INSIDE SYSTEM UNIT

CHAPTER 4

After completing this lesson, you will be able to:

- Differentiate between CPU and system unit.
- Identify computer casing and its types.
- Define power supply and describe the components found on motherboard (BIOS, ports, expansion slots, type of cables, memory slot, disk controller, cooling system and buses).
- Describe the ports (serial, parallel, PS/2, USB and fire wire ports).
- Identify sound, video, modem and network cards.
- Describe SIMM, DIMM, SDRAM and DDR.

UNIT INTRODUCTION

This unit presents information about the components of computer that exists inside the system unit. It describes the purpose of expansion cards that are installed on expansion slots on the motherboard or integrated on it. It also explains memory chips, cables used inside the system unit and ports that are found at the back of the system unit for connecting input/output devices.

4.1 COMPUTER CASING AND SYSTEM UNIT

Q.1 What is computer casing? State its purpose.

Answer

Computer casing is a box or an enclosure that contains most of the components of computer system.

Use of computer casing

It protects and organizes all the components that make up a computer. Without casing, each of the components within the computer would be vulnerable to dirty foreign objects and electrical interference. Casing also reduces the overall noise produced by computer fan and drives.

4.1.1 CPU AND SYSTEM UNIT

Q.2 Define system unit.

Answer

System Unit

Computer casing with all the components installed inside it is called system unit or main unit of the computer system. Usually, people incorrectly use the word CPU for system unit.

Q.3 Differentiate between microprocessor and system unit.

Answer

Microprocessor and System Unit

Microprocessor is the CPU of the computer that is installed on the motherboard whereas, system unit contains motherboard, hard disk, DVD writer, RAM etc..

System unit and microprocessor are shown in Fig.4.1.

Fig.4.1 System Unit (left) and Microprocessor (right)

4.1.2 COMPUTER CASINGS

Q.4 Define computer casing. Explain its types.

Answer

Computer Casing

Computer casing is a box or enclosure that contains most of the components of computer system.

Types of Computer Casings

Computer casings are of two types:

- Tower Casing
- Desktop Casing

Fig. 4.2 Tower (left) and Desktop (right) computer casings

1. **Tower Casing**
   Tower casing is the most commonly used one.
2. **Desktop Casing**
   Desktop casing is designed to keep on the desk and usually monitor is kept over it.

4.1.3 EXPLORING THE SYSTEM UNIT

Q.5 Describe the components of system unit.

Answer

Components of System Unit

System unit contains the following two main components:

- Power supply
- Motherboard

1. **Power Supply**
   The purpose of power supply in a computer is to convert alternating current (AC) to low-voltage direct current (DC) for operation of components of the computer. A power supply is already fixed in the casing when it is purchased. A power supply is shown in Fig.4.3.

Fig. 4.3 Power Supply

2. **Motherboard**
   Motherboard is also known as main board or system board. A motherboard is shown in Fig.4.4.

Fig.4.4 Motherboard

Motherboard is a circuit board that connects all the components of the computer system through ports, cables or expansion slots.

Q.6 Name some important components of a motherboard. Explain each component in detail.

Answer

Some Important Components/Parts of Motherboard

The following are some important components or parts of a motherboard:

- CPU Socket
- BIOS
- Ports
- Expansion slots
- Ribbon cable
- Memory slots
- Disk controller
- Cooling system
- Buses

1. **CPU Socket**
   CPU Socket is used to mount the CPU or Processor on the motherboard. The CPU socket is the connector on the motherboard that houses a CPU and forms the electrical interface and contact with the CPU.
2. **BIOS**
   BIOS stands for Basic Input Output System. It is a non-volatile ROM chip. The manufacturer permanently stores system programs in a firmware.

Purpose of BIOS

BIOS programs have two purposes:

i. When the computer is turned on, it initializes the computer devices such as keyboard, mouse, Hard disk, etc., and then loads the operating system from the hard disk into the RAM and makes the computer ready for operation.

ii. Secondly, it controls the basic input/output operations of all the peripheral devices attached to the computer. BIOS also has a Setup utility that allows us to configure the computer hardware, select boot device, set password, set the clock and enable or disable computer components.

3. **Ports**
   A port is an interface at the back of the computer to connect external devices. There are various types of ports on the motherboard, which are used for connecting input/output devices.
4. **Expansion slot**
   An expansion slot is a long socket on the motherboard on which circuit boards (expansion cards) are inserted to add new capabilities to the computer. There are different types of expansion slots on the motherboard in which various types of cards are fixed. These include video display, sound, modem and network cards. In modern computers, the circuitry of many of these cards is integrated in the motherboard itself to reduce size and cost.

Types of Expansion slot

Expansion slot standards include

- AGP
- PCI
- PCI express

Expansion slots are shown in Fig.4.5.

Fig.4.5 Expansion slots on motherboard

i. **AGP**
   AGP stands for Accelerated Graphics Port. It provides a high-speed channel for attaching video card to a motherboard. It provided a dedicated pathway between the processor and the graphics card. Its bus width is 32 bits.

ii. **PCI**
   PCI is used to attach different expansion cards to the computer. It is still used in some computers but is superseded by PCI Express.

iii. **PCI Express**
   PCI Express was designed to replace PCI and AGP standards. PCI Express has a bus width of 32 bits. It is the latest standard expansion slot in microcomputers and laptop computers. The main advantage of PCI Express is that it provides high-speed serial communication.

5. **Ribbon Cable**
   Ribbon Cable has several parallel wires in the same flat plane that looks like a piece of ribbon which is why it is called ribbon cable. It was used in the past for transmitting information between motherboard and devices such as floppy drive, hard disk and CD-ROM drive.

Types of Ribbon Cable

Following are the different types of ribbon cable interfaces:

- IDE Interface Cable
- SATA Interface Cable

i. **IDE Interface Cable**
   Western Digital developed integrated Drive Electronics (IDE) interface for attaching hard drivers to motherboard. The first hard drive that used IDE interface appeared in Compaq PCs in 1986.

Hard drives that had IDE interface had drive controller integrated into the drive itself rather than having a separate controller on the motherboard. Western Digital introduced new hard drives in 1994 with enhancements to IDE interface and named it Enhanced IDE (EIDE). An IDE interface cable is shown in Fig.4.6.

