaces • System utilities ◦ Regedit ◦ Command ◦ Services.msc ◦ MMC ◦ MSTSC ◦ Notepad ◦ Explorer ◦ Msinfo32 ◦ DxDiag ◦ Disk defragmenter ◦ System restore • Windows Updates
10.4 Explain command-line functions and utilities to manage the operating system including the proper syntax and switches (i.e., file attributes, commands for creating, viewing, and managing drives, directories, files, etc.)	• Command-line functions and utilities ◦ File attributes ◦ Commands for ▪ Creating ▪ Viewing ▪ Managing drives ▪ Managing directories ▪ Managing files • Basic command line tools

	○ Linux ○ Microsoft • Mac IOS
10.5 Identify common data redundancy options (i.e., network attached storage, RAID, cloud storage, etc.)	• Common data redundancy options ○ RAID 0 ○ RAID 1 ○ RAID 5 • RAID 10
STANDARD 11.0 INSTALL, CONFIGURE, AND UPDATE OPERATING SYSTEMS	
11.1 Compare and contrast the differences between native and virtualized operating system environments	• Local operating system (installed on one computer per person) • Virtualized operating system (installed on a thin client on an as needed basis) • Cost vs. Needs • Pros and cons to local • Pros and cons to virtualization
11.2 Install operating systems using default and customized installation options	• System requirements ○ Drive space ○ RAM • OS requirements ○ Compatibility
11.3 Backup and restore user data (i.e., copy/paste, images, clones, etc.)	• Local backup • Remote backup • Cloud backup • Entire system • Local files • Local settings (Google, bookmarks, etc.)
11.4 Identify common symptoms and resolve problems encountered during installations and version upgrades	• FAT vs. FAT32 vs. NTFS, etc. • No mountable hard disk detected • File not found
11.5 Perform operating system updates	• Boot methods ○ USB ○ CD-ROM ○ DVD ○ PXE ○ Solid state/flash drives

	○ Netboot ○ External/hot-swappable drive ○ Internal hard drive (partition)
11.6 Set up basic system boot sequences and boot methods including recovery options	• BIOS/UEFI • Boot menu • Recovery partition
11.7 Install and add a device by installing and configuring device drivers and required software	• Drivers • Find and download drivers • Install drivers • Device manager
11.8 Optimize the operating system (i.e., deleting temporary files, user needs, custom startup settings, built-in optimization tools, etc.)	• Disk Manager • Disk Cleanup • CCleaner • Malwarebytes, etc.
11.9 Perform cross-platform migration retaining user data and settings (i.e., computers, tablets, smartphones, etc.)	• User settings backup • Bookmarks • Favorites • Files
11.10 Interpret the meaning of common error codes and startup messages from the boot sequence and identify steps to correct problems	• Research error code • Check BIOS boot settings
11.11 Apply common diagnostic utilities and tools	• Regedit • MSConfig • CPUID • Task Manager • System Explorer • Reliability Monitor • Wi-Fi Analyze

Domain 3: Introduction to Networking **Instructional Time: 15-20%**	
STANDARD 9.0 EXPLAIN BASIC NETWORKING HARDWARE	

9.1 Differentiate common types of network cables, topologies, and their characteristics	• Network cables
	  ○ Ethernet
	  ▪ Cat 5
	  ▪ Cat 5e
	  ▪ Cat 6
	  ▪ Plenum
	  ▪ Shielded twisted pair
	  ▪ Unshielded twisted pair
	  ▪ 568A/B
	  ○ Fiber
	  ○ Coaxial
	  ○ Speed and transmission limitations
	• Network topologies
	  ○ Physical vs. Logical
	• Common topologies
	  ○ Star
	  ○ Bus
	  ○ Ring
	  ○ Mesh
	  ○ Hybrid

9.2 Install and configure network cards and adaptors	• Network interface cards
	• Network adaptors
	• Network card properties
	  ○ Half duplex/full duplex/auto
	  ○ Speed
	  ○ Wake-on-LAN
	  ○ QoS
	  ○ BIOS (on-board NIC)

9.3 Differentiate common technologies available for establishing network connectivity (i.e., routers, wireless, hubs, modem, switches, repeaters, mesh networks, etc.)	• Network types
	  ○ LAN
	  ○ WAN
	  ○ PAN
	  ○ MAN
	  ○ WMN

