Computer Systems Technology I

8622 36 weeks / 140 hours

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Acknowledgments

The 2014 task/competency list for Computer Systems Technology I was reviewed by a technical panel of industry representatives:

Students enter the world of computer technology and gain practical experience in assembling a computer system. Students will install, configure, and secure various operating systems. Students will troubleshoot computers and peripherals and use system tools and diagnostic software. They develop skills in computer networking and resource sharing. In addition, students explore the relationships between internal and external computer components. Upon successful completion of the course, students may qualify to take the CompTIA A+ certification exam.

Task Essentials List

- Tasks/competencies designated by plus icons (⊕) in the left-hand column(s) are essential
- Tasks/competencies designated by empty-circle icons (◯) are optional
- Tasks/competencies designated by minus icons (⊖) are omitted
- Tasks marked with an asterisk (*) are sensitive.

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40	⊕	Research career opportunities in computer systems technology.
41	⊕	Explain IT industry certifications.
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Examining Personal Computer Hardware		

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Assembling a Personal Computer

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63	⊕	Determine operating system based on customer needs.

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67	⊕	Apply common preventive-maintenance techniques for operating systems.
68	⊕	Identify basic procedures for troubleshooting operating systems.

Demonstrating Preventive Maintenance and Troubleshooting

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Examining Laptops

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Examining Printers

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85	⊕	Explain procedures for upgrading printers.
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94	⊕	Identify IEEE standards.
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97	⊕	Identify technologies used to establish connectivity.

Task Number	8622	Tasks/Competencies
98	⊕	Construct an Ethernet cable.
99	⊕	Identify common network problems and solutions.

Legend: ⊕Essential ◯Non-essential ⊖Omitted

Curriculum Framework

Investigating Careers

Task Number 39

Describe the primary responsibilities of a computer systems technician.

Definition

Description should include examples of daily activities such as

- installing and troubleshooting software and hardware
- safeguarding user data
- responding to service calls
- performing computer maintenance
- providing customer service.

Process/Skill Questions

- When performing computer maintenance who says when the job is done, the customer or the technician? Why?
- Why are warranty factors and backup procedures for customers so important?
- How might a computer systems technician prioritize various daily responsibilities?

Task Number 40

Research career opportunities in computer systems technology.

Definition

Research should include using resources such as the Internet, periodicals, and books as well as participating in job shadowing, internships, and social networking.

Virginia's Employment Office has information on internships as well tools and other resources students may not have at home.

Process/Skill Questions

- What careers are available for computer repair within the U.S. military?
- What are the best ways for keeping up with the most current research?
- What industry certifications might be required for positions in this field?

Task Number 41

Explain IT industry certifications.

Definition

Explanation should include identifying educational requirements and certifications.

Process/Skill Questions

- What certifications are most recognized within the industry?
- How beneficial is a certification that is not recognized by many employers?
- What can obtaining a certification do for one's job and salary prospects?

Developing Communication Skills and Ethics

Task Number 42

Explain the ethical and legal aspects of working with computer technology.

Definition

Explanation should include the ethical and legal responsibilities of the technician to

- identify situations when legal authorities should be notified
- respect customer privacy and confidentiality
- safeguard physical and intellectual property
- adhere to copyright and licensing provisions
- report harassment, cyber stalking, and cyber bullying.

Process/Skill Questions

- Are computer systems technicians faced with ethical and legal issues more often than other workers? Explain your answer.
- What does "escalate" mean, as it relates to computer repair? When should a problem be escalated?
- How should a technician handle situations in which sensitive or prohibited information is found on a client's computer?

Task Number 43

Describe the customer-support environment and technician responsibilities.

Definition

Description should examine various jobs and work environments:

- help desk
- call center
- remote support
- field technician.

The description should include the responsibilities of level-one and level-two technicians with regard to documentation and escalation of a customer's problem.

Process/Skill Questions

- What type of personality might benefit a person working in a customer-support environment?
- What are the differences among a help desk tech, a PC service tech, and PC support tech, and a bench tech?

- What are the education requirements and average salaries for the various customer support positions?
- How can Internet searches (e.g., Google) be used by tech support persons to find reliable troubleshooting approaches?

Task Number 44

Demonstrate communication skills used in customer service.

Definition

Demonstration should include

- using clear, concise, and direct statements
- allowing the customer to complete statement (avoid interrupting)
- clarifying customer statements (ask pertinent questions)
- avoiding the use of jargon, abbreviations, and acronyms
- listening to customers.

Process/Skill Questions

- What are some consequences if customer support does not communicate effectively?
- What communication skills other than a speaking skills are important for customer service?
- What role do non-verbal skills play in one's ability to provide customer service?

Demonstrating Safe Lab Procedures and Tool Use

Task Number 45

Explain the purpose of safe working conditions and procedures.

