

Competency Requirements – NCEE major CATEGORIES list

Certified Computer Service Technician – CST – 2006

Computer Service Technicians are expected to have knowledge and skills, including basic computer electronics, which make the technician competent to service and install hardware and software in the computer industry. Once the CST has acquired these skills, abilities and knowledge, they will be able to enter employment in many parts of the computer industry. With minimal training in areas unique to specific products, the CST should become a profitable and efficient part of the computer industry workforce. CSTs *may* pass the Associate exam and, by doing so, become a C.E.T. (showing the CST specialty area). In order: the listings are: #1: Major CATEGORIES; #2: Individual ITEMS verbalized into COMPETENCIES.

Certified Computer Service Technicians (CST's) must be knowledgeable and have abilities in the following technical areas:

This CATEGORIES listing serves to identify the major areas of training-study-knowledge and skills which the Computer Service Technician needs in order to perform the job of servicing the hardware and the systems software for personal computers.

This list is not a detailed listing showing the individual items about which study is required. Such a list is identified as the Competencies listing for CST and succeeds this one page categories list, which has gained NCEE consensus (3-30-05). The ITEMS listing has now been combined into one document – Competencies. This was approved by the NCEE (National Coalition for Electronics Education, Inc.) 7-31-06.

MAJOR CATEGORIES OF KNOWLEDGE – SKILLS REQUIRED:

- | | |
|--|--|
| 1.0 Computer Assembly—Disassembly | 15.0 Safety Procedures/Handling |
| 2.0 Motherboards, Buses, System Resources | 16.0 Workplace Practices |
| 3.0 Processor Characteristics | |
| 4.0 Memory Characteristics (Physical & Electronic) | (End of CATEGORIES listing for CST as approved by the NCEE 7-31-06, Individual ITEMS were approved by NCEE on July 31, 2006. Arlene Tincher, CST, project Chairman, ETA International, Greencastle, IN.) |
| 5.0 Secondary Storage Devices | |
| 6.0 Peripheral Devices | |
| 7.0 I/O Ports | |
| 8.0 Power Concepts and Power Supplies | |
| 9.0 Basic Networking Concepts | |
| 10.0 Portables | |
| 11.0 Digital Concepts | |
| 12.0 Troubleshooting/Preventive Maintenance | |
| 13.0 Operating Systems (Windows XP Pro & Home, 2000, Linux) | |
| 14.0 File Management | |

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Competency requirements list CST – Computer Service Technician – 2006

1.0 Computer Assemble and Disassembly

- 1.1 Demonstrate the proper removal and installation of a CPU
- 1.2 Demonstrate the proper removal and the correct reinstallation of RAM including the use of proper banking procedures
- 1.3 List the tools required for removal and installation of all computer system components
- 1.4 Explain the precautions and routines involved in the removal and installation of:
 - 1.4.1 Power Supplies
 - 1.4.2 Expansion cards
 - 1.4.3 Motherboard jumpers and/or dipswitch configurations and settings on the motherboard
 - 1.4.4 Connections on a motherboard
 - 1.4.5 Secondary storage devices

2.0 Motherboards and Buses/System Resources

- 2.1 Identify CPUs used in specific sockets/slots
- 2.2 Explain ISA, PCI, PCI Express and Extended PCI expansion slot differences
- 2.3 Describe mini-ITX motherboards and the difference between ATX motherboards.
- 2.4 Describe the AGP port and its function
- 2.5 Compare different chipset versions and features
- 2.6 Explain the purpose of IRQs.
- 2.7 List Common selections for COM1, Com2, LPT1, and LPT2
- 2.8 Explain the purpose and use of DMAs
- 2.9 Describe the purpose of I/O addresses
- 2.10 Explain Device Drivers and how they work within the computer system.
- 2.11 Identify memory module sockets
- 2.12 Explain how memory is addressed
- 2.13 Define the function of the Control, Data, and Address Buses
- 2.14 Explain the configuration of CMOS
- 2.15 Explain how to clear BIOS passwords
- 2.16 Describe Flash BIOS
- 2.17 Demonstrate the ability to upgrade /update BIOS
- 2.18 Explain how BIOS Beep codes are used

3.0 Processor Characteristics

- 3.1 State the Word Size (Internal Data Bus) and External Data Path bit widths for various CPUs
- 3.2 Explain the differences between the L1 and L2 cache
- 3.3 Describe Advanced Transfer Cache and its benefits
- 3.4 Describe Dual Independent Bus technology (frontside/backside Bus)