Fig.4.6 IDE Interface Cable

ii. **SATA Interface Cable**
   Serial Advanced Technology Attachment (SATA) is a new computer interface bus for connecting drives to computer. It was designed to replace EIDE bus interface. SATA bus interface is used in all the modern laptop and desktop computers. SATA drives communicate via high-speed serial cable. SATA bus interface has many advantages over older EIDE standard. These include faster and more efficient data transfer rate and reduced cable size and cost. SATA 1, SATA 2 and SATA 3 interfaces provide communications at rates of 1.5 GB/Sec, 3 GB/Sec and 6 GB/Sec respectively.

A SATA interface cable is shown in Fig.4.7.

Fig.4.7 SATA Interface Cable

6. **Memory Slots**
   These are slots on the motherboard that connect RAM with the CPU. Generally, there are two memory slots. RAM cards are inserted in these slots. RAM card is a printed circuit board having a series of RAM chips mounted on it.
7. **Disk Controller**
   Disk Controller is a circuit that allows communication between CPU and any type of drive such as floppy drive, hard drive or CD-ROM drive. Old disk controllers were implemented on a separate controller card. Modern disk controllers are integrated into the disk drive itself. For example, EIDE and SATA hard drives have their disk controller circuit inside the drives.
8. **Cooling System**
   Cooling system is required to maintain proper operating temperature inside the system unit. Computer components installed inside the system unit and system unit produce heat when the computer is on. If the temperature inside the system unit reaches a certain point, it can damage the parts. A fan is fixed on top of the microprocessor to cool it down. Heat sinks are also used to dissipate the surface area. Many computers are designed to turn themselves off if the temperature exceeds certain level. A fan for cooling microprocessor is shown in Fig.4.8.

Fig.4.8 Fan for Cooling Microprocessor

9. **Buses**
   A bus is a set of parallel wires that provides electrical path between various components of computer.

Types of buses

There are three types of buses, data bus, address bus and control bus, printed on the motherboard.

(i) **Data bus**
Data bus connects the CPU, memory and the other hardware devices on the motherboard.

(ii) **Address bus**
Address bus connects the CPU and RAM.

(iii) **Control bus**
Control bus is used to send control signals to all the components of the computer.

4.2 PORTS, EXPANSION CARDS AND MEMORY CHIPS
4.2.1 PORTS AND THEIR TYPES

Q.7 Explain types of ports.

Answer

Types of Ports

Various types of ports exist on the motherboard and they protrude at the back of the system unit for connecting devices. The following are different types of ports:

- Serial port
- Parallel port
- PS/2 port
- USB port
- Fire wire port
- HDMI port

1. **Serial Port**
   Serial ports transmit one bit of data at a time. In old computers, serial ports had 9 or 25 pins in which one pin was used for transmitting data and the rest-transmitted signals and these were called COM1, COM2 and COM3. Generally, modems were connected to these ports. These ports have been replaced with USB ports.

Fig.4.9 Serial Port

A serial port is shown in Fig.4.9.

2. **Parallel Port**
   Parallel ports can transmit multiple bits over several wires at a time. These ports had 25 pins in which 8 pins emitted one byte of information and the others were used for transmitting control signals. Parallel ports were named as LPT1, LPT2 and LPT3. These ports have been replaced with USB ports.

Fig.4.10 Parallel Port

A parallel port is shown in Fig.4.10.

3. **PS/2 Port**
   PS/2 stands for IBM's Personal System 2 microcomputer. PS/2 system introduced a new type of port for connecting keyboard and mouse, which are still used in many computers. It is a round shaped serial port.

Fig.4.11 PS/2 Port

A PS/2 Port is shown in Fig.4.11.

4. **USB Port**
   USB stands for Universal Serial Bus. It provides very fast serial transmission. It is the most commonly used port in modern computers for connecting a large variety of devices to the computer such as printers, scanners, cameras, mouse, keyboard and USB flash drives. Computer has many USB ports and these are plug-and-play ports. Plug-and-play ports automatically detect and determine what type of device is attached to the computer. When a computer detects a plug-and-play device it automatically installs the driver for it or prompts the user to install it.

Fig.4.12 USB Port

A USB port is shown in Fig.4.12.

5. **Fire Wire Port**
   It is a rectangular shaped port, generally used for connecting video devices such as camcorder to the computer. Fire wire port has four or six pins. In a six-pin connection, two extra pins are used to provide electric power. Laptop computers have 4-pin fire wire port because they do not provide electric power to devices connected to it.

Fig.4.13 Fire Wire Port

A fire wire port is shown in Fig.4.13.

6. **HDMI Port**
   HDMI stands for High Definition Multimedia Interface. HDMI technology provides audio-video interface for transmitting digital data. All the high definition equipment including PCs, laptops, camcorders, digital cameras, TV, DVR, disk players and set-top box sold today have at least one HDMI port. HDMI port transmits high quality audio-video data in totally digital form through a single cable. HDMI port is shown in Fig.4.14.

Fig.4.14 HDMI Port

4.2.2 TYPES OF EXPANSION CARDS

Q.8 What is expansion card? Explain its types in detail.

Answer

Expansion Card

Expansion card is a printed circuit board that is inserted onto an expansion slot on the motherboard. It is also known as add-on card, interface card or just card. It gives new ability to computer such as connecting to another computer using a network cable.

Types of Expansion Cards

Four types of expansion cards are commonly used in computers. These are:

- Sound Card
- Video Graphics Card
- Modem Card
- Network Interface Card

1. **Sound Card**
   The purpose of sound card is to facilitate transmission of sound in computer. In the past, beeps were the only sound that could be produced on the computer. With the invention of sound cards in the 1980s, we can store human voice in the computer and hear it through the speakers. Sounds are analog waves, whereas, computers communicate using electrical pulses that represent 0s and 1s. Sound card translate analog voice input from a microphone into digital form or it outputs the digital sound stored in the computer through the speakers. In other words, it provides analog to digital and digital to analog conversion as shown in Fig.4.15.

Fig. 4.15 Working of Sound Card

Without sound card

It will not be possible to play DVDs, CDs and run multimedia applications on a computer without the sound card. Early sound cards were installed in expansion slots on the motherboard. Motherboards of modern computers are manufactured with integrated sound cards.

2. **Video Graphics Card**
   The purpose of a video graphics card is to display text, graphics and images on the screen. In the past, video cards were installed in expansion slots but in modern computers, video hardware is integrated on the motherboard is known as integrated graphics or on-board graphics. Integrated graphics uses some of the computer's RAM and reduces the total opacity. These motherboards have an AGP, PCI or PCI Express slot for adding a high performance graphics card in place of the integrated graphics. These high performance 3D graphics cards have their own dedicated memory, which is generally between 256 MB to 1 GB. Special high performance 3D graphics cards are required for running some video games. A video graphics card is shown in Fig.4.16.