	◦ WWAN ◦ WLAN ◦ CAN • Internet connection types ◦ Cable ◦ DSL ◦ Dial-up ◦ Fiber ◦ Satellite • ISDN • Cellular ◦ Tethering ◦ Mobile hotspot • Line-of-sight wireless internet service • Wireless networking protocols ◦ 802.11a ◦ 802.11b ◦ 802.11g ◦ 802.11n ◦ 802.11ac • Frequencies ◦ 2.4Ghz ◦ 5Ghz • Channels ◦ - 1–11 • Bluetooth • NFC • RFID • Zigbee • Z-Wave • 3G • 4G • 5G • LTE
9.4 Diagnose simple hardware problems in networking equipment (i.e., interpret error codes/messages, etc.)	• Common symptoms ◦ Limited connectivity ◦ Unavailable resources ▪ Internet ▪ Local resources ▪ Shares

	▪ Printers ▪ Email • No connectivity • APIPA/link local address • Intermittent connectivity • IP conflict • Slow transfer speeds • Low RF signal • SSID not found • Troubleshooting methodology • Top Down • Bottom Up • Divide and conquer • Cable tester • Tone generator and probe
STANDARD 12.0 TROUBLESHOOT A NETWORK	

12.1 Assess the networking capabilities of common operating systems (i.e., domain, workgroup, etc.)	• HomeGroup vs. Workgroup
	• Domain setup
	• Network shares/administrative shares/mapping drives
	• Printer sharing vs. network printer mapping
	• Establish networking connections
	  ○ VPN
	  ○ Dial-ups
	  ○ Wireless
	  ○ Wired
	  ○ WWAN (Cellular)
	• Proxy settings
	• Remote Desktop connection
	• Remote assistance
	• Home vs. Work vs. Public network settings
	• Firewall settings
	  ○ Exceptions
	  ○ Configuration
	  ○ Enabling/disabling Windows Firewall
	• Configuring an alternative
	• IP address in Windows
	  ○ IP addressing
	  ○ Subnet mask
	  ○ DNS

	◦ Gateway • Network card properties ◦ Half duplex/full duplex/auto ◦ Speed ◦ Wake-on-LAN ◦ QoS ◦ BIOS (on-board NIC) • Server roles ◦ Web server ◦ File server ◦ Print server ◦ DHCP server ◦ DNS server ◦ Proxy server ◦ Mail server ◦ Authentication server ◦ Syslog
12.2 Determine best protocols and encryption levels (i.e., TCP/IP, NetBIOS, wireless encryption, etc.)	• Wireless settings ◦ Encryption ◦ Channels ◦ QoS • Protocols and encryption ◦ WEP ◦ WPA ◦ WPA2 ◦ TKIP ◦ AES
12.3 Use network troubleshooting applications (i.e., IPCONFIG, PING, TRACERT, NSLOOKUP, DIG, NETSTAT, NBTSTAT, ARP, etc.)	• Network Troubleshooting Apps ◦ ipconfig ◦ ifconfig ◦ ping ◦ tracert ◦ traceroute ◦ nslookup ◦ dig ◦ netstat ◦ nbstat ◦ arp

12.4 Define basic internet protocols and terminologies (i.e., HTTP, HTTPS, FTP, SMTP, DNS, DHCP, POP, etc.)	• HTTP • HTTPS • FTP • FTPS • SMTP • POP • DNS • DHCP • IMAP

12.5 Identify infrastructure and procedures for establishing internet connectivity	• IP addressing
	  ◦ Static
	  ◦ Dynamic
	  ◦ APIPA
	  ◦ Link local
	• DNS
	• DHCP
	  ◦ Reservations
	• IPv4 vs. IPv6
	• Subnet mask
	• Gateway
	• VPN
	• VLAN
	• NAT

12.6 Configure software/hardware firewall protection	• Hardware firewall
	• Software firewall
	• Firewall settings
	  ◦ DMZ
	  ◦ Port forwarding
	  ◦ NAT
	  ◦ UPnP
	  ◦ Whitelist/blacklist
	  ◦ MAC filtering
	  ◦ Exceptions
	  ◦ Configuration
	  ◦ Enabling/disabling Windows Firewall

Domain 4: Device Security and Future Prospects **Instructional Time: 15-20%**	
STANDARD 3.0 ADDRESS SECURITY ISSUES RELATED TO TECHNOLOGY DEVICES	

3.1 Identify security issues related to the technology environment (i.e., computer hardware and software, data, mobile devices, and networks, etc.)	• Physical security concepts
	  ○ Hardware
	  ○ Removable storage, etc.
	• Logical security concepts
	  ○ Software issues
	  ▪ Trusted/untrusted sources
	• Mobile device security
	• Data security
	  ○ Safeguarding
	  ○ Destruction/Disposal
	  ▪ Shredder
	  ▪ Drill/hammer
	  ▪ Electromagnetic (degaussing)
	  ▪ Incineration
	  ▪ Certificate of destruction
	  ○ Recycling best practices
	  ▪ Low-level/standard format
	  ▪ Overwrite
	  ▪ Drive wipe
	• Network security concepts
	  ○ Port security
	  ○ MAC address filtering
	  ○ Proxy server
	  ○ VPN
	  ○ Firewall