4.0 Memory Characteristics

- 4.1 Identify the differences in SIMM, DIMM, RIMM – SODIMM Ram packages
- 4.2 Compare RAM package bit widths
- 4.3 Describe SRAM, SDRAM, DRAM, DDR, and RAMBUS characteristics and installation procedures
- 4.4 Demonstrate proper “Banking” procedures when installing various RAM modules with various processors

5.0 Secondary Storage Devices

- 5.1 Describe EIDE hard drive technology.
- 5.2 Explain how data is stored on a hard drive
- 5.3 Compare PIO modes, ATA specs, UDMA (Various Speeds)
- 5.4 Describe EIDE cable differences for PIO mode/ATA33 and ATA66/ATA100 and ATA133
- 5.5 Describe SCSI hard drive technology and how it differs from the EIDE interface
- 5.6 Compare Serial ATA drives (specifications) to (P)IDE drives technologies.
- 5.7 Describe the CD-ROM/CD-RW technology and state its advantages and uses
- 5.8 Compare DVD, DVD-RAM, DVD-RW, and DVD+RW technologies
- 5.9 Explain the applications for USB drive
- 5.10 Explain how to perform manufacturer-specific installation procedures

6.0 Peripheral Devices

- 6.1 Explain Modem technology and standards.
- 6.2 Demonstrate the installation and configuration of a modem
- 6.3 Demonstrate how to install and use soundcards
- 6.4 Describe the basic features of video monitors and safety aspects
- 6.5 Compare the different printer technologies used in PCs
- 6.6 Describe scanner technology, installation, and operation
- 6.7 Describe digital camera operation and interfacing with PCs
- 6.8 Compare the MPEG standards for Digital Video
- 6.9 Explain keyboard theory

7.0 I/O Ports

- 7.1 Define the RS232c standard for serial ports and its purposes
- 7.2 Describe the SPP, EPP and ECP Parallel ports
- 7.3 Compare the USB ver1.1 and ver2.0 transfer rates and intended uses
- 7.4 Explain IEEE 1394 Firewire (I.Link) operation; state transfer rates and intended uses
- 7.5 Describe PS/2 ports and their purpose
- 7.6 Explain how infrared communications takes place in PCs
- 7.7 Describe Game/Midi ports
- 7.8 Explain how to identify various ports by their connectors on a PC
- 7.9 Compare Wireless USB, Bluetooth, 802.11x RF properties and typical usage

8.0 Power Concepts and Power Supplies

- 8.1 Compare the usage and capabilities of AT, ATX, ATX12V power supplies
- 8.2 Identify AT, ATX, and ATX12V power supplies
- 8.3 List the major differences between AT, ATX and ATX12V
- 8.4 Explain the removal and installation procedures for expansion cards in ATX and ATX12V systems
- 8.5 Explain the purposes of a UPS (uninterruptible power supplies)
- 8.6 Compare ATX vs. BTX power supply family

9.0 Basic Networking Concepts

- 9.1 Demonstrate the proper installation and configuration of a NIC (Network Interface Card)
- 9.2 Explain why TCP/IP Protocol is widely used and the configuration process
- 9.3 Topologies
 - 9.3.1 Explain and draw a diagram of a "Star" topology network
 - 9.3.2 Explain and draw a diagram of a "Ring" topology network
 - 9.3.3 Explain and draw a diagram of a "Bus" topology network

- 9.4 Networking Technologies
 - 9.4.1 Describe Ethernet Technology and its method of data transmission
 - 9.4.2 Differentiate between CMA/CD vs CMA/CA (CA is all 802.11x standards) Wired =CD
 - 9.4.3 Describe Token Ring Technology and its method of data transmission
- 9.5 Cabling
 - 9.5.1 Define 10/100BaseT (twisted pair)
 - 9.5.2 Describe 10/100BaseT usage
 - 9.5.3 Describe the design difference between a crossover cable and a straight through cable.
 - 9.5.4 Compare the advantages of using fiber optic cabling
 - 9.5.5 List the harmful effects of EMI (electromagnetic interference)
 - 9.5.6 Describe methods of troubleshooting cabling systems
- 9.6 Describe the principles of data integrity and protection
- 9.7 Explain the basics of Network Operating Systems (NOS)
- 9.8 Explain how Directory/File/Drive Sharing is accomplished