Fig. 4.16 Video Graphics Card

3. **Modem Card**
   A modem is a communication device that makes possible the transmission of data between computers via telephone line or other communication lines. It is abbreviation of MODulator-DEModulator. Modems are generally used for dial-up connection to Internet. Modem cards are fixed in expansion slot or modem hardware is integrated on the motherboard.

Types of Modems

There are three types of modems:

- Dial-up modem
- ISDN modem
- DSL modem

(i) **Dial-up modem**
Dial-up modem use telephone lines and they can provide transmission speed up to 56 Kbps (Kilo bits per second) which is very slow. Therefore, their use is gradually declining. It has the advantage of providing Internet connection from any location in the world and it is the cheapest internet connection.

(ii) **ISDN modem**
ISDN modem is used with Integrated Services Digital Network. Here, "Integrated" means combining of voice and data services over the same wire. It uses the same phone lines that dial-modems use. It can provide Internet connection speed up to 128 Kbps.

(iii) **DSL modem**
DSL (Digital Subscriber Line) modem is used with DSL connection to the Internet. These modems are more advanced compared to dial-up and ISDN modems. They provide extremely fast Internet speed depending upon the package and services of Internet Service Provider (ISP).

Use of modems time to time

Dial-up and ISDN modems are gradually replaced by DSL modems for high-speed Internet connection using digital subscriber line. It also uses phone lines. DSL Internet connection is more expensive than dial-up and ISDN connections.

(iv) **Network Interface Card**
Network Interface Card (NIC), commonly known as network card or LAN card, is an expansion card that provides interface to a network. Modern computers have network interface integrated into the motherboard, just like the sound and graphics cards. Network card allows computer users to connect to each other either by using cables or wirelessly. It provides communication between computers in LAN and WAN.

Types of Network Cards

Following are the types of commonly used network cards:

- 10/100 Ethernet cards
- Gigabit card
- Wireless network card

1. **10/100 Ethernet cards**
   10/100 Ethernet cards are used in home and small offices. Their data transfer rate is 10 to 100

Mbps (Mega bits per second). They are usually attached to PCI or PCIe slots. A 10/100 Ethernet card is shown in Fig.4.17.

Fig.4.17 10/100 Ethernet Card

2. **Gigabit card**
   Gigabit cards have data transfer rate of up to one Gbps (Giga bits per second). These cards are attached to computers using PCIe slot. A Gigabit card is shown in Fig.4.18.
3. **Wireless network card**
   Wireless network cards are used for wireless networking. Their data transmission speed is generally less than wired cards. They are attached to PCIe slot or USB port. A wireless network card is shown in Fig.4.19.

Fig.4.19 Wireless Network Card

Fig.4.18 Gigabit Card

4.2.3 MEMORY CHIPS

Q.9 Explain the classification of memory chips.

Answer

Classification of memory chips

Memory chips can be classified into four categories:

- SIMM
- DIMM
- SDRAM
- DDR SDRAM

1. **SIMM**
   SIMM stands for "Single In-line Memory Module". It is a small circuit board with a bunch of memory chips on it as shown Fig.4.20.

Fig. 4.20 SIMM Memory

SIMM is plugged-in into particular socket on the motherboard. It is used to add memory to computer and is referred as Random Access Memory. SIMMs typically use up to 32-bit bus. They have storage capacity ranging from 256KB up to about 32MB. SIMMs were used in early computers of 80s and 90s.

2. **DIMM**
   DIMM stands for "Dual In-line Memory Module". It is a type of computer memory. A DIMM is a small circuit board that holds memory chip. It uses a 64-bit bus to the memory, whereas, single in-line memory module (SIMM) only has a 32-bit path. This allows DIMMs to transfer more data at once. DIMMs have replaced SIMMs because they have faster data transfer rates and better capabilities than DIMMs. Memory capacities of DIMMs range from 64 MB up to 512 MB.

Fig.4.21 DIMM Memory

3. **SDRAM**
   SDRAM stands for "Synchronous Dynamic Random Access Memory". SDRAM is an improvement to standard DRAM because it retrieves data alternatively between two sets of memory. This eliminates the delay caused when one bank of memory addresses is shut down while another prepared for reading. It is called "Synchronous" DRAM because the memory is synchronized clock speed that the computer's CPU bus speed is optimized for. The faster is the bus speed, the faster will be the SDRAM.

Fig.4.22 SD RAM

4. **DDR SDRAM**
   DDR SDRAM (Double Data Rate SDRAM) is synchronous dynamic RAM that has improved memory clock speed as compared to simple SDRAM. It reads or writes two consecutive words per clock cycle. New type of SDRAMs, known as DDR 2 and DDR 3 have also come which are used in latest microcomputers.

Fig.4.23 DDR SDRAM

Difference between DDR 2 and DDR 3

DDR 2 reads or writes 4 words of data per clock cycle, whereas, DDR 3 reads or writes 8 data words per clock cycle.

KEY POINTS

- Computer casing is a box that contains most of the components of a computer.
- Computer casing with all the components installed inside it is called system unit or main unit of computer.
- Power supply is used in computer to convert Alternating Current (AC) to low voltage Direct Current (DC) for operation of components of the computer.
- Motherboard or main board is a circuit board that connects all the components of computer system through ports, cables or expansion slots.
- Disk Controller is a circuit on the motherboard that allows communication between CPU and any type of drive such as hard drive or CD drive.
- Computers have various types of ports on the motherboard that protrude at the back of the system unit for connecting devices.
- Serial ports transmit one bit of data at a time over a single wire, whereas, parallel ports transfer multiple bits over several wires at the same time.
- Expansion card is a printed circuit board that is inserted onto an expansion slot on the motherboard. It is also known as add-on card, interface card or just card.
- Commonly used expansion cards are sound card, modem card, network interface card and graphics card. In modern computers, these card are integrated on the motherboard.
- SIMM stands for Single In-line Memory Module. SIMM is a small circuit board on which RAM chips are wired together.
- DIMM stands for Dual In-line Memory Module. It is also a small circuit board like SIMM but it provides wider data bus and has more storage capacity.

