



3.0 Hardware

3.1 Explain basic cable types and their connectors, features, and purposes.

- **Network cables**

- Copper
 - Cat 5
 - Cat 5e
 - Cat 6
 - Cat 6a
 - Coaxial
 - Shielded twisted pair
 - (i) Direct burial
 - Unshielded twisted pair
- Plenum
- Optical
 - Fiber
- T568A/T568B

- **Peripheral cables**

- USB 2.0
- USB 3.0
- Serial
- Thunderbolt

- **Video cables**

- High-Definition Multimedia Interface (HDMI)
- DisplayPort
- Digital Visual Interface (DVI)
- Video Graphics Array (VGA)

- **Hard drive cables**

- Serial Advanced Technology Attachment (SATA)
- Small Computer System Interface (SCSI)
- External SATA (eSATA)
- Integrated Drive Electronics (IDE)

- **Adapters**

- **Connector types**

- RJ11
- RJ45
- F type
- Straight tip (ST)
- Subscriber connector (SC)
- Lucent connector (LC)
- Punchdown block
- microUSB
- miniUSB
- USB-C
- Molex
- Lightning port
- DB9

3.2 Given a scenario, install the appropriate RAM.

- **RAM types**

- Virtual RAM
- Small outline dual inline memory module (SODIMM)
- Double Data Rate 3 (DDR3)
- Double Data Rate 4 (DDR4)
- Double Data Rate 5 (DDR5)
- Error correction code (ECC) RAM

- **Single-channel**

- **Dual-channel**

- **Triple-channel**

- **Quad-channel**



3.3 Given a scenario, select and install storage devices.

- **Hard drives**
 - Speeds
 - 5,400rpm
 - 7,200rpm
 - 10,000rpm
 - 15,000rpm
 - Form factor
 - 2.5
 - 3.5
- **SSDs**
 - Communications interfaces
 - Non-volatile Memory Express (NVMe)
 - SATA
 - Peripheral Component Interconnect Express (PCIe)
 - Form factors
 - M.2
 - mSATA
- **Drive configurations**
 - Redundant Array of Independent (or Inexpensive) Disks (RAID) 0, 1, 5, 10
- **Removable storage**
 - Flash drives
 - Memory cards
 - Optical drives

3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

- **Motherboard form factor**
 - Advanced Technology eXtended (ATX)
 - Information Technology eXtended (ITX)
- **Motherboard connector types**
 - Peripheral Component Interconnect (PCI)
 - PCI Express (PCIe)
 - Power connectors
 - SATA
 - eSATA
 - Headers
 - M.2
- **Motherboard compatibility**
 - CPU sockets
 - Advanced Micro Devices, Inc. (AMD)
 - Intel
 - Server
 - Multisocket
- Desktop
- Mobile
- **Basic Input/Output System (BIOS)/Unified Extensible Firmware Interface (UEFI) settings**
 - Boot options
 - USB permissions
 - Trusted Platform Module (TPM) security features
 - Fan considerations
 - Secure Boot
 - Boot password
- **Encryption**
 - TPM
 - Hardware security module (HSM)
- **CPU architecture**
 - x64/x86
 - Advanced RISC Machine (ARM)
 - Single-core
 - Multicore
- Multithreading
- Virtualization support
- **Expansion cards**
 - Sound card
 - Video card
 - Capture card
 - NIC
- **Cooling**
 - Fans
 - Heat sink
 - Thermal paste/pads
 - Liquid



3.5 Given a scenario, install or replace the appropriate power supply.

- Input 110-120 VAC vs. 220-240 VAC
- Output 3.3V vs. 5V vs. 12V
- 20-pin to 24-pin motherboard adapter
- Redundant power supply
- Modular power supply
- Wattage rating

3.6 Given a scenario, deploy and configure multifunction devices/printers and settings.

- **Properly unboxing a device – setup location considerations**
- **Use appropriate drivers for a given OS**
 - Printer Control Language (PCL) vs. PostScript
- **Device connectivity**
 - USB
 - Ethernet
 - Wireless
- **Public/shared devices**
 - Printer share
 - Print server
- **Configuration settings**
 - Duplex
 - Orientation
 - Tray settings
 - Quality
- **Security**
 - User authentication
 - Badging
 - Audit logs
 - Secured prints
- **Network scan services**
 - Email
 - SMB
 - Cloud services
- **Automatic document feeder (ADF)/flatbed scanner**

3.7 Given a scenario, install and replace printer consumables.

- **Laser**
 - Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separation pads, duplexing assembly
 - Imaging process: processing, charging, exposing, developing, transferring, fusing, and cleaning
 - Maintenance: Replace toner, apply maintenance kit, calibrate, clean
- **Inkjet**
 - Ink cartridge, print head, roller, feeder, duplexing assembly, carriage belt
 - Calibration
 - Maintenance: Clean heads, replace cartridges, calibrate, clear jams
- **Thermal**
 - Feed assembly, heating element
 - Special thermal paper
 - Maintenance: Replace paper, clean heating element, remove debris
 - Heat sensitivity of paper
- **Impact**
 - Print head, ribbon, tractor feed
 - Impact paper
 - Maintenance: Replace ribbon, replace print head, replace paper
- **3-D printer**
 - Filament
 - Resin
 - Print bed