10.0 Portables

- 10.1 Explain the technology and advantages of LCD displays
- 10.2 Describe precautions and usage of batteries in laptop PCs
- 10.3 Explain common power management techniques
- 10.4 Describe PCMCIA card types and their uses

11.0 Digital Concepts

- 11.1 Compare baseband and broadband technologies.
- 11.2 Explain how DAC's and ADC's convert Digital to Analog and Analog to Digital
- 11.3 Describe interfacing connectors and how both analog and digital data are processed
- 11.4 Describe and convert Binary, Octal, and Hexadecimal numbering systems

12.0 Troubleshooting/Preventive Maintenance

- 12.1 Explain how to distinguish hardware from software issues
- 12.2 Explain the functions of PC test equipment
- 12.3 List utility software that technicians should be familiar with (Scandisk, Defragmentation, OEM specific utilities, etc.)
- 12.4 List static safety procedures, causes and effects
- 12.5 Describe the function of virus scanners and their methods
- 12.6 Describe the usage of Adware and Spyware
- 12.7 Demonstrate the ability to document and record a computer repair
- 12.8 Demonstrate the use of POST diagnostic cards for troubleshooting
- 12.9 List environmental problems common to PCs (temp, dust and dirt, smoke, etc.)
- 12.10 Explain how performance Utilities/Diagnostics (such as Norton or McAfee) are used
- 12.11 Describe the usage of PCAnywhere and Laplink

13.0 Operating Systems (Windows XP Pro & Home, 2000, Linux)

- 13.1 Demonstrate the use of Basic Disk & File Management commands
 - 13.1.1 Demonstrate inter-relations between commands on different file systems. I.E. IPCONFIG, IFCONFIG, WINIPCFG vs. DIR - Basic navigation
- 13.2 Demonstrate the use of basic troubleshooting commands (such as Fdisk, Format, Sys, Xcopy, etc.)
- 13.3 Explain the use of Command Switches
- 13.4 Demonstrate Windows XP familiarity
- 13.5 Perform common functions of Windows Desktop
- 13.6 Demonstrate the use of Windows Explorer for file and folder management

- 13.7 Demonstrate the use of Windows Device Manager for installing and troubleshooting hardware
- 13.8 Explain Windows Registry Management as it pertains to editing, backup, and restoration
- 13.9 Define purposes and usage of Virtual Memory.
- 13.10 Display the ability to adjust Virtual Memory settings
- 13.11 Explain the common steps in configuring Windows
- 13.12 Explain the purposes and usage of Msconfig.exe (Win XP Pro & Home)
- 13.13 Describe the purpose of and how System Restore is used (Win XP)
- 13.14 Describe Software Uninstall Procedures for Windows Applications
- 13.15 Demonstrate the use of Linux Disk Management basics
- 13.16 Demonstrate the use of Linux File Management commands

14.0 File Management

- 14.1 Explain the differences and advantages of FAT16, FAT32, NTFS, HPFS
- 14.2 Explain how GRUB, MBR and DOS boot records are used
- 14.3 Demonstrate the ability to partition a given hard drive .
- 14.4 Explain the types of partitions and their usage
- 14.5 Explain the procedures for directory (folder) creation and deletion
- 14.6 Demonstrate file usage (saving, deleting, copying, moving, recovery)
- 14.7 Describe the defragmentation process, how it is accomplished, and how often to use it
- 14.8 Describe how the Data Backup process works.
- 14.9 Compare the various types of backups

15.0 Safety Procedures/Handling

- 15.1 Demonstrate proper use of ESD equipment (bench pads, straps, etc.)
- 15.2 Explain precautions when handling components
- 15.3 Explain why components must be stored in anti-static packaging

16.0 Workplace Practices

- 17.1 Demonstrate ability to use parts procurement resources, references and databases
- 17.2 Describe good and bad work bench housekeeping – area safety & efficiency, and first aid
- 17.4 Describe potential hazards in both shop and in-home environments

*End of COMPETENCIES listing for CST, 2006a-FINAL, 7-31-06
(Please send your comments to Arlene Tincher, CST, at
arlene@eta-i.org Thanks)*

Suggested Study Material:

1. A+ Guide to Managing and Maintaining Your PC, 5th Edition by Jean Andrews
ISBN: 0-619-21324-8
2. Upgrading and Repairing PCs by Scott Mueller, 17th Edition. Published by QUE.
ISBN: 0-7897-3404-4
3. A+ Certification Concepts & Practice by Chuck Brooks, 4th Edition. Published by Pearson Prentice
Hall. ISBN 0-13-114772-2

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