EXERCISE

Q.1 Select the best answer for the following MCQs.

i. **Which port is generally used to connect video devices to the computer?**
   A. Fire wire port B. USB port C. PS/2 port D. Parallel port

ii. **What is computer casing with all the components installed inside it called?**
   A. Computer System B. CPU C. Motherboard D. System unit

iii. **What is the interface that provides connection to external devices called?**
   A. Expansion slot B. Memory slot C. Disk controller D. Port

x. Give one advantage and two disadvantages of using wireless network card.

Answer

Advantage of using wireless network card

Advantage of using wireless network card is that users can move around freely within the area of the network with their laptops, handheld devices etc. and get an internet connection.

Disadvantages of using wireless network card

1. The connection is not as stable as wired network card and can 'drop off'
2. Wireless network card is slower than wired networks.

Q3. Write long answers of the following questions

i. Explain IDE and SATA interfaces. Describe the following types of ports.

- Serial port
- Parallel port
- PS/2 port
- USB port
- Fire wire port

Answer

IDE Interface Cable

Western Digital developed integrated Drive Electronics (IDE) interface for attaching hard drivers to motherboard. The first hard drive that used IDE interface appeared in Compaq PCs in 1986.

Hard drives that had IDE interface had drive controller integrated into the drive itself rather than having a separate controller on the motherboard. Western Digital introduced new hard drives in 1994 with enhancements to IDE interface and named it Enhanced IDE (EIDE). An IDE interface cable is shown in Fig 4.6.

Fig.4.6 IDE Interface Cable

SATA Interface Cable

Serial Advanced Technology Attachment (SATA) is a new computer interface bus for connecting drives to computer. It was designed to replace EIDE bus interface. SATA bus interface is used in all the modern laptop and desktop computers. SATA drives communicate via high-speed serial cable. SATA bus interface has many advantages over older EIDE standard. These include faster and more efficient data transfer rate and reduced cable size and cost. SATA 1, SATA 2 and SATA 3 interfaces provide communications at rates of 1.5 GB/Sec, 3 GB/Sec and 6 GB/Sec respectively. A SATA interface cable is shown in Fig.4.7.

Fig.4.7 SATA Interface Cable

Serial port

Serial ports transmit one bit of data at a time. In old computers, serial ports had 9 or 25 pins in which one pin was used for transmitting data and the rest-transmitted signals and these were called COM1, COM2 and COM3. Generally, modems were connected to these ports. These ports have been replaced with USB ports.

Fig.4.9 Serial Port

A serial port is shown in Fig.4.9.

Parallel port

Parallel ports can transmit multiple bits over several wires at a time. These ports had 25 pins in which 8 pins emitted one byte of information and the others were used for transmitting control signals. Parallel ports were named as LPT1, LPT2 and LPT3. These ports have been replaced with USB ports. A parallel port

Fig.4.10 Parallel Port

is shown in Fig 4.10.

PS/2 port

PS/2 stands for IBM's Personal System 2 microcomputer. PS/2 system introduced a new type of port for connecting keyboard and mouse which are still used in many computers. It is a round shaped serial port.

Fig.4.11 PS/2 Port

A PS/2 Port is shown in Fig.4.11.

USB port

USB stands for Universal Serial Bus. It provides very fast serial transmission. It is the most commonly used port in modern computers for connecting a large variety of devices to the computer such as printers, scanners, cameras, mouse, keyboard and USB flash drives. Computer has many USB ports and these are plug-and-play ports. Plug-and-play ports automatically detect and determine what type of device is attached to the computer. When a computer detects a plug-and-play device it automatically installs the driver for it or prompts the user to install it.

Fig.4.12 USB Port

A USB port is shown in Fig.4.12.

Fire wire port

It is a rectangular shaped port, generally used for connecting video devices such as camcorder to the computer. Fire wire port has four or six pins. In a six-pin connection, two extra pins are used to provide electric power. Laptop computers have 4-pin fire wire port because they do not provide electric power to devices connected to it. A fire wire port is shown in Fig.4.13.

Fig.4.13 Fire Wire Port

ii. What are the functions of following expansion cards?

- Sound card
- Video display card
- Modem card
- Network Interface Card (NIC)

Answer

The purpose of sound card is to facilitate transmission of sound in computer. In the past, beeps were the only sound that could be produced on the computer. With the invention of sound cards in the 1980s, we can store human voice in the computer and hear it through the speakers. Sounds are analog waves, whereas, computers communicate using electrical pulses that represent 0s and 1s. Sound card translate analog voice input from a microphone into digital form or it outputs the digital sound stored in the computer through the speakers. In other words, it provides analog to digital and digital to analog conversion as shown in Fig.4.15.

Fig.4.15 Working of Sound Card

Video display card

The purpose of a video graphics card is to display text, graphics and images on the screen. In the past, video cards were installed in expansion slots but in modern computers, video hardware is integrated on the motherboard is known as integrated graphics or on-board graphics. Integrated graphics uses some of the computer's RAM and reduces the total opacity. These motherboards have an AGP, PCI or PCI Express slot for adding a high performance graphics card in place of the integrated graphics. These high performance 3D graphics cards have their own dedicated memory, which is generally between 256MB to 1GB. Special high performance 3D graphics cards are required for running some video games.

A video graphics card is shown in Fig.4.16.

Fig.4.16 Video Graphics Card

Modem card

A modem is a communication device that makes possible the transmission of data between computers via telephone line or other communication lines. It is abbreviation of MODulator-DEModulator. Modems are generally used for dial-up connection to Internet. Modem cards are fixed in expansion slot or modem hardware is integrated on the motherboard.

Network Interface Card (NIC)

Network Interface Card (NIC), commonly known as network card or LAN card, is an expansion card that provides interface to a network. Modem computers have network interface integrated into the motherboard, just like the sound and graphics cards. Network card allows computer users to connect to each other either by using cables or wirelessly. It provides communication between computers in LAN and WAN.

iii. Explain different types of modems.

Answer

Types of Modems

There are three types of modems:

- Dial-up modem
- ISDN modem
- DSL modem

1. Dial-up modem

Dial-up modem use telephone lines and they can provide transmission speed up to 56 Kbps (Kilo bits per second) which is very slow. Therefore, their use is gradually declining. It has the advantage of providing Internet connection from any location in the world and it is the cheapest internet connection.

2. ISDN modem

ISDN modem is used with Integrated Services Digital Network. Here, "Integrated" means combining of voice and data services over the same wire. It uses the same phone lines that dial-modems use. It can provide Internet connection speed up to 128 Kbps.