Definition

Explanation should identify

- potential hazards for users and technicians and detail the safety procedures that should be followed
- safety procedures to protect equipment from damage and data from loss
- safety procedures to protect the environment from contamination
- ergonomically designed office equipment.

Process/Skill Questions

- What electrical hazards do computer systems technicians face?
- Why is a power supply dangerous even after the power is disconnected? Why is a CRT dangerous even after the power is disconnected?
- What types of clothing and jewelry could be dangerous to wear in lab settings and when working with computer equipment?
- What must be done with a toner cartridge after it is removed from a laser printer, after being replaced?

Task Number 46

Demonstrate safe tool and material use in the lab.

Definition

Demonstration should include proper use of

- ESD-prevention procedures
- eye protection
- various hand and specialty tools
- cleaning materials.

Process/Skill Questions

- How should cleaning materials be stored?
- What items best guard against ESD?
- How does an anti-static bag protect the adapter cards that are placed inside?

Examining Personal Computer Hardware

Task 47

Describe a computer system.

Definition

Description should include defining a system consisting of major components, related software, and subsystems.

Process/Skill Questions

- What components are common to all computer systems?
- What parts of the computer are attached to the motherboard? How do they work together?
- What software is loaded to control the computer?
- What is the software called that is installed to meet particular needs of the user?

Task Number 48

Describe computer components.

Definition

Description should include the names, purposes, and characteristics of action associated with

- case
- power supply
- motherboard
- CPU
- BIOS
- CMOS
- cooling system
- ROM and RAM
- adapter cards
- storage drives (including solid-state and hybrid drives)
- internal cables.

Process/Skill Questions

- What are some pros and cons of solid-state storage drives?
- What is the difference between RAM and ROM? How is each used inside the computer?
- What are two types of cooling systems that can be used inside the computer?

Task Number 49

Describe external ports and cables.

Definition

Description should include names, purposes, and characteristics of external ports and cables (e.g., IEEE 1394, USB, and eSATA).

Process/Skill Questions

- When is it advantageous to use an external port?
- What external components can use the same cables?
- What ports are located on the outside of a computer? What devices can be attached to each port?

Task Number 50

Describe input devices.

Definition

Description should include the names, purposes, and characteristics of input devices (e.g., keyboards, pointing devices, biometric devices, assistive technology).

Process/Skill Questions

- What type of input device can you imagine being invented in the near future?
- What is the advantage of using a KVM switch? How is it used for both input and output?
- What input devices are useful to persons with physical disabilities? How are the devices used?

Task Number 51

Describe output devices.

Definition

Description should include names, purposes, and characteristics of output devices (e.g., monitors, printers, speakers, assistive technology).

Process/Skill Questions

- Which output devices require maintenance most often?
- What are some common output devices, and what are their methods of connection?
- How is a KVM switch used for output?

Task Number 52

Explain system resources and their purposes.

Definition

Explanation should include legacy as well as current system resources (e.g., IRQ, I/O addresses, DMA channels).

Process/Skill Questions

- Why are system resources called "resources"?
- What is DMA? What devices use DMA?
- What are I/O addresses, and why are they important?

Assembling a Personal Computer

Task Number 53

Install the power supply.

Definition

Installation should include various mounting methods.

Process/Skill Questions

- What precautionary steps should be taken when installing the power supply?
- Can an A+ Certified Technician open a power supply to fix it?
- When replacing a power supply unit, what factors must be considered to install the best for the computer?

Task Number 54

Demonstrate how to attach components to the motherboard and install the motherboard.

Definition

Demonstration should include attaching the CPU, heat sink/fan assembly, and RAM components to the motherboard prior to its installation.

Process/Skill Questions

- What documentation is available for technicians to follow when attaching components to the motherboard?
- What information resources are valuable when installing a motherboard?
- How are standoffs installed, and what is their relationship to the motherboard?

Task Number 55

Install internal drives.

Definition

Installation should include

- jumper settings
- cable types and cable connections
- applicable power connections
- correct mounting procedures.

Process/Skill Questions

- What are the consequences of failure to follow correct mounting procedures when installing internal drives?
- What possible problems could occur if a drive is not securely attached inside the computer?
- What data cable will be used for the newest EIDE devices to move data the fastest?

Task Number 56

Install adapter cards.

Definition

Installation may include the NIC, wireless NIC, video-adapter card, and sound cards.

Process/Skill Questions

- When are adapter cards needed?
- When removing an adapter card, which direction should the card be rocked to dislodge it?
- What are the differences among PCI, AGP and PCIe adapter card connections?

Task Number 57

Connect internal cables.

Definition

Connection should include power and data cables.

Process/Skill Questions

- What safety concerns are present when connecting internal cables?
- To what devices can a Molex connector provide power?
- If a data cable were connected backwards, what could happen to a hard drive?