3.2 Identify and apply or create and update policies to maintain data integrity and security	• Asset identification
	• Regulatory and compliance policy
	• Security policies
	  ○ Authentication
	  ▪ Single/multi factor
	  ○ Password
	  ○ Acceptable use
	  ○ Remote access
	  ○ Network maintenance

	○ Incident handling
3.3 Explain the importance of physical security of computer hardware and electronic devices	• Device security best practices • Physical security measures ○ Mantrap ○ Badge reader ○ Smart card ○ Security guard ○ Door lock ○ Biometric locks ○ Hardware tokens ○ Cable locks ○ Server locks ○ USB locks ○ Privacy screen ○ Key fobs ○ Entry control roster • Data destruction and disposal ○ Shredding ○ Incinerating ○ Drive wipe ○ Overwrite, etc. • Inventory management • Asset tags
3.4 Explain user-related threats (i.e., ransomware, phishing, viruses, email attachments, social engineering, spoofing, identity theft, spamming, etc.)	• Types of Malwares ○ Virus ○ Trojan horse ○ Worms ○ Adware ○ Spyware ○ Ransomware ○ Rootkits ○ Spam ○ Keylogging ○ Botnet ○ Zombie ○ Grayware ○ Scareware • Guidelines for users • Social engineering ○ Regulated data

	▪ Personally Identifiable Information(PII) ▪ Payment Card Industry(PCI) ▪ General Data Protection Regulation(GDPR) ▪ Protected Health Information(PHI) ○ Types of attacks ▪ Dumpster diving ▪ Shoulder surfing ▪ Piggybacking ▪ Masquerading ▪ Eavesdropping • Phishing
3.5 Identify methods to protect and prevent security threats	• Prevention and resolution of security threats ○ Tools and methods for ▪ Detection ▪ Removal ▪ Prevention ○ Antivirus/Anti-malware ▪ Installation ▪ Updates • Password best practices ○ Strong ○ Expiration/reset ○ Screensaver password ○ BIOS/UEFI passwords ○ Mandatory ○ Account management (admin) ○ Policy in place • Autorun • Principle of Least Privilege • Firewall, security settings • Incident response ○ First response ▪ Identify ▪ Report ▪ Data/device preservation ○ Documentation ○ Chain of custody ▪ Evidence tracking ▪ Documentation • Forensic investigation

3.6 Explain external threats (i.e., denial of service, hacking/cracking, intrusion, etc.)	• TCP/IP attacks
	  ◦ DoS
	  ◦ DDoS
	  ◦ Spoofing
	  ◦ DNS poisoning
	  ◦ SYN flooding
	  ◦ Man-in-the-middle (MitM)
	• Zero-day attacks

STANDARD 4.0 EXPLORE LEGAL AND ETHICAL ISSUES RELATED TO INFORMATION TECHNOLOGY	

4.1 Identify issues specific to intellectual property rights including copyright, software licensing, patents, software piracy, and software duplication	• Digital Content Management (CMS)
	  ◦ Software licensing
	  ◦ Digital Rights Management (DRM)
	• End User License Agreement (EULA)
	• Software types
	  ◦ Open source
	  ◦ Proprietary
	• Software piracy and duplication
	  ◦ Software and systems patenting

4.2 Identify issues and trends affecting data and information privacy	• Significance of data privacy • Information privacy protection laws • File encryption • Big data- processing and handling

4.3 Differentiate between ethical and unethical uses of technology (i.e., black hat/white hat hacking, industry-specific restrictions, etc.)	• Code of ethics
	• Acceptable Use Policy(AUP)
	• Industry guidelines and restrictions on access
	• Hackers
	  ◦ White hat
	  ◦ Black hat
	  ◦ Grey hat

4.4 Identify workplace issues created by improper use of technology (i.e., cyberbullying, discrimination, social posts, trolling, privacy, etc.)	• Netiquette ◦ Digital Citizenship • Cyberbullying • Discrimination • Data breach • Cybersecurity guidelines • Employee misuse of social media

	• Bring Your Own Device (BYOD) programs- pros/cons • E-discovery guidelines education
STANDARD 5.0 EXPLORE RAMIFICATIONS OF TECHNOLOGY DEVELOPMENT	

5.1 Explore challenges regarding the evolution of technology and their impact on our lives (i.e., automation, shift in occupations, data compatibility, security, privacy, consumer history, etc.)	• History and evolution of technology
	  ○ Timeline
	  ○ Important inventions/inventors
	• Internet of Things (IoT)
	  ○ Smart homes
	  ○ Smart devices
	  ▪ Thermostat
	  ▪ Light switches
	  ▪ Security cameras
	  ▪ Door locks
	  ▪ Voice-enabled smart speaker
	  ▪ Digital assistant
	• Occupations in technology
	  ○ Programmer
	  ○ Network technician
	  ○ IT technician
	  ○ Data analyst
	• Automation and its effects

