**Module 1 Assignment:**

**BIOS and Motherboards - answer the following questions:**

1. What are the functions of the BIOS?
2. What is the role of CMOS? How does it differ from the BIOS?
3. Why does the CMOS require a battery?
4. What might be some common reasons for editing the CMOS settings?
5. What factors will you consider when selecting a motherboard?
6. How can you add peripheral devices to a system?
7. How are PCI and PCI Express different?
8. What is the most common bus type for video cards on new motherboards?

The Answers should be as follows:

<table>
<thead>
<tr>
<th>Answers</th>
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<tbody>
<tr>
<td><strong>1. What are the functions of the BIOS?</strong></td>
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<tr>
<td>The BIOS is a program stored in a read-only memory (ROM) chip that the CPU automatically loads and executes when it receives power. Important things to know about the BIOS are:</td>
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<tr>
<td>• The BIOS program controls the startup process and loads the operating system into memory.</td>
</tr>
<tr>
<td>• The BIOS is an example of firmware.</td>
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<tr>
<td>• You should check for BIOS updates from manufacturers frequently. Updating the BIOS (called <em>flashing</em> the BIOS) makes new features available, such as allowing the BIOS to recognize newer hardware devices.</td>
</tr>
<tr>
<td>• Most BIOS chips are 64k in size, though there is 384k address space available for the BIOS to use.</td>
</tr>
<tr>
<td>• Some motherboards have two BIOS chips, one for the main BIOS and a second for a backup.</td>
</tr>
</tbody>
</table>
2. What is the role of CMOS? How does it differ from the BIOS?

CMOS memory is a special RAM chip powered and maintained by a small battery that holds basic configuration data your computer needs in order to start. Important things to know about the CMOS are:

- To change the data stored in CMOS memory, use a CMOS editor program that is part of your BIOS.
- The CMOS battery can be a low-voltage dry cell, lithium mounted on the motherboard, or even AA batteries in a housing clipped on a wall inside of the case. The electric current is about 1 millionth of an amp and can provide effective power for years.

CMOS may lose its settings with a loss of power. BIOS will not.

3. Why does the CMOS require a battery?

If the voltage of the battery drops significantly, you may lose your CMOS settings every time you power-off or power-on your computer. If a CMOS battery fails, replace it and afterwards reenter the CMOS information.

4. What might be some common reasons for editing the CMOS settings?

- To change the boot device order.
- To enable or disable motherboard devices.
- To add a password to the setup program to prevent unauthorized access.

5. What factors will you consider when selecting a motherboard?

Choosing the correct motherboard requires attention regarding which features and configurations are available. Ensure that the board chosen is compatible with the system CPU and that there are enough compatible expansion and memory slots, keeping in mind future upgrading requirements. The motherboard must also be compatible with the case Form Factor.

6. What is the difference between the northbridge and southbridge chipsets on a motherboard?

The northbridge chip provides control for main and cache memory, the front side bus, and the AGP and PCIe graphics. The northbridge is closest to the CPU. The northbridge dictates the CPU and memory type supported by the motherboard. On some motherboards, the northbridge chip includes an integrated graphic processor. The northbridge often has a heat sink and sometimes a fan, especially if it includes built-in video.
The **southbridge** chip provides the real time clock, controls power management, and provides the controllers for the PCI bus and USB devices.

| 7. How are PCI and PCI Express different? PCI uses a parallel bus while PCIe uses a serial bus. PCIe also has a higher maximum throughput, smaller footprint, better scaling, and improved error detection. |
| 8. What is the most common bus type for video cards on new motherboards? PCIe is considerably faster than AGP bus types and is therefore the most common bus type today. |

**Module 1 Discussion**

*You have been asked to remove a dual inline memory module and insert one with a larger capacity in its place. Describe the process for doing so.*

The Answers should be as follows:

1. Unplug the power cable from the computer.
2. Open the system cover to gain access to the memory slots.
3. Pull the tabs on either end of the DIMM away from the DIMM.
4. Pull the loose DIMM straight out of the slot and away from the motherboard.
5. Ensure that the locking tabs are completely opened and out of the way of the slot.
6. Insert the new DIMM straight down into the slot.
7. Apply firm and even pressure downward until the locking tabs automatically snap into place.
8. Nudge the tabs inward toward the module to make sure they are tight.
9. Close the system cover.
10. Reconnect all necessary cables.
11. Boot the system to confirm that the new module is recognized and working properly.

**Module 2 Assignment:**

**Memory, Expansion Cards and Storage Devices:** Answer the following questions:

1. How does RAM differ from ROM?
2. What is the difference between SRAM and DRAM?
3. What are two advantages of using DDR3 memory over DDR2 memory?
4. Which type of devices typically use mini-PCI cards?
5. Which buses are commonly used by graphics cards?
6. What are the advantages of hard disks over all other forms of storage media?
7. How does SATA improve upon the limitations of PATA?
8. Which storage device types are magnetic media? Which are optical? Solid state?