Task Number 58

Assemble the computer case.

Definition

Assembly should include installing the side panels and connecting external cables.

Process/Skill Questions

- What tools are used when assembling the computer case?

- What problem is caused by leaving an open space that would normally be covered by an adapter card?

Task Number 59

Boot the computer.

Definition

Booting should include identifying POST codes, configuring CMOS setup, and recognizing problems with the BIOS. The technician should reset MBD by clearing NVRAM after installation of any hardware for a clean system boot.

Process/Skill Questions

- How is a computer booted in safe mode?
- What is NVRAM and why is it important?
- How does a technician access BIOS setup?

Task Number 60

Replace computer components.

Definition

Replacement should include selection and installation of

- case and power supply
- motherboard
- CPU and heat sink/fan assembly
- RAM
- adapter cards
- field-replaceable units (FRUs)
- storage devices and hard drives
- input and output devices.

Process/Skill Questions

- How might the replacement of one component affect other components?
- What are typical considerations when determining whether to replace a hard drive?

- When replacing any adapter cards, what is the most important factor to consider?

Exploring the Fundamentals of Operating Systems

Task Number 61

Explain the purpose of an operating system.

Definition

Explanation should include the characteristics of modern operating systems and key concepts.

Process/Skill Questions

- What basic functions does an operating system perform?
- What portion of the OS is responsible for interacting directly with the hardware?
- How does an OS affect the performance of installed applications?

Task Number 62

Compare purpose, limitations, and compatibilities of operating systems.

Definition

Comparison should include desktop, network, and mobile device operating systems.

Process/Skill Questions

- What are the minimum installation requirements for Windows XP? Windows 7? Windows 8?
- Compare the GUI of Windows 7 and Windows 8. What are some primary differences? How do those differences affect usability of each?
- Why would using Linux be preferable to using Windows? When would it not?

Task Number 63

Determine operating system based on customer needs.

Definition

Determination should include

- analyzing applications and environments that are compatible with an operating system
- assessing minimum hardware requirements and compatibility.

Process/Skill Questions

- What operating system and minimum requirements would you recommend for a music recording studio? Why?
- What are some options that will allow a customer the use of legacy applications and still have features of recent Windows versions?

Task Number 64

Prepare for operating system installation.

Definition

Preparation should include the following steps:

- Describe custom installation options.
- Identify the boot sequence files and registry files.
- Compare and contrast features and limitations of file systems.
- Determine directory structures

Process/Skill Questions

- What is the difference between an upgrade and a clean installation of an operating system?
- You currently have Windows 7 installed on your computer. You wish to install Windows 8 and still maintain functionality of Windows 7. What needs to be done to facilitate this?
- Before installing any OS onto a PC, what should you do to allow for a trouble-free installation?

Task Number 65

Install an operating system.

Definition

Installation should include the following steps:

- Verify the minimum system requirements.
- Identify hard drive setup procedures.
- Prepare hard drive.
- Install the operating system using default settings.
- Create accounts.
- Configure device drivers.
- Install applicable updates.
- Verify installation.

Process/Skill Questions

- Considering the minimum hardware requirements, what size would you recommend for the operating system hard drive partition? Why?
- What should you do during a Windows XP installation to allow for specialty hard drive controllers?
- What needs to be configured in the BIOS prior to installing an OS?
- As soon as an OS installation is complete, what critical items must be addressed? Why?

Task Number 66

Navigate a graphical user interface (GUI).

Definition

Navigation should include the following steps:

- Manipulate items on the desktop.
- Explore control-panel applets.
- Explore administrative tools.
- Install, navigate, and uninstall an application.

Process/Skill Questions

- What is the function of the Event Viewer? What are the different types of events?
- How do you delete an item without it going to the recycling bin?
- How were applications initiated before the advent of GUIs?

Task Number 67

Apply common preventive-maintenance techniques for operating systems.

Definition

Application should include

- creating a preventive-maintenance plan
- scheduling a task
- backing up the hard drive
- updating operating systems and software.

Process/Skill Questions

- What utilities should be run as part regular maintenance?
- Why does fragmentation slow down a computer system?
- What is the advantage of "defragging" the hard drive? Why set up a schedule for that process to occur?

Task Number 68

Identify basic procedures for troubleshooting operating systems.

Definition

Troubleshooting should include

- reviewing the troubleshooting process
- identifying common problems and solutions (e.g., automated system recovery and recovery console)
- documenting findings, actions, and outcomes.

Process/Skill Questions

- What should a technician do as the first step of troubleshooting?

- A customer has a program that runs on Windows XP but not on Windows 7. What can you do to allow this program to run?
- A computer has been running extremely slow and sometimes stops responding. What can you do to fix this?
- A computer frequently "blue screens." What information on the BSOD can you use to determine the cause?