3. DSL modem

DSL (Digital Subscriber Line) modem is used with DSL connection to the Internet. These modems are more advanced compared to dial-up and ISDN modems. They provide extremely fast Internet speed depending upon the package and services of Internet Service Provider (ISP).

iv. Describe commonly used Network Interface Cards (NICs).

Answer

Types of Network Cards

Following are the types of commonly used network cards:

- 10/100 Ethernet cards
- Gigabit card
- Wireless network card

1. 10/100 Ethernet cards

10/100 Ethernet cards are used in home and small offices. Their data transfer rate is 10 to 100 Mbps (Mega bits per second). They are usually attached to PCI or PCIe slots. A 10/100 Ethernet card is shown in Fig.4.17.

Fig.4.17 10/100 Ethernet Card

2. Gigabit card

Gigabit cards have data transfer rate of up to one Gbps (Giga bits per second). These cards are attached to computers using PCIe slot. A Gigabit card is shown in Fig.4.18.

Fig.4.18 Gigabit Card

3. Wireless network card

Wireless network cards are used for wireless networking. Their data transmission speed is generally less than wired cards. They are attached to PCIe slot or USB port. A wireless network card is shown in Fig.4.19.

Fig.4.19 Wireless Network Card

LAB ACTIVITIES

Following lab activities are to be carried out during the practical periods.

1) Students should *be* shown the components found inside the system unit such as CPU Socket, BIOS, ports, expansion slots/cards, types of cable interfaces and cables used, memory slots and microprocessor and their functions should be explained.

Answer

Practical Work

2) Fixing of all the components inside the computer casing (on the motherboard) should be demonstrated so that the students understand how system unit is assembled.

Answer

Practical Work

3) The mounting and dismounting of CPU should be demonstrated to the students.

Answer

Practical Work

4) All the above activities should also be demonstrated through videos or animations.

Answer

Practical Work

iii. What is the function of power supply in the computer?

Answer

Function of Power Supply

The function of power supply in a computer is to convert Alternating Current (AC) to low-voltage Direct Current (DC) for operation of components of the computer.

iv. Define motherboard.

Answer

Motherboard

Motherboard is a circuit board that connects all the components of computer system through ports, cables or expansion slots.

v. What is the function of BIOS in the computer?

Answer

Function of BIOS

BIOS have two functions:

1. When the computer is turned on, it initializes the computer devices such as keyboard, mouse, hard disk, etc., and then loads the operating system from the hard disk into the RAM and makes the computer ready for operation.
2. Secondly, it controls the basic input/output operations of all the peripheral devices attached to the computer. BIOS also has a Setup utility that allows us to configure the computer hardware, select boot device, set password, set the clock and enable or disable computer components.

vi. What is the function of disk controller in the computer?

Answer

Function of Disk Controller

The function of disk controller is to enables the CPU to communicate with a hard disk, floppy disk or other kind of disk drive.

vii. Define port and expansion slot.

Answer

Port

A port is an interface at the back of the computer to connect external devices.

Expansion Slot

An expansion slot is a long socket on the motherboard on which circuit towards (expansion cards) are inserted to add new capabilities to the computer.

viii. Write a brief note on cooling system used in the computer.

Answer

Cooling System

Cooling system is required to maintain proper operating temperature inside the system unit. Computer components installed inside the system unit produce heat when the computer is on. If the temperature inside the system unit reaches a certain point, it can damage the parts. A fan is fixed on top of the microprocessor to cool it down. Heat sinks are also used to dissipate the surface area. Many computers are designed to turn themselves off if the temperature exceeds certain level.

ix. Differentiate between SIMM and DIMM.

Answer

Differences between SIMM and DIMM:

SIMM	DIMM
1. SIMM stands for "Single In-line Memory Module".	1. DIMM stands for "Dual In-line Memory Module".
2. SIMMs typically use up to 32-bit bus.	2. DIMM uses a 64-bit bus to the memory.
3. SIMMs have storage capacity ranging from 256 KB up to about 32 MB.	3. Memory capacities of DIMMs range from 64 MB up to 512 MB.

Q.2 Write short answers of the following questions

i. Define computer casing and describe its types.

Answer

Computer Casing

Computer casing is a box or enclosure that contains most of the components of computer system.

Types of Computer Casings

Computer casings are of two types:

- Tower Casing
- Desktop Casing

Fig.4.2 Tower (left) and Desktop (right) computer casings

1. Tower Casing

Tower casing is the most commonly used one.

2. Desktop Casing

Desktop casing is designed to keep on the desk and usually monitor is kept over it.

ii. Differentiate between computer casing and system units.

Answer

Difference between computer casing and system units:

Computer Casing	System Unit
Computer casing is a box or an enclosure that contains most of the components of computer system. It protects and organizes all the components that make up a computer.	Computer casing with all the components installed inside it is called system unit or main unit of the computer system. Usually, people incorrectly use the word CPU for system unit.

iv. Which of the following provides interface to network?

A. NIC B. Modem C. Parallel port D. BIOS

v. Which part of computer protects and organizes all the main parts of a computer?

A. Power supply B. Motherboard C. Casing D. Expansion slots

vi. What is the purpose of power supply in the computer?

A. to convert low-voltage to high-voltage B. to convert DC to AC
C. to convert AC to low-voltage DC D. to generate power

vii. Which circuit board connects all the components of computer?

A. Motherboard B. Ports C. Network card D. Cables

viii. What is BIOS?

A. Programs in RAM B. Port
C. Interface D. Non-volatile ROM chip

ix. Which of these provides high-speed channel for attaching video card to motherboard?

A. IDE interface B. AGP C. Disk controller D. Memory slot

x. Which card displays text, graphics and images on the screen?

A. Network card B. Gigabit card C. Modem card D. Video graphics card

Answers

i.	A	ii.	D	iii.	D	iv.	A	v.	C
vi.	C	vii.	A	viii.	D	ix.	B	x.	D

Q.2 Write short answers of the following questions

i. Define computer casing and describe its types.

Answer

Computer Casing

Computer casing is a box or enclosure that contains most of the components of computer system.

Types of Computer Casings

Computer casings are of two types:

- Tower Casing
- Desktop Casing

Fig. 4.2 Tower (left) and Desktop (right) computer casings

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Answer

Difference between computer casing and system units:

Computer Casing	System Unit
Computer casing is a box or an enclosure that contains most of the components of computer system. It protects and organizes all the components that make up a computer.	Computer casing with all the components installed inside it is called system unit or main unit of the computer system. Usually, people incorrectly use the word CPU for system unit.

iii. What is the function of power supply in the computer?