The Answers should be as follows:
# Answers

**How does RAM differ from ROM?** RAM is volatile memory and loses information when power is removed, ROM is non-volatile and does not lose information when power is removed.

**What is the difference between SRAM and DRAM?**
- SRAM is more complex and less dense (i.e. lower storage capacity) than DRAM.
- SRAM is faster and requires less power than DRAM.
- SRAM is typically used in cache memory, such as CPU cache, hard disk cache, and cache in networking devices.

**What are two advantages of using DDR3 memory over DDR2 memory?**
- Double the data rate of DDR2
- Requires less voltage and at higher frequencies

**Which type of devices typically use mini-PCI cards?**
A typical use for a mini-PCI slot is to add internal cards (such as wireless cards) to laptops

**Which buses are commonly used by graphics cards?**
PCIe is most commonly used for video cards in modern computer systems.

**What are the advantages of hard disks over all other forms of storage media?**
- They have lots of storage (starting at 16 GB up to several TB)
- They are significantly faster than floppy disks
- The cost per MB is cheap

**How does SATA improve upon the limitations of PATA?**
- Is faster than PATA.
- Provides built-in support for disk protection methods.
- Provides for easy configuration--just connect the device to the SATA port.
- Supports external devices through the External SATA (also called eSATA) standard. eSATA is faster than USB and Firewire.

**Which storage device types are magnetic media?** Floppy Drives and Hard Drives are magnetic, CD ROM and DVD Rom and Blu-Ray are optical, Flash Drives are solid state.
Module 3 Assignment:

CPUs, Connections, and Power Supplies: Answer the following questions:

1. What is the difference between the three levels of cache memory?
   Level 1 (L1) cache is integrated on the processor die itself and stores instructions for the processor. On multi-core systems, each processor typically has its own L1 cache. Some processors might have two L1 caches, one for instructions and one for data.
   Level 2 (L2) cache is additional cache used for both instructions and data. Depending on the processor, L2 cache might be shared between two or more cores, or exclusive to a single core.
   Level 3 (L3) cache is additional cache beyond the level 2 cache. For multi-core systems, L3 cache is shared between all cores.

2. What is the biggest limitation of using a 32-bit processor?
   A 32-bit processor can process 32-bits of information at a time; a 64-bit processor can process 64-bits of information. Over the last several years, processors have been moving from 32-bit processors to 64-bit processors. The biggest advantage of 64-bit processors over 32-bit processors is in the amount of memory they can use. 32-bit processors have a limit of 4GB. 64-bit processors have a theoretical limit of 16.8 TB, although operating system and current hardware limitations impose a much lower practical limit.

3. What is the difference between hyper-threading and multithreading?
   Hyper-threading is a feature of some Intel processors that allows a single processor to run threads (instructions) in parallel, as opposed to processing threads linearly. Hyper-threading enables a processor to execute two threads at the same time. For example, on a quad-core Intel system that supports hyper-threading, the processor can execute 8 threads at a time (2 on each core).

   Hyper-threading is not the same as multithreading. Multithreading is a feature of an application that allows it to sent multiple threads at the same time. Applications are typically written to support multithreading to take advantage of multiple cores (executing threads on two or more processors at the same time) or hyper-threading features.

4. What function does the red switch on a power supply perform? Why is this important?

The Answers should be as follows:

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<td>4. What function does the red switch on a power supply perform? Why is this important?</td>
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Most power supplies have the capacity to receive both 110 and 220 volt power just by toggling a switch (typically red) on the power supply casing. You can use this switch when using the power supply in other countries. When troubleshooting, make sure this switch is set to the correct voltage.

5. What is a watt? How does the watt rating for a power supply affect the devices you can use in a system?

Power supplies are rated in watts. The watt describes how much work or how much power can be supplied to various devices. The more devices you have in your computer, the more wattage you will require.

Module 3 Discussion

Discuss the process for removing a power supply from a computer chassis

The Answers should be as follows:

1. Remove the power source from the system.
2. Ground yourself and the computer to the same source of ground.
3. Remove the cover from the system.
4. Locate the power supply.
5. Follow all wiring harnesses from the power supply to their termini, disconnecting each one.
6. Remove any obstructions that appear as if they might hinder removal of the power supply.
7. Locate and remove the machine screws on the outside of the case that that are used to secure the power supply.
8. Pull the power supply out of the case.