Demonstrating Preventive Maintenance and Troubleshooting

Task Number 69

Explain the purpose of preventive maintenance and data protection.

Definition

Explanation should include

- increasing safety
- maintaining performance
- providing data protection
- increasing product longevity
- maintaining productivity.

Process/Skill Questions

- How can preventive maintenance improve system performance?
- Why are Windows updates so important?
- How does optimizing the Windows registry increase system performance?

Task Number 70

Perform preventive maintenance and data protection.

Definition

Performance should include

- using backup procedures
- inspecting visual and audio components
- making system updates
- scheduling preventive maintenance
- cleaning components on a routine basis
- using various utilities.

Process/Skill Questions

- What are the steps of the backup process? What are the advantages of automatic backups? Of manual backups?
- In most cases, why would you only backup user data and not the entire hard drive?
- What are some free third-party applications that are used in preventive maintenance and data protection?

Task Number 71

Identify the steps of the troubleshooting process.

Definition

Identification should include the following steps:

- Gather data from the customer.
- Verify the obvious issues.
- Identify simple solutions first.
- Gather data from the computer.
- Evaluate the problem and implement the solution.
- Close with the customer.
- Document findings, actions, and outcomes.

Task Number 72

Apply the steps of the troubleshooting process.

Definition

Application should include

- identifying the problem

- establishing a theory of probable cause
- testing the theory to determine cause
- establishing a plan of action to resolve the problem
- implementing the solution
- verifying full system functionality
- documenting findings, actions, and outcomes.

Process/Skill Questions

- What is the importance of documenting findings, actions, and outcomes?
- Why document your troubleshooting process as you go through it?
- What are the steps of CompTIA Six Step Troubleshooting Process?

Task Number 73

Use tools and software to perform preventive maintenance.

Definition

Use should include hardware, software, and other tools.

Process/Skill Questions

- What software is often used during preventive maintenance?
- What exactly do Defrag and CHKDSK do?
- What is the function of System File Checker?
- What is the procedure for entering the recovery console?

Examining Laptops

Task Number 74

Compare desktop and laptop characteristics.

Definition

Comparison should include common uses of desktops and laptops.

Process/Skill Questions

- When might a desktop be more desirable than a laptop?

- What type of equipment would be needed to turn a laptop into a desktop?
- What types of applications are more suited for use on a desktop? Why?

Task Number 75

Describe the components of a laptop.

Definition

Description should include external and internal components, such as

- batteries
- docking station or port replicator
- storage devices
- additional RAM
- expansion card.

Process/Skill Questions

- What are some benefits of using a docking station?
- When are external components necessary when using a laptop?
- What are the major components of a laptop's display subsystem?

Task Number 76

Compare desktop and laptop components.

Definition

Comparison should include motherboards, processors, power management, and expansion capabilities.

Process/Skill Questions

- In what ways is a laptop display subsystem different from that of a desktop?
- How do laptop hard drives and desktop hard drives differ in size and performance?
- Compare the cooling systems of a laptop and a desktop. What are the primary differences?

Task Number 77

Describe how to configure laptops.

Definition

Description should include an explanation of how to configure power settings and how to safely install and remove laptop components.

Process/Skill Questions

- How do you configure a laptop to hibernate when the lid is closed?
- How do you configure a laptop to display on the LCD and an attached projector?
- Why go to the manufacturers website when replacing internal components on a laptop?

Task Number 78

Explain common preventive-maintenance techniques for laptops and portable devices.

Definition

Explanation should include identifying appropriate cleaning procedures and describing optimal operating environments.

Process/Skill Questions

- What are the advantages of performing Disk Cleanup on laptop hard drives?
- What preventive maintenance should be run on laptops but does not apply to desktops?
- On laptops used in many areas of the country (e.g., office environments, hotspots, airports, homes), what should be done more often to keep data safe? Why?
- What is the best way to clean a laptop display, keyboard, and other exterior parts?

Task Number 79

Explain troubleshooting and repair procedures for laptops.

Definition

Explanation should include

- assembly/disassembly
- troubleshooting power issues
- backlighting (LCD)
- keypad issues
- cooling
- documenting findings, actions, and outcomes.

Process/Skill Questions

- What steps should be taken to resolve power issues?
- What procedures must be followed when disassembling a laptop computer?
- If a laptop will not display an image on the LCD, what steps should be taken to troubleshoot the problem?

Examining Printers

Task Number 80

Describe the types of printers currently available.

Definition

Description should include characteristics and capabilities of laser, impact, inkjet, solid-ink, and other printers. The description should also examine printer-to-computer interfaces.

Process/Skill Questions

- What is the major difference between a laser printer and an LED printer?
- What type of printer would most commonly be found in a corporate setting?
- When is it more cost effective to upgrade from an inkjet printer to a laser printer?

Task Number 81

Describe potential safety hazards and safety procedures associated with printers.