Answer

Function of Power Supply

The function of power supply in a computer is to convert Alternating Current (AC) to low-voltage Direct Current (DC) for operation of components of the computer.

iv. Define motherboard.

Answer

Motherboard

Motherboard is a circuit board that connects all the components of computer system through ports, cables or expansion slots.

v. What is the function of BIOS in the computer?

Answer

Function of BIOS

BIOS have two functions:

1. When the computer is turned on, it initializes the computer devices such as keyboard, mouse, hard disk, etc., and then loads the operating system from the hard disk into the RAM and makes the computer ready for operation.
2. Secondly, it controls the basic input/output operations of all the peripheral devices attached to the computer. BIOS also has a Setup utility that allows us to configure the computer hardware, select boot device, set password, set the clock and enable or disable computer components.

vi. What is the function of disk controller in the computer?

Answer

Function of Disk Controller

The function of disk controller is to enables the CPU to communicate with a hard disk, floppy disk or other kind of disk drive.

vii. Define port and expansion slot.

Answer

Port

A port is an interface at the back of the computer to connect external devices.

Expansion Slot

An expansion slot is a long socket on the motherboard on which circuit towards (expansion cards) are inserted to add new capabilities to the computer.

viii. Write a brief note on cooling system used in the computer.

Answer

Cooling System

Cooling system is required to maintain proper operating temperature inside the system unit. Computer components installed inside the system unit produce heat when the computer is on. If the temperature inside the system unit reaches a certain point, it can damage the parts. A fan is fixed on top of the microprocessor to cool it down. Heat sinks are also used to dissipate the surface area. Many computers are designed to turn themselves off if the temperature exceeds certain level.

ix. Differentiate between SIMM and DIMM.

Answer

Differences between SIMM and DIMM:

SIMM	DIMM
1. SIMM stands for "Single In-line Memory Module".	1. DIMM stands for "Dual In-line Memory Module".
2. SIMMs typically use up to 32-bit bus.	2. DIMM uses a 64-bit bus to the memory.
3. SIMMs have storage capacity ranging from 256 KB up to about 32 MB.	3. Memory capacities of DIMMs range from 64 MB up to 512 MB.

x. Give one advantage and two disadvantages of using wireless network card.

Answer

Advantage of using wireless network card

Advantage of using wireless network card is that users can move around freely within the area of the network with their laptops, handheld devices etc. and get an internet connection.

Disadvantages of using wireless network card

1. The connection is not as stable as wired network card and can 'drop off'
2. Wireless network card is slower than wired networks.

Q3. Write long answers of the following questions

i. Explain IDE and SATA interfaces. Describe the following types of ports.

- Serial port
- Parallel port
- PS/2 port
- USB port
- Fire wire port

Answer

IDE Interface Cable

Western Digital developed integrated Drive Electronics (IDE) interface for attaching hard drivers to motherboard. The first hard drive that used IDE interface appeared in Compaq PCs in 1986.

Hard drives that had IDE interface had drive controller integrated into the drive itself rather than having a separate controller on the motherboard. Western Digital introduced new hard drives in 1994 with enhancements to IDE interface and named it Enhanced IDE (EIDE). An IDE interface cable is shown in Fig 4.6.

Fig.4.6 IDE Interface Cable

SATA Interface Cable

Serial Advanced Technology Attachment (SATA) is a new computer interface bus for connecting drives to computer. It was designed to replace EIDE bus interface. SATA bus interface is used in all the modern laptop and desktop computers. SATA drives communicate via high-speed serial cable. SATA bus interface has many advantages over older EIDE standard. These include faster and more efficient data transfer rate and reduced cable size and cost. SATA 1, SATA 2 and SATA 3 interfaces provide communications at rates of 1.5 GB/Sec, 3 GB/Sec and 6 GB/Sec respectively. A SATA interface cable is shown in Fig.4.7.

Fig.4.7 SATA Interface Cable

Serial port

Serial ports transmit one bit of data at a time. In old computers, serial ports had 9 or 25 pins in which one pin was used for transmitting data and the rest-transmitted signals and these were called COM1, COM2 and COM3. Generally, modems were connected to these ports. These ports have been replaced with USB ports.

Fig.4.9 Serial Port

A serial port is shown in Fig.4.9.

Parallel port

Parallel ports can transmit multiple bits over several wires at a time. These ports had 25 pins in which 8 pins emitted one byte of information and the others were used for transmitting control signals. Parallel ports were named as LPT1, LPT2 and LPT3. These ports have been replaced with USB ports. A parallel port

Fig.4.10 Parallel Port

Q.1 Select the best answer for the following MCQs.

i. Which port is generally used to connect video devices to the computer?

A. Fire wire port B. USB port C. PS/2 port D. Parallel port

ii. What is computer casing with all the components installed inside it called?

A. Computer System B. CPU C. Motherboard D. System unit

iii. What is the interface that provides connection to external devices called?

A. Expansion slot B. Memory slot C. Disk controller D. Port

3. SDRAM

SDRAM stands for "Synchronous Dynamic Random Access Memory". SDRAM is an improvement to standard DRAM because it retrieves data alternatively between two sets of memory. This eliminates the delay caused when one bank of memory addresses is shut down while another prepared for reading. It is called "Synchronous" DRAM because the memory is synchronized clock speed that the computer's CPU bus speed is optimized for. The faster is the bus speed, the faster will be the SDRAM.

Fig.4.22 SD RAM

4. DDR SDRAM

DDR SDRAM (Double Data Rate SDRAM) is synchronous dynamic RAM that has improved memory clock speed as compared to simple SDRAM. It reads or writes two consecutive words per clock cycle. New type of SDRAMs, known as DDR 2 and DDR 3 have also come which are used in latest microcomputers

Fig.4.23 DDR SDRAM

Difference between DDR 2 and DDR 3

DDR 2 reads or writes 4 words of data per clock cycle, whereas, DDR 3 reads or writes 8 data words per clock cycle.