5.2 Explore future trends in technology with positive and negative implications	• Technological advancements • Pros and cons of technology

5.3 Explore methods for keeping up with technology changes (i.e., forums, newsletters, Google alerts, technology announcements, etc.)	• Current industry standards and requirements
	• Benefits of staying current
	• Ways to keep up with technology trends
	  ○ Enrollment in online courses
	  ○ Technology blogs
	  ○ Newsletters
	  ○ Forums
	  ○ Social media
	  ○ Apps (i.e., Flipboard)
	  ○ Peer-to-peer networking
	  ○ TED Talks, etc.

Domain 5: Introduction to Technology Devices Maintenance **Instructional Time: 10-15%**	
STANDARD 1.0 APPLY PROBLEM-SOLVING AND CRITICAL THINKING TO MAINTAINING TECHNOLOGY DEVICES	

1.1 Assess the technology environment (e.g., software, devices, operating systems, and device compatibility)	• Assessment
	  ◦ Device location
	  ◦ Environment
	  ◦ Device usage
	  ◦ Software status
	  ◦ Hardware conditions
	  ◦ Operating system
	• Adequate documentation of assessment

1.2 Identify common project management concepts and limitations (e.g., project management triangle, goals, Gantt charts, and user needs)	• Management Information Systems(MIS) • Project management triangle • Project Life cycles • Gantt Chart • Information gathering and research • Goal setting and documenting
1.3 Determine priorities in establishing and maintaining computers/electronic devices (i.e., user needs, workflow, data security, etc.)	• Different Priority level tasks • Priority assessment and assignment • Conversation etiquettes • Open and closed ended questions

1.4 Apply problem-solving processes to computers and electronic devices (i.e., define problem, identify cause, research problem, select and test solution, prevent the problem, etc.)	• Troubleshooting methodology
	  ◦ Identify problem
	  ▪ User interview
	  ▪ Backup
	  ▪ Recent changes
	  ▪ System/application logs
	  ◦ Establish theory of probable cause
	  ▪ Internal/external research
	  ▪ Obvious possibilities
	  ◦ Test theory to determine cause
	  ▪ Confirm or re-establish new cause
	  ◦ Establish plan of action
	  ▪ Planning
	  ▪ Resolution
	  ◦ Verify full system functionality and solution

	○ Implement preventive maintenance • Documentation
1.5 Document the results and update the problem-solving process	• Documentation for current/future reference ○ Ticket ○ Email ○ Quick-reference guide ○ Manuals ○ Repair logs • User report
STANDARD 2.0 MAINTAIN A SAFE AND ENVIRONMENTALLY CONCIOUS TECHNOLOGY WORKPLACE	
2.1 Identify and apply personal responsibility for a safe and healthy environment (i.e., conforming to industry standards and recycling protocols for toxic/non-toxic materials, avoid/eliminate electrical hazards, etc.)	• Equipment grounding • Proper component handling and storage ○ Antistatic bags ○ ESD straps ○ ESD mats ○ Self-grounding • Toxic waste handling ○ Batteries ○ Toner ○ CRT ○ Cell phones ○ Tablets • Personal safety ○ Power disconnection ○ No jewelry/loose clothes ○ Lifting techniques ○ Weight limitations ○ Electrical fire safety ○ Cable management ○ Safety goggles ○ Air filter mask • Compliance with government regulation ○ Safety Data Sheet(SDS)/MSDS
2.2 Use job-specific tools, materials, and equipment used to maintain technology	• Combination ratchet/Screwdriver ○ Philips ○ Flat head ○ Torx Star ○ Hex

	• Cable tester • Cable stripper • Punch down • Crimper • Multimeter • Loopback plug • Toner generator and probe • POST card • Power supply tester • Three-pronged parts retriever, etc.

2.3 Identify ergonomics and repetitive strain injuries experienced in technology maintenance occupations	• Personal safety
	  ○ Electric shock
	  ○ Burns protection
	  ○ Precautionary lifting of heavy objects
	  ○ Fire hazards
	  ○ Fire-extinguisher usage rules (PASS)
	  ○ Protection from air-borne particles (i.e., printer toner particles)

2.4 Explain various safety measures and procedures including electrostatic discharge and how inadequate measures can damage equipment	• Static electricity
	  ○ Causes
	  ○ Effects
	  ○ Safety
	• Anti-static tools
	  ○ Bag
	• Mat/pad
	  ○ Wrist strap