Definition

Description should include

- burn hazards
- ozone
- disposal/recycling
- high-voltage hazards.

Process/Skill Questions

- What documentation tells you about potential environmental hazards and proper disposal techniques for various printer components?
- How does a multimeter help test for electrical problems in a printer?
- Where would you go to find information specific to your printer's parts and maintenance?

Task Number 82

Describe the installation and configuration process for printers.

Definition

Description should explain how to

- set up a printer
- power and connect the device using a local or network port
- install and update the device driver, firmware, and RAM
- identify configuration options and default settings
- optimize printer performance
- print a test page
- share a printer.

Process/Skill Questions

- What driver download source will provide you with the most configuration options and utilities when installing a new printer?
- How would you determine what firmware version the printer is using?
- When installing a printer, what is the easiest way to ensure compatibility to make sure that the operating system recognizes the new hardware?

Task Number 83

Configure a local printer.

Definition

Installation should include

- connecting the device to a local port
- configuring the driver and software
- configuring options and default settings
- verifying functionality.

Process/Skill Questions

- What documentation is available to assist when configuring a local printer?
- What interface cable would most inkjet, laser, and thermal printers use to connect to a computer?
- When is it beneficial to have a local printer instead of a network printer?
- What is the first thing that you should do after installing a local printer to be sure that it is configured and working properly?

Task Number 84

Configure a network printer.

Definition

Configuration should include

- driver installation
- file and print sharing
- appropriate protocol installation.

Process/Skill Questions

- What documentation is available when configuring a network printer?
- What will you need to connect a printer if you wish to use Bluetooth technology?
- How would you configure a computer to share a local printer across the network?
- What Windows setting would you use to automatically search for network printers?

Task Number 85

Explain procedures for upgrading printers.

Definition

Explanation should include memory, firmware, and paper trays for printers and optimizing performance of scanners to include resolution, file format, and default settings.

Process/Skill Questions

- What are some common upgrades for printers?
- What happens if a page you print on a laser printer requires more memory than the printer has installed?
- What happens if you try to upgrade the print area of a laser printer from 8.5 x 11 to 11 x 17 by ordering a larger paper tray?
- What printer upgrade option allows a printer to act as a standalone printer on a network?

Task Number 86

Demonstrate common preventive-maintenance techniques for printers.

Definition

Demonstration should include

- scheduled maintenance according to vendor guidelines
- a suitable environment for printers and scanners
- cleaning methods
- checking capacity of ink and toner cartridges.

Process/Skill Questions

- How often should printer components be cleaned?
- Where would you find the setting for the print spooler on a Windows OS?
- What can you use denatured alcohol for on printers?
- What should you do to you laser printer every time you replace the toner?

Task Number 87

Troubleshoot local and network printers.

Definition

Troubleshooting should include

- using the six-step troubleshooting process
- using hardware-specific utilities
- identifying common problems and solutions.

Process/Skill Questions

- What is the most likely problem if an impact printer is printing white bars through the text?
- What should you check on a laser printer if it keeps grabbing multiple sheets even after loading a new ream of paper?
- What could be the problem if an inkjet printer no longer prints yellow, although all other colors print fine?

Exploring Networks

Task Number 88

Explain the principles of networking.

Definition

Explanation should define computer networks and detail the benefits of networking.

Process/Skill Questions

- What is the main reason for implementing a network?
- What is the minimum number of computers required to establish a network?
- What is the maximum number of computers allowed on a LAN?

Task Number 89

Describe types of networks.

Definition

Description should include, but not be limited to

- LAN
- MAN
- PAN
- WAN
- WLAN
- peer-to-peer
- client/server.

Process/Skill Questions

- How have networks evolved over the past 20 years?
- What are the two major types of networks used by the Windows OS?
- What is the difference between an Intranet and the Internet?
- What is the difference between a Local Area Network (LAN) and a Wide Area Network (WAN)?

Task Number 90

Describe networking concepts and technologies.

Definition

Description should include an explanation of bandwidth and data transmission, public and private IP addressing, Internet protocols and applications, commonly used port numbers, and the TCP/IP stack.

Process/Skill Questions

- What are some strategies for managing bandwidth?
- What is the name of the service that must be installed on a Windows computer to connect to a network?
- What is the purpose of the loopback IP address 127.0.0.1?
- What is the benefit of using Dynamic Host Configuration Protocol (DHCP)?

Task Number 91

Describe the physical components of a network.

Definition

Description should include names, purposes, and characteristics of network devices and common network cables and connectors.

Process/Skill Questions

- What are the benefits of mapping a network drive?
- How are IP and MAC address similar/different?
- What would you suggest to someone who has trouble connecting to the internet using their integrated NIC?
- Do you predict the number of physical components of a network will grow or shrink in the future? Explain.

Task Number 92

Describe LAN topologies and architectures.