KEY POINTS

- Computer casing is a box that contains most of the components of a computer.
- Computer casing with all the components installed inside it is called system unit or main unit of computer.
- Power supply is used in computer to convert Alternating Current (AC) to low voltage Direct Current (DC) for operation of components of the computer.
- Motherboard or main board is a circuit board that connects all the components of computer system through ports, cables or expansion slots.
- Disk Controller is a circuit on the motherboard that allows communication between CPU and any type of drive such as hard drive or CD drive.
- Computers have various types of ports on the motherboard that protrude at the back of the system unit for connecting devices.
- Serial ports transmit one bit of data at a time over a single wire, whereas, parallel ports transfer multiple bits over several wires at the same time.
- Expansion card is a printed circuit board that is inserted onto an expansion slot on the motherboard. It is also known as add-on card, interface card or just card.
- Commonly used expansion cards are sound card, modem card, network interface card and graphics card. In modern computers, these card are integrated on the motherboard.
- SIMM stands for Single In-line Memory Module. SIMM is a small circuit board on which RAM chips are wired together.
- DIMM stands for Dual In-line Memory Module. It is also a small circuit board like SIMM but it provides wider data bus and has more storage capacity.

EXERCISE

Q.1 Select the best answer for the following MCQs.

i. Which port is generally used to connect video devices to the computer?

A. Fire wire port B. USB port C. PS/2 port D. Parallel port

ii. What is computer casing with all the components installed inside it called?

A. Computer System B. CPU C. Motherboard D. System unit

iii. What is the interface that provides connection to external devices called?

A. Expansion slot B. Memory slot C. Disk controller D. Port

Q.1 Select the correct choice from the following questions.

1. It is a box or an enclosure that contains most of the components of computer system:
   A. Computer casing B System unit C. CPU D. ALU
2. It reduces the overall noise produced by computer fan and drives:
   A. Computer casing B. System unit C. CPU D. ALU
3. Types of computer casings are:
   A. One B. Four C. Two D. Three
4. System unit contains the following two main components:
   A. Hardware and software B. System software and application software
   C. CPU and system unit D. Power supply and motherboard
5. It is used to mount the CPU or Processor on the motherboard:
   A. CPU Socket B. BIOS C. Ports D. Expansion slot
6. It is a non-volatile ROM chip:
   A. CPU Socket B. BIOS C. Ports D. Expansion slot
7. The manufacturer permanently stores system programs in a:
   A. Hardware B. Firmware C. Shareware D. Freeware
8. It is an interface at the back of the computer to connect external devices:
   A. CPU Socket B. BIOS C. Port D. Expansion slot
9. It is a long socket on the motherboard on which circuit towards expansion cards are inserted to add new capabilities to the computer:
   A. CPU Socket B. BIOS C. Port D. Expansion slot
10. How many types of Expansion cards?
    A. One B. Two C. Three D. Four
11. PCI stands for:
    A. Peripheral Control Interconnect B. Personal Control Interconnect
    C. Physical Component Interconnect D. Peripheral Component Interconnect
12. AGP stands for:
    A. Arithmetic Graphic Port B. Accelerated Graphics Port
    C. Accelerated Group Port D. Accelerated Graphic Part
13. Main circuit board, processor, power supply, storage devices are found in:
    A. Motherboard B. System unit C. Keyboard D. Floppy disk
14. PCI Express has a bus width of:
    A. 32 bits B. 16 bits C. 64 bits D. 8 bits
15. It is a circuit that allows communication between CPU and any type of drive such as floppy drive:
    A. Disk Controller B. Cooling system C. Bus D. Port
16. It is a set of parallel wires that provides electrical path between various components of computer:
    A. Disk Controller B. Cooling system C. Bus D. Port
17. These ports transmits one bit of data at a time:
    A. Serial ports B. Parallel ports C. PS/2 ports D. USB ports
18. These ports have been replaced with USB ports:
    A. Serial ports B. Parallel ports C. PS/2 ports D. Fire wire ports
19. These ports can transmit multiple bits over several wires at a time:
    A. Serial ports B. Parallel ports C. PS/2 ports D. USB ports

20. These ports introduced a new type of port for connecting keyboard and mouse:
    A. Serial ports B. Parallel ports C. PS/2 ports D. USB ports
21. It provides very fast serial transmission.
    A. Serial ports B. Parallel ports C. PS/2 ports D. USB ports
22. It is a rectangular shaped port, generally used for connecting video devices such as camcorder to the computer:
    A. Fire wire ports B. HDMI ports C. PS/2 ports D. USB ports
23. It provides audio-video interface for transmitting digital data:
    A. Fire wire ports B. HDMI ports C. PS/2 ports D. USB ports
24. Types of modems are:
    A. Two B. Three C. Four D. Five
25. This modem uses telephone lines and they can provide transmission speed up to 56 Kbps:
    A. Dial-up Modem B. ISDN Modem C. TP Link D. DSL Modem
26. It can provide Internet connection speed up to 128 Kbps:
    A. Dial-up Modem B. ISDN Modem C. TP Link D. DSL Modem
27. They provide extremely fast Internet speed depending upon the package and services of Internet Service Provider (ISP):
    A. Dial-up Modem B. ISDN Modem C. TP Link D. DSL Modem
28. Modem is an abbreviation of:
    A. module/DE module B. modulator/demodulator
    C. mode/demode D. modulation/demodulation
29. SIMMs typically use up to _____ bus:
    A. 32-bit B. 8-bit C. 64-bit D. 16-bit
30. These have storage capacity ranging from 256KB up to about 32MB:
    A. SIMM B. DIMM C. SDRAM D. DDR SDRAM
31. DIMMs typically use up to _____ bus:
    A. 32-bit B. 8-bit C. 64-bit D. 16-bit

Answers:

1.	Computer casing	2.	Computer casing
3.	Two	4.	Power supply and motherboard
5.	CPU Socket	6.	BIOS
7.	Firmware	8.	Port
9.	Expansion slot	10.	Three
11.	Peripheral Control Interconnect	12.	Accelerated Graphics Port
13.	System unit	14.	32 bits
15.	Disk Controller	16.	Bus
17.	Serial ports	18.	Serial ports
19.	Parallel ports	20.	PS/2 ports
21.	USB ports	22.	Fire wire ports
23.	HDMI ports	24.	Three
25.	Dial-up modem	26.	ISDN Modem
27.	DSL Modem	28.	modulator/demodulator
29.	32-bit	30.	SIMM
31.	64-bit		

Q.2 Give short answers of the following questions

Q1: Define system unit.

Ans. Computer casing with all the components installed inside it is called system unit or main unit of the computer system. Usually people incorrectly use the word CPU for system unit.

Q2: Define computer casing.

Ans. Computer casing is a box or enclosure that contains most of the components of computer system.

Q3: How many types of computer casing are there?

Ans. Computer casings are of two types.