Module 4 Assignment:

Configurations, Displays, Connectors, and Peripherals: Answer the following questions:

1. How can you tell the difference between a DVI-A and a DVI-D cable?
2. What type of Video Card would have an F-Type connector?
3. Which LCD display type typically has the fastest response time? What uses make a monitor with a slow response time a poor choice?
4. What is the difference between composite and component video?
5. What feature of a non-interlaced monitor makes it a better quality than an interlaced monitor?
The Answers should be as follows:

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| 1. How can you tell the difference between a DVI-A and a DVI-D cable?  
A DVI-A (digital video-analog) connection on a video card provides analog output  
A DVI-D (digital video-digital) connection on a video card provides digital output  
| 2. What type of Video Card would have an F-Type connector?  
Video cards and monitors with a built-in TV tuner have an F-type cable TV connector  
| 3. Which LCD display type typically has the fastest response time? What uses make a monitor with a slow response time a poor choice?  
Twisted Nematic (TN) panels are the most common type used in computer monitors, especially in smaller sizes.  
| 4. What is the difference between composite and component video?  
A composite video connection on a video card provides analog, video-only TV output.  
Composite video connectors are RCA connectors (typically yellow). Component Video uses three cables normally split into Red, Blue, and Green  
| 5. What feature of a non-interlaced monitor makes it a better quality than an interlaced monitor?  
Non-interlaced video supports Full HD.  

Module 5 Assignment:

Network Cabling, IP Addressing, ports, and Protocols: Answer the following questions:

1. Why are wires twisted together in twisted pair cables?  
2. What advantages do fiber optic cables offer over twisted pair or other media choices?  
3. What is the difference between a MAC address and an IP address?  
4. What is the address class of IP address 133.66.155.189?  
5. What is the most common protocol suite used by computers today? Why?
The Answers should be as follows:

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| 1. **Why are wires twisted together in twisted pair cables?**  
  Two wires are twisted to reduce the effects of Electromagnetic Interference (EMI) and crosstalk. Because the wires are twisted, EMI should affect both wires equally and can be cancelled out. |
| 2. **What advantages do fiber optic cables offer over twisted pair or other media choices?**  
  - Totally immune to Electromagnetic Interference (EMI)  
  - Highly resistant to eavesdropping  
  - Supports extremely high data transmission rates  
  - Allows greater cable distances without a repeater |
| 3. **What is the difference between a MAC address and an IP address?**  
  The MAC address is a unique hexadecimal identifier burned into the ROM (physically assigned address) of every network interface. With TCP/IP, the logical network and logical host addresses are combined into a single Logical address called the IP address. |
| 4. **What is the address class of IP address 133.66.155.189?**  
  This is a Class B address because the first octet falls in the range 128 - 191 |
| 5. **What is the most common protocol suite used by computers today? Why?**  
  TCP/IP is the protocol suite used on the Internet and on most networks. Nearly all computers today use TCP/IP for communication because it is generally light weight for memory and CPUs and is routable. |

**Module 5 Discussion**

*Discuss the differences and improvements of IPv6 over IPv4 and why IPv6 may be a necessity*

The Answers should be as follows:

IPv6 instead of a 32-bit address, it provides for 128-bit addresses. That will provide for $3.4 \times 10^{38}$ addresses, which theoretically should be more than enough that globally they will never run out. We are quickly running out of available network addresses using IPv4.
### Module 6 Assignment:

Networking Technologies: Answer the following questions:

1. What type of device is required to create an infrastructure wireless network configuration?
2. What is the purpose of an SSID?
3. Which wireless standards are typically backwards compatible with 802.11a?
4. You are using WEP for a small home network. Which authentication type should you use?

The Answers should be as follows:

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</table>
| 1. **What type of device is required to create an infrastructure wireless network configuration?**
An infrastructure wireless network employs an **access point** that functions like a **hub** or **router** on an Ethernet network.
|
| 1. **What is the purpose of an SSID?**
The Service Set Identifier (SSID), also called the **network name**, groups wireless devices together into the same logical network. All devices on the same network must use the same SSID.
|
| 1. **Which wireless standards are typically backwards compatible with 802.11a?**
802.11n is the only backward compatible standard.
|
| 1. **You are using WEP for a small home network. Which authentication type should you use?**
When using WEP, use open authentication. Using shared key authentication with WEP uses the key that is used for encryption for authentication as well. This use exposes the key to additional attacks, making WEP more susceptible to being compromised.

### Module 7 Assignment:

Networking Devices and Tools: Answer the following questions:

1. Describe the function of a Modem
2. Describe the function of an Access Point
3. Describe the function of a Router.

The Answers should be as follows:

<table>
<thead>
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</table>
| **Modem** - modulate and demodulate (modem) digital signals that computers use into analog signals that can be passed over telephone lines.
|
| **Access Point** - modulate and demodulate (modem) digital signals that computers use into analog signals that can be passed over telephone lines.
|
| **Router** - highly intelligent devices that connect multiple network types and determine the best path for sending data.
|
Module 7 Discussion

Part 1 - Discuss the differences between a Workgroup and a Domain.