Definition

Description should include logical and physical topologies (e.g., BUS, STAR, and RING). It should also include Token Ring and Ethernet architectures.

Process/Skill Questions

- How are ring and bus topologies similar/different?
- What is the biggest disadvantage of a mesh (peer-to-peer) topology?
- What is the most commonly used LAN topology in business?

Task Number 93

Identify standards organizations.

Definition

Identification should include

- IEEE
- EIA/TIA
- ANSI.

Process/Skill Questions

- What does EIA/TIA regulate?
- What professional organizations do you believe would help you to grow professionally as a computer technician?
- What are the requirements for becoming a student member of IEEE?

Task Number 94

Identify IEEE standards.

Definition

Identification should include cabled and wireless standards (i.e., IEEE 802.x).

Process/Skill Questions

- What is the IEEE standard for ethernet?
- What IEEE standards apply to wireless systems?
- How can you ensure that you stay up-to-date on current IEEE standards?

Task Number 95

Compare OSI and TCP/IP data models.

Definition

Comparison should include definitions of the OSI (Open System Interconnection) and TCP/IP (Transmission Control Protocol/Internet Protocol) models, with an explanation of how they differ.

Process/Skill Questions

- How are TCP/IPv and TCP/IPv6 similar? How are they different?
- What are the standard abstraction layers in the open systems interconnection (OSI) data model?

- What three pieces of information do you need to set up an IP address?

Task Number 96

Configure a NIC.

Definition

Configuration should include

- installing or updating a NIC driver
- attaching computer to existing network.

Process/Skill Questions

- What documentation is available to help when configuring a NIC?
- What is the benefit of configuring a NIC to run in full duplex mode?
- What would be the benefit of upgrading a company's hubs to switches?
- What is most likely the problem if you plug an active Ethernet cable into your NIC and Windows does not recognize it?

Task Number 97

Identify technologies used to establish connectivity.

Definition

Identification should include the names, purposes, and characteristics of

- telephone technologies
- power line communication
- broadband
- wireless (e.g., Bluetooth, infrared, cellular)
- VoIP.

Process/Skill Questions

- What role do telephone technologies play in establishing connectivity?
- What category of UTP cable would you suggest for a start-up company?
- What are the strengths and weaknesses of using Fiber-optic cabling?

- What type of connection provides for communication for wireless keyboards and mice?

Task Number 98

Construct an Ethernet cable.

Definition

Construction should include

- T-568A/B terminations
- category 5/6 cabling
- RJ-45 (8P8C) connectors
- testing.

Process/Skill Questions

- What is the difference between EIA/TIA 568A and 568B cabling standards?
- What are the physical differences in RJ45 and RJ11 and what are they each used for?
- What is the difference between UTP and STP?

Task Number 99

Identify common network problems and solutions.

Definition

Identification should include

- listing wiring, configuration, and hardware issues
- relating problems to layers of the network models
- reviewing the troubleshooting process.

Process/Skill Questions

- How can the technician identify the layer to which the network problem is related?
- How does the ping command work?
- What kind of information would you find using the ipconfig command?
- Which command would you use if you wanted to know the IP address of a device by domain name system?

SOL Correlation by Task

39	Describe the primary responsibilities of a computer systems technician.	
40	Research career opportunities in computer systems technology.	English: 10.8 History and Social Science: VUS.1, VUS.14
41	Explain IT industry certifications.	
42	Explain the ethical and legal aspects of working with computer technology.	History and Social Science: GOVT.1, GOVT.9, GOVT.10
43	Describe the customer-support environment and technician responsibilities.	
44	Demonstrate communication skills used in customer service.	English: 10.1, 11.1 History and Social Science: GOVT.1, GOVT.16
45	Explain the purpose of safe working conditions and procedures.	
46	Demonstrate safe tool and material use in the lab.	
47	Describe a computer system.	Science: PH.1
48	Describe computer components.	Science: PH.6, PH.11
49	Describe external ports and cables.	
50	Describe input devices.	
51	Describe output devices.	
52	Explain system resources and their purposes.	
53	Install the power supply.	
54	Demonstrate how to attach components to the motherboard and install the motherboard.	
55	Install internal drives.	
56	Install adapter cards.	
57	Connect internal cables.	
58	Assemble the computer case.	
59	Boot the computer.	
60	Replace computer components.	
61	Explain the purpose of an operating system.	

