# 1.0 Hardware

## 1.1 Given a scenario, configure settings and use BIOS/UEFI tools on a PC.

- **Firmware upgrades/flash BIOS**
- **BIOS component information**
  - RAM
  - Hard drive
  - Optical drive
  - CPU
- **BIOS configurations**
  - Boot sequence
  - Enabling and disabling devices
  - Date/time
  - Clock speeds
  - Virtualization support
  - BIOS security (passwords, drive encryption: TPM, LoJack, secure boot)
- **Built-in diagnostics**
- **Monitoring**
  - Temperature monitoring
  - Fan speeds
  - Intrusion detection/notification
  - Voltage
  - Clock
  - Bus speed

## 1.2 Explain the importance of motherboard components, their purpose and properties.

- **Sizes**
  - ATX
  - Micro-ATX
  - Mini-ITX
  - ITX
- **Expansion slots**
  - PCI
  - PCI-X
  - PCIe
  - miniPCI
- **RAM slots**
- **CPU sockets**
- **Chipsets**
  - Northbridge
  - Southbridge
- **CMOS battery**
- **Power connections and types**
- **Fan connectors**
- **Front/top panel connectors**
  - USB
  - Audio
  - Power button
  - Power light
  - Drive activity lights
- **Bus speeds**
- **Reset button**

## 1.3 Compare and contrast various RAM types and their features.

- **Types**
  - DDR
  - DDR2
  - DDR3
  - SODIMM
  - DIMM
  - Parity vs. non-parity
  - ECC vs. non-ECC
  - RAM configurations
    - Single channel vs. dual channel vs. triple channel
  - Single sided vs. double sided
  - Buffered vs. unbuffered
- **RAM compatibility**

## 1.4 Install and configure PC expansion cards.

- **Sound cards**
- **Video cards**
- **Network cards**
- **USB cards**
- **Firewire cards**
- **Thunderbolt cards**
- **Storage cards**
- **Modem cards**
- **Wireless/cellular cards**
- **TV tuner cards**
- **Video capture cards**
- **Riser cards**

## 1.5 Install and configure storage devices and use appropriate media.

- **Optical drives**
  - CD-ROM/CD-RW
  - DVD-ROM/DVD-RW/DVD-RW DL
  - Blu-ray
  - BD-R
  - BD-RE
- **Magnetic hard disk drives**
  - 5400 rpm
  - 7200 rpm
  - 10,000 rpm
- **Hot swappable drives**
- **Solid state/flash drives**
  - Compact flash
  - SD
  - MicroSD
  - MiniSD
  - xD
  - SSD
  - Hybrid
  - eMMC
- **RAID types**
  - 0
  - 1
  - 5
  - 10
- **Tape drive**
- **Media capacity**
  - CD
  - CD-RW
  - DVD-RW
  - DVD
  - Blu-ray
  - Tape
  - DVD DL

## 1.6 Install various types of CPUs and apply the appropriate cooling methods.

- **Socket types**
  - Intel: 775, 1155, 1156, 1366, 1150, 2011
  - AMD: AM3, AM3+, FM1, FM2, FM2+
- **Characteristics**
  - Speeds
  - Cores
  - Cache size/type
  - Hyperthreading
  - Virtualization support
  - Architecture (32-bit vs. 64-bit)
  - Integrated GPU
  - Disable execute bit
- **Cooling**
  - Heat sink
  - Fans
  - Thermal paste
  - Liquid-based
  - Fanless/passive

## 1.7 Compare and contrast various PC connection interfaces, their characteristics and purpose.

- **Physical connections**
  - USB 1.1 vs. 2.0 vs. 3.0
    - Connector types: A, B, mini, micro
  - Firewire 400 vs. Firewire 800
  - SATA1 vs. SATA2 vs. SATA3, eSATA
  - Other connector types
    - VGA
    - HDMI
    - DVI
  - Audio
    - Analog
    - Digital (Optical connector)
  - RJ-45
  - RJ-11
  - Thunderbolt
- **Wireless connections**
  - Bluetooth
  - RF
  - IR
  - NFC
- **Characteristics**
  - Analog
  - Digital
  - Distance limitations
  - Data transfer speeds
  - Quality
  - Frequencies

## 1.8 Install a power supply based on given specifications.

- **Connector types and their voltages**
  - SATA
  - Molex
  - 4/8-pin 12v
  - PCIe 6/8-pin
  - 20-pin
  - 24-pin
- **Specifications**
  - Wattage
  - Dual rail
  - Size
  - Number of connectors
  - ATX
  - MicroATX
  - Dual voltage options

## 1.9 Given a scenario, select the appropriate components for a custom PC configuration to meet customer specifications or needs.