- ⇨ Tower Casing
- ⇨ Desktop Casing

Q4: What are the main components of system unit?

Ans. System unit contains the following two main components:

- ⇨ Power supply
- ⇨ Motherboard

Q5: What is the purpose of power supply?

Ans. The purpose of power supply in a computer is to convert alternating current (AC) to low-voltage direct current (DC) for operation of components of the computer. A power supply is already fixed in the casing when it is purchased.

Q6: Define motherboard.

Ans. Motherboard is also known as main board or system board. Motherboard is a circuit board that connects all the components of the computer system through ports, cables or expansion slots.

Q7: What is the purpose of CPU socket?

Ans. CPU Socket is used to mount the CPU or Processor on the motherboard. The CPU socket is the connector on the motherboard that houses a CPU and forms the electrical interface and contact with the CPU.

Q8: What is meant by BIOS?

Ans. BIOS stands for Basic Input Output System. It is a non-volatile ROM chip. The manufacturer permanently stores system programs in a firmware.

Q9: What is the purpose of BIOS programs?

Ans. BIOS programs have two purposes:

1. When the computer is turned on, it initializes the computer devices such as keyboard, mouse, Hard disk, etc., and then loads the operating system from the hard disk into the RAM and makes the computer ready for operation.
2. Secondly, it controls the basic input/output operations of all the peripheral devices attached to the computer. BIOS also has a Setup utility that allows us to configure the computer hardware, select boot device, set password, set the clock and enable or disable computer components.

Q10: Define port.

Ans. A port is an interface at the back of the computer to connect external devices. There are various types of ports on the motherboard, which are used for connecting input/output devices.

Q11: How many types of expansion slots are there?

Ans. Following are the types of expansion slots:

- ⇨ AGP
- ⇨ PCI
- ⇨ PCI express

Q12: What is meant by AGP?

Ans. AGP stands for Accelerated Graphics Port. It provides a high-speed channel for attaching video card to a motherboard. It provided a dedicated pathway between the processor and the graphics card. Its bus width is 32 bits.

Q13: What is meant by PCI?

Ans. PCI is used to attach different expansion cards to the computer. It is still used in some computers but is superseded by PCI Express.

Q14: Define PCI Express.

Ans. PCI Express was designed to replace PCI and AGP standards. PCI Express has a bus width of 32 bits. It is the latest standard expansion slot micro and laptop computers. The main advantage of PCI Express is that it provides high-speed serial communication.

Q15: How many types of ribbon cable interfaces are there?

Ans. Following are the different types of ribbon cable interfaces:

- ⇨ IDE Interface Cable
- ⇨ SATA Interface Cable

Q16: How many types of ports are there?

Ans. Various types of ports exist on the motherboard and they protrude at the back of the system unit for connecting devices. The following are different types of ports:

- ⇨ Serial port
- ⇨ Parallel port
- ⇨ PS/2 port
- ⇨ USB port
- ⇨ Fire wire port
- ⇨ HDMI port

Q17: How many types of expansion cards are used in computers?

Ans. Four types of expansion cards are commonly used in computers. These are:

- ⇨ Sound Card
- ⇨ Video Graphics Card
- ⇨ Modem Card
- ⇨ Network Interface Card

Q18: What is the purpose of sound card?

Ans. The purpose of sound card is to facilitate transmission of sound in computer.

Q19: How does sound card work?

Ans. Sounds are analog waves, whereas, computers communicate using electrical pulses that represent 0s and 1s. Sound card translate analog voice input form a microphone into digital form or it outputs the digital sound stored in the computer through the speakers. In other words, it provides analog to digital and digital to analog conversion.

Q20: What will happen if there will be no sound card in computer system?

Ans. It will not be possible to play DVDs, CDs and run multimedia applications on a computer without the sound card. Early sound cards were installed in expansion slots on the motherboard. Motherboards of modern computers are manufactured with integrated sound cards.

Q21: What is the purpose of a video graphics card?

Ans. The purpose of a video graphics card is to display text, graphics and images on the screen.

Q22: What is modem?

Ans. A modem is a communication device that makes possible the transmission of data between computers via telephone line or other communication lines. It is abbreviation of MODulator-DEModulator.

Q23: How many types of modems are there?

Ans. There are three types of modems:

- ⇨ Dial-up modem
- ⇨ ISDN modem
- ⇨ DSL modem

Q24: State the use of modems with the passage of time.

Ans. Dial-up and ISDN modems are gradually replaced by DSL modems for high-speed Internet connection using digital subscriber line. It also uses phone lines. DSL Internet connection is more expensive than dial-up and ISDN connections.

Q25: How many types of network cards are there?

Ans. Following are the types of commonly used network cards:

- ⇨ 10/100 Ethernet cards
- ⇨ Gigabit card
- ⇨ Wireless network card

Q26: What is 10/100 Ethernet cards?

Ans. 10/100 Ethernet cards are used in home and small offices. Their data transfer rate is 10 to 100 Mbps (Mega bits per second). They are usually attached to PCI or PCIe slots.

Q27: What is gigabit card?

Ans. Gigabit cards have data transfer rate of up to one Gbps (Giga bits per second). These cards are attached to computers using PCIe slot.

Q28: State the use of wireless network cards.

Ans. Wireless network cards are used for wireless networking. Their data transmission speed is generally less than wired cards.

Q29: Into how many categories memory chips can be classified?

Ans. Memory chips can be classified into four categories:

- ⇨ SIM
- ⇨ DIMM
- ⇨ SDRAM
- ⇨ DDR SDRAM

Q30: Define SIMM.

Ans. SIMM stands for "Single In-line Memory Module". It is a small circuit board with a bunch of memory chips on it. SIMM is plugged-in into particular socket on the motherboard. It is used to add memory to computer and is referred as Random Access Memory.

Q31: Define DIMM.

Ans. DIMM stands for "Dual In-line Memory Module." It is a type of computer memory. A DIMM is a small circuit board that holds memory chip. It uses a 64-bit bus to the memory, whereas single in-line memory module (SIMM) only has a 32-bit path.

Q32: Define SDRAM.

Ans. SDRAM stands for "Synchronous Dynamic Random Access Memory". SDRAM is an improvement to standard DRAM because it retrieves data alternatively between two sets of memory.

Q33: Define DDR SDRAM.

Ans. DDR SDRAM (Double Data Rate SDRAM) is synchronous dynamic RAM that has improved memory clock speed as compared to simple SDRAM. It reads or writes two consecutive words per clock cycle.