62	Compare purpose, limitations, and compatibilities of operating systems.	
63	Determine operating system based on customer needs.	
64	Prepare for operating system installation.	
65	Install an operating system.	
66	Navigate a graphical user interface (GUI).	
67	Apply common preventive-maintenance techniques for operating systems.	
68	Identify basic procedures for troubleshooting operating systems.	
69	Explain the purpose of preventive maintenance and data protection.	
70	Perform preventive maintenance and data protection.	
71	Identify the steps of the troubleshooting process.	
72	Apply the steps of the troubleshooting process.	
73	Use tools and software to perform preventive maintenance.	
74	Compare desktop and laptop characteristics.	
75	Describe the components of a laptop.	
76	Compare desktop and laptop components.	
77	Describe how to configure laptops.	
78	Explain common preventive-maintenance techniques for laptops and portable devices.	
79	Explain troubleshooting and repair procedures for laptops.	
80	Describe the types of printers currently available.	
81	Describe potential safety hazards and safety procedures associated with printers.	
82	Describe the installation and configuration process for printers.	
83	Configure a local printer.	
84	Configure a network printer.	
85	Explain procedures for upgrading printers.	
86	Demonstrate common preventive-maintenance techniques for printers.	
87	Troubleshoot local and network printers.	
88	Explain the principles of networking.	
89	Describe types of networks.	

90	Describe networking concepts and technologies.	
91	Describe the physical components of a network.	
92	Describe LAN topologies and architectures.	
93	Identify standards organizations.	English: 10.5, 11.5, 12.5
94	Identify IEEE standards.	English: 10.5, 11.5, 12.5
95	Compare OSI and TCP/IP data models.	English: 10.5, 11.5, 12.5
96	Configure a NIC.	
97	Identify technologies used to establish connectivity.	
98	Construct an Ethernet cable.	
99	Identify common network problems and solutions.	

Project: Computer Assembly Lab System Build

Duty Areas
Demonstrate Safe Lab Procedures and Tool Use
Exploring the Personal Computer
Assembling a Computer

Materials

- PC components
- Tool kit

Instructions

Assemble basic computer system from parts provided:

1. Prepare workstation for assembly (ESD equipment, tool kits, etc.).

2. Install power supply into computer chassis.

3. Install processor on motherboard.

- Verify orientation.
- Be aware of safety zone and screwdriver use.
- Remember thermal paste.
- Install heat sink and fan.
- Connect fan to power header on motherboard.

4. Install RAM.

- Verify orientation.

5. Set appropriate motherboard jumpers, or DIP switches.

6. Install motherboard into chassis.

- Allow for standoff positioning.
- Use proper screws.
- Align backplane.
- Tighten screws.

7. Install floppy disk drive (if applicable).

- Check cable orientation.
- Observe "the twist" and connect to the proper drive.
- Connect Berg connector (power).

8. Install IDE hard disk drive.

- Set jumpers (master/slave/CS).
- Decide if the drive is primary or secondary.
- Check cable orientation (Pin 1).
- Determine whether to use 40 vs. 80 conductor data cable.
- Mount the drive (four screws).
- Connect Molex connector (power).

9. Install optical drive.

- Set jumpers (master/slave/CS).
- Decide if the drive is primary or secondary.
- Check cable orientation (Pin 1).
- Determine whether to use 40 vs. 80 conductor data cable.
- Mount the drive (four screws).
- Connect audio cable.
- Connect Molex connector (power).

10. Install video card.

- Select appropriate adapter.
- Seat the video card.
  - If AGP, use slot lock.

11. Install Network Interface Card (NIC).

- Select appropriate adapter.
- Seat the NIC.

12. Install sound card.

- Select appropriate adapter.
- Attach auxiliary audio cable from optical drive (see above).
- Seat the sound card.

13. Connect front-panel connectors.

- Refer to the motherboard manual for proper joining of front-panel connections.
- Connect leads to motherboard.
- Double-check these connections.

14. Connect power supply to motherboard.

- Determine whether to use P1 or P4 connection.
- Connect auxiliary power connectors.
- Refer to motherboard manual.

15. Double-check connections.

- Ensure power cable is connected.
- Ensure data cables are connected.
- Ensure CPU fan is clear.

Project: Installing Windows XP Operating System

Duty Area

Exploring the Fundamentals of Operating Systems

Materials

- PC
- Windows XP OS

Instructions

1. Check system requirements.

- System requirements for chosen operating system
  - o Things to check:

1. Processor
2. RAM
3. ROM
4. VGA (video)
5. CD-ROM or DVD optical drive
6. Keyboard and mouse

2. Prepare computer for installation.

- Computer must be completely assembled.
- Power on computer and insert disk.
- Power off computer.

3. Power on computer.

- If the OS does not begin loading automatically, press any key to boot from disk.
    - Installation of needed files and drivers will start.

4. Begin installation processes.

- Press enter to select "install operating system now."
- Read license agreement and press the specified button to agree or disagree.

5. Partition the drive.

- Read the screen instructions regarding partitioning.
- Select the unpartitioned space unless otherwise instructed.
- Press specified key to create partition.
- Read screen information.
- Type in the full amount of free space.
- Press specified key to create.
- Double-check that the new partition is selected, and press specified key.

