

3. SDRAM

SDRAM stands for "Synchronous Dynamic Random Access Memory". SDRAM is an improvement to standard DRAM because it retrieves data alternately 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 SDRAM

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 cards 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

- 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

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 unit.

Answer

Difference between computer casing and system unit:

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 boards (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 of
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.

A serial port is shown in Fig.4.9.



Fig.4.9 Serial Port

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

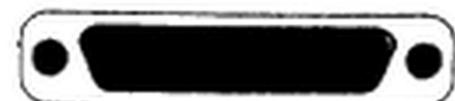


Fig.4.10 Parallel Port

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.

A PS/2 Port is shown in Fig.4.11



Fig.4.11 PS/2 Port

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.

A USB port is shown in Fig.4.12



Fig.4.12 USB Port

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.

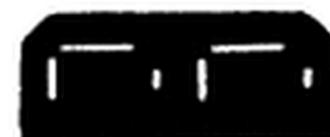


Fig.4.13 Fire Wire Port

ii. What are the functions of following expansion cards?

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

Answer

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.

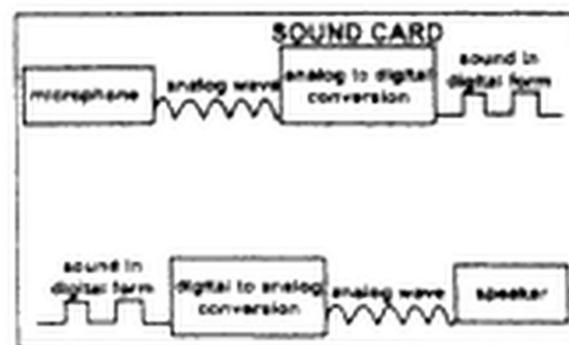


Fig. 4.15 Working of Sound Card

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.

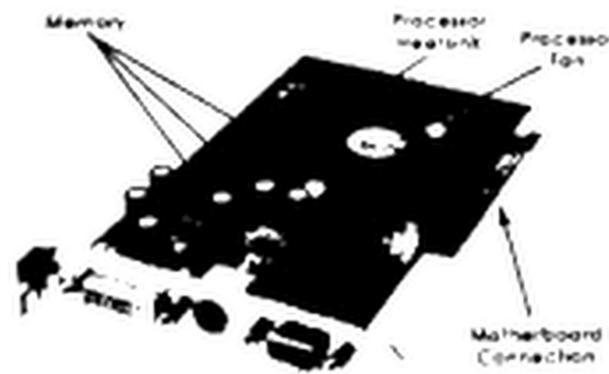


Fig. 4.16 Video Graphics Card

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. 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.

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