Part 2 - Discuss the difference between a LAN, a WAN, a PAN, and a MAN

The Answers should be as follows:

Part 1 - A workgroup is often referred to as a peer-to-peer network, and there is no centralized administration. A domain is a server-based network; the server (often called a domain controller) manages user accounts and security for the network. Workgroups are best suited for networks with 10 or fewer computers and low security requirements.

Part 2 - A LAN is a local area network, which typically means a network in one centralized location. A WAN is a wide area network, which means several LANs in remote locations connected to each other. A PAN is a small Bluetooth network. A network that spans an area such as a city or a campus is a MAN.

Module 8 Assignment:

Laptops: Answer the following questions:

1. Why do processors for laptop computers not require the large heat sink and fan combinations that are used in PCs to dissipate heat?
2. What devices are controlled through Windows Power Schemes?
3. What are the 3 types of PCMCIA cards and what are the typical uses?
4. What standard is replacing the PCMCIA card?

The Answers should be as follows:

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<tr>
<td>1. Why do processors for laptop computers not require the large heat sink and fan combinations that are used in PCs to dissipate heat? Processors built especially for laptop computers have lower power consumption requirements and produce less heat than desktop processors.</td>
</tr>
<tr>
<td>2. What devices are controlled through Windows Power Schemes? Each power scheme controls power down settings for the monitor, hard drives, and the entire system, and has settings for when running on AC power or on battery power.</td>
</tr>
</tbody>
</table>
3. What are the 3 types of PCMCIA cards and what are the typical uses?
Type I, II, and III. Type I is obsolete but was used for SRAM and FLASH. Type II is used for I/O like Modems and LAN. Type III is used for storage such as hard Drives and Optical Drives.

4. What standard is replacing the PCMCIA card?
The PCMCIA standards are being replaced by a new standard, PCI Express or ExpressCard.

Module 9 Assignment:

Printers: Answer the following questions:

1. What is a common application for a thermal printer?
Many cash registers use this type of printer for creating receipts.

2. How can memory improve the performance of your printer?
Printers can improve performance by having built-in memory. Additional memory improves performance and reduces the processing load on computers. In some cases, you can add or upgrade the memory in a printer.

3. Which printer type has the highest print quality?
Laser Printers

4. What is the function of the print driver? The print queue?
The Print Driver is the software that allows the printer to communicate with the print device. The Print Queue is the portion of the hard drive where print jobs are stored before going to the print device.

5. When sharing a printer, why might you need to load additional drivers for the printer?
Each network host that wants to use the printer must have the corresponding printer driver installed. If the client computers run a different version of Windows, you can add the necessary printer drivers to the printer object.

Answers

1. What is a common application for a thermal printer?
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2. How can memory improve the performance of your printer?
   Printers can improve performance by having built-in memory. Additional memory improves performance and reduces the processing load on computers. In some cases, you can add or upgrade the memory in a printer.

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   Each network host that wants to use the printer must have the corresponding printer driver installed. If the client computers run a different version of Windows, you can add the necessary printer drivers to the printer object.
Module 9 Discussion

Discuss the basic procedures to install and configure Printers

The Answers should be as follows:

1. Install and update the device driver and calibrate the device.
2. Configure options and default settings.
3. Print a test page.
4. Verify compatibility with the operating system and applications.
5. Educate users about basic functionality.

Module 10 Assignment:

Operational Procedures: Answer the following questions:

1. Which computer components are particularly dangerous to technicians?
2. Where would you find safety information regarding chemicals?
3. What are common methods to help prevent ESD?
4. What are 5 elements of job-related professional behavior?
5. How should you handle prohibited content or activity on a network?

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<tr>
<td>1. Which computer components are particularly dangerous to technicians?</td>
</tr>
<tr>
<td>The most dangerous are the power supply and the monitor</td>
</tr>
<tr>
<td>2. Where would you find safety information regarding chemicals?</td>
</tr>
<tr>
<td>You can find this information on a Material Safety Data Sheet (MSDS).</td>
</tr>
<tr>
<td>3. What are common methods to help prevent ESD?</td>
</tr>
<tr>
<td>Grounding yourself; using an antistatic wrist strap, bag, or mat; and controlling the humidity levels.</td>
</tr>
<tr>
<td>4. What are 5 elements of job-related professional behavior?</td>
</tr>
<tr>
<td>Punctuality, accountability, flexibility, confidentiality, and privacy.</td>
</tr>
<tr>
<td>5. How should you handle prohibited content or activity on a network?</td>
</tr>
<tr>
<td>Always have policies and procedures in place to deal with prohibited content or activity. When an incident happens, follow the procedures, report through proper channels, preserve the data or device, and follow the chain of custody.</td>
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</tbody>
</table>