6. Research file systems.

- Investigate file system types.
    - Research which file system is best for chosen operating system.

7. Install file system.

- Select best file system.
- Press specified button to select file system.
- Installation will begin.
- When installation completes, the computer will automatically restart, continuing with remaining installation steps.

8. Set up GUI (Graphical User Interface).

- Installation continues.
- Read screen instructions, making changes as necessary.
- Press "next."

9. Set up name and organization.

- Input name and organization.
  - Press "next."
- Input product key provided by teacher.
  - Press "next."
- Type a user account approved by teacher.
  - Press "next."
- Select date, time, and time zone.
  - If time zone is unknown, research correct answer.
  - Press "next."

10. Install network.

- Two choices:
  - Typical
  - Custom

- Research both options and choose best option for the computer.
- Select that option and press "next."
- Press "next" again.

11. Finish the installation.

- The installation will finish unaided.

12. Set screen resolution.

- The installation program will check for screen resolution.
- If resolution is incorrect, the program will adjust it and await your confirmation.
- If resolution is correct, click "OK."
- If you cannot read the text, wait for further adjustments.

13. Complete setup.

- When the installation is complete, the computer will automatically reboot.

14. Welcome to your operating system.

- The first screen will be a welcome message.
- Before clicking "next," connect all Ethernet or Internet cables.
- Press "next."

15. Verify Internet connection.

- The next screen will show a connection to the Internet.
    - If you are connected to the Internet through a network, click "yes."
    - If teacher does not wish to do this step yet, press "skip."

- Registration

    - The next screen leads to *optional* registration.

1. The teacher will advise as to whether to click "yes" or "no."
2. Research the pros and cons of both options.

16. Establish user accounts.

- Setup will ask for user accounts, or you may skip ahead to administrator's account.
- If setup asks for a user account name, check with teacher to determine the correct name to be entered into the dialog box.
- Press "next."

17. Success.

- You have successfully installed an operating system.*

* The above instructions will not work for all operating systems. If these instructions are not applicable to your OS, research the appropriate installation method.

Teaching Resources

CompTIA
A+ Essentials Objectives
A+ 220-502 Objectives
http://www.comptia.org

Cisco Networking Academy
IT Essentials: PC Hardware and Software
Training Resources Academy Connection
http://www.cisco.com

Entrepreneurship Infusion Units

Entrepreneurship Infusion Units may be used to help students achieve additional, focused competencies and enhance the validated tasks/competencies related to identifying and starting a new business venture. Because the unit is a complement to certain designated courses and is not

mandatory, all tasks/competencies are marked "optional." Teachers can find the infusion/unit in the course listing.

Microsoft Imagine Academy Resources

Microsoft Imagine Academy (MSIA) offers classroom resources and materials and instructional techniques that will help enhance instruction and learning for this course. Using the school's membership ID and product key for the Microsoft Imagine Academy, all resources are available through the [MSIA Member Dashboard on the Microsoft site.](#)

- To access the curriculum resources, select the Classroom Tile from the member site.
- To access downloadable curriculum resources including the MOAC e-Book, Lesson Plans, and Study Guides select Curriculum Overview - Curriculum Downloads.
- To access Online Learning videos and tutorials select Online Learning Directory tile.
- For more information visit: [How to Get Started with Microsoft Imagine Academy Program.](#)

Appendix: Credentials, Course Sequences, and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- A+ Certification Examination
- Business Information Processing Assessment
- College and Work Readiness Assessment (CWRA+)
- Computer Maintenance Technology Examination
- Computer Networking Fundamentals Assessment
- Computer Repair Technology Assessment
- Computer Service Technician (CST) Examination
- Computer Technology Assessment
- Customer Service Examination
- Customer Service Specialist (CSS) Examination
- IC3 Digital Literacy Certification Examination
- IT Fundamentals+ Certification Examination
- Microsoft 365 Fundamentals Examination
- Microsoft Certified Azure Fundamentals Examination
- Microsoft Dynamics 365 Fundamentals Examination
- Microsoft Office Specialist (MOS) Examinations
- Microsoft Technology Associate (MTA) Examinations
- National Career Readiness Certificate Assessment
- Network Administration Certification Tests
- Professional Communications Certification Examination
- Security+ Certification Examination
- Technical Support Certification Tests
- Workplace Readiness Skills for the Commonwealth Examination

Concentration sequences: *A combination of this course and those below, equivalent to two 36-week courses, is a concentration sequence. Students wishing to complete a specialization may take additional courses based on their career pathways. A program completer is a student who has met the requirements for a CTE concentration sequence and all other requirements for high school graduation or an approved alternative education program.*

- Computer Systems Technology II (8623/36 weeks, 280 hours)

Career Cluster: Information Technology	
Pathway	**Occupations**
Information Support and Services	**Computer Support Specialist**