- **Graphic/CAD/CAM design workstation**
  - Multicore processor
  - High-end video
  - Maximum RAM
- **Audio/video editing workstation**
  - Specialized audio and video card
  - Large fast hard drive
  - Dual monitors
- **Virtualization workstation**
  - Maximum RAM and CPU cores
- **Gaming PC**
  - Multicore processor
  - High-end video/specialized GPU
  - High-definition sound card
  - High-end cooling
- **Home theater PC**
  - Surround sound audio
  - HDMI output
  - HTPC compact form factor
  - TV tuner
- **Standard thick client**
  - Desktop applications
  - Meets recommended requirements for selected OS
- **Thin client**
  - Basic applications
  - Meets minimum requirements for selected OS
  - Network connectivity
- **Home server PC**
  - Media streaming
  - File sharing
  - Print sharing
  - Gigabit NIC
  - RAID array

## 1.10 Compare and contrast types of display devices and their features.

- **Types**
  - LCD
    - TN vs. IPS
    - Fluorescent vs. LED backlighting
  - Plasma
  - Projector
  - OLED
- **Refresh/frame rates**
- **Resolution**
- **Native resolution**
- **Brightness/lumens**
- **Analog vs. digital**
- **Privacy/antiglare filters**
- **Multiple displays**
- **Aspect ratios**
  - 16:9
  - 16:10
  - 4:3

## 1.11 Identify common PC connector types and associated cables.

- **Display connector types**
  - DVI-D
  - DVI-I
  - DVI-A
  - DisplayPort
  - RCA
  - HD15 (i.e., DE15 or DB15)
  - BNC
  - miniHDMI
  - miniDin-6
- **Display cable types**
  - HDMI
  - DVI
  - VGA
  - Component
  - Composite
  - Coaxial
- **Device cables and connectors**
  - SATA
  - eSATA
  - USB
  - Firewire (IEEE1394)
  - PS/2
  - Audio
- **Adapters and convertors**
  - DVI to HDMI
  - USB A to USB B
  - USB to Ethernet
  - DVI to VGA
  - Thunderbolt to DVI
  - PS/2 to USB
  - HDMI to VGA

## 1.12 Install and configure common peripheral devices.

- **Input devices**
  - Mouse
  - Keyboard
  - Scanner
  - Barcode reader
  - Biometric devices
  - Game pads
  - Joysticks
  - Digitizer
  - Motion sensor
  - Touch pads
  - Smart card readers
  - Digital cameras
  - Microphone
  - Webcam
  - Camcorder
- **Output devices**
  - Printers
  - Speakers
  - Display devices
- **Input & output devices**
  - Touch screen
  - KVM
  - Smart TV
  - Set-top Box
  - MIDI-enabled devices

## 1.13 Install SOHO multifunction device/printers and configure appropriate settings.

- **Use appropriate drivers for a given operating system**
  - Configuration settings
    - Duplex
    - Collate
    - Orientation
    - Quality
- **Device sharing**
  - Wired
    - USB
    - Serial
    - Ethernet
  - Wireless
    - Bluetooth
    - 802.11 (a/b/g/n/ac)
    - Infrastructure vs. ad hoc
  - Integrated print server (hardware)
  - Cloud printing/remote printing
- **Public/shared devices**
  - Sharing local/networked device via operating system settings
    - TCP/Bonjour/AirPrint
  - Data privacy
    - User authentication on the device
    - Hard drive caching

## 1.14 Compare and contrast differences between the various print technologies and the associated imaging process.

- **Laser**
  - Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly
  - Imaging process: processing, charging, exposing, developing, transferring, fusing and cleaning
- **Inkjet**
  - Ink cartridge, print head, roller, feeder, duplexing assembly, carriage and belt
  - Calibration
- **Thermal**
  - Feed assembly, heating element
  - Special thermal paper
- **Impact**
  - Print head, ribbon, tractor feed
  - Impact paper
- **Virtual**
  - Print to file
  - Print to PDF
  - Print to XPS
  - Print to image

## 1.15 Given a scenario, perform appropriate printer maintenance.

- **Laser**
  - Replacing toner, applying maintenance kit, calibration, cleaning
- **Thermal**
  - Replace paper, clean heating element, remove debris
- **Impact**
  - Replace ribbon, replace print head, replace paper
- **Inkjet**
  - Clean heads, replace cartridges, calibration, clear jams